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1 Lomonosova Str., Bld.6, LV-1019, Riga, Latvia e-mail: isma@isma.lv

Operating system for real-time embedded systems programming

Maksym Lipchanskyi*

National Technical University «Kharkiv Polytechnic Institute», Ukraine

*Corresponding author's e-mail: maksym.lipchanskyi@kpi.edu.ua



Abstract

Nowadays, software development for embedded systems is increasingly based on real-time operating systems. Despite the increasing complexity of such systems development, the undoubted advantages are the wide functionality of the developed software. As a result, inter-process communication appears in complex systems as interaction between number of processes. For the data exchange between processes using messages and queuing mechanism, semaphores, signals and mutexes to synchronize the processes. This paper presents the choice of real-time operating system and shows the program design for an embedded system based on the development board "GlobalLogic Embedded Starter Kit".

Keywords: operating system, embedded system, real-time, FreeRTOS

1 Introduction

The using of real-time operating systems in the software development for embedded systems significantly expands the range of tasks to be solved [1].

Real-time operating systems are divided into two types: hard real-time systems and soft real-time systems. Hard real-time operating systems are systems that can provide the required execution time for a real-time task even in the worst cases. Soft real-time operating systems can provide the required execution time for a real-time task on average, with an acceptable deviation from the required one. A real-time operating system is often referred to as a system that can be used to solve hard real-time tasks [2, 3].

2 Overview

When choosing a real-time operating system for embedded systems, there are many factors to consider that affect both the software development process and its functioning.

Several of the most well-known real-time operating systems reviewed: uc/os, KeilRTX, FreeRTOS.

Advantages of uc/os [4]: support for a large number of processors, advanced functionality, a large number of different libraries. Disadvantages: commercial, difficult to use.

Benefits of KeilRTX [5]: it is free, easily ported to ARM-based processors, it has the availability of different libraries. Disadvantages: it has limited functionality, supports only ARM-processors, it is not high speed.

Advantages of FreeRTOS [6]: free, ported to a large number of processors, high functionality, the availability of different libraries, complete documentation. Disadvantages: difficult porting process to new processors.

Among the real-time operating systems for embedded systems FreeRTOS plays a respectable role, it is characterized by its popularity and wide range of features,

low memory footprint, open source, availability of detailed documentation.

3 Decision

When developing software for STM32 microcontrollers it is convenient to use the integrated development environment STM32CubeIDE that includes built-in support for the FreeRTOS real-time operating system.

FreeRTOS including into a new project is showed on Figure 1.

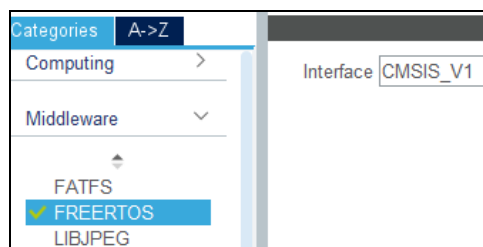


FIGURE 1 FreeRTOS support adding into a new project

Then the necessary number of tasks (Figure 2), a messaging queue (Figure 3) and a semaphore for tasks synchronization are created (Figure 4).

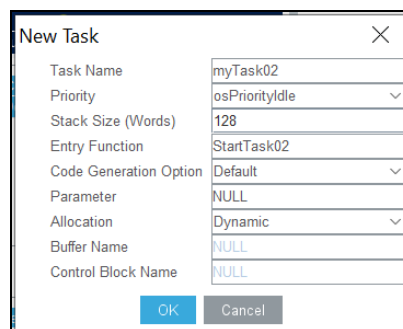


FIGURE 2 Task creating

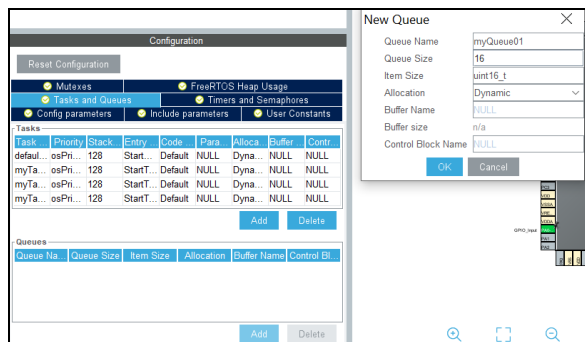


FIGURE 3 Queue creation

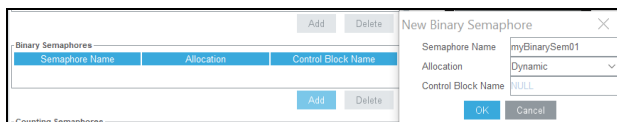


FIGURE 4 Semaphore creation

Messages are added to the queue using the `xQueueSend(xQueue, pvItem, xTicks)` function, where: `xQueue` is the queue identifier, `pvItem` is a pointer to the message being transmitted, `xTicks` is waiting time for a

placing message in the queue. Messages are received by the function `xQueueReceive(xQueue, pvBuffer, xTicks)`, where `xQueue` is the queue identifier, `pvBuffer` is a pointer to the received message, `xTicks` is time to wait for a new message.

To work with semaphore, the following functions are used: `xSemaphoreTake(xSemaphore, xBlockTime)` locks the semaphore, and `xSemaphoreGive(xSemaphore)` unlocks the semaphore, where: `xSemaphore` is the semaphore identifier, `xBlockTime` is time in ticks to wait for releasing the semaphore.

As a result, a project with FreeRTOS was created, the necessary elements were added, functions for organizing the interaction of tasks are given.

4 Conclusion

The choice of operating system for the embedded system based on STM32 microcontroller is shown. The design of the program based on FreeRTOS operating system has been performed. Message queue and semaphore using were demonstrated.

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Distance Learning Techniques for Object Oriented Programming

Heorhii Molchanov*

National Technical University "Kharkiv Polytechnic Institute", Ukraine

*Corresponding author's e-mail: heorhii.molchanov@khp.edu.ua



Abstract

Even though there are several programming paradigms e.g. procedural and functional, most of the code we write today is object-oriented and some of the most popular programming languages are object-oriented e.g. Java, Python, PHP, and JavaScript all supported object-oriented programming. More than 1.5 billion students and youth across the planet are or have been affected by school and university closures due to the COVID-19 pandemic. The use of effective distance learning techniques for object oriented programming is especially relevant nowadays, during the COVID-19 pandemic. This work is an attempt to summarize the problems facing teachers and students in this situation and to make online learning effective by combining many years of practical experience in distance learning with modern technologies available through the Internet.

Keywords: object oriented programming, distance learning, online learning

1 Introduction

Object-oriented programming (OOP) is a programming paradigm based on the concept of "objects", which can contain data and code: data in the form of fields (often known as attributes or properties), and code, in the form of procedures (often known as methods) [1].

Many of the most widely used programming languages (such as C++, Java, Python, etc.) are multi-paradigm and they support object-oriented programming to a greater or lesser degree, typically in combination with imperative, procedural programming. Significant object-oriented languages include: (list order based on TIOBE index) Java, C++, C#, Python, R, PHP, Visual Basic.NET, JavaScript, Ruby, Perl, Object Pascal, Objective-C, Dart, Swift, Scala, Kotlin, Common Lisp, MATLAB, and Smalltalk [1].

Probably the most commercially important recent object-oriented languages are Java, developed by Sun Microsystems, as well as C# and Visual Basic.NET (VB.NET), both designed for Microsoft's .NET platform [1].

The TIOBE programming language popularity index graph from 2002 to 2021 is shown in Figure 1 [2].

The TIOBE Programming Community index is an indicator of the popularity of programming languages. The index is updated once a month. The ratings are based on the number of skilled engineers world-wide, courses and third party vendors. Popular search engines such as Google, Bing, Yahoo!, Wikipedia, Amazon, YouTube and Baidu are used to calculate the ratings. The TIOBE Index for March 2021 is shown in Figure 2 [2].

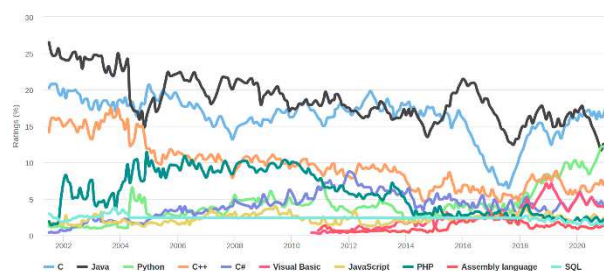


FIGURE 1 TIOBE Programming Community Index
 In the 2000s the object-oriented Java (blue) and the procedural C (black) competed for the top position [1].

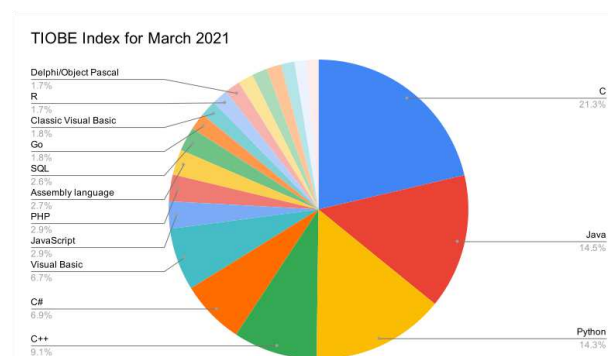


FIGURE 2 TIOBE Programming Community Index

The Institute of Electrical and Electronics Engineers (IEEE) has posted a ranking of programming languages for 2020 on its website (Figure 3 [3]).

Rankings are created by weighting and combining 11 metrics from 8 sources: CareerBuilder, Google, GitHub, Hacker News, the IEEE, Reddit, Stack

Overflow, and Twitter [3].

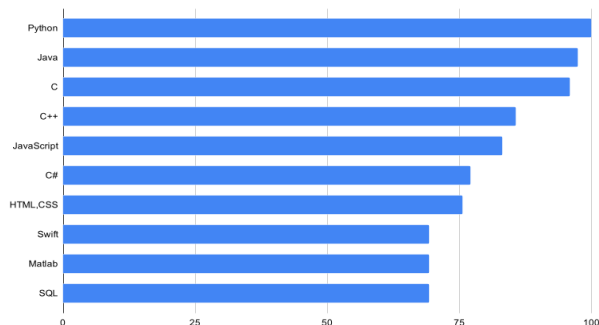


FIGURE 3 IEEE: The Top Programming Languages

The top three have not changed: they are Python, Java and C.

Thus, training of candidates for junior programmers in object-oriented programming languages is currently relevant and in demand by commercial software companies.

The COVID-19 pandemic has left universities and colleges scrambling to bring all courses online - with little preparation or time for instructors to make the transition. And with the immediate and long-term future of higher education delivery uncertain at best, it's a safe bet that most if not all courses will require at least some online components. Instructors who are new to the online learning environment may feel a lot of anxiety about how best to provide their students with the learning experience they deserve [4].

In 2017, 6.6 million students enrolled in distance learning. Due to the spread of COVID-19, that number has skyrocketed to over 400 million students. Online learning from a distance has become a go-to method of education, especially as we all adjust to new circumstances presented by the COVID-19 pandemic [5].

2 Overview

A relatively short scan of the full and often freely available online distance education (DE) reports can show a teacher precisely how to organize efficient text discussions and audio and videoconferences and can

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provide references to highly relevant specialized studies in other areas of the literature.

The Technical Reports section of the International Review of Research in Open and Distance Learning discusses best and worst practices for the use of online educational software. The media and software evaluated in these reports have changed over the years, but the features common to the efficient DE practices that they enable have largely remained constant.

With the current pandemic in mind, UNESCO (2020) has provided an updated list of resources and solutions, perhaps perplexing in its length and complexity for those who require fast solutions and evaluative evidence [6].

3 Decision

This work is an attempt to make online learning for object oriented programming effective. Distance learning technologies offer a myriad of benefits for OOP learning education, including convenience, flexibility, effectiveness, and efficiency.

Modern Internet technologies allow us to take full advantage of these benefits. However, there are also a number of problems.

4 Conclusion

Unfortunately, sweeping, fallacious criticisms of DE research by influential educators such as the Global Learning Council (GLC) actively disparage the traditional DE literature; and the distinction between emergency remote education and traditional DE will be meaningless to them. Criticisms of online learning in widely read outlets such as Forbes magazine (Tyre, 2020) will also obstruct the attempt to promote its pandemic solutions [6].

However, as practice shows, the combination of many years of practical experience in distance learning with modern technologies can significantly increase the effectiveness of online learning for object oriented programming.

Static study of the most loaded elements of the differential "ELocker" when it is locked

Oleksandr Ostroverkh*

National Technical University «Kharkiv Polytechnic Institute», Ukraine

*Corresponding author's e-mail: ostrov.sasha@gmail.com



Abstract

Currently, the world has created a large number of programs and software packages that implement the finite element method (FEM). It is the most common method of solving a wide range of scientific and engineering problems. This is due to the simplicity of the concepts of FEM, its inherent logic and efficiency of application. SOLIDWORKS, namely its COSMOSWorks Designer module, has been selected as a software package for design and research. The developed and researched model became a rotary plate of a differential with lock "ELocker". The conducted researches allowed to determine the characteristic stress concentrators on the working surface of the rotary plate. According to the results of the calculation, the maximum displacement and deformation equivalent, as well as the minimum strength factor were determined. The temperature regime of loading does not cause fears

Keywords: finite element method, differential, plate, model, strength

1 Introduction

The calculation of parts and assemblies of mechanisms are an important component of their design and construction. Modern computer technologies allow to carry out complex calculations of the geometrical sizes of details and knots depending on a number of factors: operating conditions, operating modes, material. Currently, the world has created a large number of programs and software packages that implement the finite element method; it is the most common method of solving a wide range of scientific and engineering problems. This is due to the simplicity of the concepts of FEM, its inherent logic and efficiency of application. The key idea of FEM is as follows: a continuous medium (structure as a whole) is replaced by a discrete one, by dividing it into domains (finite elements), in each of which the behavior of the medium is described by a separate set of functions representing stresses and displacements in the specified domain. The end elements are connected by nodes. Interaction of finite elements with each other is carried out only through nodes. The elements are arranged in a certain way depending on the design of the object and are fixed in accordance with the boundary conditions. Finite elements allow to adequately describe all variety of designs and details. The finite element method refers to the variational methods of the theory of elasticity and allows us to estimate the stress-strain state of flat and bulk structural elements. [1, 2].

2 Review

In this work, the design and study of the differential swivel plate with the "ELocker" lock was carried out,

namely the working surface on which the pusher briefly passes during the interlocking. The studies were conducted in the SOLIDWORKS software complex, using the COSMOSWorks Designer module [3]. As a result, stress concentrators on the working surface of the plate were determined, the safety margin of the part and the maximum movement with the equivalent of deformation, the minimum safety factor and the temperature loading mode were found.

3 Solution

The rotary plate was chosen as the studied model, namely the working surface on which the pusher briefly passes during the activation of the lock [4]. The plates has three corrugated recesses for a more uniform and smooth engagement of the movable coupling with the gear of the half-axis with the locking ring, when turning the lock on and off. The model of the rotary plate is made in the SOLIDWORKS program, the material is alloy steel, fixed on the edge adjacent to the electromagnet, the external load is applied in the direction perpendicular to the working edge. Next, the creation of a grid, the division of the part into finite elements that are used to build a discrete model of a real body. It should be noted that the use of a small grid allows to obtain fairly accurate results, on the other hand, the use of large elements reduces the computational work. The results of the static nodal voltage (fig. 1) show that the maximum value occurs at the trailing edge adjacent to the electromagnet and at the bottom of the wavy edge. The maximum value is 370.85 MPa, which is a safe value at the yield strength of 620MPa.

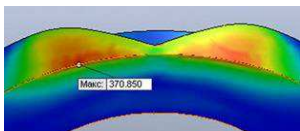


FIGURE 1 Static nodal voltage

The maximum movement in the longitudinal direction is 0.032 mm, which is not a significant deviation and does not affect the performance of the whole mechanism. The maximum value of movement occurs at the moment of inclusion of blocking that is at movement of the pusher and entering into coupling of a coupling and a gear wheel of a half-axis (fig. 2).

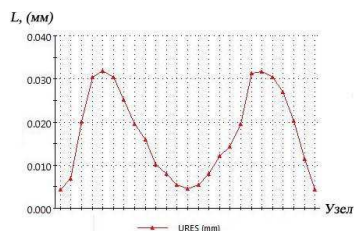


FIGURE 2 Result of static displacement sounding

The equivalent deformation value, which is equal to 0.001 mm, was also calculated. A distinctive feature is the voltage concentrator, which arises on the reverse side of the work surface.

When calculating the equivalent deformation, the minimum value of the margin of safety occurs not on the working surface of the edge, but on the reverse side, which is adjacent to the electromagnet (Fig. 3).

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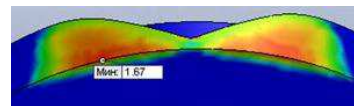


FIGURE 3 developed coefficient spare start

Temperature calculation with the application of heat flux to the working surface of the part, showed that the maximum value equal to 222.8 ° C occurs when the lock is turned off (the pusher is in the lower working zone), so the effect of jamming the pusher is excluded, as it is possible only when the lock.

4 Conclusions

The developed model describes the behavior of the real structure with a sufficiently high degree of accuracy. The study shows the characteristic stress concentrators on the working surface of the turntable. The executed model meets the requirement of a safety margin. Based on the results of the calculation, the maximum displacement was determined and the deformation equivalent was found. The minimum safety factor takes into account the fact that the adjacent electromagnet when locked acts as a reinforcing element of the structure, the current value of the safety margin is acceptable. The temperature regime of the load is not a concern, as the maximum thermal power that can occur is determined by the force of the spring that pushes the coupling and the pusher, and the power of the electromagnet needed to overcome this force, when you turn on the lock.

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Selection of the optimal algorithm for the regulator of the automatic control system by the machining center

Oleksandr Shefer^{1*}, Oleksandr Laktionov²

1,2 National University «Yuri Kondratyuk Poltava Polytechnic», Ukraine

*Corresponding author's e-mail: avs075@ukr.net



Abstract

In the theses of the report on the basis of existing approaches, the structure of the choice of machining center automatic control system modifier regulator has been proposed. Unlike existing ones, it enables to minimize high frequency noise and minimize disturbances using vibration and roughness sensors. The obtained results of experimental work are important, as they improve the parts- manufacturing process quality and reduce energy consumption.

Keywords: law of control, machining center

1 Introduction

The choice of industrial-technological system regulators for automatic control systems is considered to be a complex process, where various factors are considered. In this case, the choice of the law of control depends on the problem under study where: "...for multidimensional control systems, the dependence of the regulation law on the organization system remains" [1, c.226].

Law of control: "...mathematical dependence, with the help of which the regulating action $u(t)$ is determined by the error signal $e(t)$ " [2]. Therefore, the corresponding laws of regulation are implemented with the help of regulators, where mathematical apparatus of different complexity are used. But the complications of the mathematical apparatus, on the one hand, lead to the minimization of the regulation time and the minimization of the external factors influence, and on the other, in the equipment cost increase [3]. At the same time, in research papers [4], ways of the regulators using methods structure improving for the computer-integrated systems quality improving are being studied.

2 Overview

Based on the previous stage of the subject study, where the foundations for improving the complex electrical systems control quality are determined, a theoretical and methodological premise about the conditions for choosing a regulator of an automatic control system for a processing center are simulated.

The study of the automatic control systems content and structure of processing centers and implementation of various combinations of these systems components is an indicator of the product manufacturing process efficiency increasing. A detailed review of the adaptive systems structure by the cutting process was studied in [5].

In [6], the relationship between the quality of

machining parts and the automatic control system, which structure elements are improved by optimizing the cutting mode and considering the tool vibration.

There are research works, where: "In determining the structure of the automatic control system, it was decided to stabilize the cutting process by its main characteristic - power" [7, p.81].

Control quality control was carried out by the selected controller, where the known control laws are implemented, namely: proportional, integral and differential. According to the results of the experimental work, it was established: "... the optimal (according to the criterion of the minimum maximum power deviation) value

$T_d = 0,03$ s» [7, p.81]. At the same time, the relevance was noted as follows: "... research in the form of a multifactor experiment" [7, p.84].

The experience of existing research [5-7] shows that the choice of regulator and the law of regulation depend on the object of study and the factors affecting it. At the same time, insufficient attention was paid to the regulators, where there were filters of input signals. It enabled to get more stable input signal, as the disadvantage of some regulators is high-frequency noise.

3 Statement of the research problem

The research studies the technology of choosing the regulator for the machining center automatic control system.

Therefore, it is necessary to solve the following tasks:

1. To build an information-logical diagram of the processing center.
2. To propose improvements to the existing structure of the automatic control system of the processing center [7, p.82] due to the reasonable choice of the modified PID controller and taking into account the disturbing influences.

21 22 23

4 Decision

It is known: "... a high-order mathematical model has an error in describing the operation of a real control object, which arises due to the linearization of complex

dependencies, the proximity of solutions to equations" [8, p.12]. Therefore, in order to determine the structure of the control object, an information logical diagram of the processing center is build, Figure1.

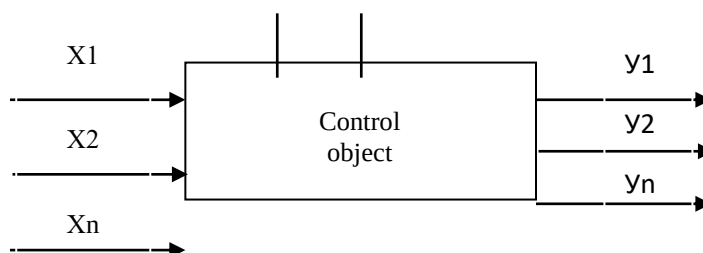


FIGURE 1 Information-logical diagram of the machining center

In fig. 1 it is shown: X1, X2, Xn – multiple inputs; Y1, Y2, Yn – multiple outputs; Z1, Z2 – multiple disturbances. Based on the theoretical and methodological premise and considering the well-known experience [6], the number of disturbing influences of the model is two, where the vibration and roughness sensor are used. Thus, the information-logical diagram is a prerequisite for constructing the structure of the processing center control system. The closest to this study is the control system structure [7], so is taken as a basis.

In order to substantiate the choice of a regulator and prove the adequacy of the model, a comparative analysis of the control quality of several regulators must be carried out. They are the regulators [8]: with weighting coefficients during installation, with a shaping filter for the installation signal with two DOF mechanisms.

Modified proportional-integral-derivative controllers reduce high-frequency noise. The more efficient is the regulator that demonstrates the minimum power error and the minimum disturbing influences. The reliability of the obtained results is checked according to the control quality characteristics: the regulator speed, the regulation time, and the regulator parameters.

5 Conclusion

The existing problem of the automatic control system of the machining center is the use of regulators that provide insufficient quality control in the manufacture of blanks. This problem is solved by selecting one of the modified regulators in order to minimize high-frequency noise and disturbing influences.

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The use of Cloud Computing in the Internet of Things (IoT)

Yuliia Skoryk*

Kharkiv National University of Radio Electronics, Ukraine

**Corresponding author's e-mail: skoryk.yu@gmail.com*



Abstract

Today, there are a large number of cloud platforms that provide diverse and multifunctional development services. However, not all of them can be used to create the concept of the Internet of Things. It becomes necessary to select and compare a suitable platform. This paper discusses the advantages, disadvantages of using cloud platforms.

Keywords: Internet of Things, cloud computing, platform support.

1 Introduction

The relevance of research in the field of cloud technologies, allowing to implement the concept of the Internet of Things, is due to the rapid development of information technologies and the growing needs of mankind in optimizing the surrounding processes and the correct organization of the interaction of information resources with people. These tasks are fundamental to the concept of the Internet of Things, which consists in the independent integration and coordinated work of things without direct intervention in human management.

Cloud computing is a software and hardware technology that enables ubiquitous network access on demand to shared, configurable computing resources. Cloud computing technology is based on the outside and inside. The front end provides interaction between the user and the system and consists of client equipment and applications that access the cloud environment. The inner part is the very cloud infrastructure, which includes services, servers, computers, data storage.

The relevance of the use of cloud technologies in various spheres of life is due to their versatility and ease of use. Basically, their rapid development and distribution is due to a number of the following advantages.

Availability. Providing ubiquitous access to data located in the cloud infrastructure through any device connected to the Internet.

Mobility. The user is free from attachment to the place of data access. The main and decisive aspect is the availability of an Internet connection.

Profitability. The user does not bear the costs associated with the purchase of computationally powerful expensive equipment, software and maintenance of the system as a whole.

High manufacturability. The user is provided with large computing power for storing, analyzing and processing data.

Flexibility. Cloud computing is highly scalable to

provide resources and services to users as and when they need them.

Security. Data security and integrity is ensured through the use of cryptographic tools and secure protocols through which data is transmitted.

These aspects reflect the usability of cloud technologies that can be implemented in any area of human activity.

Internet of Things (IoT) – it is a network of physical objects containing built-in technology that allows these objects to measure the parameters of their own state or the state of the environment, use and transmit this information. In other words, IoT can be understood as a certain set of devices that interact with each other and their owner via the Internet or other networks.

2 Overview

This paper discusses the advantages, disadvantages and conclusions of using cloud platforms Windows Azure and IBM Bluemix.

3 Decision

Today, there are a large number of cloud platforms such as PaaS that provide diverse and multifunctional services for development. However, not all of them can be used to create the concept of the Internet of Things. Basically, many PaaS platforms are solely focused on developing web applications and web extensions for sites. Windows Azure and IBM Bluemix platforms are considered, they have the necessary functionality to solve the task at hand. The cloud platform IBM Bluemix, in contrast to Windows Azure, contains specialized development and visualization tools for developing the Internet of Things, and also has the ability to use both a relational database and non-relational, thereby expanding the functionality for the developer. To get started, you need to sign up for an IBM Bluemix account. Also, the platform can work

with large amounts of data.

4 Conclusion

The use of cloud technologies in this concept is due to the fact that when developing applications, a number of problems can arise, which can take a lot of time and financial costs to eliminate. In an effort to reduce time to

market, many companies are expanding their use of cloud solutions to develop new applications and services for their customers. By freeing them from traditional IT industry constraints such as setting up servers, data warehouses and virtual machines, cloud application developers can move from concept to developing a new service and bringing it to market in a short period of time.

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Computer systems and networks in the process of training software developers with a background in digital intellectual property

Mykhaylo Soloshchuk*

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: mykhailo.soloshchuk@khpi.edu.ua



Abstract

The project ACM / IEEE Computing Curricula 2020 [1] notes that the formation of paradigms of future directions of training human resources (HR) for the progress of the industry of software (SW) development and information technology (IT) will be based on the fundamental concept of "Computing" as a unifying term. However, it is already clear that along with knowledge and technical skills in computing, SW developers will need a variety of additional competencies related to soft skills, taking into account human disposition, growth of managerial skills, or, for example, focusing on the ability to use specific tools for patent analytics, provision and protecting digital intellectual property (DIP) rights. This paper analyzes possible points of contact of computing skills and rights protection and data analytic skills for DIP ecosystem.

Keywords: Computing Curricula 2020, computing skills, digital intellectual property right, patent analytics tools.

1 Introduction

In large SW companies, IP protection is usually handled by lawyers and patent specialists. For small and medium-sized businesses (and even more so for digital startups), such responsibilities are increasingly being assigned to SW developers. Computing Curricula 2020 provides ample opportunities for university educational programs in the formation of students' individual trajectory of learning and the formation of a core of integral competencies at the junction of both engineering knowledge and knowledge, for example, in project management, human resource development, in the field of digital law and, in particular, in the field of rights to objects of DIP. Digital rights are human rights that include the right to access, use, create and publish digital works, access and use computers and other electronic devices, as well as communication networks, in particular the INTERNET, in order to meet the demand for information. The concept of digital law is inextricably linked with the concept of digital services: if there is no digital service in the required volume, then there can be no digital right to use them.

IP rights to objects of Computing, and above all to SW, were involved in the 21st century in the process of mass creation and consumption of digital services in the field of e-commerce, banking, logistics, communication, show business, digital content and other areas. In post-industrial economics service sector generates more wealth than the manufacturing sector of the economy [2].

This process is greatly facilitated by the IP digital transformation which allows you to get the greatest income

from introduction into business of ownership rights to such "digital" IP as computer programs, digital multimedia content, databases, inventions, utility models, integrated circuit topology, industrial designs, know-how, trademarks, websites, domain names, forming the core of the DIP ecosystem.

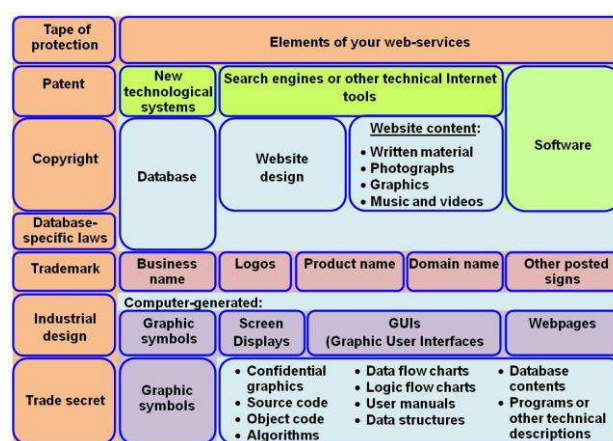


FIGURE 1 Diagram IP-protection of the elements of typical web-service (shows the way of maximize the income from its use [3])

The confirmation of these processes is the almost unprecedented rate of growth in the number of patent applications for objects of Computing. The leaders in the number of US patents are the giants of the IT industry. The TOP-10 [4] at the end of 2020 includes IBM (9435 US patents), Samsung (8539), Intel (3284), Microsoft (2972), Apple (2840), Google (2379).

Therefore, it is important for SW developers, IT engineers and SW business owners to fully understand not only their rights and obligations in relation to SW as a DIP, but also their possibilities for their commercialization [5].

2 Overview

In this paper, by monitoring current vacancies in the US HR market [5], it is concluded that most often employers can expect the following additional competencies in the field of DIP from a SW developer: identifying and evaluating options for IP protection early in the SW development lifecycle; features of regulation of DIP rights in IT markets; legal relations, models and principles of management, mechanisms of order and DIP protection by subjects of rights and technological entrepreneurship; mechanisms to increase competitiveness through the formation of intellectual capital, a DIP portfolio and the commercialization of startups; social, economic, legal and ethical aspects of DIP [6].

3 Decision

As an example, consider a typical scheme of innovation and production cycles in the IT industry (Figure 2), the nature of which depends on the business model of a particular developer company.

As a rule, outsourcing and outstaffing companies do not use mechanisms for protecting DIP rights in the development process, because their main task is to optimize the human, financial and production resources of customers, who own all IP rights. The possibility of using DIP rights to generate scalable income arises in the product/start-up and/or innovation cycles, when the technical solutions of the R&D companies are introduced into the final product at the early incubation stages of the process of performing such

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mandatory phases of the SW development cycle as the creation and prototype testing, assessment of its manufacturability, functionality and risks associated with the use of IP rights of third parties. The portfolio of innovative solutions based on DIP rights determines the composition of core competence and intellectual capital of technology companies, ensuring their long-term competitiveness.

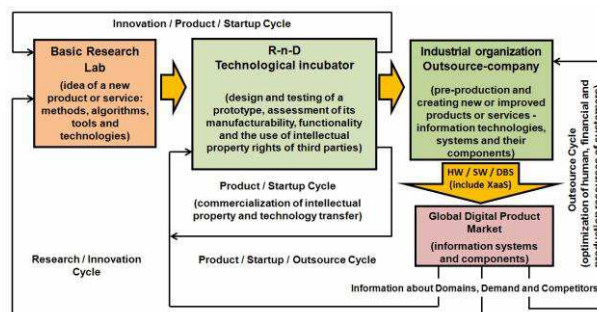


FIGURE 2 Innovation and Production Cycles in the IT Industry

4 Conclusion

In the process of training SW developers with experience in DIP at the Department of Computer Science and Intellectual Property of the National Technical University "Kharkiv Polytechnic Institute", various computer systems, analytical online platforms and networks [7] are widely used.

Using big data and text mining technology, such patent analytics tools can generate global semantic maps of patents and scientific articles according to their contextual similarity. By accurately identifying any request (a description of a technology, product, or patent by its location), patent analytics tools help SW developers understand its technological, IP and business significance.

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Application of modern computer technologies for analyzing features of the formation of micro-dug oxide coatings

Valeria Subbotina *

National Technical University "Kharkov Polytechnical Institute", Kirpicheva str, 2, Kharkov

* Author 's corresponding E-Mail: subbotina.valeri@gmail.com



Abstract

The study is devoted to the analysis of the features of the formation of micro-dug oxide coatings. The role of modern computer technologies for processing the obtained experimental data is shown. Kinetics of formation of MDO coatings on AB alloy has been described. Phase composition of coatings depending on current density is studied and microhardness dependence on coating thickness is graphically shown.

Keywords: micro-dug oxidation, aluminium alloy, phase cohesion, aluminium oxides, corundum, mullite, microhardness

1 Introduction

Corrosion protection has an important nationality value and is solved by applying protective coatings or by doping materials. The most common covers are obtained by an electrochemical method.

The discovery of the method of electrochemical deposition on the surface of some thermodynamically stable films was the beginning of a new approach to solving these problems. Relatively strong anode films have become possible not only on valve metals, but also on their alloys.

2 Analytical overview

Modern industry places high demands on functional, protective and decorative coatings on metals. These coatings should combine a large number of properties, such as corrosion resistance, high hardness, wear resistance, etc.

One of the most promising surface hardening methods is the micro-dug oxidation method, which allows to obtain ceramic-like coatings on parts from valve metals and their alloys, which are distinguished by high insulating, mechanical, electrical and thermo physical characteristics, operational properties. The valve are called metals, oxide films of which are formed by an electrochemical pathway, have a unipolar conductivity in the system of metal - oxide - electrolyte, such as Al, Ti, Zr, Mg, etc. It has led to the widespread use of these coatings in mechanical engineering,

instrument making, radio electronics, aviation, cosmic and other areas [1].

Very resistant inorganic protective coatings at high temperatures and in aggressive media are various ceramic coatings. However, the technology of their preparation is complex and time-consuming, and the clutch with the basis is often unsatisfactory [2].

In the literature, there is information that the properties of MDO coatings depend on their thickness, that is, the thickness of the coatings is crucial when evaluating their properties [3].

It should be noted that the convenience of systematization and processing of the obtained experimental data increases through the use of modern computer technology.

The study of the kinetics of the formation of coatings and the issue of optimizing the MDO process was carried out on an AV alloy in an alkaline-silicate electrolyte. It is shown that the thickness of the coating depends on the density of the current and processing time (fig. 1), that is, it is determined by the amount of electricity used (fig. 2) and is described by the Faraday law.

The results of X-ray phase analysis have shown that in an alkaline-silicate electrolyte in the micro raving discharge mode, the surface layer turns into high-temperature crystalline modifications of aluminum oxides: γ -Al₂O₃, α - α 3 (corundum) Ta 3Al₂O₃ 2SiO₂ (Mullite) (fig. 3).

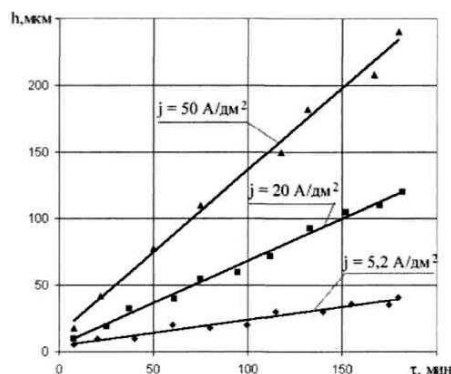


FIGURE 1 Kinetics of MDO-coating formation on AB alloy is the thickness of the coating; τ – the processing time; j – current density

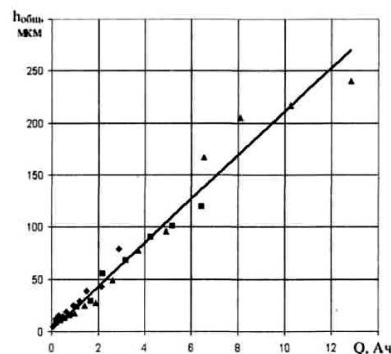


FIGURE 2 Dependence of the general thickness of a covering on quantity of the used electricity on AB alloy

◆ – $j = 5.2 \text{ A/dm}^2$; ■ – $j = 20 \text{ A/dm}^2$; ▲ – $j = 50 \text{ A/dm}^2$

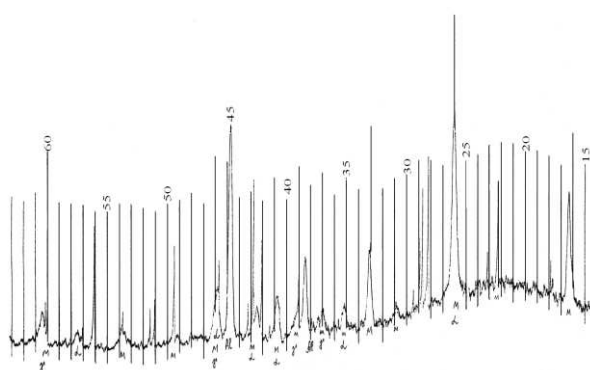


FIGURE 3 Diffractogram Fragment MDO coating (λ -Cu), main layer

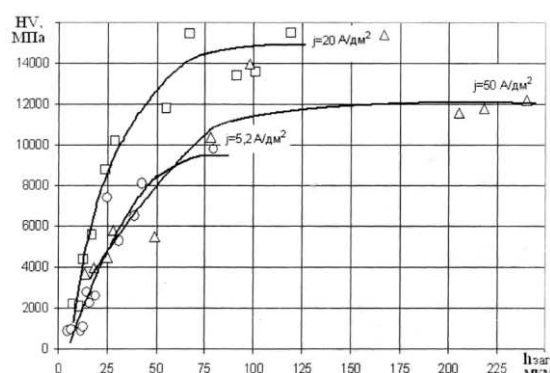


FIGURE 4 Microhardness of MDO coatings

Analysis of X-ray diffractograms shows that the phase composition of the MDO coatings is non-generated in thickness, as well as different for coatings of different thickness. Ensuring the same properties of coatings across the entire surface being treated requires the production of equal coatings.

Thus, the studied studies unequivocally showed that there is a complete correlation between the thickness of the formed MDO coating and the amount of electricity that was required to form the coating. Varying current density, we can significantly increase the performance of the process, although the costs cannot be reduced. But recommendations for increasing the current density to accelerate the MDO process are suitable after comparing the properties of coatings that are formed with different current density. As a criterion, the microhardness of the coatings was used (fig. 4).

3 Formulation of the problem

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The purpose of this work was to study the effect of current density on the phase composition and properties of the coatings.

4. Conclusions

1. Coatings on aluminum alloy AB in an alkaline-silicate electrolyte in anodic-cathode mode was formed using the method of micro-dug oxidation (MDO).
2. It is shown that the coating thickness is determined by the electrolysis mode and is proportional to the number of electrical current passed. To form a coating with a thickness of about 250 μm , it is necessary approximately 15-20 A h (duration of processing 3 hours).
3. The phase composition of the coating has been studied and it is established that the phase composition is non-uniform and depends on the thickness of the coating. The main phases are crystalline aluminum oxides γ - Al_2O_3 , α - α_3 (corundum) $\text{Ta } 3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ (Mullit)

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Computer modeling of structural transformations in various temperature conditions with surface hardening of materials using friction and deformation

Oleg Volkov *

National Technical University "Kharkov Polytechnical Institute", Kirpicheva str, 2, Kharkov

* Author's corresponding e-mail: volkovoleg1978@gmail.com



Abstract

A computer simulation was carried out, which made it possible to evaluate the heating temperature, structural transformations and the level of microhardness obtained during thermal friction hardening of steels. The microstructure of steel 15Kh11MF after thermofriction hardening is presented. A graph of the temperature field occurring in the sample during processing and a graph of the microhardness distribution over the sample cross section are given. It is analyzed which hardening mechanism can prevail in different temperature conditions.

Keywords: computer modeling, thermal friction hardening, heating temperature, temperature field, microstructure, microhardness

1 Introduction

Surface hardening techniques that involve deformation of the surface under friction conditions are of sufficient scientific interest. It is the thermal friction hardening (TFH) method that requires heating and deformation of the surface to be treated, and is a fast and economical method characterized by high efficiency.

2 Analytical overview

As is known, according to previous studies [1-3] in the process of contact - tool and the workpiece, there is a heating of its surface layer, as a result of which phase and structural transformations occur. Warming up the surface depends on the intensity of the heat flux into the workpiece, which occurs during the processing process at the expense of friction forces.

The depth of heat propagation into samples can be determined by the experimental and estimated method [2, 3]. Computer simulation in such matters significantly facilitates the ability to determine the necessary parameters, which are difficult to fix due to the high speed of the process.

So, on the example of samples from steel 15x11MF, when solving the thermal conductivity problem, temperature fields were obtained.

The temperature field is represented in the form of isotherms in the coordinates $y(x)$, where the y coordinate is directed perpendicular to the treated surface, and the x coordinate is parallel to the feed direction. Thus, the temperature fields shown in the boundary plane of the sample plate section

Since the problem of thermal conductivity is solved in

the coordinate system, which moves together with the thermal source, that is, with the surface of the contact, the coordinate x is the distance from the front edge of the heat source. Thus, if the value of the coordinate x is divided into the feed rate s ($\tau = X/S$), then the result will be the time for which the field has passed above the surface of the front surface of the heat source. In addition, the resulting temperature fields allow to determine the maximum heating temperature of the samples at a distance of y from the surface. In this case, the value of the value of y can vary from 0 to any depth within the temperature field and with any measurement step. For this, it is necessary to have data on the heating temperature of the surface layer at different depths and about the time for which the heating and cooling of the surface layer point was implemented, and, accordingly, its site. Based on this, it is possible to determine the nature of hardening, namely, whether it is thermal. And taking into account the fact that the last isotherm, according to the conditions of this experiment, corresponds to a temperature of 100°C, which for steels is below the conversion temperature, it is sufficient to clearly determine the possibility of one or another conversion in steels and the depth of its propagation in the TFH process [3].

It should be noted that the samples were processed according to the TFH mode defined earlier as optimal [3]. As can be seen from fig. 1, in the sample of steel 15x11MF in the initial state after hardening and low-temperature release when hardening TFH, for example, at a depth of $y = 0.35$ mm, the maximum temperature is 900 °C.

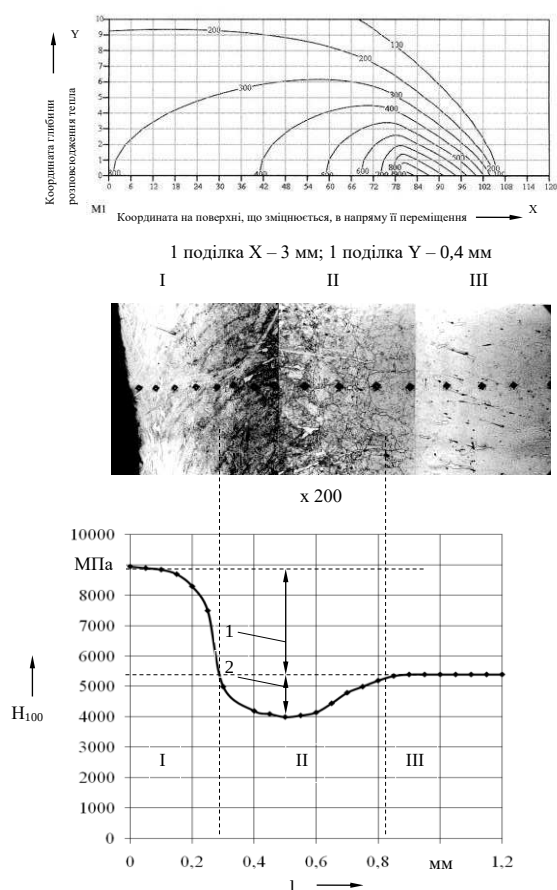


FIGURE 1 Graph of temperature field at the time of TFH, microstructure and microhardness of the sample from steel 15x11MF

1 - hardening efficiency; 2 - transition efficiency; I - hardening zone; II - transition zone; III - base metal zone

For example, the critical point of the AC1 for steel 15x11MF is 810 °C. Accordingly, all layers of metal heated during the TFH process must be hardened at the time of heating at TFH with sufficient time to pass the austenization

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process. When heated to temperatures below the critical hardening cannot take place. Then there is a slope, since short-term heating creates conditions for this.

Using data from the temperature fields, the temperature of the surface temperature during the TFH was determined, which made it possible to determine the maximum heating temperature of the samples at different depths from the surface.

The analysis of the results obtained suggests that a significant increase in the microhardness of the surface is ensured by the simultaneous influence of two hardening mechanisms: thermal - hardening and deformation - label, the dominance of each of which may vary depending on the conditions of processing, chemical composition, the initial state of the hardening objects and other factors.

Due to the fact that such superficial hardening is caused by the simultaneous influence of many factors, issues related to analyzing its nature are constantly being studied.

3 Formulation of the problem

The purpose of this work was computer simulation of structural transformations, under various temperature conditions, based on the determination of the intensity of heating the studied objects at different depths from the surface with surface hardening of materials using friction and deformation.

4 Conclusions

It is clearly shown that computer simulation allows to quickly and efficiently determine the nature and degree of warm-up of samples by cross section from the TFH surface, which allows to predict the structural transformations in the materials that determine their potential properties.

The data obtained can also be used in mathematical planning of an experiment aimed at optimizing processing modes to predict the beneficiation of expected structures and properties that can be obtained in materials during their surface hardening.

Intelligent automated computer systems

Alexandr Zakovorotniy*, Artem Kharchenko

National Technical University «Kharkiv Polytechnic Institute», Ukraine

*Corresponding author's e-mail: zakovorotniy@kpi.kharkov.ua

Abstract

Fuzzy logic and neural network methods are currently used to solve problems related to process modeling in the conditions of uncertainty or insufficient input data. Neural networks allow not only to model processes as close as possible to real ones, but also to forecast the values of technical parameters. The reliability of a computer system depends on the right choice of the input parameters and the accuracy of calculations. This work is devoted to the issue of developing the automated computer system, taking into account the dynamics of railway vehicles.

Keywords: computer systems, fuzzy logic, neural networks, intelligent control, forecasting

1 Introduction

These days automated computer systems can find new solutions to complex problems in various fields of science and technology. However, there are many issues to consider when developing new intelligent systems. The hardware components of computer systems can not take into account all set of the factors, but mathematical models must consider possible critical conditions. The use of fuzzy logic and neural networks allows to solve some problems associated with the dynamic systems control in conditions of uncertainty and to increase the precision of the modeling.

These methods are used not only to real-time processing, but also can be applied to forecast parameters such as critical speed.

2 General

The object of research is the accurate determination of the critical speed of railway vehicles in the computer decision support system. There are a number of external factors that affect the stability of the system and the value of the critical speed at a certain point in time [1].

We can define speed and stability as linguistic variables. This is important for the speed of information processing in the computer system and for determination the probability of critical states. We assess the accuracy of the simulation

results by comparing them with the experimental data. The membership functions in the adaptive neural fuzzy inference system (ANFIS) are trained to minimize the difference between the experimental data and the fuzzy simulation results [2].

This work focused on the following issues:

- Conditions of uncertainty and noise (technical and environmental factors)
- Real-time monitoring of the critical speed
- Computer data processing speed
- Research of artificial neural network forecasting model
- Design of fuzzy logic control system.

We need to take these issues into account to develop a reliable automated computer system.

3 Conclusions

Thus, in the development of computer systems, it is important to investigate environmental factors and critical values of the parameters. We should also to take into account the stability of nonlinear system and speed of information processing in computer systems to forecast the critical speed of motion. Fuzzy logic methods and neural networks make it possible to build reliable forecasting models and make decisions that are similar to human behavior in the intelligent automated computer systems.

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Promising game-development modern platform

Kobiakova Yelyzaveta, Khotunov Vladyslav and Kutsevsky Sergey

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: cheza132@gmail.com, vkhotunov@gmail.com*

Abstract

The phenomenon of video games is a new and very relevant direction for scientific research. It has passed in a very short period of several decades from small and local works in various fields of science, such as marketing, cultural studies, philosophy, etc. to large scientific research with many options. studying such an interesting object of research as video games. The purpose of this work is to study and analyze the market and trends in the development of video games, to determine the most promising direction for small IT companies.

Keywords: game-developing, mobile platform, game publishers

1 Introduction

Today, the global video game industry is one of the significant parts of the global economy, and the games themselves have long been perceived by many users as high-quality multifaceted entertainment, which has found great popularity among the world population. Also, the field of video games in the modern world is a very highly paid niche.

Video games have also greatly influenced other areas of art and entertainment. There are a huge number of sites, magazines, TV programs that are devoted to the topic of video games, a large number of films are based on the plots of video games (for example, Lara Croft, World of Warcraft, Mortal Combat, Resident Evil, and others).

It is also worth mentioning the phenomenon of "gamification", when gaming practices are used in non-gaming spheres (mainly in advertising, educational, military, marketing), which carries the goal of attracting and retaining a large audience, contributes to learning assistance.

Video games have greatly influenced the social dimension. Many genres include "multiplayer mode", when users can not only connect to one game session, but also actively communicate via text chats and voice technologies during the game.

Over the past seven years, the video game market has grown by 60% compared to other areas of entertainment. On average, the market reaches up to \$ 160 billion per year, confidently overtaking the film industry. Half of the video game market is in the Asian region (China, Korea, Japan), next are North America (about 30%) and Western Europe (about 20%). The main factor in the development of the video game market is the development of Internet technologies and the reduction in the cost of Internet services, as well as the availability of technology (computers, smartphones) for ordinary people and the simplification of the development of the video games themselves.

2 Overview

Given the huge variety of video game platforms, the purpose of this work is to research the most suitable platform for opening a video game development team in a

small IT company. To make a decision, the following criteria will be considered:

- Current position in the video game market
- Ratio of average time spent by users.
- Distribution model and payback
- Complexity of development

3 Decision

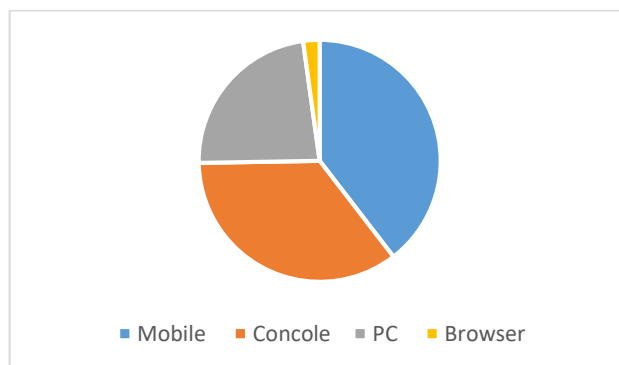


FIGURE 1 The ratio of different video game platforms in the market

Currently, users prefer mobile gaming, which includes gaming applications on tablets and smartphones, which can be explained by the convenience and availability of such applications, as well as the ease of mastering the games of this technology. This segment occupies 36% of the video game industry market, and 80% of the entire mobile applications market. The popularization of digital gaming stores and mobile apps has made it easier for small studios to publish mobile games. Developers who create games in small teams without the support of official publishers tend to create "indie games" (aka "independent video games"). Such games have no restrictions, they allow you to show "creative freedom", but they also do not differ on a large scale. Due to the popularity of indie games, large publishers often take patronage over small development studios, without limiting their creative ideas, choosing such a model can simplify the distribution model and ensure the payback of the game.

4 Conclusion

Based on the research, we can conclude that the best choice for a small branch of game developers today is the best

choice of a mobile platform due to the ease of development, its popularity and the ability to conclude a lucrative contract with the publishing company.

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Developing a web application for efficiently organizing personal finances using the Vue framework.

Bohdan Yevych, Vladyslav Khotunov, Sergey Kutsevsky

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: bohdan.yevych@gmail.com, vkhotunov@gmail.com*



Abstract

In the modern world, people perform many financial transactions. As a result, this creates a lot of unforeseen and unnecessary expenses. Using special online services will make it possible to avoid unforeseen expenses.

There are many services for planning personal finances. Some take photographs of checks, others recognize transactions from a mobile bank, while several people can simultaneously manage the budget in others.

The main disadvantage of existing solutions is that they require too much attention from the user and are cluttered with unnecessary functionality.

Keywords: web application, Vue framework, financial transaction.

1 Introduction

To increase capital, it is not enough to pay attention only to income; expenses require special attention. This is not difficult to do. You need to keep track of your expenses and income using a personal finance accounting application.

All financial transactions must be recorded. Certain financial transactions cannot be ignored. Just a few minutes a day, and at the end of the month, an accurate understanding of a number of indicators will be formed. Where did the money come from, what was it spent on, how much is left. Using finance statistics, you can determine what you need to reduce costs.

2 Overview

The purpose of this work is to develop a web application for personal finance accounting, which will make it possible to resolve issues related to financial accounting and user planning.

The user can create his own account where he will add categories of expenses and income. Different criteria fit into these categories, it is possible to build expense schedules, support is available in 2 languages.

3 Decision

The key goal of the project is to create a modern, fast and easy-to-use application. The Single Page Application tool using Vue technology is suitable for developing this application.

The advantage of this approach is that all resources are loaded in one session, and during actions on the page, the data simply changes, which in turn saves time. Moreover, if the project is implemented with simple logic and there are no complex requirements for the user interface. Using Vue is recommended.

4 Conclusion

The implementation of such a web application will provide an opportunity to solve a number of problems.

First, it will allow you to conveniently and quickly record income and expenses. Secondly, with its help, you can view statistics for a specified period, and from statistics you can extract enough useful information, which will provide an opportunity to reduce costs.

Development of a hospital information system to facilitate the activities of a medical institution.

Vladyslav Kipka, Vladyslav Khotunov*, Kutsevsky Sergey

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: vkhotunov@gmail.com

Abstract

Due to the rapid development of information and communication technologies, the development and implementation of a medical information system has become one of the most important means of improving the quality of medical care for many medical institutions. There are many studies on the factors influencing physicians' use of the medical information system in terms of various theories or models. However, research on physician behavior in terms of the difference between importance and effectiveness is rarely discussed.

Keywords: hospital information system , web application .

1 Introduction

Information systems make service delivery easier at many levels. They assist with process preparation, management, and execution, as well as data recording. Health information systems refer to a collection of systems that cover all aspects of health care, including patient care as well as resources for early disease detection, health issue prevention, which wellness promotion, and can be used in any environment.

The information management system complements the other components of the very complex organizational structure and operations of a hospital. The scope, content and structure of the hospital information system serve many different functions. It contains a set of sub-systems and applications that utilizes information-communications technology and computerization optimally to facilitate the delivery of services of the hospital.

The hospital information system should be able to exchange patient data with other healthcare organizations through the exchange of medical information, data warehouse, or other means to ensure quality of service. It is intended to contribute to the national health database by providing evidence for health promotion, disease prevention and early warning, as well as planning, resource use, epidemiology, mixed case calculation and other purposes. [1]

2 General

Hospital information systems allow you to quickly and efficiently establish electronic document flow, flexibly

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arrange work with patients, and keep an operational record of the work of administrative personnel. [2]

The aim is to create a web application to facilitate the operation and automation of a medical institution. A web application in the form of a hospital information system should solve the following tasks:

- Increase the efficiency of personnel by automating routine tasks;
- Improve the quality of patient care;
- Ability to access the necessary information;
- Effectively use working time for employees.

A web application can present functionality:

- Information about the medical institution, its working hours, etc.
- Search. The ability to search for specific categories, for example, by keyword, doctor, etc.;
- Personal account of the patient. Patient information, analysis information;
- Ability to display the schedule of doctors' appointments;
- Placing a catalog of services. Patients can choose the services they need;
- Possibility of feedback. Users can leave their feedback and wishes for the medical staff, which will improve the quality of patient care.

3 Conclusions

Today, hospital information is becoming more complex and relevant. In today's world, healthcare automation refers specifically to the use of information technology to ensure timely and targeted dissemination of critical data.

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Developing an Air Quality Sensor to Improve Plant Productivity

Kiril Zhytnych*, Khotunov Vladyslav*, Olifirenko Vitalii*

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: kirya.kuzmich@gmail.com, vkhotunov@gmail.com

Abstract

This project considers existing similar technical solutions and justification of the relevance of building an air quality control system and humidity. This system measures parameters such as carbon dioxide levels in the range of 0 ... 5000 mg / kg, formaldehyde in the range of 0 ... 5 mg / kg, concentration dust particles ranging in size from 0.3 to 10 mm and air humidity up to 100%. For of the master's project, modern inexpensive sensors, microcontrollers, radioelements with minimal error and provide high the effectiveness of this system. In the course of the work, the structural, functional and schematic diagram of the system, analysis and calculation of errors are carried out.

Keywords: air quality, air pollution

1 Introduction

Indoor air pollution is a big problem nowadays, devices that can control air quality and humidity have been developed. Such systems help to assess the level of pollution and respond to the problem in time. Air quality is determined by the level of air pollution, that is, the concentration of pollutants in it. Air quality can change not only from day to day, but also over several hours. This is because pollution levels can vary depending on the amount of air emissions, the time of day, for example rush hour air pollution is highest, the weather conditions, with strong winds, air quality tends to be much better, and many other factors. In this regard, it is necessary to regularly measure the level of air pollution.

2 Overview

- The developed system is primarily aimed at protecting the health of the population, but the system being developed also has a wide range of applications, ranging from enterprises and private organizations to various government agencies.
- Everyone knows that carbon dioxide quickly builds up indoors, which can
- cause very serious harm to your health.
- This device has the following characteristics:
 - Measurement of carbon dioxide (CO₂)

concentration;

- Temperature measurement (-5 ° C to 60 ° C)
- Displays air humidity
- CO₂ measurement accuracy: ± 75 mg / kg or $\pm 5\%$ of the result;
- Accuracy of temperature measurement: ± 0.5 ° C;
- The advantages of such a device are the relatively high accuracy of carbon dioxide measurement and
- temperature,
- The device also has the function of recalling min. / Max. CO₂ value, as well as output to an HTML page with a graph of min. / Max. CO₂ value.
- The device has a built-in digital clock and calendar, sound
- an indicator that notifies of an increased concentration of carbon dioxide.

3 Conclusion

As a result of the project, a system was developed air quality and humidity control, selected modern sensors for measuring such quantities like carbon dioxide concentration, formaldehyde level, humidity level and concentration of dust particles in the air.

This project presents and justifies the choice of the structural system diagrams, on the basis of which the functional diagram is developed.

A section on safety was also written, it makes it possible to minimize possible injuries while working with the device

Variety of blogs. Development on next.js

Poidenko Maksym*, Vladyslav Khotunov*, Kholupnyak Katerina

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: mrpoidenko@gmail.com, vkhotunov@gmail.com*

Abstract

The Internet and information technologies continue to rapidly penetrate into our lives, thereby simplifying routine tasks. The use of information technology allows you to optimize those tasks and processes that take up part of your personal time, one of them is the Blog. With the advent of Next.js in recent years, coupled with the popularity of React, a new opportunity has emerged for finding static blogs. Next.js makes it easy to create static websites based on its file system with little or no configuration required.

Keywords: blog, information technology

1 Introduction

Blog - an Internet event log, Internet diary, online diary, website, the main content of which is regularly added entries containing text, images or multimedia. Blogs are characterized by short entries of temporal significance, ordered in reverse chronological order, with the last entry at the top. The difference between a blog and a traditional diary is determined by the environment. Blogs are mostly public and involve the interaction of third-party readers who can take part in an open dialogue with the author. The dialogue is carried out in the form of different comments to the posts of the blog author or his blogs. There are different types of resources. They are distinguished by methods of payment, by authorship, content and by the purpose of creation. By payment method, all blogs are divided into · offline and · created on free platforms. If you intend to use a blog to make money, it is recommended to create an offline resource, which implies the use of paid hosting.

2 Overview

The most common blogs are online diaries. Internet diaries are divided into · corporate, · collective, and · authors. An author's personal blog is maintained by one person. The author shares his thoughts or his own experience.

Corporate blogs are created by company employees. The goal is to increase the popularity of the organization, attract new customers and rally the team. According to the purposes of creation, they distinguish between thematic, general thematic, image, business resources.

Blogs are distinguished by content text, video or vlogs, podcasts, photo blogs.

There are also rarer types of blogs: typecast, blog or microblogging. The difference between typecasts and others is that the author writes texts on a typewriter, and only posts scanned articles on the blog. Publish different types of information on the blog. But for one post - only one format: video, text or links. This is the main requirement. Only small messages, links or videos are published on the microblog.

Blog design: what it should be:

- Flexible format.
- Entries can be as short or long as you like.
- Entries do not have to contain text. Video and photo blogs can be attractive and popular.

- Blogs can be used to become someone as an expert in their field, thereby increasing business opportunities.

3 Decision

- Several problems have been identified that need to be addressed:
- Recently, Next.js has been positioned as React Framework for Production, and with such a bold statement, it offers many features to help you take your React websites from scratch to production. These features would be less important if Next.js were relatively difficult to learn thanks to its many features that provide more things and more nuances to learn.
- Next.js is for static sites and has been well designed for this purpose. But it also goes further with gradual static regeneration, which works well with existing features to make development more comfortable. Next.js has a number of advantages, namely:
- Relatively easy to learn.
- Built-in CSS support.
- Automatic TypeScript support.
- Multiple data sampling techniques.
- File system routing.

4 Conclusion

Nowadays, the Internet significantly affects our lives and simplifies many tasks. And people who value their time try to optimize simple processes. In the course of writing the first stage of the master's work, it was revealed that many people use blogs in Ukraine. With the help of a blog, many people share their achievements, their opinions and important events. There are a lot of people who use blogs just to follow their idols. The current competitors providing such solutions were also analyzed, their advantages and disadvantages were identified, which will make the future project simple, affordable and at the same time technologically advanced. The necessary components of existing blogs were examined. During the work on the project, a fully working system for working with a blog was developed. The developed blog system can be used for people who need to share or post their information.

Investigated the system for using Next.js to create a static blog framework.

System for processing financial accounting and service requests using the web interface

Ihor Burdylo*, Khotunov Vladyslav*, Olifirenko Vitalii

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: burdyloigor@gmail.com, vkhotunov@gmail.com*



Abstract

The company that currently provides physical services needs to process financial accounting. In fact, every enterprise has a computer and office equipment, therefore needs to maintain this equipment. Consequently, the company that serves such enterprises needs to prepare financial statements for corporate clients. This is done after equipment repair services are provided at the end of each month, quarter or year.

Keywords: information technology, information system, financial accounting.

1 Introduction

The task of large enterprises is to generate income on an ongoing basis from the needs of their customers. The company develops intensively if the client is satisfied. The more intensively the enterprise develops, the more personnel are involved in the work process. Therefore, the problem of the IT structure in such conditions of the company's development is key. Its solution will allow to minimize the working staff of the IT department within the enterprise.

A modern user in such enterprises expects a quick solution to his requests and often requires the provision of high-quality reporting information. The task of the company that provides these services is to satisfy the needs of the user.

The main focus of the project is focused on ensuring the continuous operation of the product and the reliability of the reporting data for the product. In addition, this project allows enterprises-customers to save money, as it uses automated software instead of employees, which does not need to pay wages.

2 Overview

The system of financial accounting and requests for the provision of services provides automatic processing of information without the participation of employees of the enterprise's IT department. Provides an automatic solution to customer problems related to his needs.

This system works without integration into the client's internal services and is based on a separate web platform. That allows you to use this solution in your workflow. And it can be used simply and conveniently in any enterprise.

To achieve these objectives, the following issues are addressed:

- considered the advantages and disadvantages of the project on the market, as well as the relevance of the

development of web applications of this type;

- the role of speed and quality of the product in this industry has been determined;
- an overview of already created solutions for the project under development is provided, their errors are indicated before the required requests;
- the development of the product functionality management system has been completed;
- diagnostics of its own project was carried out, in which it was revealed how it forms its data register and monitors errors.

3 Decision

Due to the fact that enterprises-customers have many offices, they need to use such a product, as this will reduce their financial costs for the internal IT structure. Without the use of this product, the offices of the enterprise have no automation, which entails the use of human resources to solve the needs for physical services, as well as to conduct financial accounting.

4 Conclusion

Today there are competitors who use this type of projects, but not all of them guarantee high-speed performance, uninterrupted operation and, most importantly, integrated financial accounting along with functions for providing services using a web platform.

The system for processing financial accounting and requests for the provision of services does not require integration into the internal services of the customer's enterprise and can be used separately on the web platform. It makes it possible to have personalized user access to corporate data of the system, allows you to create and process applications for the provision of services, as well as create and maintain financial reports.

Development of the web-based application for unified accounting of utilities and meter reading transfer

Roman Krasnikov*, Khotunov Vladyslav*, Kutsevsky Sergey

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: romchigan@gmail.com, vkhotunov@gmail.com

Abstract

The Internet and information technologies continue to rapidly penetrate into our lives, thereby simplifying routine tasks. In the modern world, it became possible to order the necessary goods, pay for various services and solve domestic tasks online - this need became especially acute during a pandemic. The use of information technologies allows you to optimize those tasks and processes that take up part of your personal time, one of which is payment and accounting of utilities.

Keywords: accounting of utilities, information technologies

1 Introduction

The web-based application for unified accounting of utilities is a web site used by the user on any device with Internet access. The advantage of this web application is the fact that the user only needs to register once and get full access to keeping accounting of utilities of their home. The user no longer needs to stand in the queues of the post office or bank to pay for services, go to check meter readings, waste time filling out and checking paper bills - all this can be done online. You just need to enter your residential address and you will be shown all the information regarding utilities - upcoming payments, arrears and penalties, transaction history and payment receipts, history of meter readings, accounting for apartment and general house meters, information on benefits and subsidies, important news and announcements regarding the services provided. Almost every utility company has the ability to send meter readings on the website, but there are many different sites, different forms, in which you constantly need to enter the same information. Not all of them work correctly, which can lead to errors and incorrect calculations. A web application will minimize risks and address these deficiencies by combining all services in one place.

2 Overview

The web application will greatly simplify the accounting of utilities for ordinary users. Will reduce the entry threshold for people who have not previously encountered the accounting of utilities. It will save a lot of time on performing standard tasks, because everything is automated as much as possible. The service receives data and automatically generates payment details, statements, receipts. The user will be able to pay bills or meter reading transfer from anywhere in the world if he has access to the Internet.

With this service, users can:

- receive receipts for payment of utilities
- check accruals and payment arrears
- pay payments online
- keep records according to meter readings

- view the history of charges
- receive receipts for payments
- view the dynamics of changes in meter indicators for a specific period
- enter accounting for several addresses in one personal account
- receive news from utilities about innovations, inspections, accidents

3 Decision

Several problems have been identified that need to be addressed:

Some users do not have gadgets or access to the Internet and therefore will not be able to use this service - for example, retirees. But the user will be able to provide access to the personal account to other people, for example, relatives. And this partially solves the problem, but you also need to remember about the transfer of personal data that is stored in your personal account. One of the goals is to make the web application simple and secure at the same time.

Information about the indicators must be copied directly from the meters. But what if a person does not have the opportunity to stay in the apartment and he cannot send reports on time? Then the utilities will not generate receipts or send receipts with the base rate, which is not always beneficial, because after that a recalculation will follow. This process can be automated by supplying counters that automatically submit metrics. The goal is to study the complexity of the implementation and the financial component of this automation.

4 Conclusion

Nowadays, the Internet significantly affects our lives and simplifies many tasks. And people who value their time try to optimize simple processes. In the course of writing the first stage of the master's work, it was revealed that the market of utilities in Ukraine is quite complex and retrograde, but modern technologies and requirements have come here, both from the utilities themselves and from their

consumers. The current competitors providing such solutions were also analyzed, their advantages and disadvantages were identified, which will make the future

project simple, available and at the same time technologically advanced.

Game development

Voidenko Stanislav, Khotunov Vladyslav, Kholupnyak Katerina*

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: igorpetrenk321@gmail.com, vkhotunov@gmail.com

Abstract

Games have become a ubiquitous source of entertainment - if you add up all the hours of active play and watching it, it turns out that this is the most favorite pastime in the world. Members of this community differ in the way they interact with the content. If you take into account the narrower criteria for how a person shares game content and discusses it in social networks, what content he creates himself, there are many game lovers.

1 Introduction

In the modern world, the creation of video games is one of the largest segments of the entertainment industry. The scale of the gaming industry is comparable to, for example, the film industry. And in terms of growth rate over the past five years, the video game industry has significantly outpaced it.

In terms of the degree of influence on consumers and their involvement in the interactive environment offered by video games, this segment has long stood out among other forms of entertainment.

Game development cannot be viewed in isolation from the computer game industry as a whole. The creation of games itself is only part of a complex "ecosystem" that ensures the full life cycle of the production, distribution and consumption of such complex products as computer games. Around the core, consisting of game developers and publishers, specialized media, special financial and advertising tools are developing; specialized physical sites appear (new generation Internet cafes, locations for cyber tournaments, etc.); In addition, players from adjacent markets want to occupy their niche - electronics manufacturers (for example, Apple) or Internet corporations (for example, Google), which have all the resources to bring promising gaming solutions to the market.

As for the key trends that determine the development of the global gaming industry, here, first of all, it is necessary to note new technologies: mobile, cloud, virtual, graphic, artificial intelligence. For several years now, computer games have been actively integrated into social networks. A reverse trend has also appeared - they themselves are becoming a kind of social networks.

The following levels can be distinguished in the structure of the modern gaming industry: platforms, game engines, video game development, publishing and operating, popularization and consumption.

A very small number of educational institutions in the world train specialists directly for the gaming industry.

2 Overview

The computer games industry (development, publishing and promotion of games) is one of the fastest growing branches of computer technology and, at the same time, the global entertainment sector. Games become cultural phenomena

and are recognized as works of art.

The number of gamers is growing (2.5 billion players in 2019), and gaming itself is becoming a highly paid profession. Free games continue to generate the bulk of gaming revenue (78%), with Asian markets accounting for 59% of revenue, where users prefer sophisticated mobile games. Honor of Kings and Peacekeeper Elite (Tencent) brought developers over \$ 2 billion each in 2020.

In 2020, the mobile games market grew by 10% and accounted for 58% of the total volume of the gaming industry. Experts attribute the growth of this segment to the fact that the majority of mobile gamers (62%) use smartphones and tablets not so much when traveling as as the main gaming platform.

Game development is the process of creating a computer product.

On the other hand, it is possible to develop homemade computer games. A striking example are so-called constructor games... The first computer game was - Spacewar.

3 Development stages:

- The first step is to prepare a plan according to which the game will be created.
- The second step is to develop the game concept, character design, models, and terrain.
- The third stage is genre, script.
- The fourth step is to create the first layout of the game.
- The fifth stage - Entering and developing a general plan with OpenGL physics calculation using Nvidia PhysX.
- The sixth stage is fix Bugs.
- Seventh stage - Testing the finished product.

4 Conclusions

Games have always been a class of software that instantly responds to all market innovations. So it was with the Internet - the mass hysteria about the Web was just gaining momentum, and the first game servers were already opening for those who wish. The capabilities of the Internet are undeniably higher in comparison with a classic local area network: 3-5 people usually play on the first, maximum 8-

10. In addition, these people need to all get together, guess the time ... On the Internet, you don't need to look for opponents - they are always there, and in excess, in addition, the average number of player simultaneously playing fluctuates around 50-100 people (Diablo, battle servers. net). Considering that the interestingness of the multiplayer mode is directly proportional to the number of opponents, the advantage of the Internet becomes obvious. In addition, factors such as unknown opponents come into play, which always stokes the curiosity of the game.

Comparison of various methods for short-term forecasting of solar power plant performance

Sofya Kiseleva^{1*}, Natalia Lisitskaya², Semen Frid², Alexandr Mordynskiy²

¹Lomonosov Moscow State University, Russia

²Joint Institute for High Temperatures of the Russian Academy of Sciences, Russia

*Corresponding author's e-mail: k_sophia_v@mail.ru



Abstract

In connection with the relevance of the Solar power plants (SPP) performance forecasting, research on the forecast effectiveness based on numerical weather forecast (NWP) was carried out. The SPP in the Yaylyu village (Altai Republic) was chosen as a model. The forecast accuracy of the SPP performance (root-mean-square error) was about 13-14%. The artificial neural networks using to improve the quality of the performance forecast did not give a significant decrease in the error, in contrast to similar researches conducted for SPP in the Moscow region. It is important to investigate the climatic conditions influence on the forecast accuracy

Keywords: solar power plants, power forecasting, financial losses, forecast errors

1 Introduction

With the increase in the solar generation share, it becomes more and more important to maintain a power and energy balance in the power grids. Since SPP cannot guarantee the electric power generation at a precisely specified time, therefore, the forecast of the generated and supplied to the grid energy is extremely relevant. In contrast to the foreign conditions of the SPP functioning, when forecast errors lead to significant profit losses and an increase in the payback period of projects, in Russia (currently and until 2024) the main profit is made up of capacity payments, which mitigates the consequences of productivity forecast errors.

One of the methods used to SPP performance forecast is based on modeling the solar power plants using numerical weather forecasts (forecasting the insolation incident and temperature in the surface air layer). In this case the result is determined by the NWP accuracy, and it can be low both in terms of temporal and spatial resolution. Therefore, it becomes necessary to refine the NWP in terms of forecasting solar radiation, which can be carried out using a combination of different methods. For example, by combining NWP forecasting with machine learning methods.

2 Features of the electricity market, including renewable energy plants, in the Russian Federation

The importance of an accurate forecast for SPP in Russia is determined by the state support measures and the Rules for the Wholesale Market of Electric Energy and Power that are currently in force for renewable energy plants. The system of subsidizing the use of renewable energy for plants connected to the Unified Energy System of Russia works in such a way that most of the proceeds (95 ... 99%) of solar

power plants are payments for the supply of capacity. Nevertheless, the sale of generated electricity on the wholesale market must comply with the rules, among which one of the most important is the day-ahead price bid. It represents the hourly forecast of the station's output for the next day, submitted before 13:30 Moscow time of the previous day (the maximum forecast horizon is 36 hours). If the actual output deviates from the price order for the day ahead within $\pm 10\%$ of the installed capacity, solar power plants are not penalized. Their losses from non-fulfillment of the dispatch schedule consist of:

- lost profits when actual production exceeds the permissible deviation range of deviations (10% of the installed capacity);
- losses caused by the accrual of a negative imbalance in the balancing market proportionally to the deviations of generation in excess of the permissible range.

Lost profit arises due to the fact that excess energy is paid at a very low tariff (1p/kWh / MWh), and losses from negative imbalance are due to the difference between the day-ahead market price and the price indicator of the balancing market.

3 Materials, methods and results

To implement a hybrid approach to predicting the SPP performance, an autonomous solar power plant in the village of Yaylyu of the Altai Republic (SPP Yaylyu) was used as a model, for which a significant array of productivity data and solar radiation was accumulated. An autonomous hybrid 60 kW solar-diesel power plant includes 496 thin-film PV modules manufactured by Hevel [1] and 9 network inverters SMC 7000HV-11 [2] manufactured by SMA Solar Technology AG [3]. SMA controllers and inverters are equipped with telemetry systems, which allows the user to

access the power plants indicators through a special Internet portal (<https://www.sunnyportal.com>).

To validate the NWF based Yailu SPP performance forecast, the ICON-EU model radiation arrival forecasts (German Weather Service (DWD) and the Max Planck Meteorological Institute of the University of Hamburg (MPI-M)) were used. The TRNSYS system was used to simulate the SPP operation.

The error in predicting the hourly electricity generation based on the radiation flux density normalized to 1000 W / m² in the PEM plane, calculated according to ICON data, was: winter – 17%, spring – 16%, summer – 18%, autumn – 17%. At the same time the forecast accuracy individual hourly values of production is low, namely, they determine the economic effect of forecasting, which, along with the root-mean-square error, can be used as a metric of forecast accuracy.

Large errors in solar radiation forecasting as part of a numerical weather forecast force us to look for other forecasting methods, in particular, statistical. As noted in [4], in the absence of monitoring of meteorological conditions at SPP, the problem of predicting the solar radiation is most accurately solved using artificial neural networks (ANNs). To improve the forecasting accuracy, various combinations of geographical and meteorological factors are selected as input parameters of the INS. In this case, the selection of the most significant factors is important, however, the task of determining the optimal set of factors has not yet been solved [5].

In the present studies, the prediction of solar radiation daily sums was carried out using a multilayer ANN (4 hidden layers) with a sigmoid activation function trained by the backpropagation method. The input of the ANN was supplied with daily sums of total solar radiation on the horizontal surface for 28 days (28 input neurons), and the output was a forecast for the 29th day (1 output neuron). As additional values taken into account, the declination of the sun, the season and a number of meteorological parameters were used.

When forecasting by the statistical method the performance of the SPP Yaylu actinometric data were divided into 2 parts: one part for the period from 08.03.2013 to 14.01.2020 was used to train the statistical forecast model. The second part of the data (from January 15, 2020 to November 30, 2020) was compared with the statistical

forecast of daily solar radiation sums in the inclined plane and the ICON NWF solar radiation sums recalculated into the inclined plane for the same period. To improve the forecast accuracy in some configurations of statistical models, additional parameters from the NASA POWER database were added to 28 input neurons: sun declination, season, pressure, specific humidity, relative humidity, total precipitation, wind speed (min, max and average).

As a result, the forecast error (root-mean-square error) of daily solar radiation sums according to the statistical model for SPP Yailu was more than 25%. Since the forecast based on NWF gave an error for the incoming solar radiation much lower. The calculations of productivity and estimates of the financial losses of the station due to the inaccuracy of the statistical forecast were not carried out.

4 Conclusion

In connection with the solar energy development and the current conditions of the wholesale electricity and capacity market, forecasting the solar power plants performance in the Russia climatic conditions is becoming an important scientific and technical task. To test the forecasting methods, a hybrid approach was used to predict the solar radiation and the productivity of SPP in the village of Yailu (Altai Republic). It have been shown that the mean square forecast error based on ICON NWF data is significantly lower than the error of statistical models based on neural networks. The minimum root-mean-square error of the NWF forecast is 13 ... 14%, the minimum losses from non-compliance with the dispatch schedule are 15 ... 20%. A statistical forecast using a multilayer ANN even for daily amounts of solar radiation gives an error of more than 25%. At the same time, a similar hybrid forecast for the climate conditions of the Moscow region gave more encouraging results of the ANN application, which poses the problem of studying the climatic conditions influence on the possibility of using the described approach to predicting the SPP performance.

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Statistical simulation of atmospheric turbulence

Anatolii Pashko*

Taras Shevchenko National University of Kyiv, Ukraine

*Corresponding author's e-mail: aap2011@ukr.net



Abstract

The paper studies methods of statistical simulation of atmospheric turbulence. The need to model atmospheric turbulence arises in many applied problems. Among them are the estimation of the aircraft resource, the construction of the trajectories of unmanned aerial vehicles, the estimation of the dispersion of ballistic shells. The study is based on the methods of statistical modeling of stationary Gaussian random processes. When modeling stationary Gaussian processes, the shaping filter method can be used. It is described by a system of stochastic differential equations. The paper proposes a modeling method that uses spectral representations of a stationary Gaussian process. Using the spectral representation allows you to build models with a given accuracy and reliability. The estimates of accuracy and reliability in the space of integrable functions are given

Keywords: Gaussian random process, accuracy, reliability of models

1 Introduction

Monte Carlo methods, or statistical modeling methods, are often used in the design and construction of intelligent systems to solve complex problems. Their feature is that instead of using combinatorial methods, you can perform a computational experiment a large number of times. The method is well suited for problems that cannot be solved by classical mathematical methods. Methods of machine learning in the fields of meteorology, economics, finance and others face the problem of having large data for their study. With the help of statistical modeling is the accumulation of characteristics and parameters that reflect the behavior of complex systems, taking into account the influence of possible external factors. When using statistical modeling methods, the system is endowed with real properties and modeling is provided under different initial conditions. The accumulated data is, in fact, a source of data for learning. This is especially important in reinforcement learning tasks. Learning based on a model experiment gives good results [1-2]. The Monte Carlo method solves the problem of reinforcement learning by averaging the results of the experiment. Among the methods of statistical modeling a special place is occupied by methods of modeling of Gaussian stationary processes. In [3-5], methods for modeling Gaussian processes based on spectral images of these processes were investigated. The use of the developed algorithms allows to build implementations of Gaussian random processes with given accuracy and reliability.

An important area of application of statistical modeling methods is atmospheric turbulence modeling. Estimate of influence of atmospheric turbulence is an important issue in many applications. So, when flying in a turbulent atmosphere, the aircraft experiences overloads from wind gusts directed along all axes - longitudinal, normal and

transverse [6-7]. The most significant overloads are directed along the normal axis. Atmospheric turbulence is the main factor determining the aircraft design resource. Various approaches to the description of turbulence in different applied problems are presented in papers [8-10].

When assessing the impact of wind effects on the movement of the aircraft, the wind speed is considered as the sum of two components

$$W(x) = W_0 + W_T(x),$$

where $W_0 \in R^3$ is constant component, $W_T(x)$ is atmospheric turbulence.

Atmospheric turbulence is assumed to be a three-dimensional Gaussian random field

$W_T(x) = (X1(x), X2(x), X3(x))^T$ of argument $x \in R^3$. The matrix correlation function of the field is described by the longitudinal correlation function

$$R_t(x) = EW_t(x+y)W_t(y)^T, \quad R_t(x) = \sigma^2 \exp\left(-\frac{|x|}{L}\right),$$

where L is turbulence scale, $W_t(y)$ is projection of vector $W(y)$ onto the direction x , along which the correlation moment is calculated.

Matrix spectral density corresponding to the correlation function $R_t(x)$, has the form

$$F_{k,l}(\lambda) = \frac{2\sigma^2 |\lambda|^2 \left(\delta_{k,l} - \frac{\lambda_k \lambda_l}{[\lambda]^2} \right)}{L\pi^2 \left(|\lambda|^2 + L^{-2} \right)^3},$$

where $\delta_{k,l}$ is Kronecker symbol.

Wind loading and turbulence in the atmosphere have a significant impact on the dynamics of movement of unmanned aerial vehicles (UAV), as well as unguided and corrected aerial vehicles (UCAV). Regular movements of air masses and random gusts of wind, their unsteadiness caused by atmospheric turbulence, are sources of additional forces and moments acting on UAV and UCAV in flight. They lead to disturbed motion, complicate the trajectory correction process, create loads on the aircraft elements, which contribute to the damage to the structure of the deployable stabilizers, etc. [11]. In connection with the above, studies aimed at studying the effect of atmospheric turbulence on the dynamics of motion of aircraft for various purposes are very relevant and have great practical importance.

One of the ways to improve the accuracy of shooting in ballistic problems is to correct the trajectories of the projectile in order to parry the disturbing factors acting on it and, consequently, to compensate for the resulting misses.

One of the most attractive aspects of the theory of stability of turbulent flows is its intermediate position between the deterministic description using macroscopic equations (such as the Navier- Stokes equation) and the theory of random processes [12-13].

The aim of this work is to develop methods of statistical modeling of atmospheric turbulence based on spectral representations of Gaussian stationary processes and comparison of the obtained results with the classical shaping filter algorithm.

2 Shaping filter method.

The models for the formation of a random atmosphere are usually based on realizable algorithms of canonical expansions, forming filters, or special empirical orthogonal functions. In this case, the spatial distribution of the wind speed field is characterized by two correlation functions: longitudinal R_t and lateral R_n . They describe the statistical characteristics of two components of the random wind speed: one is directed tangentially to the trajectory, the other is normal.

For correlation functions we use expressions:

$$R_t(r) = \sigma^2 \exp\left(-\frac{|r|}{L}\right),$$

$$R_n(r) = \sigma^2 \left(1 - \frac{|r|}{2L}\right) \exp\left(-\frac{|r|}{L}\right),$$

where σ^2 is dispersion of wind speed components, L is turbulence scale, $|r|$ is modulus of the radius vector determining the position of the points of the wind field relative to the considered point, $r = Vt$.

The system of difference equations for modeling has the form

$$W_{k+1} = W_k + h \left(-W_k \frac{V}{L} + \sigma \left(\sqrt{\frac{2V}{L}} \right) \xi_k \right),$$

$$W'_{k+1} = W'_k + h \left(W'_k + \sigma \left(\sqrt{\frac{3V}{L}} \right) \xi_k \right),$$

$$W_{k+1}^n = W_k^n + h \left(-\left(\frac{V}{L}\right) W_k' - \frac{2V}{L} W_k + \sigma \left(\sqrt{\left(\frac{3V}{L}\right)^3} \right) (1 - 2\sqrt{3}) \xi_k \right)$$

3 Spectral model of turbulence

Let (T, B, μ) be some measurable space with $\mu(T) = 1$.

Let $X(t), t \in \mathbb{R}^1$ be Gaussian stationary random process $EX(t) = 0$.

Suppose $B(\tau) = EX(t + \tau)X(t) = \int \cos(u\tau) dF(u)$ is correlation function of the process, $F(u)$ is spectral function.

The random process has an image

$$X(t) = \int_0^\infty \cos(tu) d\zeta_1(u) + \int_0^\infty \sin(tu) d\zeta_2(u),$$

Where $\zeta_1(u)$ and $\zeta_2(u)$ are centered uncorrelated random processes with uncorrelated increments such that for arbitrary $0 \leq u_1 < u_2$ the following equality takes place

$$E(\zeta_1(u_2) - \zeta_1(u_1))^2 = E(\zeta_2(u_2) - \zeta_2(u_1))^2 = F(u_2) - F(u_1).$$

Images of stationary Gaussian random processes for different correlation functions were studied in [16].

Let $\Lambda > 0$, $D(\Lambda, N): 0 = u_0 < u_1 < \dots < u_N = \Lambda$ be splitting of the interval $[0, \Lambda]$. Random process

$$X_N(\Lambda, t) = \sum_{i=0}^{N-1} (\cos(u_i t) (\zeta_1(u_{i+1}) - \zeta_1(u_i)) + \sin(u_i t) (\zeta_2(u_{i+1}) - \zeta_2(u_i)))$$

Is called an approximation model of the process $X(t)$.

Therefore, model A of process $X(t)$ can be obtained by modeling the sum

$$X_N(\Lambda, t) = \sum_{i=0}^{N-1} (\cos(u_i t) \eta_i^1 + \sin(u_i t) \eta_i^2),$$

where $\{\eta_i^1, \eta_i^2\}$ are independent strictly subgaussian

random variables with $E\eta_i^1 = E\eta_i^2 = 0$ and

$$E(\eta_i^1)^2 = E(\eta_i^2)^2 = F(u_{i+1}) - F(u_i).$$

ESTIMATES OF ACCURACY AND RELIABILITY OF MODELS.

Let some random process $X(t)$ and all $X_n(t, \Lambda)$ belong to some functional Banach space $A(T)$ with norm $\|\cdot\|$. Let two numbers $\delta > 0$ and $0 < \alpha < 1$ be given. The model $X_n(t, \Lambda)$ approximates the process $X(t)$ with reliability $1 - \varepsilon$ and accuracy δ in the norm of space $A(T)$, if there is an inequality $P\{\|X(t) - X_n(t, \Lambda)\| > \delta\} \leq \varepsilon$.

Modeling of atmospheric turbulence is reduced to building a model of a stationary Gaussian process.

The following theorems hold.

Theorem 1. The model $X_n(t, \Lambda)$ approximates the process $X(t)$ with reliability $1 - \varepsilon$ and accuracy δ in the norm of space $L_2(T)$, if for numbers Λ and n the following inequalities hold

$$B_{n,\Lambda} < \delta^2 \quad \text{and} \quad \exp\left\{\frac{1}{2}\right\} \frac{\delta}{\sqrt{B_{n,\Lambda}}} \exp\left\{-\frac{\delta^2}{2B_{n,\Lambda}}\right\} \leq \varepsilon,$$

$$\text{where} \quad B_{n,\Lambda} = 2T \sum_{i=0}^n \int_{\lambda_i}^{\lambda_{i+1}} \left(1 - \frac{\sin(T(\lambda - \lambda_i))}{T(\lambda - \lambda_i)}\right) f(\lambda) d\lambda + \\ + T \left(\int_{\Lambda}^{\infty} f(\lambda) d\lambda \right).$$

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4 Conclusion

The paper studies methods of statistical modeling of atmospheric turbulence based on the spectral representation of Gaussian stationary processes. For comparison the modeling filter method is considered. The use of spectral representation makes it possible to build models with a given accuracy and reliability. The paper gives estimates of accuracy and reliability in the space of integrable functions. Shaping filter modeling requires solving a system of stochastic differential equations.

The obtained models can be used to study the effect of atmospheric turbulence on the reliability of aircraft, to plot the trajectories of unmanned aerial vehicles, and to assess the dispersion of ballistic projectiles.

Fractal dimensions of simulated interstellar dust grains

N A Satonkin^{1*}, J R Kalniņš², A I Vasyunin¹, V A Sokolova¹, A B Ostrovskii¹

(1) Ural Federal University named after the first President of Russia B. N. Yeltsin, Russia and
(2) Ventspils University of Applied Sciences, Latvia

*Corresponding author's e-mail: n.a.satonkin@urfu.ru

Abstract

It is known that interstellar dust grains play an important role in the evolution of interstellar clouds. In this work we discuss the results of microscopic modeling of interstellar dust grains for the conditions typical for the regions of star formation using the Monte Carlo method. Impact of the model parameters on the fractal dimension of a dust particle was investigated.

Keywords: astrochemistry – dust, ISM, Monte Carlo method, fractal dimension

1 Introduction

Interstellar dust grains along with atomic and molecular gas are the main components of star-forming regions in our Galaxy. Interstellar dust play a crucial role in physics and chemistry of star formation, as they serve as coolants of collapsing protostars and provide their surface for chemical processes that proceed inefficiently in the gas phase. Polarimetric observations of magnetized star-forming regions suggest that grains have non-spherical shape. This result is confirmed by the captures of interplanetary dust particles with artificial satellites and laboratory experiments on dust growth under conditions similar to that in the interstellar medium. Here, we present the results of microscopic Monte Carlo simulations of the formation of fractal grain particles under interstellar conditions. We explore the impact of model parameters on the resulting fractal dimension of simulated particles and compare it to the experimentally measured fractal dimension of dust grain particles.

2 Methods and calculation

Fractal dimension is studied using a microscopic Monte Carlo model that generates amorphous dust cores of interstellar dust particles. Amorphous core (Fig. 1) is formed by random accretion of carbon atoms on a single initial “seed” carbon atom. The core is constructed using the accretion mechanisms and the numerical functions for the locations of the potential wells which described below.

Preliminary coordinates of the accretion site are randomly selected and projected onto a random point on the surface of the unit sphere according to the algorithm described in [1].

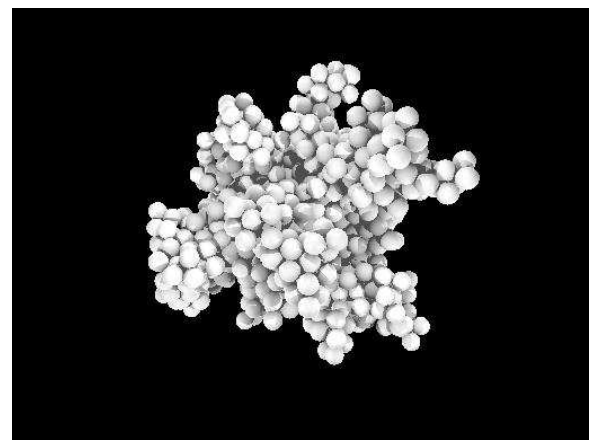


FIGURE 1 A sample of amorphous core containing 1000 carbon atoms

Each atom of the grain has its own potential approximated by the Lennard-Jones potential:

$$U(r) = 4 * \varepsilon * \left[\left(\frac{\sigma}{r} \right)^{12} - \left(\frac{\sigma}{r} \right)^6 \right], \quad (1)$$

where r – distance between arbitrary point and selected atom;
 ε – the depth of the potential well; σ – the distance at which the interaction energy becomes zero.

The potential of two interacting atoms can be calculated as described in [2]:

$$U(r) = 4 * \sqrt{\varepsilon_1 \varepsilon_2} * \left[\left(\frac{(\sigma_1 + \sigma_2)}{2r} \right)^{12} - \left(\frac{(\sigma_1 + \sigma_2)}{2r} \right)^6 \right]. \quad (2)$$

We take into account atoms of only one chemical element (carbon, in our case), so this formula will match with formula (1).

TABLE 1 Simulation results for various values of the Lennard-Jones potential constants

№ of simulation	Particle	$\varepsilon/k, K$	$\sigma, \text{\AA}$	Reference	ρ in the center (half of the radius)	ρ total
1	C	52	3.098	[4]	2.63	2.44
2	C	80.516	3.67	[5]	2.44	2.28
3	C	47.85	3.89	[6]	2.38	2.25
4		21	3.098		2.62	2.43
5		104	3.098		2.63	2.43
6		52	2.098		3.03	2.72
7		52	4.098		2.4	2.26
8	Without potential	–	–		2.62	2.44
9	C (100000 atoms)	52	3.098	[4]	2.65	2.52

The potential of the grain surface at arbitrary point is a linear superposition of potentials of all individual atoms. Magnitude of the potential at arbitrary point of the surface is calculated as a superposition of the interaction potentials of atoms located within a radius of $2.5 \sigma_{\max}$ around the location of interest. We considered $\sigma_{\max}$ to be the maximum possible σ in the system.

Total three-dimensional potential U at specific point is calculated as

$$U = \sum_{i=0}^n U_i(r_i), \quad (3)$$

where U_i is the pairwise interacting potential; r_i – the distance between the interacting atoms.

To determine mutual position of atoms in the system we calculate the coordinates of the minima of the three-dimensional potential field in which atoms are located. For each accreting atom we calculate the value of a local minimum of the potential. The atom is then placed there. The calculations of the minima are carried out using the gradient descent algorithm.

Fractal dimension (ρ) is calculated as

$$\rho = \log_R N, \quad (4)$$

where R – the radius of the smallest sphere that contains the constructed grain core in units of particle radius, N – the number of atoms inside the sphere.

3 Results

Various parameters of the Lennard-Jones potential for the carbon atoms were found in the literature and then utilized to generate the core. Fractal dimension of the core is then calculated. Using the data from Table 1, we performed simulations to assess the influence of model parameters on the fractal dimension of the core. The fractal dimension was measured for the amorphous dust core consisting of 10^3 carbon atoms, except simulation 9, where we modeled the core that consist of 10^5 atoms. Radius of the carbon atom is $1.7 \text{ \AA}$ [3]. The fractal dimension was calculated in two ways: for the sphere with radius R and $R/2$. Results are shown in Table 1.

One can see from Table 1 that the structure of the dust particle is inhomogeneous: the core (central part of the grain) always has a denser structure. Results show that the parameters of the potential significantly affect the structure of the core.

Results of simulations show that σ impacts the structure of the core greatly, while the depth of the

potential well ϵ has almost no influence. Moreover, the results of the simulation where the potential does not effect on atom position and where at which atoms are placed at the first intersection of the ray directed from infinity to the first particle of the core and already existing carbon atom (simulation 8) are almost identical to the one with the

potential parameters taken from one of the literature sources (simulation 1). However, as we can see from the figures (Fig. 2 and Fig. 3), the number of atoms in calculations with the potential (Figure 2) changes uniformly, but in calculations without the potential (Figure 3) its number changes non-smoothly, forming “steps” on the figure (e.g., the blue line). This shows differences in the internal structure of the core in different models. Core structures for simulations 1 and 8 are shown in Figure 4. Calculations of fractal dimension with increased number of atoms were made in Simulation 9. In the center of the grain core one can see the condensation of atoms in comparison to simulations with smaller number of atoms in the core, but total fractal dimension remains approximately the same and the structure type remains unchanged.

Note that our model reproduces the structure of the dust cores similar to those observed experimentally under conditions of high-speed collision, corresponding to late stages of evolution of dust particles [7], with $\rho > 2$.

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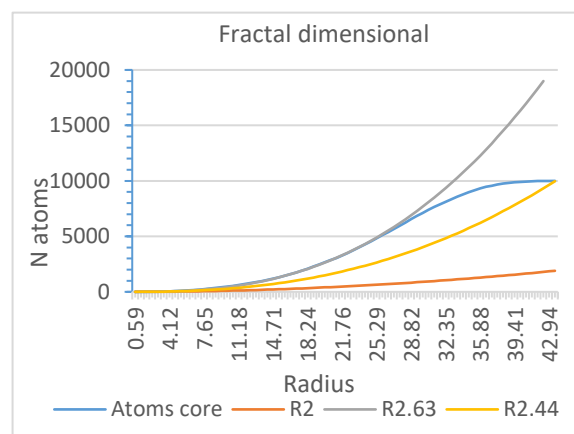


FIGURE 2 – Fractal dimension in the simulation 1.

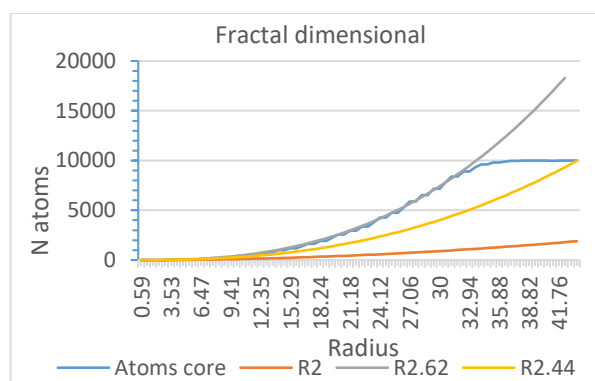


FIGURE 3 – Fractal dimension in the simulation 8.

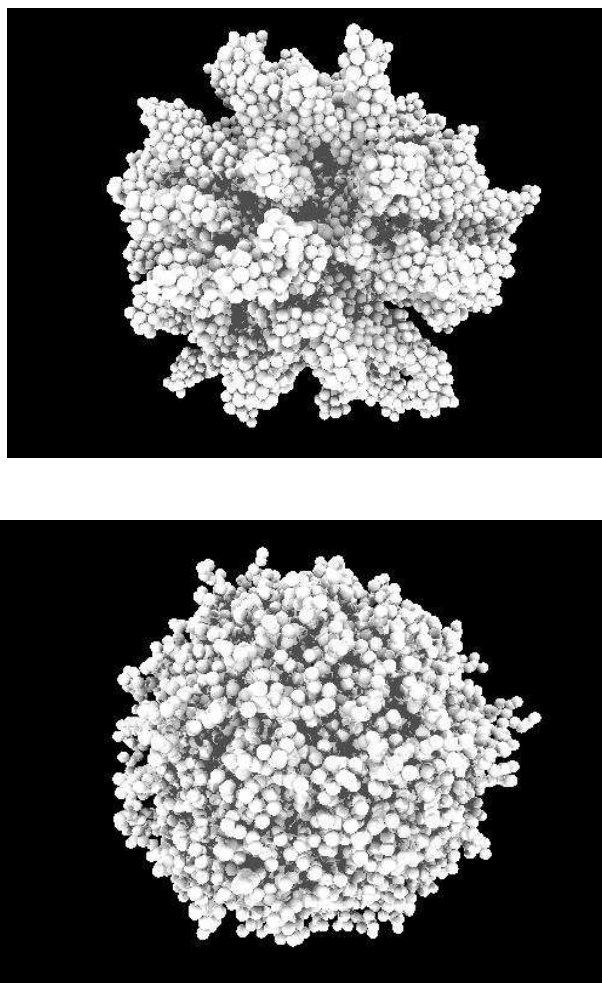


FIGURE 4 – Dust cores in simulation 1 (up) and simulation 8 (down)

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The problem of beam deflection as it propagates through a glass prism. Methodological aspects of teaching

Yelena Kozmina^{1*}, Alytis Gruodis²

¹ISMA University of Applied Science, Riga, Latvia
²Institute of Chemical Physics, Vilnius university, Lithuania

*Corresponding author's e-mail: jelena.kozmina@isma.lv *

Abstract

The problem of the propagation of a light ray through a glass prism, i.e. how to determine the most effective path, belongs to the classical problems of geometrical optics. The function of deviation angle on incident angle was analyzed by means of first derivative method to establish the extremum (minimum). Methodological aspects of teaching include the trigonometric transformations as well as assessment of the conditions.

Keywords: shortest optical way, extremal path, beam deflection.

1 Introduction

The practical application of the prism is very wide: it is used in measuring devices, laser instruments, solar cells, etc. The problem of the propagation of a light ray through a prism belongs to the classical problems of geometrical optics [1-2], namely, how to establish the most effective way (the shortest way, or the fastest way, etc). In a material science, uniaxial crystals can be characterized using the light dispersion phenomena [3].

The deviation angle δ can be determined using Snell's law at two interfaces (air-glass on the left and glass-air on the right) – see Fig. 1. However, the deviation angle δ can be expressed through the incident angle α using a quite complicated function. Studying this function through the first derivative is extremely difficult.

This work is devoted to the methodological aspects of teaching related to the analysis of the prism deviation angle δ on incidence angle α .

2 Dependence of the angle of deviation δ on the angle of incident α

Suppose that the glass prism is present. The deflection angle is denoted by φ , $\varphi \in (0; \pi/2)$, while the index of refraction – by n , $n \geq 1.5$. Beam passes through the prism from left to right (the path is indicated by arrows in Figure 1). Let us assume the air refraction index is $n_1 = 1.0003 \approx 1$.

For the left interface, the angle of deviation is equal to δ_1 , and according to Snell's law,

$$\sin \alpha = n \sin \beta_1 \quad (1)$$

For the right interface, the angle of deviation is equal to δ_2 , and according to Snell's law,

$$\sin \gamma = n \sin \beta_2 \quad (2)$$

Prism vertex angle φ is related to the refractive angles:

$$\varphi = \beta_1 + \beta_2 \quad (3)$$

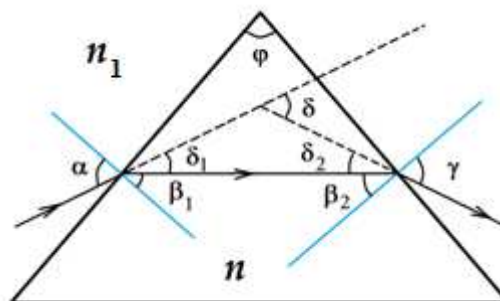


FIGURE 1 Deviation of the light beam by the prism. Vertex angle φ , deviation angle δ .

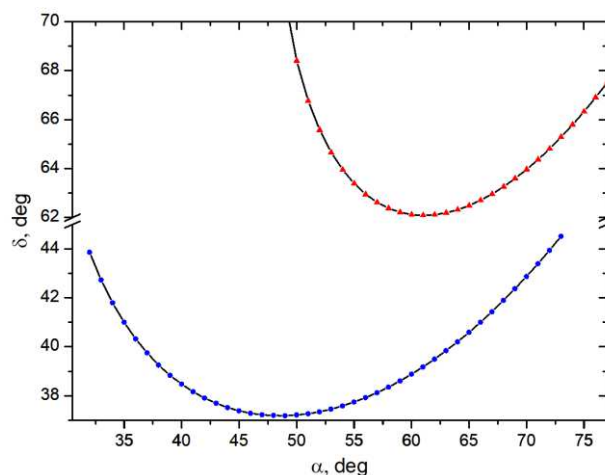


Figure 2 Dependence of the deviation angle δ on incident angle α according to Eq. (5) for different prisms with $\varphi = 60$ deg.

Dots: $n=1.5$ (glass), $\delta(\min)=37.18$ deg at $\alpha_1=48.59$ deg;
 triangles: $n=1.75$ (SF6), $\delta(\min)=62.09$ deg at $\alpha_2=61.05$ deg.

Total beam deviation angle δ is realized due to interactions at left and right interfaces:

$$\delta = \delta_1 + \delta_2 \quad (4)$$

Using dependencies (1) - (4), we can derive $\delta = \delta(\alpha)$:

$$\delta = \alpha + \arcsin\left(n \sin\left(\varphi - \arcsin\frac{\sin \alpha}{n}\right)\right) - \varphi \quad (5)$$

3 Finding the extremum of the function $\delta(\alpha)$

Let's find the derivative of the function $\delta(\alpha)$ and transform it to the form

$$\frac{d}{d\alpha} \delta(\alpha) = 1 - \frac{(\cos \varphi \cdot \sqrt{n^2 - \sin^2 \alpha} + \sin \varphi \cdot \sin \alpha) \cdot \cos \alpha}{\sqrt{n^2 - \sin^2 \alpha} \cdot \sqrt{1 - (\sin \varphi \cdot \sqrt{n^2 - \sin^2 \alpha} - \cos \varphi \cdot \sin \alpha)^2}}. \quad (6)$$

We look for values α at which the derivative $\frac{d}{d\alpha} \delta(\alpha)$ is equal to 0 and get the equation

$$\sin^4 \alpha - n^2 \cdot \sin^2 \alpha + \frac{n^4 \cdot \sin^2 \varphi}{4} = 0. \quad (7)$$

For $\varphi \in (0; \pi/2)$ solutions of this equation are

$$\alpha = \pm \arcsin\left(n \sin \frac{\varphi}{2}\right), \quad \alpha = \pm \arcsin\left(n \cos \frac{\varphi}{2}\right). \quad (8)$$

Considering only $\alpha > 0$ we get $\frac{d}{d\alpha} \delta(\alpha) > 0$, hence the function $\delta(\alpha)$ is increasing, if

$$\alpha > \arcsin\left(n \sin \frac{\varphi}{2}\right). \quad (9)$$

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We get $\frac{d}{d\alpha} \delta(\alpha) < 0$, hence the function $\delta(\alpha)$ is decreasing, if

$$0 < \alpha < \arcsin\left(n \sin \frac{\varphi}{2}\right). \quad (10)$$

It means that the point $\alpha = \arcsin\left(n \sin \frac{\varphi}{2}\right)$ is the point of minima of the function $\delta(\alpha)$ and

$$\delta\left(\arcsin\left(n \sin \frac{\varphi}{2}\right)\right) = 2\arcsin\left(n \sin \frac{\varphi}{2}\right) - \varphi. \quad (11)$$

Note that if $n \geq 1.5$ and $\varphi/2 \in (0; \pi/4)$ then

$$n \cos \frac{\varphi}{2} > 1.5 \cdot \cos \frac{\pi}{4} \geq 1.5 \cdot \frac{\sqrt{2}}{2} > 1, \quad (12)$$

therefore $\arcsin\left(n \cos \frac{\varphi}{2}\right)$ does not exist.

Thus, figure 2 represents the dependence of the deviation angle δ on incident angle α for different prisms with

$\varphi = 60$ deg.

4 Conclusion

The exact formulas for calculating the minimum value of the incident angle and the value of the deviation angle at this point are obtained. Shortest optical way through the prism represents the way parallel to the basis of the prism.

Fluorene-based enamines: quantum chemistry study

Alytis Gruodis*

Institute of Chemical Physics, Vilnius university, Lithuania

*Corresponding author's e-mail: Alytis.Gruodis@ff.vu.lt

Abstract

Quantum chemical simulations of V1237 (fluorene with double left and right 2,5-amino-substituents) were performed using DFT B3LYP/6-31G routine. Establishing of most probable conformers and following simulation of electronic excitation allows to estimate the effectiveness of molecular charge redistribution.

Keywords: fluorene derivative, DFT simulations, molecular charge redistribution.

1 Introduction

This work is aimed to the problem of hybrid organic–inorganic halide perovskite-based solar cells (PSCs). Hole transporting materials (HTM) of high stability and low cost are essential for the reliable operation of layers of PSCs. Several core materials such as fluorenes, carbazoles, pyrenes, etc could be successfully used as HTMs. Simulations of the geometry and electronic excitation of the very promising material V1237 (fluorene with double left and right 2,5-amino-substituents) [1] will be discussed here.

2 Quantum chemical simulations

Quantum chemical calculations of V1237 were performed by means of Gaussian09 software [2] in order to establish the most probable molecular geometry and corresponding absorption spectrum. Density functional theory (DFT) method B3LYP/6-31G was used for geometry optimization. Two most probable conformers (a and b, after ground state geometry optimization) are presented in Fig. S1.

Several typical conformers of both structures could be formed due to following condition. Amino subfragments are formed as quite well expressed π -conjugated fragments: $>C=CH-N^*-CH=C<$ oriented quasi linearly, and this bridge between two oxy-phenyl subsubfragments must be treated as the important factor for fragment displacement in space. Two chains of oxy-phenyl subfragments of left and right fragments could be oriented in shape of upper side roof according to fluorene core (see Fig. 1), but other oxy-phenyl subfragments are oriented chaotically.

3 Molecular charge redistribution

The semiempirical TD method (for singlets only) was used for the simulation of the electronic absorption spectrum. Distributions of electron density for the HOMO as well as the LUMO for **V1237** structures are presented in Fig. 2. Any pure CT charge redistribution behaviour was established. In general, charge redistribution between left and right amino-substituents and central core fluorene unit is typical for both conformers. It is necessary to point out that amino subfragments could play the role of charge

donors as well as charge acceptors, depending on fragment orientation to the central core fluorene unit (a conformer, HOMO→LUMO transition). Also, charge redistribution between amino fragment and fluorene core takes place (b conformer, HOMO-LUMO transition). Due to parallel orientation of the two neighbour oxy-phenyl subsubfragments, pure expressed intramolecular dimmer takes place.

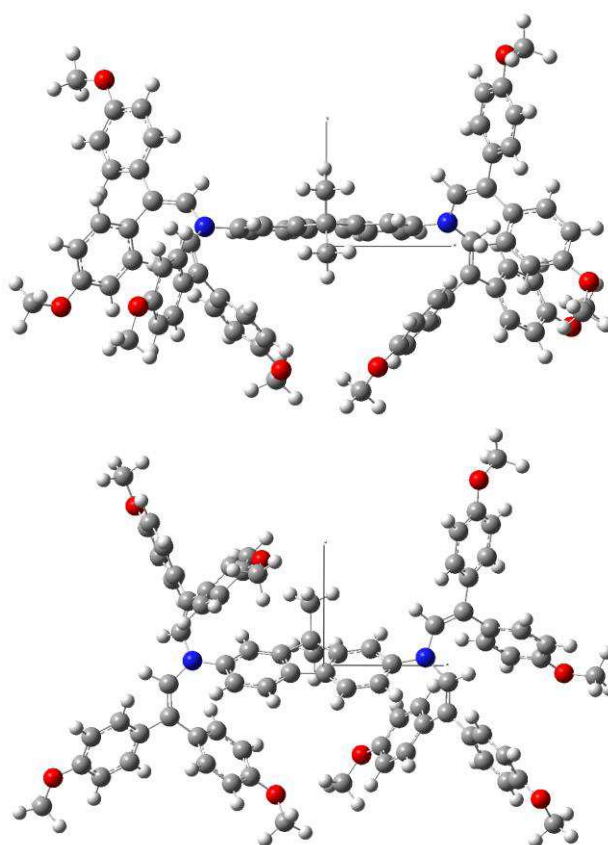


FIGURE 1 Two most probable conformers of V1237: a) top, b) bottom.

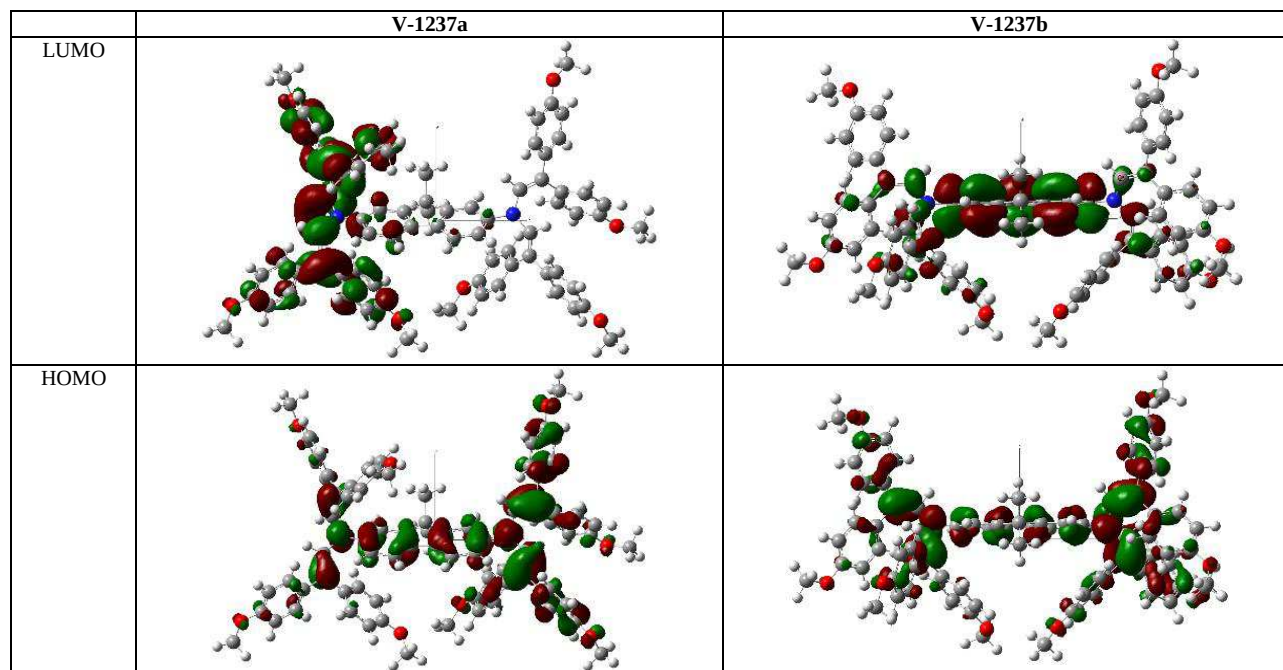


FIGURE 2 **V1237** structure, a and b conformers, XY projection. Distributions of electron density for the HOMO and LUMO.

4 Acknowledgements

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Scientific discourse on the prospects the development of nanomaterials for field emission cathodes

Viktors Gopejenko^{*1,2}, Artis Teilans³

1ISMA University of Applied Science, Latvia

2Ventspils University of Applied Science, Latvia

3Rezekne Academy of Technologies, Latvia

^{*}Corresponding author's e-mail: viktors.gopejenko@isma.lv, artis.teilans@rta.lv



Abstract

The publication is a review of the literature on topical areas of modern science and technology for the production, research and application of nanomaterials for field emission.

Keywords: field emission, nanomaterials, cathode, vacuum, microelectronics.

1 Introduction

Recently, studies of field emission (FE) processes from new types of nanomaterials and structures, which are tip structures with nanometer characteristic dimensions, have attracted considerable interest. The most striking example of such structures are carbon nanotubes. A distinctive feature of nano emitters is the relatively low voltage required for the occurrence of noticeable emission currents. From a practical point of view, multi-emitter field emission cathodes (FEC), which are arrays of pointed nanostructures deposited on various substrates, are especially relevant. Optimization of the parameters of such FEC requires an understanding of the fundamental scientific laws of their work. Along with carbon nanotubes, it is of interest to study FEC based on other nanoscale carbon structures (nanowalls or nanoscale graphite, nanodiamond), as well as nanofibers of oxides of some metals.

2 Research results and discussion

Numerous experimental studies indicate the extremely high efficiency of FEC. At the same time, a fundamental difference is noted between field emission from nanocarbon and from other materials, despite the similarity of their geometric characteristics, work functions, and other parameters that should determine the emission characteristics within the framework of the Fowler-Nordheim model. Therefore, the determination of the potential capabilities of multi-emitter FEC and the search

for ways to increase their stability is one of the urgent scientific and practical problems. An additional circumstance that determines the interest in multi-emitter FEC is the unique mechanical properties (strength, elasticity) of the nanostructures that form them. These properties have a significant effect on their field emission characteristics due to the electromechanical effects that arise when a voltage is applied.

3 Conclusion

Vacuum microdevices, which are based on the phenomenon of field emission and made with the use of microelectronic technologies, represent a new class of microdevices - these are vacuum tubes in microelectronic design.

They combine the advantages of both lamp technology and semiconductor technology, such as:

- small size of elements;
- the ability to integrate and manufacture on a single chip;
- inertia-free (wide frequency range up to 1014 Hz);
- wide range of operating temperatures (more than 500C);
- monoenergeticity of the emitted electrons;

The study of the FEC phenomena is especially important in connection with the prospect of their application in vacuum microelectronic devices and nanoelectromechanical devices of a new type

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Investigation of stratospheric and meteorites origin aerosols as climate impact factors using remote sensing data technologies

Viktors Gopejenko^{*1,2}, Artis Teilans³, Vladimir Korshunov⁴

¹ISMA University of Applied Science, Latvia

²Ventspils University of Applied Science, Latvia

³Rezekne Academy of Technologies, Latvia, Latvia

⁴Research Production Institute "Typhoon", Russia

**Corresponding author's e-mail: viktors.gopejenko@isma.lv, artis.teilans@rta.lv, korshunov@rpatyphoon.ru*



Abstract

The processes taking place in the stratosphere affect the formation of the climate and ecology of planet Earth. In the context of climate changing process understanding, it is important to study the interaction of the stratosphere and troposphere. A special task is to identify the relationship between stratospheric and tropospheric processes, the relationship of stratospheric processes with weather anomalies. In the paper is to present existing methods and results for determining the parameters of the middle atmosphere using of the integrated data from remote space and ground sources. The obtained results are the base for creation the concept framework for the Earth's climate modelling.

Keywords: atmosphere, stratosphere, climate modelling, data processing.

1 Introduction

The dynamic manifestations of the middle layer of the Earth's atmosphere, the stratosphere -the region of the atmosphere between about 12 and 80 km altitude, have a noticeable effect on human life. The processes taking place in the stratosphere affect the formation of the climate and ecology of planet Earth, radio channels, flights of spacecraft, and determine the monitoring capabilities for predicting weather and catastrophic events. In the context of climate changing process understanding, it is important to study the interaction of the stratosphere and troposphere. A special task is to identify the relationship between stratospheric and tropospheric processes, the relationship of stratospheric processes with weather anomalies. For this, systematic long-term measurements are carried out and analyzed, and methods for automatic processing of the measurement results are developed, the statistical characteristics of the measured parameters of the stratosphere are determined in order to increase the monitoring efficiency. A systematic approach to the problem of monitoring various characteristics of the average atmosphere should include both global monitoring tools using space-based devices and ground-based measurements.

2 Methodology

Wave disturbances of the middle atmosphere such as inertial-gravitational and gravitational waves play an important role in the dynamics of the middle atmosphere, since they initiate the transfer of energy and momentum from the troposphere to the stratosphere. Knowledge of the

characteristics of wave disturbances in the middle atmosphere is necessary for their adequate parameterization in dynamic and climatic models. According to lidar measurements, wave disturbances in the middle atmosphere can be identified from the results of relative fluctuations in temperature or atmospheric density. The vertical profiles of temperature of middle atmosphere (30–60 km) are derived from data of lidar sensing at 355 and 532 nm wavelengths using a modified Rayleigh method.

3 Research results and discussion

In the paper is to present existing methods and results for determining the parameters of the middle atmosphere using of the integrated data from remote space and ground sources:

- ground lidar sounding data at wavelengths of 308, 355 and 532 nm
- data of Sentinel-5 Precursor mission of the Copernicus Programme with instrument is an ultraviolet, visible, near and short-wavelength infrared spectrometer called Tropomi.

4 Conclusion

The present existing methods and obtained results for determining the parameters of the middle atmosphere are base for creation the concept of integrated platform for calculating and evaluating the characteristics of the middle atmosphere (troposphere, stratosphere) that affect the Earth's climate.

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Powerful reputation management mechanism in federated cloud.

Rajendra Kakani

ISMA University, Latvia

Corresponding author's e-mail: kakanirajendra.84@gmail.com



Abstract

Now a days Cloud computing plays a vital role to access storage, servers and databases. Cloud resources are accessible for lease. Computational services provides a cost efficacious solution to virtual network requirements, low trust on the rented resources restrict malicious users from using it. In order to reduce the cost, resources are shared, i.e., there persist multi-tenancy. As the connection channels and other computational resources are allocated, it creates security and privacy issues. A user may not recognize a trustworthy co-tenant as the users are anonymous. The user depends on the Cloud Provider (CP) to assign trustworthy co-tenants.

Keywords: Federated cloud, multi tenancy, cloud provider.

1 Introduction

A Federated Cloud is the distribution and management of many external and internal computing services such as shared resources to match business needs [1]. A federation is the merging of many smaller parts that execute a common action. Federation of cloud refers to the unification of software, infrastructure and platform services from networks that can be administrating by a client via internet.

A federated cloud (community cloud) [2] is established by contributions from several cloud providers and a virtual network request may be contended by more than one cloud provider.

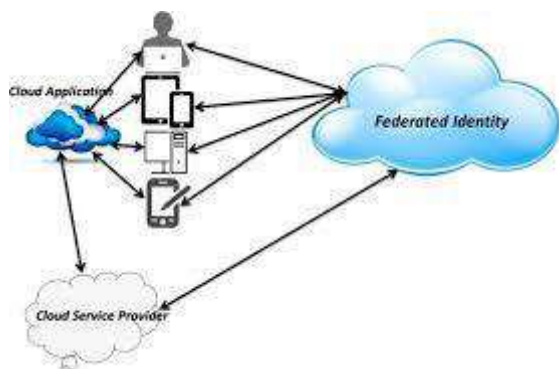


FIGURE 1 Federated Cloud

In a federated cloud, a Cloud provider threats its own reputation as it shares its resources with other CPs (a virtual network request may comprise over the resources owned by several CPs). Here the problem in a virtual network may originates from the physical resources owned by other CPs. Most of the clients place their data in the cloud. Correctness of data and security is main concern [3]. Security issues prevent the users from acquiring cloud computing. To develop user's trust on Cloud Providers (CPs), the prominence of the CPs can be used as it helps users to choose relevant CP. A reputation management mechanism

(RMM) goal is to take into account of the malicious and selfish behaviours of CPs and reflect this on their reputation. In this study, we propose a robust Powerful RMM in the federated cloud which focus on multi-tenancy. In a multi-tenancy cloud, the user rely on the CP for reliable co-tenants to assign good co-tenants to a good user.

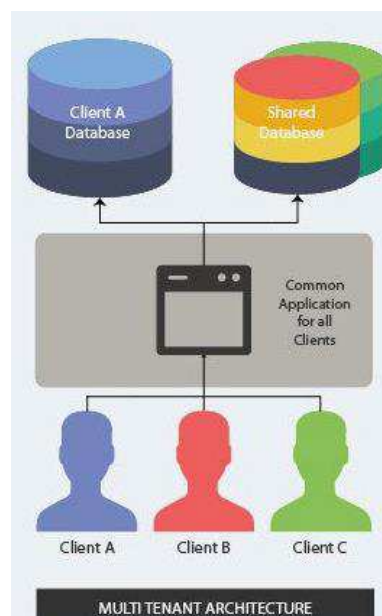


FIGURE 2 Multitenancy Architecture

In the above figure 2 it shows that many customers can use the single cloud provider at the same time. Each tenant data is isolated and remains invisible to the other tenants.

2 Overview

Briefly our powerful RMM works as follows:

- 1) First, Each CP differentiate malicious users from good users and it should allocate resources to them

such that the following holds:

- a) It must not allow any malicious user to become a co-tenant of a good user.
 - b) It may allow malicious users to share resources among themselves.
- 2) Cloud providers share information about multi tenancies.
 - 3) Each CP reports the behaviour of users to the RMM.
 - 4) A CP's reputation is increased if the reputations of the users in each group of multi-tenant users are consistent, i.e, either their reputations increase or decrease.

The advantage is it allows maximum co-tenancy irrespective of the behaviours of users.

3 Decision

Cloud provides the benefits of scalability, elasticity and on-demand allocation of resources, which pushes the multi-tenant architecture to the next level. Multitenancy enables users to share resources with securing data. Cloud provider

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differentiate good and bad users. It assigns good user to another good user but it did not assign good user to bad user (malicious user). In this way it secures data, and threats. So that every customer can use safely the cloud.

4 Conclusion

Multi tenancy makes cloud computing affordable but it also introduces new risk from malicious co-tenants. A user depends on the CP for allocation of safe co-tenants. The main aim is to encourage CPs to make correct segmentation among good and malicious users, i.e., a good user gets only other good users as cotenants.

The existing RMMs for cloud computing does not consider this criteria to estimate reputation of the CPs. The existing RMMs for cloud computing use traditional aggregation of feedback from users to rate the CPs. In this paper we have developed a unique powerful RMM that encourages CPs to differentiate between good and malicious users and assign resources in such a way that they do not share resources.

Developing a prediction model for prognosis of COVID-19: Critical data analysis and mortality risk prevention.

Manoj Reddy Pannala*, Viktors Gopejenko

ISMA University of Applied Science, Latvia

* Corresponding author's e-mail: manojpannala@outlook.com



Abstract

The outbreak of novel Coronavirus (COVID-19), which was caused by SARS (Severe Acute Respiratory Syndrome) which is now named SAR-CoV-2 which affected more than one-third of the world's population, which is now considered as the global pandemic. Since the growth at an increased pace of the spreading of the virus, there is neither effective treatment nor a vaccine with little or no side effects nor well-established clinical research or management to cure or eradicate the virus. To endure the risk of reducing the mortality rate and to predict the age threshold at which there is a high chance of mortality risk even after vaccination in the European countries. There is a need for more detailed knowledge required for reducing the mortality rate which will be useful for the healthcare workers in providing better management. To provide a prediction model based on data gathered from vaccination reports, considering the factors: age, immunity, previous medical conditions. Providing an analysis of vaccines from different countries and their success rate and adherence side effects if any. To create a prediction model for the types of vaccines to use for the specific category of people based on the factors using simulations on VENSIM and machine learning prediction models.

Keywords: data analysis, VENSIM, machine learning

1 Introduction

The first outbreak occurred in December 2019, a pneumonia-like virus was detected in Wuhan (Hubei, China), and caused by a novel coronavirus namely severe acute respiratory syndrome coronavirus 2 which is now named SARS-CoV-2. Since the advent of the outbreak of the COVID-19 virus more than 110 million cases were registered around the globe with more than 2 million death cases. Since then, the public health responses have been working tirelessly in containing and reducing the rate at which the disease is being spread in several countries.

With the growth at the increased pace of the spreading of the virus, there is neither effective treatment nor a vaccine with little or no side effects nor well-established clinical research or management to cure or eradicate the virus. To endure the risk of reducing the mortality rate and to predict the age threshold at which there is a high chance of mortality risk even after vaccination in the European countries. There is a need for more detailed knowledge required for reducing the mortality rate which will be useful for the healthcare workers in providing better management.

Many countries have worked tirelessly in developing a vaccine for the virus. Pfizer/BioNTech, Covaxin, Moderna, and Oxford-AstraZeneca are among the first to have successfully passed the testing phase.

Figure 1 (Data, 2021) [4] shows the daily doses given to people in different countries.

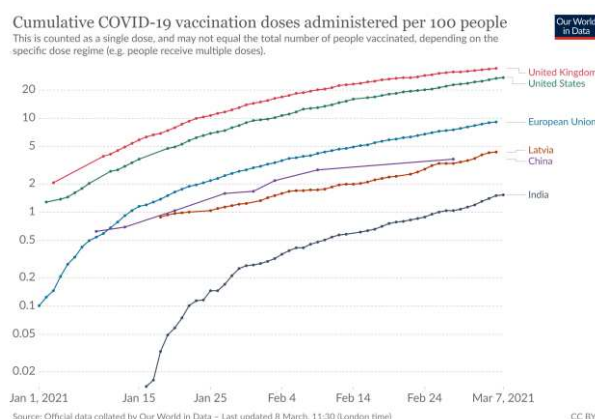


FIGURE 1 COVID-19 Vaccination Doses Administered

There is a need for more detailed knowledge required for reducing the mortality rate which will be useful for the healthcare workers in providing better management. Implement a prediction model based on data gathered from vaccination reports, considering the factors: age, immunity, previous medical conditions. Performing analysis of vaccines from different countries and their success rate and adhere side effects if any and create a prediction model for the types of vaccines to use for the specific category of people based on the factors using simulations on VENSIM and machine learning prediction models.

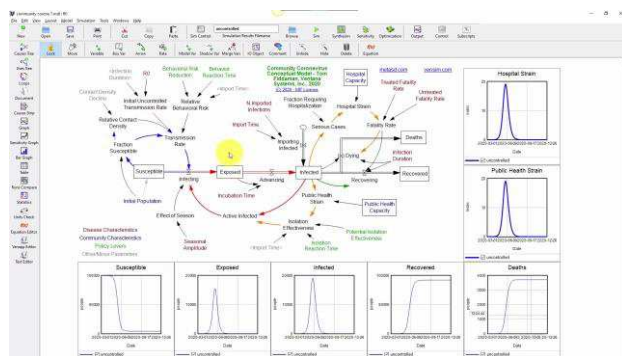


FIGURE 2 VENSIM Classic SIR Epidemic Model

Figure 2 (Vensim Epidemic, n.d.) [5] demonstrates the VENSIM classic SIR epidemic model from basic components, illustrates some VENSIM features, and some System Dynamics concepts of growth, equilibrium, and loop dominance (Vensim Epidemic, n.d.) for a better understanding of the prediction model for achieving faster and utmost reliable prognosis results for clinical.

2 Overview

This work discusses the scenarios for providing vaccination to the people based on the following issues:

- Gathering the data based on the countries with age threshold.
- Vaccination issued within the countries and people who had side effects with the vaccination.
- Different age groups, previous failing health issues may require a different dosage of vaccine.
- Machine Learning Prediction models.
- VENSIM classic SIR epidemic model.

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3 Decision

Using a set of open-source technologies we will be creating a Prediction model based on vaccination for different age groups/immunity rates. Taking this even further by analyzing different vaccines from different countries and their success rate helps to separate the types of vaccines used to cure a specific category of people (prediction model). Technically we will be using the different Machine learning models to predict the vaccine types and dosages required for a different set of people, depending on the different types of scenarios on the Streamlit API. Further, we will be simulating the VENSIM (Ventana Systems, Inc.)

Classic SIR epidemic model from basic components, illustrates some VENSIM features, and some System Dynamics concepts of growth, equilibrium, and loop dominance (Vensim Epidemic, n.d.) for a better understanding of the prediction model for achieving faster and utmost reliable prognosis results for clinical.

4 Conclusion

Developing a prediction model for prognosis of COVID-19 using Machine Learning model and VENSIM simulations based on the data analysis. The data analysis is based on vaccination for different age groups, immunity rate and their previous health history by data analysis of different vaccines from different vaccine manufactures and their success rate, side-effects, and understanding the previous health records of the patients.

This simulation would better yield the purpose of the vaccine beyond its significant performance and reduce the mortality rate by using the data efficiently and reducing the mortality rate which will be useful for the healthcare workers in providing better management.

Analysis of Different Software Testing Techniques

Nikunj Patel*, Viktors Gopejenko

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: patelnikunj2233@gmail.com*



Abstract

A Software testing is an activity which is expected for gauge include or a capacity of a program and assurance that it meets the important impact. Programming delivered won't ever be impeccable without being tried and endorsed. This causes us to find a method for testing disguised bugs at various stages by a prevalent strategy. Testing is a methodology where we can spot disguised bugs, code shortcomings or any unused code in certain product. Right now, there are heaps of methods being utilized for testing issues in programming; among them, most capable procedures for testing programming are discovery trying, white-box testing, and dark box testing. In sort to take testing, by means of different methods includes extraordinary utilization of assets and time. Numerous strategies have brought about duplication of exertion since they find similar sort of deficiencies. For this expectation, proper choice of testing methods is fundamental. So there is needed to assess testing strategies. The greater part of the observational investigation had performed to assess programming testing methods regarding precision and effectiveness. In this paper, we have outlined and looked at the three generally normal and habitually utilized programming testing procedures for finding mistakes; they are white-box testing, discovery testing, and dim box testing.

Keyword- Software Testing; Black Box Testing, Grey Box Testing, White Box Testing

1 Introduction:

The significance of testing as indicated by ANSI/IEEE-1059 standard is that trying is the method of investigate a product module to detect the distinctions among existing and vital conditions (that is surrenders/blunders/bugs) and to evaluate the highlights of programming thing. The point of testing is check, affirmation (approval) and flaw finding to get issues – and the expectation of administering those issues is to sort them out. Programming testing is one of the major and essential procedures for accomplishing top notch programming [1]. Programming testing is prepared to spot presence of deficiencies, which cause programming breakdown. Notwithstanding, programming testing is a tedious and costly occupation. Programming testing is the significant phase of SDLC. While creating programming, programming testing costs between 20% to 40% of everything of programming advancement. The fundamental goal of testing is to spot deficiencies and disappointments that happened being developed and to ensure that product is sans bug [2]. Ill-advised and lacking testing has come about numerous social issues, monetary issues and programming related issues. To test the framework thoroughly is one such arrangement, yet with restricted assets, time and cash, it isn't pragmatic. For this reason, fitting choice of testing strategies is significant, so it is conceivable to pick successful testing methods. To get adequate data with respect to how well they do? How much source they abuse, and rely upon boundaries that they have mulled over, is troublesome [3]. In sort to bring out testing, utilizing various strategies, includes extreme utilization of assets and time. Numerous procedures have brought about replication of endeavors since they find same sort of issues. Consequently, there is need to survey

testing methods. The majority of the examinations directed to appraise programming testing. To perceive which testing technique is reasonable and having the suitable data worried to proficiency and pace of testing and assets of testing in such are trying plan.

Programming testing is significant action in Software Development-Life-Cycle. Programming testing is the methodology of evaluate the usefulness and appropriateness of a program through execution or study. Programming testing is a technique for confirming and approving that a product application or program meets the business and logical prerequisites that guided its plan and advancement and functions as anticipated and furthermore distinguishes fundamental blunders or blemishes sorted according to the seriousness level in the application that should be set. The entire work separated into four sections. The underlying portion shows the connected work done in the field of examination, Second part exhibits the investigation methodology and stream of exploration to get a result, third it is a most basic piece of the paper that show the disclosures of exploration work and last part exhibit the finish of our work.

2 Related Work:

Testing Technology – There are various trying methods however we disk just some significant procedures in this paper they are:- Dark Box/Black-Box Testing will be trying with no data of the inward instrument of the product under test. Otherwise called utilitarian testing or information yield driven testing. A product testing technique whereby the internal system of the thing being tried are not known by the analyzer is called discovery testing. Discovery testing

regards the product as a "Black Box" – with no data of inward working and it just checks the fundamental parts of the framework. While performing discovery testing, an analyzer should realize the framework plan and won't approach the source code.

White-Box: White-Box testing dependent on an investigation of internal working and construction of a segment of the product. White-Box testing is the methodology of giving the contribution to the framework and investigation how the framework cycles to encourage contribution to deliver the fundamental yield. It is urgent for an analyzer to have the total data of the source code. White-Box testing is important at coordination, unit and framework levels of the product testing strategy. In white-Box testing, one can be sure that all parts through the test things are effectively performed.

Grey-Box testing is likewise distinguishing as clear testing. It mixes of discovery testing and white-box testing. An analyzer will have restricted data of inward construction/rationale. It builds the territory of testing by zeroing in on all perplexing framework's layers by mixing all current black-box and whitebox testing. An analyzer can check both the yield and the interaction that prompts yield. It is valuable to most testing stages, basically in coordination testing.

Head of Testing – Testing an application can just uncover that at least one shortcomings stay alive in the application, in any case, testing alone can't demonstrate that the application is sans issue. Subsequently, it is fundamental to propose experiments which find whatever number blames as would be prudent.

1. Testing should be founded on the customer prerequisites.
2. Testing time and assets are restricted.
3. Top to bottom testing is unimaginable.
4. Utilize successful assets to test.
5. Testing arranging ought to be done early.
6. Testing should start in little and progress in huge.
7. Testing should be completed by an alternate testing group or outside group.
8. All tests ought to be as per client necessities.
9. Allot the best individual for testing.
10. The test ought to be intended to show programming absconds and not their nonattendance.
11. Set up the test reports including experiments and test results to sum up the consequence of testing.
12. Advance test arranging is should be refreshed convenient.
13. Testing activities should start as ahead of schedule as conceivable in the product or framework improvement life cycle and should be focusing on characterized destinations.
14. Imperfection gathering alludes to few section contain the greater part of the deficiencies uncovered through executing testing, or are answerable for the most operational disappointment.

3 Methodology:

The examination explores different programming testing

methods in programming Development strategy. And furthermore break down that what how the testing approach is affected and give a fitting outcome. This will assist us with underscoring the meaning of testing procedures. To accomplish our proposal point, we utilized insightful and observational investigations. Observational examination will be done through the data accumulated through different information sources and scientific investigation is made through the content Analysis on different exploration articles identified with our branch of knowledge. Lastly the steady near strategy is utilized to contrast the Empirical discoveries and the realities find from our logical finding. These Analysis and examination considers are prompts find different testing strategies Issues in programming improvement In this exploration report Show the near investigation of the three testing methods. Albeit the analyzer can't actualize all the testing method in collect and produce the immediate impact of the task. Since the time, cost, precision, exertion and bug recognition rate are the significant imperatives for the testing. We relatively break down the three testing procedures and on the review study, it has discovered that some information that show underneath –

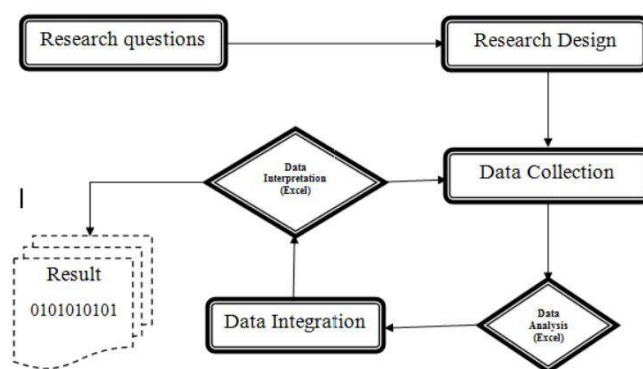


Table1. Comparative Table

Keys/Methodology	Black Box	White box	Grey Box
Accuracy	81.6%	88.4%	91.6%
Bug Detection	18.40%	20.40%	23.00%
Efforts taken to test	08.40%	11.40%	18.40%
Time taken to test	38min	50min	54min
Cost	8.0%	10.0%	18%

4 Conclusion:

To close our study, we get back to the issue that how to get an appropriate procedure to test a product framework and discover blunders. In any case, it is truly unrealistic to discover all the blunders in the program. Subsequently, the significant inquiry emerges, which procedures we would embrace to test. For this reason, we have taken and dissected various testing methods. At long last, the aftereffects of the investigation have been introduced. The significant ends are that our present testing strategy information is extremely restricted and depends on impressions and discernments, however as indicated by the Survey result and perception there are some outcome closed, that are recorded beneath. Gray-Box testing gives the more precise outcome as

contrast with different procedures. Gray-Box testing gets more bugs when contrasted with different procedures. Black-Box testing requires least exertion to test an

experiment as contrast with different procedures. Black-Box testing sets aside least effort to test an experiment as contrast with different strategies.

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A Processing Model on Big Data for Ecommerce Sites

Shithi Srivatsav*, Viktors Gopejenko

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: shithi.srivastav@gmail.com



Abstract

We are in the digital era where every day to day traditional task such as sending a letter, watching a movie, reading a book and shopping etc., have been digitalised in last two decades. The impact of digitalization has been seen in all the aspects of the modern-day life. The impact of digitalization is clearly noted across all the industries and the traditional industries started to move from regular “Brick and mortar industry” to “digital industries.” All the digital industries completely depend on data, its generation, integration, analysis and reporting.

Data mining technology is very useful for analyzing customer reviews on e-commerce sites. The main purpose of the project is to characterize and predict “early reviewers” to increase product sales. Early product reviews often have a significant impact on subsequent product sales. Users who comment early are considered early commentators.

Keywords: Big data, data mining technology, early reviewers, early commentators, data sets.

1 Introduction

E-commerce is a fast-growing digital business with a lot of potential in future. E-commerce industry has to maintain its efficiency with increasing size of its environment. It requires advanced technology, robust tools and programming techniques to maintain the required efficiency. Before making an informed purchasing decision, online reviews have become an important source of information for the users. The product life cycle is divided into three phases, such as early stage, majority and backward. Early product reviews often have a significant impact on subsequent product sales. Users who comment early are considered early commentators. Identifying early reviewers helps monitor and manage early promotions, and early reviewers are likely to be actual adopters of the product so they can buy directly.

There are two important reasons to predict early reviewers, they tend to award higher average ratings. Early reviewer tends to post more helpful comments. First prepare the data to delete unnecessary data. The second is the detection and deletion of spammers. This is the process of deleting all irrelevant comments. This is part of the data cleansing process.

Next is the statistical analysis process, which is the process of analyzing the number of users and the number of early comments submitted by the users. Finally, the feature of comments is that they can predict early commentators.

2 Objective

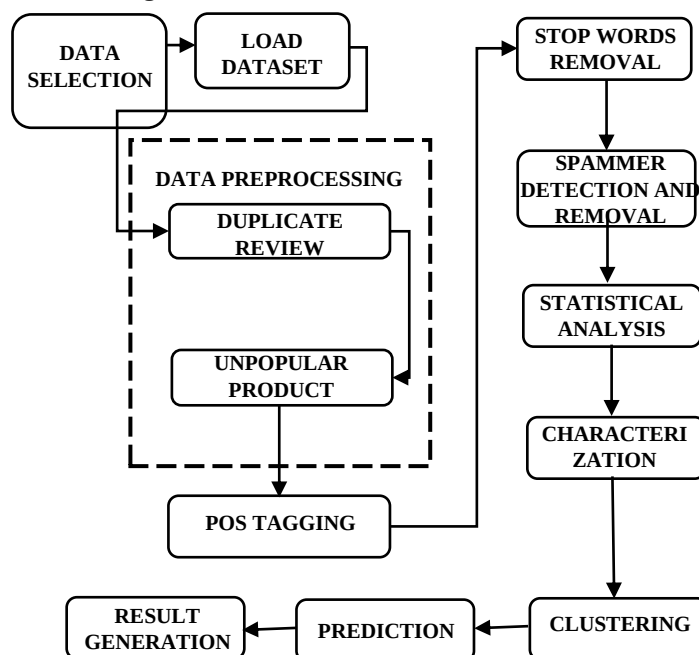
- Analyze user comments to increase product output.
- The analysis of product reviews also shows that the ratings of early reviewers and the help scores they receive can affect the popularity of the product.
- The main goal is to increase the product's visibility

and sales.

3 Proposed System

We focus on characterizing early comments and detecting early commentators, which is different from the existing work of extracting opinions from comment data or determining goals (or holders) of opinions. As far as we know, this is the first time that early reviewers have been analyzed and found on Amazon, a data set for e-commerce review in the real world. This project will effectively characterize and predict early reviewers of the Amazon dataset.

4 Flow Diagram



5 Overview

DATA SELECTION AND LOADING

- Data mining techniques are part of the business intelligence domain and apply specific algorithms to discover hidden patterns and relationships in large data sets.
- An e-commerce website is an open system where almost any customer behaviour is possible.
- Here we have loaded the web server logs into the database for further proceedings.

DATA PRE-PROCESSING

- The data is pre-processed to remove reviews from anonymous users, since we would like to associate each review with a unique user.
- We then remove duplicate reviews often caused by multiple versions of the same product. We also remove inactive users and unpopular products:
- we only keep the users who have posted at least ten and five reviews, and products which have received at least ten and five reviews in Amazon datasets

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respectively.

REVIEW SPAMMER DETECTION AND REMOVAL

- It's a process of detecting and removing spammer reviews.
- It is possible that spam reviews are posted to give biased or false opinions on some products to influence the consumers' perception of the products by directly or
- indirectly inflating or damaging the product's reputation.

RESULT GENERATION

The final report will be generated based on the overall reviews of the Early Reviewers.

6 Conclusion

In this paper, we have studied the novel task of early reviewer characterization and prediction on one real-world online review datasets (Amazon). It will effectively predict the early reviewers.

Ruler and compass constructions

Alexandr Kovantsov, Alexander Samsonovich

Riga Technical University



Abstract

This work focuses on creating new graphs from the given function graph using only simple tools like a ruler and a compass and planimetry formulas to find graphs of $f^{2^k}(x)$ and $f^{\frac{1}{2^k}}(x)$ where $k \in \mathbb{N}$ and $f^n(x)$ where $n \in \mathbb{Z}$.

Keywords: function graphs, right triangle, intersecting chord theorem, intersecting tangent - secant theorem, similarity of triangles

1 Content

A lot of difficult math problems can be broken down to a simple one. The same principle can be applied to find complex function graphs using only a plain school geometry with a ruler and a compass and without any analytical and algebraic solution. The process of creating this kind of constructions allow to imagine how ancient mathematicians were able to create different function graphs from a given one. In this work such theorems like intersecting tangent-secant, intersecting chord theorems and similarities of triangles will play a big role to obtain new function graphs. All the figures are done with the help of **GeoGebra**¹. This work expands the research of the [4] paper. Given the graph of an arbitrary function $y = f(x)$, it is possible to create graphs of the functions $f^{2^k}(x)$ and $f^{\frac{1}{2^k}}(x)$ where $k \in \mathbb{N}$ and $f^n(x)$ where $n \in \mathbb{Z}$, using only a compass and a ruler. Although it is possible to say that $f^{2^k}(x)$ is the same as $f^{\frac{1}{2^k}}(x)$ when $k < 0$, however methods for getting those two functions are different.

To obtain $f^{2^k}(x)$, we found that intersecting chord theorem can be used.

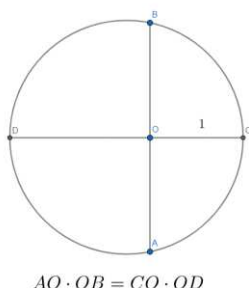


FIGURE 1 Formula and visualization of intersecting chord theorem.
 Segment $CO = 1$.

If there are segments AO and OB with a length of $f(x_0)$, where x_0 is an arbitrary point on the graph, then $f^2(x_0)$ can be found, since $CO = 1$, then $AO \cdot OB = CO \cdot OD \Rightarrow f(x_0) \cdot f(x_0) = 1 \cdot OD \Rightarrow OD = f^2(x_0)$. This procedure can be repeated with a new obtained $f^2(x_0)$ to get $f^4(x_0), f^8(x_0), \dots, f^{2^k}(x_0)$ after $k \in \mathbb{N}$ iterations.

To obtain $f^{\frac{1}{2^k}}(x)$, we found that the formula for calculating a length of a height to a hypotenuse can be used.

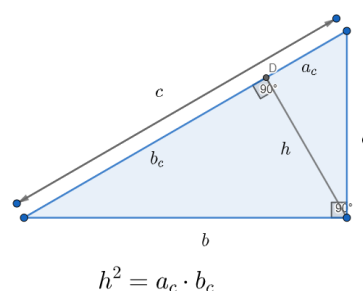


FIGURE 2 The formula $h^2 = a_c \cdot b_c$ for calculating the height to the hypotenuse.

In the formula it is possible to take square root from both sides and to set one side to be a unit segment, that is to be the length of 1. Then formula is converted to a form:

$$h = \sqrt{a_c}$$

Thus, a segment with a length of a square root can be obtained. If the process is repeated with a new received segment, it is possible to get segments with the lengths $f^{1/4}(x_0), f^{1/8}(x_0), \dots, f^{1/2^k}(x_0)$, after $k \in \mathbb{N}$ iterations of the same process.

Several methods can be applied to obtain $f^n(x_0)$ where $n \in \mathbb{Z}$. First, intersecting tangent-secant theorem.

¹ <https://www.geogebra.org/>

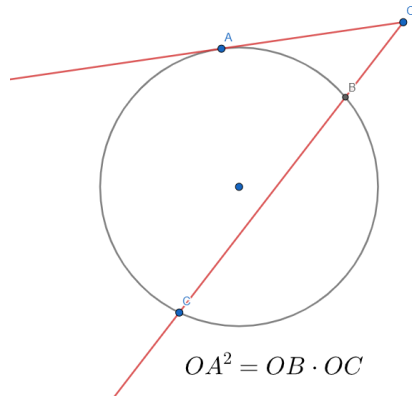


FIGURE 3 Formula of intersecting tangent-secant theorem

Using this theorem is easy to note that arbitrary segment with the length of $f(x_0)$ can be taken to the power of 2 if OB or OC will be equal to 1. However, combining this method and the second one (FIGURE 2), it can be shown that the segment $f(x_0)$ of any power $n \in \mathbb{Z}$ can be drawn.

The second approach uses similarities of triangles.

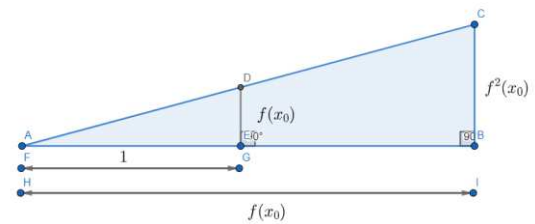


FIGURE 4 Right $\triangle ABC$ is used to obtain $f^2(x_0)$, when $f(x_0) > 1$.

We have shown that if there are 2 right triangles and one side is a unit segment. Then combining segments of $f(x_0)$ of even and odd powers, for example $f(x_0)$ and $f^2(x_0)$ to get $f^3(x_0)$, it is possible to create the segment $f^n(x_0)$ of any $n \in \mathbb{Z}$ power.

However, both these methods of obtaining $f^n(x_0)$ have different solutions when $0 < f(x_0) < 1$ and when $f(x_0) > 1$.

We have also concluded that the first method of intersecting tangent-secant theorem is not as efficient as using similarities of triangles to receive $f^n(x_0)$.

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Mobile Security: Analysis and Challenges of information

Venkata Mukesh Marabathuni*, Viktors Gopejenko

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: mukeshmarabathuni@gmail.com



Abstract

Now-a-days smart mobile usage has rapidly been increasing among the users. The scientific papers on this mobile security are of great demand. This study focuses on what type of issues the users are facing while exploring mobile usage. So many vulnerabilities are known to exist in security principles. Also, mobile users give accidental permissions to applications. Even mobile applications consist of bugs which can expose their confidential data. That is why this paper gives some fundamental principles of issues like threats and risks which users face in their daily mobile usage. A clear view on overcoming these problems and business strategies of companies is discussed.

Keywords: mobile security, apk, application development, app permissions, malware

1 Introduction

The most used electronic gadget in this current era is smart mobile. Not only a general user but also business administrators are vital to get exposed to data breach. Not only smart mobiles are granted with specific benefits but also high risk of exposing their confidential information.

The widely used mobile operating systems are Android and iOS. There were days where windows mobile operating system and blackberry operating system used to compete with android and ios after Symbian era. Though they had popular reputation for their OS security, they lack in their application development which led to discontinue those platforms. So android and ios are major operation systems in the market.

The research questions are defined as:

- What are the types of attacks in mobile security?
- How to overcome from these attacks?
- What tools and methods could be used for defense?
- What is process of downloading an application and granting permissions?

For suppose, a mobile is lost then information which stored on it can also be lost. There is a high chance of inspecting malware into the mobile thereby extracting data which is store on it. This is why high encryption is needed to unlock the device. Another feature is called Remote Swipe which is a good practice to erase the data stored on device by just swiping remotely.

When it comes to android, applications are directed installed from play store but there are some websites where apk can be modded to access paid app or subscription for free. If that apk is downloaded from unknown source and installed on mobile device, then there is a high risk of exposing data as application can access user permission. So, app permissions are always need to be checked after while using app. Even secured apps from stores might contain bugs thereby app needed to be updated for its next update. Application development is a major task for a developer as

one should be careful while writing cod to not expose general bugs for exploiters. Rooting android mobiles can expose high risk of data theft as it is unprotected process. Popups in browser should not be redirected to unknown websites.

A virtual private network VPN is required while using mobile from unknown networks. It's better to spoof or hide IP addresses. For example, using Cloudflare Warp is very essential for every user as it hides DNS queries of user.

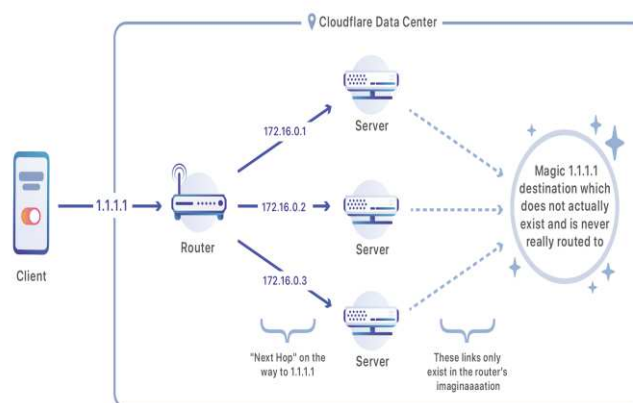


FIGURE 1 Data manipulated securely by Cloudflare

Bluetooth is also a major risk in mobile security. Hackers are known to use high range antennas to access this short-range personal area network. Even Bluetooth headsets are risky as hackers can eavesdrop user conversation. So, it's better to disable when Bluetooth is not in use. Even Near Field Communication NFC is a risky usage as unknown person can spy on mobile payment and therefore at least password should be used to secure any contactless payment.

2 Overview

Mobile usage has become a common part in human lifestyle. The confidential information is being exposed to hackers either intentionally or unintentionally. Fundamental security principles are needed while using a mobile. Cybercrime is well known attack where cybercriminals access employee's mobile device apps or any sources and then use this chance as a gateway to hack enterprise to demand their needs. Application development should be audited and to restrict unknown apps in their store. Encrypted messaging platforms should be used like Wickr.

3 Decision

A secured connection establishment is required in mobile security. There should be configured VPN protocols while using mobile. TLS/SSL connection must be checked while accessing websites in a browser. Blocking any strange SMS

could be beneficial from phishing attacks. The research not only discussed features of mobile device but also threats that pose to mobile security and to overcome those issues Social Engineering is the major focused security as users are psychologically manipulated into data leakage. Strict data protection rules should be followed like General Data Protection Regulation so that sensitive information access can be limited.

4 Conclusion

The research paper came to conclude that smart mobile users are unaware of losing their data. Because of their lack of care, they are facing mobile security challenges. Not only downloading applications from unknown sources even granting unnecessary permissions can expose their data. Personal files are should be uploaded to trusted cloud services thereby protecting the risk of formatting device. The device should get quality system updates.

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Straightedge and compass: constructions of arithmetic operations with function values by means of elementary geometry

Alexandr Kovantsov, Agata Kuznecova, Klara Kuznecova

Riga Technical University



Abstract

The thesis offers a new outlook on the traditional arithmetic operations by graphically depicting addition, subtraction, multiplication, division, extraction of roots and exponentiation of functional values, applying the properties of elementary geometry and using compass and ruler without gridlines as instruments in the process of construction. Newly developed methods of geometric transformations or proofs of the impossibility of certain constructions as the result of research work broaden the perception of the arithmetic operations, showcase the bond between algebra and geometry [3][9], reflect on the progress made in the development of the mathematics, highlight the importance of geometric properties, and encourage future research regarding the graphic depiction of arithmetic operations.

Keywords: arithmetic operations with functions, geometry, unit segment, compass and ruler construction.

1 Introduction

The in-depth research of arithmetic operations is beneficial for solving advanced math problems. The idea of viewing such basic mathematics operations as addition, subtraction, multiplication, division, extraction of roots and exponentiation through geometric constructions, that way combining two major chapters of mathematics - algebra and geometry, is relatively new, however, graphically depicting traditional arithmetic operations with functional values aids in understanding both the basis of Euclidean geometry and arithmetic.

The descriptions and analysis of postulates and theorems by mathematicians of Ancient Greece [1] provide an outlook on the development of mathematics as science. The construction of graphs of functions relying only on compass and ruler without gridlines or straightedge as instruments in the process [2] provides an example of innovative use of theorems of elementary geometry. The use of compass and ruler without gridlines in geometric constructions implies to base the construction algorithm on Euclidean geometry principles.

The examination of related works [4][7][8] aimed the study to develop unique methods of graphical depiction of the traditional arithmetic operations with functional values by applying the properties of elementary geometry and using compass and ruler without gridlines as instruments in the process of construction, provide step-by-step descriptions as well as evaluate and prove the possibility of each method. The research results not only offer an original interpretation of the basis of Euclidean geometry but can be further used as a concise learning material when acquiring methods of complicated problem solutions in mathematics.

2 Methods

The research comprised of examining an arbitrary graph of function $f(x)$, selecting a unit segment, and eventually elaborating construction algorithms for the graphical depiction of the addition, subtraction, multiplication, division, extraction of roots and exponentiation of the functional values. Each method was presented visually along with a detailed description of consecutive constructions supported by the theorems of elementary geometry. The possibility of constructing the graph of function for certain operation using only compass and ruler without gridlines was proven through the theorems of mathematicians of the Ancient Greece [5][6]. The results were generalized, considering the domain of function and negative values. The case that a stipulated graph of function cannot be constructed with the deemed instruments only was hypothesized following multiple unsuccessful attempts to do it practically. The information sources were researched, and the hypothesis was proven to be true with originally developed methods.

3 Summary

In the framework of the research the methods for geometrically depicting the arithmetic operations with the functional values were developed. All the functions constructed by the described methods are demonstrated below (Figure 1, Figure 2):

Given: graph of function $y = f(x)$, unit segment

Demonstrated constructions: $y = f^2(x)$; $y = \sqrt{f(x)}$;

$$y = \frac{1}{\sqrt{f(x)}}; y = \frac{1}{f(x)}; y = \frac{1}{f^2(x)}$$

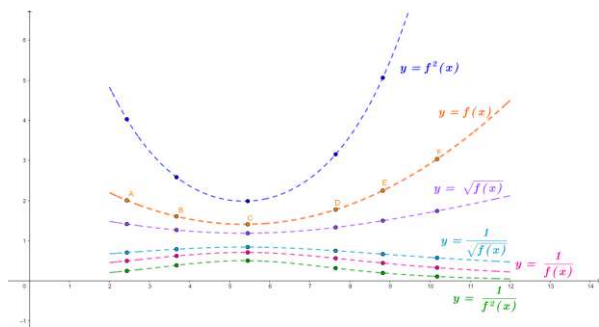


FIGURE 1 The graphs of all the functions constructed by the elaborated methods if one graph of a function is given

Given: graphs of functions $y = f_1(x)$ and $y = f_2(x)$, unit segment

Demonstrated constructions: $y = f_1(x) \cdot f_2(x)$;

$y = f_1(x) + f_2(x)$; $y = f_1(x) - f_2(x)$; $y = \frac{f_1(x)}{f_2(x)}$

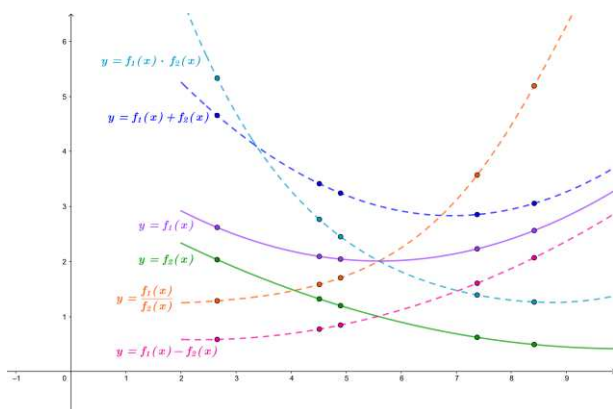


FIGURE 2 The graphs of all the functions constructed by the elaborated methods if multiple graphs of functions are given

4 Conclusion

- 1 The basic arithmetic operations like addition, subtraction, multiplication, division, in some cases also extraction of roots and exponentiation can be completed geometrically.
- 2 The irrationality of a number depends on the choice of the unit segment.
- 3 Following the construction algorithms developed and described in this research paper function $f(x)$ graphs of powers $-1; -\frac{1}{2}; \frac{1}{2}; 2$ can be constructed using the compass and a ruler, if $f(x)$ graph and a unit segment are given.
- 4 Repeatedly performing described algorithms under the same conditions, it is theoretically possible to construct function $f(x)$ graphs of powers $-\frac{1}{2^n}; \frac{1}{2^n}; -n; n$, where $n \in \mathbb{N}$.
- 5 The described algorithms can be applied to k functions, if graphs of all the functions $(f_1(x), f_2(x), \dots, f_k(x))$, where $k \in \mathbb{N}$ and a unit segment are given.
- 6 It is impossible to precisely construct the function $f(x)$ graph of power $\frac{1}{3}$, by using the same methods.
- 7 The theorems of elementary geometry acquired within the school program can be applied for constructing graphs of functions.

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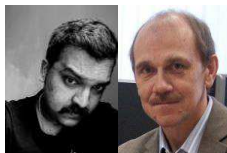
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The Role and Potential of Online Streaming for Enterprises

Anvesh Kumar Boora^{*}, Viktors Gopejenko

ISMA University of Applied Science, Latvia

^{*}Corresponding author's e-mail: anveshboora@gmail.com



Abstract

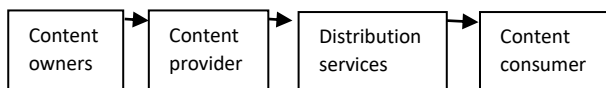
Nowadays, many companies provide on demand content over the Internet. Online Streaming is a form of video delivery increasing in prevalence in the consumer and commercial areas and its use in commercial application has been limited to primarily large enterprises. The Content providers is measured by the number of subscribers; however, pirates that re-distribute obtained content illegally. The Content providers would like to know how serious the problem is in order to address it.

Keywords: Online Streaming, Content providers, pirated.

1 Introduction

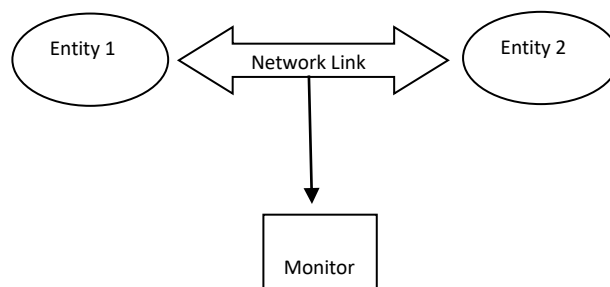
In the Market of Internet Multimedia there are content providers offering on demand or live content to their subscribers. For example, Netflix offers its subscribers movies and TV series online, which is its own production (e.g., stranger things) or bought from other content providers, and some live broadcasting like Sky Sports, ESPN from all sport league all over the world. However, some users are pirating these contents from content providers as normal viewers and publishing the content to other viewer illegally. The content provider addresses some serious piracy problems like crawling techniques, illegal service audience measurement and analysis.

The value chain of Internet multimedia market explains the environment of internet multimedia, content owner produces the content and other distribution, content providers buy copyright of content from the content owner, Distribution service provides paid delivery service to content provider to deliver content over the internet, content consumer consumes the content via their devices.



Pirates receives the content from content providers via a distribution service as normal content consumer, many viewers are attracted by illegal services because its satisfying user experience.

The measurement and analysis approaches mainly two categories of network measurement approaches are passive measurement and active measurement, the active measure relies on the capability to send packets to servers and applications and analyze response. The passive measurement refers to the process measuring a network without creating any traffic on the network and it can be providing detailed information about the monitored network entity.



The basic principle of passive measurement is to be monitor observes any packets travelling through the link between both networked entities.

Peer communication it is a tree-based architecture and mesh-based architecture, and it can classify into two classes control flow and data flow. The role of peers in aP2P streaming network.

2 Overview

This work discusses the advantages, disadvantages and conclusions on the following issues:

- The idea of P2P client network connectivity by monitoring client connections so we can observe new peers.
- The manager node is responsible for allocating monitor nodes to each task group.
- The passive measurement measuring a network without creating any traffic.

3 Decision

The requirement on the monitoring systems is the system can monitor an arbitrary P2P streaming System it can notice a view in the system. Monitor can start the installed P2P clients on the same computer and listen to the traffic associated with the client. It can be divided into 3 phase, measurement, analysis and reporting.

4 Conclusion

I conclude that online streaming for enterprises and many companies provide on demand content over the internet.

The various sector of value chain of internet multimedia

has different content providers and different platforms are facing illegal viewing the solution for measurement and analysis of an arbitrary P2P streaming system, traffic measurement methodologies and traffic analysis.

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Research and optimization of building wireless sensor networks

Balaji Mode*, Viktors Gopejenko

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: balajiroyal91@gmail.com



Abstract

Wireless sensor networks (WSNs) are a widely used technology for distant checking in association with Internet of Things (IoT). For the WSN community, the basic research challenge for mobile sensor nodes is localization. The sensor node position of the WSN is correlated to NP difficult, so it is very complicated to determine the actual coordinates of the sensor node. Computational intelligence methods help to get the best explanation to a given NP hard problem. Today, most investigators are more aware of the three beacon-based positioning methods, but fewest assistants focus on two or a single beacon-based positioning method. It uses the methods of Firefly or Hybrid Eagle and the firefly optimization algorithm (called computational intelligence algorithm) to provide a single fire-based positioning method for randomly implemented mobile sensor nodes. The reproduction results of computational aptitude algorithms show that planned work using hybrid optimization completes better in terms of average position error, computational cost or number of located nodes in Firefly and Hybrid Eagle using the Firefly optimization algorithm. By efficiently using network resources, it also reduces the vision problems in mobile sensor nodes.

Keywords: wireless sensor network (WSN), optimization, Sensor Nodes, Base Station, Cluster

1 Introduction

The wireless sensor network (WSN) is an inexpensive device. These procedures are called sensors. Sensors are limited in terms of memory, energy and processing capacity [1]. Wireless sensor networks have a wide range of submissions, such as observation, natural adversity relief, patient tracking, military goals and automated warehouses, and it provides solutions for various applications. In many of these applications, the position perceived by unknown nodes is very important, even very important, as defined by Labraoui et al. [2]. Without knowing location of sensor nodes, information collected is actually worthless. Given that position or area data described by Wang et al. Usually valuable for scope, shipping, command, area benefits, target tracking and protection, location is one of the most important topics [3] therefore, estimating location and area is a worthy professional test for researchers. In general, localization plays a key role in the design of efficient Applications in sensor networks, which are defined and summarized by Akyildiz et al. [4].

SENSOR NODES

Sensors nodes are commonly worked off couple of sensor units in effective manner and association with bit units such as microcontroller unit, signal conditioning unit, transceiver unit and a power management unit which is shown in Figure-1.1. Sensor device detects the data and pass it to mote. The sensor nodes are usually a multi-functional, energy efficient wireless device.

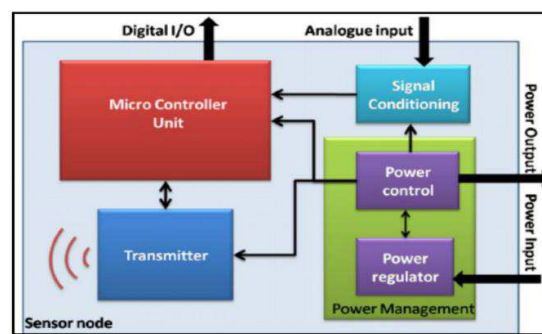


FIGURE 1 Sensor Node internal structures

Sensors play major work to quantify the progressions in map with different parameters like temperature, weight, stickiness, sound, pressure of environmental condition etc. Data are collected from all the sensor nodes and send to the sink node then via gateway it reaches to the destination nodes as shown in Figure 1.2. A mote comprises of processor attached with memory, battery and Analog to Digital converter for interfacing with a sensor and other handset for framing an Ad Hoc system. They collect and conversation data required for WSN functionality Sensor network comprises of large number of sensor nodes to screen and control the sensor environment as described in Zhang [5]. Sensor nodes have minimal effort low power devices used in detecting, figuring and correspondence capacities. A sensor node can just cover a small area, however the collaboration of numerous sensors can give more solid and better checking of vast ranges. Sensor nodes can be conveyed arbitrarily and they can set up specially appointed systems to gather and send information to the remote base station. Sensor systems have an assortment of military and a regular citizen application as described by Arampatzis et al. [6].

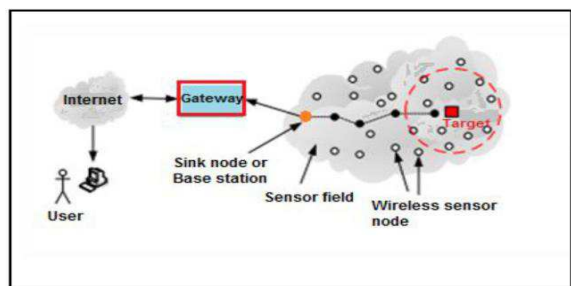


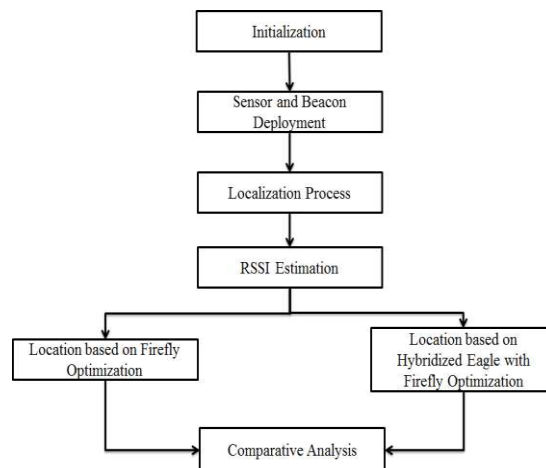
FIGURE-1.2 Wireless sensor network

The quick procedure, self-association or adaptation to internal failure attributes of sensor systems make them an exceptionally valuable perceiving procedure for military applications, for example, combat zone observation, damage assessment, organic and atomic assault discovery, gear checking and surveillance of contradicting powers and landscape. For country security, sensor system can be sent for border observation. The capacity to screen physical and ecological conditions, often in real time, for example, temperature, weight, light and humidity. The capacity to work devices, for example, switches engines or actuators that control those conditions and the capacity to give effective, dependable interchanges by means of a remote system. Significant issues in WSNs are confirmation and protection, forswearing of administration, localization and power utilization.

PROPOSED SYSTEM

The system is designed by comparing and analyzing the firefly and the hybrid eagle and using a positioning method based on the fire fighting optimization algorithm. The Firefly algorithm is a population-based optimization algorithm that mimics attractiveness of fireflies for flashing lights. Given the physical attitude of light strength, which is the wrong way round comparative to the square of area, principle can describe an appropriate purpose for distance between two fireflies. To optimize the adaptation function, characters are required to move systematically or randomly in population. This way you can make sure that all fireflies move to more attractive fireflies, which will flash brighter until populace converges to the brightest fireflies. In this process, the firefly algorithm is executed using the three parameters of desirability, randomization and absorption. The Eagle strategy proposes to iteratively association accidental search using L'evy walk with Firefly algorithm. Numerical research or results show that, planned Eagle approach is very effective for stochastic optimization.

Mode B, Gopejenko V



PROPOSED FLOWCHART

- Initially deploy both sensor nodes and beacon nodes in the network with static manner.
- Perform the localization process using Hybridized Eagle based Firefly Algorithm.
- This localization considered the distance, coverage area and Received Signal Strength Indication (RSSI).
- The EPO algorithm mimics the eagle's habitat behavior, just like the eagle, the algorithm also finds the highest point in the optimal solution.
- Eagle has a very simple but unique way to explore its terrain.
- When flying high in the sky, look around by trying a few points and moving to the highest point, then look again and repeat the same process. This repetition allows the eagle to reach the highest point
- Fireflies are unisexual, so a firefly will be attracted to other fireflies, regardless of gender.
- Attraction is directly proportional to brightness, and both decrease as the distance increases.
- For any two flashing fireflies, the firefly with lower brightness will therefore move to the firefly with higher brightness.
- If no firefly is lighter than one, it will move randomly.
- The brightness of the firefly depends on the range of the objective function.
- To optimize the adaptation function, individuals are forced to move systematically or randomly in the population.
- The attraction parameter is based on the light intensity between two fireflies and is defined using an exponential function.
- Hybridized optimization provided the new predicted location of each sensor based on the beacon node positions.

MODULES

- Parameter Initialization
- RSSI Estimation
- Firefly Optimization
- Hybridized Eagle with Firefly Optimization
- Comparative Analysis (Mean Square Localization Error by varying Number of Nodes)

2 Conclusion

Firefly algorithm can be used to determine the route from each cluster CH to BS. First, firefly is prepared. Here, each firefly represents a route from CH to BS. Firefly's size is equal to number of CH, and for BS additional positions are added. Here, each position represents next hop of CH to route data to BS. For each iteration, the lighter firefly moves to lighter firefly, or position of each firefly is updated. Repeat this process to reach maximum number of generations. The fitness purpose used is composed of

remaining energy from next hop, .Firefly algorithm is one of evolutionary optimization algorithms inspired by the construction of fireflies in nature. Although effective, its parameters do not change during the iteration process, as does particle swarm optimization. Firefly algorithm is powerful in local search. The algorithm follows special properties of fireflies. The system is designed by comparing and analyzing the firefly and the hybrid eagle and using a positioning method based on the firefighting optimization algorithm.

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Enterprise information system improvement program

Aksharkumar Patel,* Alexander Mrochko

ISMA University of Applied Science, Latvia



Abstract

The information system is the basis for effective management of economic objects. Enterprise Information Systems (EIS) are expressly implied in the worldwide performance of an organization. The purpose of the EIS is to ensure the competitiveness of the enterprise in the modern global business space. Meanwhile, their possible inflexibility compared to the necessary rapid development of the supported organization remains an important open research question. There are various methods for evaluating EIS capabilities and their performance metrics to assist systems analysts and business administrators in EIS improvement projects. In particular, a system is proposed for structuring the set of existing skills dimensions according to the needs for updating and the basic qualities of information systems.

Keywords: Enterprise information system, Agility, Transaction processing system, Management information system

1. Introduction

In a context where the development limit of an organisation is a vital factor for its example of overcoming adversity, the control of its Enterprise Information System (EIS) elements is of earlier interest. Nevertheless, the acceleration of the organisation changes suggests a modification of how EIS evolution and control must be handled. Traditionally, once the alignment is built, the environment of the organisation advances and changes, requiring a change of the arrangement and its evolution after some time. The evolution of the alignment along time is an intricate inquiry that is positioned intermittently as one of the major preoccupations of managers. In reality, this evolution has to be managed not only from an IT perspective as well as from strategical and organisational perspectives.

Our objective is the current EIS in the thought about organisation with the goal of improving the exhibition of those EIS. Henceforth, we think about the issue with an EIS re-designing perspective, instead of with a product advancement point of view, with needs coming from business and not from innovation. As an outcome, the control of the EIS elements might be not all that develop and must be improved.

The following a methodology in four main steps shown in Figure 1.

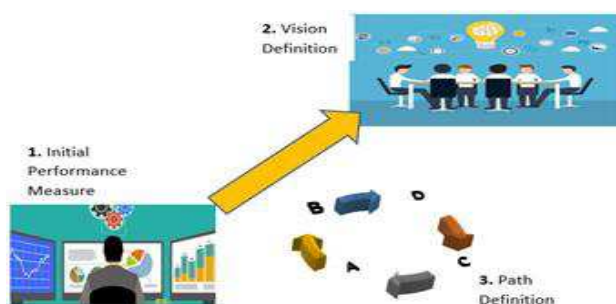


FIGURE 1 Improvement project global methodology

- 1 Diagnostic based on performance measurements at the current situation.
- 2 Vision definition on expected performance level agreement.
- 3 Path definition between the current situation and vision one.
- 4 Path control to ensure the consistency between the realised actions and initial path.

2. EIS definition & Levels

System perspective, any organization is characterized by three layers to be specific working, choice and data. Thusly, in excess of a straightforward programming apparatus, a data framework likewise coordinates the association layers. Outlines out the theoretical region involved by every one of the five processing.

Among all existence information systems, six specific types of EIS exist and are considered in our research work: transaction processing system (TPS) the operational level; office support system (OSS) and knowledge management systems (KMS) at the knowledge level; management information system (MIS) and decision support system (DSS) at management level; the executive support systems (ESS) at the strategic level.

EIS have 4 types of level:

- a. Software - Constrained by a bunch of advancement rules;
- b. Service - An agile system required to be created with service-oriented architecture (SOA) that contains a bunch of services that can be utilized individually;
- c. Business Process - Business process represents the relationship of all services expected to finish a business task, and how it very well may be changed depend on the environment;
- d. Information system - This level contains the whole system of business the board instruments for information system.

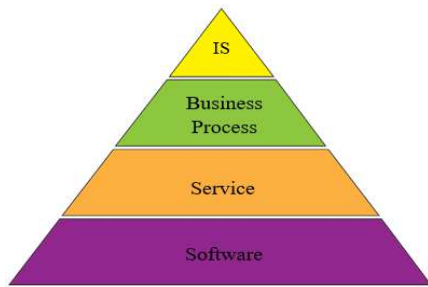


Figure 2 Four level an information system

3. Dimensions of agility

We propose to break down the system into five measurements:

- **Appropriation Process:** It means the adaptability wanted in the system to monitor changes in the elements. This makes an interpretation of its inward capacity to adjust proper conduct in new circumstances without seeing the need to present external intercessions.
- **Adaptation to Changes:** It presents every one of the activities to be set up by the organization utilizing its assets to adjust to outside changes.
- **Response Time decrease:** For being deft, the framework needs to effectively lessen the reaction time. Thus, it should diminish the client stand by an ideal opportunity to get to administrations.
- **Objective's accomplishment continuation:** The solid component of deftness is the capacity to constantly accomplish the targets regardless of natural irritations.
- **Customer inclusion:** The light-footed technique is a customer focused methodology and the customer inclusion ought to be considered all through the item lifecycle.

4 Use of the framework

In this system, we characterize the two measurements that structure all measurements that can be applied to assess the

nimbleness of an EIS.

In any case, as per the particular setting of progress project, none every one of them are needed to both characterize the underlying circumstance and the vision. For example, a SME, represented considerable authority in mechanical part creation and which needs to change or refresh its ERP to improve its creation proficiency, will zero in on the business and data frameworks levels, since it might not have interior abilities to adjust the product.

We consider that every framework and every setting is extraordinary. Every circumstance has its own objective. These objectives must be changed in measurements and in edge esteems. These measurements and edge are utilized in the system.

5 Conclusion

Enterprise Information Systems constantly affect the worldwide expression of an organisation and the troubles to cause them to develop at a parallel. We propose to coordinate deftness as a critical attribute of an EIS, to quantify, control and improve this execution pointer.

For this end, we initially propose an all-encompassing meaning of the nimbleness idea applied to EIS, consolidating both natural and outward capacities of the framework and its elements. This definition blends the two fundamental areas that communicate in an EIS, for example software engineering and agile manufacturing.

Based on this definition, we propose a total system that structures all the potential measurements committed to the deftness estimation, as per the four levels of an EIS (from software to information system) and the five aspects of the deftness definition. By development, as per the organization development and the setting of evolution, each level can be handled autonomously and the various measurements can or not be joined between levels.

Today, the system isn't comprehensive as in all current or fundamental measurements have not been incorporated inside. A first progressing research work is to look up this test. In equal, an execution of the system has started and is presently in part tried. However, a total execution and approval will be acknowledged in future works.

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Multi UAV simulator in Unity

Ilyas Assanov*

Satbayev University, Almaty, Kazakhstan

*Corresponding author's e-mail: assanov.z@gmail.com



Abstract

This paper describes a simulator application specifically designed to calculate the multi-agent motion of Unmanned Aerial Vehicles (UAVs) during spraying/mapping missions. This simulator has the main purpose to simulate UAV movement through waypoints from a centralized multi-agent application. Currently, some simulators are presented in different papers. However, the lack of multi-UAV simulators, designed to simulate behaviour of the UAV flock for agriculture purposes motivated this work. The main requirement for this framework is to simulate real physics and dynamics, likewise, the same precision should be provided about collision data. Moreover, simulation should be flexible for adjustments and stress-resistant for manual changes during the process.

Keywords: UAV, simulation, Unity, agriculture, unmanned aerial system

1 Introduction

In recent years, the problem of automatization of UAV piloting seems intense. UAVs have enough superiority in front of traditional ways of detecting and spraying large agricultural areas. Our project is focused on solving the agricultural problem of spraying fields. This paper is a part of the entire project as a simulator. According to paper [1] authored by Che Mat et al, game engines such as Unity (fig. 1) can provide commercial strength and well-supported 3D development environments that enable fast and safe simulation development. In this paper, we present a basic collision and test simulator for multiple UAVs with adjustable settings for each agent.



FIGURE 1. Flock of 3 UAV agent in Unity environment simulator

In The key explanation is that the majority of simulation systems on the market are unable to meet our project's requirements.

Tested simulators are described in the next part.

2 UAV path planning system

In this approach we suggest a centralized multiple-UAV path planning system. Some different mission types should be implemented in the simulator. As input values simulator get waypoints array from path planning algorithm (fig 2).

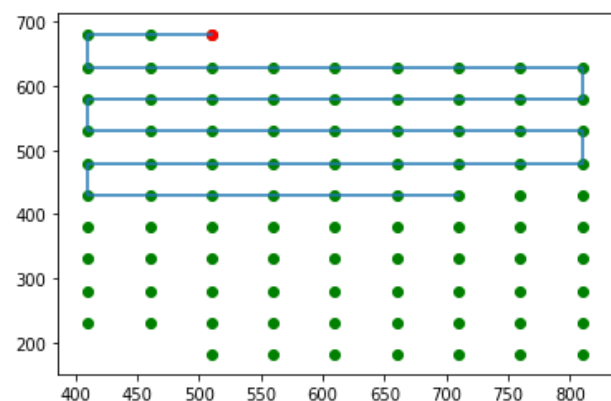


FIGURE 2. Waypoints array appearance.

Challenging part of simulating the process of spraying drones is short battery life-time and limited lifting power (for spraying substance) of agents, which leads to necessary refilling manipulations during the mission. The bottleneck of multiple UAV spraying is the process of launching and refilling the drone, because all agents have to visit the same point. By the same token we got a mobile ground station which helps drones to solve refilling problems, meanwhile stops of the mobile station can be optimized as well. Besides refilling of the substance tank is going to be manual, so this timing system has to be stress-resistant enough.

Simulator general tasks:

- Test fly before executing the real process of mapping and spraying.

- Simulate physical bodies of UAVs to prevent collisions in a physical environment.
- Make time optimization in moving paths for UAVs and mobile station.

3 Overview

Several authors have proposed simulator algorithms, nevertheless, the most of the simulation systems available are not unable to meet all requirements for solving our needs. The paper after Yuchao Hu and Wei Meng [2] described a developed simulator, which can successfully simulate multi-unmanned aerial vehicle local planning. Nevertheless, that simulator was developed for LIDAR UAVs. That is one of the limitations of our system.

UAV flight algorithm described is sufficient details in work [3] by Massimiliano De Benedetti et al. They suggested a multi-agent simulator using C++ and QT5 library. That approach has not been designed for simulation of movement through prepared waypoints to verify calculated paths. Besides, this team made a UAV simulator described in [4] developed using AgentSimJs for web-based simulations. They meet a close problem of plant inspection by the flock of UAVs. Furthermore, they include machine learning for optimization purposes. Another success realization was presented by Amjed Al-Mousa et al [5]. That paper described details of simulator architecture created in Unity. As well they show success bandwidth communication speed inside that system.

Overviewed papers were implemented with various programming languages and simulators. However successful simulations were demonstrated as results of described works.

Based on reviewed works Unity has been selected for developing simulation framework. The proposed simulator is developed in Unity game engine. One of the benefits is that it can be used to develop cross platform applications.

4 Unity

Unity is flexible and powerful tool for creating multiplatform games and interactive experiences. Besides game developments, Unity3D could also be employed by academic research [3, 6]. Based on reviewed works Unity

has been selected for developing simulation framework. One of the benefits is that Unity can be used to develop cross platform applications.

5 Decision

As we know, simulation technologies can verify planned routes for UAVs and identify potential problems in bottleneck parts of the spraying process.

For better simulation we need to follow some requirements:

- UAV agents can be heterogeneous
- Simulation should be accurate enough to make decisions about real launches
- Collision detection system
- LIDAR sensing excluded
- Real-time changes in simulation should be available

6 Conclusion

Simulator for verifying multiple UAV paths for agricultural needs is described. Overviewed papers show that simulations can verify safe routes for UAVs and predict collisions inside a virtual environment.

7 Future works

Final simulator work has been divided in 3 steps:

- Making UAV agents follow prepared waypoints, imported from another script. Main purpose to give information about collision (this paper describes the first phase).
- Optimize launching and landing time for agents to go in series with each other.
- Learning ML-agents in Unity simulator for spraying

Future works are going to reach the next steps of final simulator realization.

8 Acknowledgment.

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A browser-based face detection system

Alibek Abdurazakov

Satbayev University, Kazakhstan

Corresponding author's e-mail: abdurazakov.alibek13@gmail.com



Abstract

Face recognition is the process of identifying a person by their face. Face detection is a necessary first step in face recognition systems to localize and extract the face region from the background. Today there are many face recognition systems. However, the main disadvantage of many of them is that both face detection and recognition processes occur on the server side. As a result, solving the problem of recognizing a large number of faces requires significant computing resources of server equipment, which is very expensive. This article discusses the method and implementation of a face recognition system, where face detection is implemented on the client-side. This method allows reducing the wasted resources of server hardware.

Keywords: face recognition, face detection, Tensorflow.js

1 Introduction

The COVID-19 pandemic has led to the largest ever disruption in the functioning of all spheres of human life. In particular, the pandemic has hit the education system, which, according to UNESCO as of April 1, 2020, affected almost 1.6 billion students in more than 190 countries all over the world [1]. School and other educational closures have affected 94 percent of the world's student population, with 99 percent in low- and lower-middle-income countries. The pandemic has forced many countries to switch to online education. So, one of the challenges of today's education is to conduct efficient online exams.

Exams are an essential tool for determining a learner's knowledge. Students try to resort to tricks and cheat on any exams, while on online exams, the number of attempts to cheat is much higher than on offline exams [3][4]. Since the purpose of exams is to determine students' proper knowledge, identifying such violations is an important task. Online proctoring systems can solve this problem. The basis of online proctoring systems is the functions of face detection and face identification.

In addition to education, many other activity areas have also switched to a remote work format [2]. Banks, public service centers, and other services that work with people began to identify their customers through face identification.

For this reason, an optimal implementation of face detection and face recognition systems is essential. It is necessary to develop an architecture that will support many users with a minimum load on the server-side.

2 Overview

Traditionally, the entire face recognition process takes place on the server-side. So, any image received from the user's PC is sent to the server, and regardless of who or what is displayed on this image, it is processed. From this,

it follows that even those images in which there is no face, or the face is hard to see can be sent for processing. Such images create unnecessary load on the server. This approach is applicable if the organization has a good IT infrastructure and extensive computing resources. This article discusses a face recognition method where the face detection process is implemented on the client-side. A method that significantly reduces the server's load by sending for processing only those images that include a face. This work also discusses various web-based face detection libraries' advantages and disadvantages.

3 Decision

As an example of implementing the proposed approach, an online proctoring system for conducting online exams, in which face detection is implemented on the client-side, is considered. A feature of the system is that the server part is used only to enter the exam, that is, to identify the student. The subsequent detection of violations during the exam occurs on the student's PC, as shown in Figure 1. Thus, the server's task is only to save the received violations to the database.

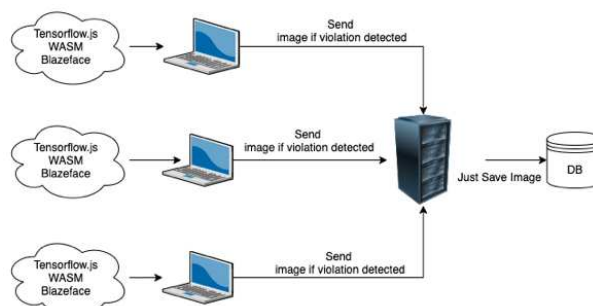


FIGURE 1 Detection of violations

Due to the transfer of the face detection process from the server-side to the client-side, we could increase the number of simultaneous connections from 500 users to 5000. At the same time, the server capacity did not change.

4 Conclusion

A comparative analysis of existing libraries that implement the process of detecting faces in a browser is carried out. The possibilities of the Tensorflow.js library are considered. A comparative analysis of the backends of the Tensorflow.js library has been carried out. The implementation of the online proctoring system

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is considered. This work proposes an approach to the implementation of the system, due to which it is possible to significantly reduce the load on the server.

5 Acknowledgments

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Approaches of customer segmentation

Akylbekov Olzhas*

Satbayev University, Kazakhstan

*Corresponding author's e-mail: o.akylbekov@stud.satbayev.university



Abstract

The recent improvement of information technology (IT) lead to increasing the amount of customer data to be created, stored and processed for the needs of varied organizations. One of the marketing tools is segmentation that can help the organization to stimulate sales activities and earn money from it. At the present time different companies are used many tools and approaches to segment own customers by collecting and stored data. There are many algorithms and methods to segment customer data. However, the most efficient and profitable approach of segmentation depends on goals and type of the organizations. This paper is an attempt to describe ways of segmentation in Banking sector that are currently used on industry.

Keywords: segmentation, customer data

1 Introduction

These days, it is critical for marketing to understanding of how to use big data for segmentation purposes. Many different ways are used to assist the marketing for effectively segment customer data [1]. In order to choose the benefited approach of customer segmentation at Bank three methods are employed. The research paper describes the behavioral, socio-demographic and product segmentation of customer. The research is performed on data provided by non-bank lending company. The goal of the study is to create and compare these three approaches that will segment customers to closely understand bank customer data. The outcome of segmentation is found the best way to describe bank customers and recommended best way of commutation. Results demonstrated that customer segmentation is not only economically benefited the company, but also aid attentively understand their customers.

Behavioural segmentation is to divide consumers depend on behaviour patterns as they cooperate with a company [3]. This category of segmentation learning the behavioural features of clients — their use of, attitude towards, likes/dislikes of, or response to a bank products, services, or brands.

Socio-demographic segmentation is to segment company customers according to customer's age, sex, profession, education, etc. This method of segmentation is essential when designing targeted marketing campaigns [2].

Product segmentation is one of the popular approaches of segmentation that divide company clients by their bought and owned products [4]. The main theory of product segmentation is that an organization can release a single product with relatively minor variations, sale it to different customer groups.

2 Overview

This work discusses three methods of segmentations:

The resulting customer vectors (**behavioral profiles**) require clustering to identify macro segments (customers who actively use several set of products and do not use the rest). For clustering, the most modern models were chosen: Bayesian Dirichlet processes and a variational autoencoder (neural network).

Each of these models is aimed at working with any form of data distribution, and also does not require specifying the number of clusters. The number of clusters is automatically detected (Figure 1) [4].

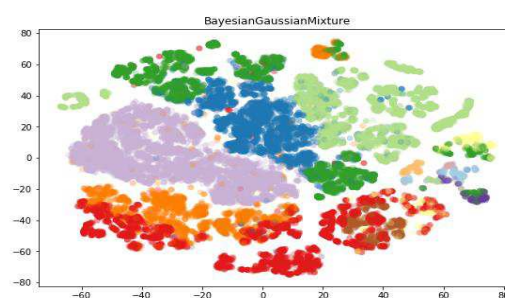


FIGURE 1 Cluster visualization in 2D

There is a classic problem with segmenting customers by **sociodemographic** attributes. Let's say we want to segment our customers by income. Sociodemographic attributes are often a table of categorical data (textual). The problem is that we would like to draw a fairly accurate relationship between the values of the attributes of the client and his income - and this is well done by some machine learning methods, called ensembles or committee. On the other hand, we would like to get an easily interpretable result, which is what classical decision trees do best.

Solution of two-tier model (stacking):

1st level: coding of categorical variables with the smoothed mean of the target variable for that category. Used in credit scoring (special case) - Information Value, WoE.

$$\text{smoothed likelihood} = \frac{(\text{mean}(\text{target}) * \text{nrows} + \text{global mean} * \alpha)}{(\text{nrows} + \alpha)}$$

where: global mean is the average value of the target indicator in the sample, alpha - regularization (smoothing factor).

2nd level: classic decision tree. The selection of the optimal partitioning depth is carried out using cross-validation to ensure the minimum discrepancy between the error in training and control (Figure 2).

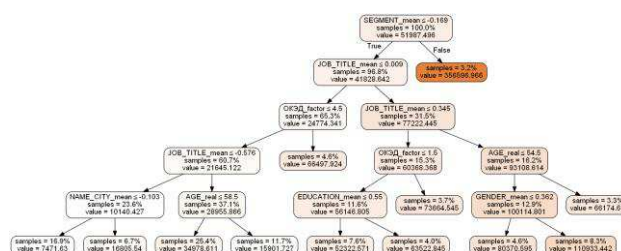


Figure 2 The final decision tree of the model: depth - 5, selected by validation.

Within the framework of the project, the problem was solved as follows. Let us recall a few facts: recently, a real boom in natural language processing has been received by models of distributive semantics based on neural networks (word2vec), which turn each word into a special vector (a set of numbers) [5]. It turned out that such vectors ("representations") have almost magical properties: they can be added and subtracted. For example, if you subtract the vector of the word Man from the vector of the word King and add the vector of the word Woman, you get the vector of the word Queen. Moreover, such vectors significantly reduce the dimension of the original problem (by tens, and sometimes hundreds of times).

The same approach to dimensionality reduction based on the latest advances in machine learning can be applied to the client's behavioural data, his activity and purchase history, revealing his affiliation and activity within the main product groups (Loans, Deposits, Transfers, Purchases,

Internet Banking, Credit Cards). This technique allowed not only to reduce the dimensionality for understanding the client's profile, but also to obtain an interpretable profile. At the same time, it is now very easy to compare different clients with each other, i.e. use look-alike modelling. This approach is now continuing to evolve for building Real-Time Marketing and trigger campaigns using historical data on MCC codes. Now imagine - you bought coffee at the entrance to the airport before going on vacation, and the Bank is already interested through the mobile bank application: did you forget to take out insurance for traveling abroad? This can be done in a couple of clicks!

In addition, based on the received customer insights, a system of macro segments was built, which clearly showed the Customer Journey - how customers move from one segment to another over time, changes in income, level of technology use, childbirth and retirement.

3 Decision

In the production, these three segmentations were used and applied for marketing aims. Behavioural segmentation is run quarterly to watch the customer movements. It brings us to better understanding which operations most popular and how to manipulate customers behaviour for company benefit. Sociodemographic segmentation assists to correctly write message or push notification for customer which is most likely to be read by them. The last approach shows the most popular product of the company which brings more profit for company. Moreover, this method can be used to build perfect Customer Journey in the future.

4 Conclusion

Merge of three different approaches has constructed a new way of performing traditional segmentation in the financial institution. Big data and IT can be used in marketing field to build customer segmentation for any company. Additionally, this work shows that combination of these methods may truly help understand customers and efficiently interact with them. This thesis will be improved into big scientific article by adding the literature review and coding part in Python.

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Development and forecasting of transport flow parameters. Using a composition of machine learning methods

Sailau Assel*

International Information Technology University, Kazakhstan

Corresponding author's e-mail: asel-sailau@mail.ru

Abstract

The number of vehicles on the roads of Almaty(Kazakhstan) increases annually, as a result of which the intensity and density of traffic flows on the roads increases. This leads to congestion, a decrease in the speed of traffic flow, an increase in the negative impact of transport on the environment, and is also a potential cause of road traffic accidents (RTA), including fatalities.

The work is devoted to solving the problem of analysis and forecasting of traffic flows in the city of Almaty(Kazakhstan). As the initial data for solving this problem, GPS data on the location of individual vehicles are used. By projecting the obtained information onto the graph of the city's transport network, as well as using additional filtering, it is possible to obtain an estimate of the individual parameters of traffic flows. These parameters are used for short-term forecasting of changes in the situation in the city's transport network.

Keywords: GPS, traffic flow, transport network, traffic accidents

1 Introduction

The development and widespread active use of modern electronic communications systems, global navigation systems, active and passive sensors of various types and purposes has led to the emergence of the possibility of solving extremely complex problems, the very formulation of which seemed impossible two decades ago. Examples of such problems include the problems of creating "smart cities" and intelligent transport systems. The considered problem of constructing a short-term forecast of the parameters of traffic flows in large cities is one of the many problems that have to be solved on the way of a complete and effective solution of these problems. At the present time, the solution of this problem turns out to be also useful, what well-known companies clearly demonstrate Microsoft, Yandex, etc., providing various internet services and / or mobile applications that enable road users visually analyze the development of the transport situation in your city and plan your movements. In this case, information about the predicted parameters of TP can be used not only for viewing, but and for solving related technical problems.

2 The subject of research

Theories, various methods of managing the city's transport infrastructure and traffic flows were used as a methodological basis for the work.

3 Research methods:

regression models; time series models; neural network models; support vector machine.

4 Overview

In this work, a directed graph is used as a mathematical model of the road traffic system, the arcs of which correspond to the real sections of the road network, and the vertices are the nodes dividing the road sections. The

direction of the arc determines the direction of movement of the vehicle on the corresponding section of the network, and the parameter of the TP on a specific section of the network is defined as a function $v: W \times T \rightarrow R$. The following values will act as the parameters of the TP on the arc:

- flow rate;
- average time for a vehicle to pass through a network segment;
- flux density;
- stream.

In the work, under the parameter TP, we mean any of the specified values.

The geometrical location of the segment $\omega \in W$ of the transport network is defined as a two-valued function of the form $\bar{x}^{\omega}(\tau) (\tau \in [0,1])$ such that the coordinates $(x_0^{\omega}(0), x_1^{\omega}(0))$ и $(x_0^{\omega}(1), x_1^{\omega}(1))$ determine the physical location of the start and end points of the corresponding MAC segment, and the geometric location of the remaining points can be obtained by setting the parameter in the interval $t \in (0, 1)$.

5 Decision

The proposed forecasting method will use several stages to build a forecast. At the first stage, it is proposed to decompose the transport graph into a certain number of subgraphs according to the territorial basis.

On the second, to describe the space-time state of the distribution of traffic flows in the resulting subgraphs, a dimension reduction method based on the principal component method is used.

At the third stage, for each of the subgraphs, several elementary forecasts are generated using the support vector machine and the potential function method.

At the fourth stage, an additional elementary forecast is formed, calculated using the Box-Jenkins models.

At the fifth stage, a forecast will be built for each of the

subgraphs using an adaptive linear composition of the obtained elementary forecasts.

At the final stage, the forecast parameters of traffic flows in the entire transport network of the city are calculated as a linear combination of data for subgraphs possible to significantly reduce the cost of testing automation and to achieve faster and more reliable tests.

6 Conclusion

The project proposes a new method short-term prediction of traffic flow parameters for management of road systems of a large city based on an adaptive composition model of elementary prediction algorithms.

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The proposed adaptive composition algorithm has the following properties:

- the entire UDS of the city;
- uses information from individual vehicles (GPS) as data sources,

not information from traffic sensors;

- takes into account the spatio-temporal redundancy of data on TP on the analyzed road traffic system;
- possesses adaptability in relation to the analyzed situation on the CDS graph.

Experiments to identify changes in synthesized images

**Abay Bekbaganbetov^{1*}, Maryam Ospanova¹, Marina Yelis¹,
Jan Rabcan⁴ and Ravil Muhamedyev^{1,3}**

¹Satbayev University, Kazakhstan, Almaty

³ Institute of Information and Computational Technologies. Kazakhstan

⁴University of Zilina, Slovakia

*Corresponding author's e-mail: bekbaganbetov.abay@gmail.com



Abstract

This paper considers the problem of identifying changes in the images that simulate frames obtained from UAVs. Experiments were conducted on the use of deep neural networks on specially synthesized video datasets simulating the flight of the UAV equipped with a Full HD stabilized camera over rough terrain. A Siamese architecture network based on a pre-trained UNET network was used in the experiments. An accuracy score of 93-99% was achieved on identifying changes in the scene.

Keywords: CNN, precision farming, synthetic images, deep learning, Intelligent Unmanned Aerial Vehicle Technology (IUAVT)

1 Introduction

The system of new technologies called precision farming (PF) is based on the collection and practical application of large amounts of data on spatially distributed objects. Remote sensing, aviation and unmanned aerial vehicles (UAVs) [1] are used for collecting such data. It is necessary to develop methods for processing images obtained from UAV to solve classification and identification problems. These images are characterized by high resolution and relatively small space coverage compared to remote sensing. Currently, the use of deep neural networks is the natural technological technique for the automatic solution of these problems.

The work describes experiments of using pre-trained UNET [2] networks to identify changes in the scene. VGG16 model [3] was also used in the experiments, however, the results obtained using UNET are shown below.

2 The data used

Several specially synthesized video sets were used for computational experiments. Each set consists of 3 videos: a video of the flight of the aircraft, a video with the changed landscape (elements are added, for example, a shovel, a hose), a video with the selected changed element (mask). The number of frames is the same. Figure 1 shows an example of the images obtained from the synthesized video. The first row contains the original frames, the second – the changed frame, and the third – the mask.

To input the image the neural network it is transformed as follows:

- 1) All image sizes have been changed from 1920×1080 (Full HD) to 455×256.

- 2) Frames with masks have been changed from RGB to Grayscale.
- 3) Pixel values are normalized. Value for a color image (average – [0.485, 0.456, 0.406], standard deviation – [0.229, 0.224, 0.225]), gray (average – 0.485, deviation – 0.229).

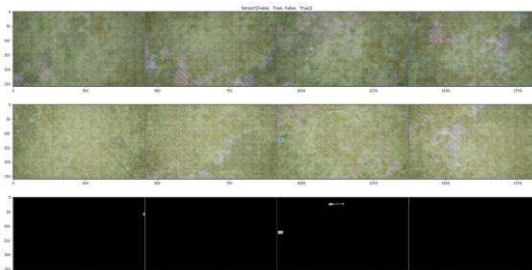


FIGURE 1 Example of the received images from the synthesized video

3 Computational model and results obtained

The model was trained in the proportions of 90% for training and 10% for validation. For training, the amount of a difference and a without_difference data was taken the same. (If the number of difference frames was 400 in the file, then a without_difference was taken randomly in the amount of 400 pieces). For training it was decided to use transfer learning with the basic resnet18 model. Each frame is passed to this model, and the output is a vector of dimension Nx1000, where N is the number of frames. Then we combine two vectors, get the vector of size Nx2000 and pass it to a linear layer with a sigmoidal activation function, which gives a value from 0 to 1. We assume that if the value is greater and equal to 0.5, then the image contains objects of interest. Figure 2 shows the class listing used to define

frames with changes.

```
class SiameseNet(nn.Module):
    def __init__(self, embedding_net):
        super(SiameseNet, self).__init__()
        self.embedding_net = embedding_net
        self.result = nn.Linear(2000, 1).cuda()

    def forward(self, x1, x2):
        output1 = self.embedding_net(x1)
        output2 = self.embedding_net(x2)

        x = torch.cat([output1, output2], dim=1)

        return torch.sigmoid(self.result(x))

model_ft = models.resnet18(pretrained=True)
net = SiameseNet(model_ft)
```

FIGURE 2 Class listing used to define frames with changes

Binary cross-entropy was used to evaluate the training. Stochastic gradient descent (learning rate 0.001, momentum 0.9) was used for optimization.

The table of results of computational experiments (Table 1) shows the parameters and results of computational experiments. The "Data" column describes the video data that was used for training. The next 2 columns contain information about the amount of data. The last 3 columns contain experimental results.

TABLE 1 Results of computational experiments

№	Data	Number of frames of training	Number of frames of validation	Cross - entropy	Accuracy	Training time
1	Only land2	1235	137	0.0011	0.93	9m 2s
2	Land2, land3	3249	361	0.001	0.9972	35m 1s
...	...	...	...	...	...	...
6	Land2,3,4,4s dvig, 5, 6fall, 6spring, 7fall, 7spring	36909	4101	0.0012	0.9919	252m 23s

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Notes:

- lang 2, 3, 4, 5, 6, 7 – a folder with video files with the corresponding flyby number;
- fall – autumn landscape;
- spring – spring landscape;
- Sdvig – shift of the image in the video frame.

4 Conclusion

The developed Siamese model of the neural network can determine whether a frame contains objects of interest based on two frames submitted to it for analysis. The experiments show that the resulting solution works under different conditions simulated in the simulation environment (lighting, seasonality, and frame shifts).

The obtained accuracy values allow us to state the high quality of identification within a synthetic set of images.

Further work involves increasing synthetic datasets and conducting experiments on real datasets.

5 Acknowledgments

This research has been funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (Grant No. IPH AP08856412). This publication was realized with support of the Operational Programme Integrated Infrastructure in frame of the project: Intelligent systems for UAV real-time operation and data processing, code ITMS2014+: 313011V422 and co-financed by the European Regional Development Found. The authors would like to thank prof. Ing. Elena Zaitseva and prof. Ing. Vitaly Levashenko from Dept. of Informatics, University of Žilina for their valuable feedback and cross-country collaborations

Explainable machine learning for healthcare decision-making tasks

Marina Yelis^{1*}, Yan Kuchin², Adilkhon Symagulov², Elena Muhamedieva²

¹Satbayev University, Kazakhstan

²Institute of Information and Computational Technologies MES RK

*Corresponding author's e-mail: k.marina92@gmail.com



Abstract

Recently, artificial intelligence (AI) has made great strides due to the rapid development of machine learning technologies. Despite this, there are potential risks associated with a "black box" approach to learning. Unlike classical ML methods, where model results can usually be explained, deep model learning lacks transparency, making it difficult to understand how the model made a particular decision. In this paper, we consider Explainable Machine Learning (EML) methods as applied to the construction of a decision support system in healthcare. The essence of the proposed approach is to build an explanatory machine learning model and then use the explanations to make management recommendations for healthcare organizations. To evaluate the applicability of the approach, we used the "Hospital General Information" open dataset. The results show that the explanatory machine learning model correctly ranked the key hospital performance measures. This confirms the applicability of EML as part of a decision support system for health care.

Keywords: explainable machine learning, multi-criteria decision support system, GeoAI, SHapley Additive exPlanations (SHAP), black box explanation

1 Introduction

Advances in technology, improvements in learning algorithms, and access to large amounts of data have enabled advances in machine learning (ML), leading to its widespread industrial adoption.

As a result, many real-world problems are solved today using machine learning models. Machine learning is successfully used to solve problems in medicine [1, 2], biology [3], robotics, urban agriculture [4] and industry [5, 6], agriculture [7], modeling environmental [8] and geo-environmental processes [9], communication system design [10], astronomy [11], petrographic research [12, 13], geological exploration [14], natural language processing [15, 16], etc.

However, when decisions ultimately affect people's lives (e.g., in medicine, law, finance, or defense), there is a need to understand how such decisions are provided by AI methods [17]. This is a major barrier to the practical application of machine learning.

Recently obtained results in the development of explanatory systems [18, 19] allow not only to apply them to assess the weight of machine learning model features, but also, in our opinion, to use them in the decision support process.

2 Method

Our approach, which be called as MCDSS based on the explanation of "black boxes" (MCDSS&BBE). It was discussed in [20]. MCDSS&BBE consists of the following key elements (Figure 1).

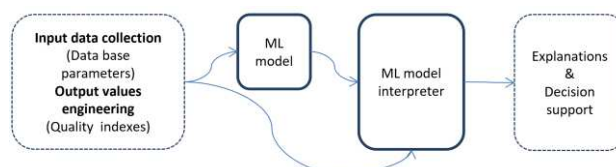


FIGURE 1 MCDSS&BBE workflow schema

First, we collect input data and define targets, indicators that can be synthesized, or be some aggregation of external indicators.

Secondly, we build a non-linear model based on the controlled learning method (ML model), where we take into account the maximum number of available parameters.

Thirdly, we estimate the contribution of parameters to the result achieved by the model as a whole and by a separate object (using the model interpreter ML).

Fourthly, we use the results of the interpretation to develop recommendations.

The ML model considered as a way to answer the question "Why do we have this or that classification or regression result? The answer to this question for a single object is a recommendation to change input parameters to increase the values of target indicators (quality indicators). In other words, we consider the data model as a way to describe the regularities of real systems and form recommendations for their change. The SHAP interpreter [19] is used to solve the multicollinearity problem.

The application of MCDSS&BBE was described in [21].

The development of MCDSS&BBE is an element of the GeoAI Healthcare system designed to make recommendations for the management of healthcare

organizations.

To assess the applicability of this approach, we used elements of MCDSS&BBE to analyze the Hospital General Information open dataset provided by Medicare.

3 Results

Dataset has the overall hospital rating, which we use as our target in the building model, and the other 7 features which affect that overall rating. To build the recommendation system we have to figure out dependencies, how each feature affects the overall score. To do so machine learning models were built and trained to predict quality features. As a result of the experiments, a CatBoost regression model was applied [22]. Then using SHAP, the model's features were ranked in terms of their weight in the process of getting the result. In Figure 2, each line corresponds to a specific feature, which is sorted by significance (SHAP value) in descending order. Each point represents the value of each indicator and its impact on the overall rating. Its position along the horizontal axis shows how negative (left) or positive (right). At the same time, the color of the dot indicates the value of the factor - the red dots have a high value of this factor (higher than the average value in the sample), and the blue color, respectively, a low value.

The overall hospital quality rating includes more than 100 indicators, divided into 7 groups or categories of indicators: Mortality, Safety of Care, Readmission, Patient Experience, Effectiveness of Care, Timeliness of Care, and Efficient Use of Medical Imaging. The data source states that a statistical model known as the hidden variable model is used. Seven different hidden variable models are used to calculate scores on 7 groups of indicators. The hospital's cumulative score is then calculated by taking the weighted average of these group scores.

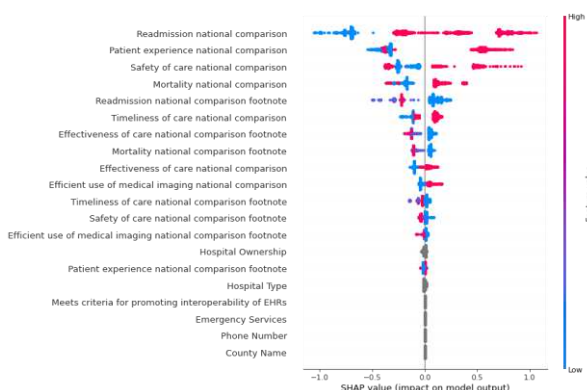


FIGURE 2. The influence of factors on the feature “overall hospital rating”.

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According to Figures 2, we can see the influence of individual features on the results of the regression model. If we compare the results with the main indicators mentioned above, we see that the 4 main indicators have a strong influence on the hospital overall rating. In this way, we show that it is possible to build recommendation systems to improve the quality of hospital services by applying machine-learning model.

4 Conclusion

The explanatory system built based on a machine learning regression model correctly ranked the main parameters of hospitals. Consequently, the influence of these factors is correctly reflected in the built model and can be applied to assess the quality of a medical institution.

The results confirm the hypothesis that Models of machine learning (explainable ML - EML) can be applied to support decision-making on the management of health care facilities.

The main limitations of this approach are:

- Difficulties in interpreting the results of explanations by applied specialists. In other words, the results obtained with EML still need further interpretation for end users.
- If the parameters under consideration have a complex semantic interpretation or do not have it at all, the use of current EML models makes no sense.
- Objectives of further research:
- Use the proposed scheme of EML application in other subject areas.
- Development of automatic or semi-automatic systems to explain the obtained results.

5 Acknowledgments

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METHOD OF NEURAL NETWORKS FOR INVERSE HEAT CONDUCTION PROBLEMS

Keneskyzy Karina*

International Information Technology University, Kazakhstan

Corresponding author's e-mail: carinakenesova@mail.com

Abstract

This paper solves an important class of inverse heat conduction problems by using a back propagation neural network to identify unknown boundary conditions. The feasibility of the proposed method is considered in a series of numerical simulations. The proposed method of neural networks successfully predicts unknown parameters with acceptable error. The solution of the problem is an iterative procedure, at each step of which, using a neural network, the value of one of the parameters that define the parametric representation of the desired value is specified. The combination of neural network technologies with high-quality information about the regularities of the processes of non-stationary thermal conductivity makes it possible to increase the accuracy of solving the problem.

Keywords: modeling, heat conduction equation, inverse problem, neural network.

1 Introduction

The development of methods for solving inverse heat conduction problems is an urgent, rapidly developing area, and today there are large number of methods based on various approaches to the theory of solving ill-posed and inverse problems of computational mathematics and artificial intelligence. In this article, an approach is proposed to solving inverse problems of thermal conductivity based on the use of method of neural networks. The method of neural networks can be applied to the simplest classical problems of mathematical physics, the solution of which is well known to some non-classical problems. It shows parallels between new neural network and classical mathematical approaches to solving the problem and offers new points of view and algorithms.

2 The purpose of the research

is to develop a method of neural networks for finding the heat conductivity coefficient: to develop method for finding the initial boundary value problem of solutions of heat conduction equations; to develop an approximate method and an algorithm for solving the inverse problem and compiling a program by building neural network; to conduct numerical solutions and show the convergence of solving iterative methods and methods of neural networks.

3 Research methods:

In the course of the study, the following methods were used: mathematical modeling, iterative method, and method of neural networks

4 Overview

MATHEMATICAL MODEL OF THE HEAT TRANSFER PROCESS

The differential heat conduction equation is determined as a mathematical dependence, usually expressed by a partial

differential equation, which characterizes the flow of the physical phenomenon of heat transfer and allows it to calculate the temperature field at any internal point of the body at any time.

By integrating the differential equation, it obtains an analytical relationship between the values for the entire space and the entire time interval under consideration. The relationship between the quantities involved in the heat conduction is established in this case by the so-called differential equation of heat conduction, on the basis of which the mathematical theory of heat conduction is built. The derivation of the differential equation of heat conduction is based on the law of conservation of energy, combined with the Fourier law.

Formulation of initial-boundary value problems. In the 1D (one-dimensional) case, general view of the differential equation of heat conduction is written as:

$$\gamma_0 c \frac{\partial \theta}{\partial t} = \frac{\partial}{\partial z} \left(\lambda \frac{\partial \theta}{\partial z} \right) + W, \quad (1)$$

and in the 3D case

$$\gamma_0 c \frac{\partial \theta(x, y, z, t)}{\partial t} = \frac{\partial}{\partial x} \left(\lambda \frac{\partial \theta(x, y, z, t)}{\partial x} \right) + \frac{\partial}{\partial y} \left(\lambda \frac{\partial \theta(x, y, z, t)}{\partial y} \right) + \frac{\partial}{\partial z} \left(\lambda \frac{\partial \theta(x, y, z, t)}{\partial z} \right) + W(x, y, z, t) \quad (2)$$

It is often necessary to write equations (1) for cylindrical or spherical coordinate systems. In the axisymmetric case, that is, when the solution does not depend on the polar angle, azimuth, and elevation angle, equation (1) is written using the parameter r :

1) in Cartesian coordinates, where $r = 0$; 2) in cylindrical coordinates, where $r = 1$; 3) in spherical coordinates, where $r = 2$.

With r parameter, equations (1) are written as:

$$\gamma_0 c \frac{\partial \theta}{\partial t} = \frac{1}{r^i} \frac{\partial}{\partial z} \left(\lambda z^i \frac{\partial \theta}{\partial z} \right) + W$$

In this case the heat changes depending on the polar

angle, the heat conduction equation in the polar system is written as:

$$c\rho \frac{\partial T}{\partial t} = \lambda \left(\frac{1}{r} \frac{\partial}{\partial r} \left(r \frac{\partial T}{\partial r} + \frac{1}{r^2} \frac{\partial^2 T}{\partial \varphi^2} \right) \right)$$

In order to use any of these equations, they must be supplemented with conditions such as:

1) setting the geometry of the sample; 2) setting the initial condition that determines the temperature distribution in the sample at the initial time; 3) setting the boundary conditions of the first, second, third or fourth kind, which determine the laws of heat transfer on the boundary surfaces of the sample under consideration.

The initial conditions are usually given in the form of known values of the temperature field inside the test sample at the initial time:

$$\theta(x, y, z, 0) = \theta_0(x, y, z)$$

Boundary conditions can be defined as boundary conditions of the first, second, third, or fourth kind.

The boundary conditions of the first kind are usually set in the form of a known law of temperature turn over time on the surface of the test sample:

$$\theta|_r = T_1(t)$$

The boundary conditions of the second kind are usually given in the form of known functions of the change in time of the heat flow on the surface of the sample.

$$\lambda \frac{\partial \theta}{\partial n} \Big|_r = q(t)$$

Boundary conditions of the third kind describe the interaction of a sample with the environment according to the law of convective heat transfer proposed by Newton and having the form:

$$q = \alpha(\theta|_r - T_b(t)),$$

where α – heat transfer coefficient; $\theta|_r$ – ground temperature on the ground surface; $T_b(t)$ – air temperature.

In this, the boundary condition of the third kind is written as:

$$\lambda \frac{\partial \theta}{\partial z} \Big|_r = -\alpha(\theta|_r - T_b(t))$$

The boundary conditions of the fourth kind are set at the internal boundaries of the contact of two solids or at the boundaries of the solid – liquid (gas) contact as follows:

$$\begin{cases} \theta(h-0, t) = \theta(h+0, t) \\ \lambda_1 \frac{\partial \theta(h-0, t)}{\partial z} = \lambda_2 \frac{\partial \theta(h-0, t)}{\partial z} \end{cases}$$

In practice, a mixed boundary value problem of a special type is often used:

$$\begin{cases} \gamma_0 c \frac{\partial \theta}{\partial t} = \frac{\partial}{\partial z} \left(\frac{\partial \theta}{\partial z} \right) \\ \theta(0, t) = T_1, \quad \lambda \frac{\partial \theta}{\partial z} \Big|_{z=H} = -\alpha(\theta|_{z=H} - T_b(t)), \quad \theta(z, 0) = \theta_0(z) \end{cases}$$

By this way, it is necessary to determine the distribution of the ground temperature for any $z \in (0, H)$, at any time $t \in (0, T)$.

The resulting problem is called a direct problem, and the desired solution to the temperature distribution depends on the following parameters:

$$\theta = \theta(z, t, H, T, \alpha, c, \gamma_0, \lambda, \theta_0, \theta_0(z), T_1, T_b(t)).$$

5 Decision

A large number of works, including E. M. Kartashov [1, p. 4], and M. L. Krasnov [2, p. 4], are devoted to the analysis and development of methods for solving boundary value problems of the heat equation. And you can also use an electronic resource [3, p. 4], [4, p. 4].

Currently, both analytical and numerical methods are used to solve boundary value problems of the heat equation. In particular, finite difference and finite element methods are universal methods. In their application, the process is reduced to the discretization of the problem and the search for a solution to a system of linear algebraic equations. As a rule, computer-aided design systems use numerical methods. However, the problem with this approach is that such algorithms, due to their sequential nature, are poorly parallelized between several computing devices. Given the increasing spread of distributed computing systems, there is a need for an algorithm that has the advantages of the mentioned finite difference method, the finite element method and allows you to use the advantages of parallel computing [2, p. 4].

Using of neural networks as a new methodology for solving both old – classical and new non-classical problems is based on a number of special properties of neural networks. The proposed neural network approach allows us to obtain a solution immediately in an analytical (or piecewise analytical) form – in the form of a function that satisfies the required conditions for smoothness and behavior at infinity. With using of neural networks, can calculate linear functions, nonlinear functions of a single variable, as well as all kinds of superpositions – functions of functions obtained by cascading networks.

6 Conclusion

In this paper, an approximate solution is carried out using a neural network. It consists in determining the parameters of a mathematical model based on the available experimental information. Note that the solution of the heat equation, the described model is applicable to the solution of arbitrary elliptic partial differential equations. In which case, it is necessary to find these

parameters $\gamma_0, c, \lambda, \alpha$, then the received task is called the coefficient of inverse heat conduction problem, in

case if it is necessary to find $\theta_0(z)$ – the retrospective inverse problem, and when determining these parameters T_1 or $T_b(t)$ of the boundary inverse problem.

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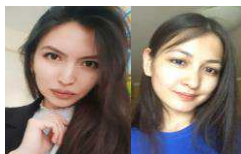
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Conditions and prerequisites for the problems of traffic flows in modern megalopolises (on the example of Almaty)

Shakizat Kudaibergen*, Diana Otegen*

International Informational Technology University, Kazakhstan

*Corresponding author's e-mail: diana.otegenn@gmail.com



Abstract

Unsustainable transport can cause air pollution, noise, accidents and other negative influences that harm people and the environment, which is especially true in urban areas. Today, about 50% of the world population of 7, 7 billion people live in cities. According to the UN, this share will rise to almost 85% in 2050, when the planet is expected to increase its population to 9 billion people. Today, cities account for nearly two-thirds of global energy consumption and over 70% of emissions. Thus, the sustainability of urban transport is a major issue and will only grow in importance.

The aim of the thesis is to improve the management system of urban traffic flows in a large city of the Republic of Kazakhstan (for example, Almaty) to solve transport problems.

Keywords: traffic flow, transport, megapolis

1 Introduction

Cities play a critical role in today's world and are the engine of the global economy. Cities, being a place with a high level of accumulation and concentration of population, economic activity are complex spatial structures that are supported by transport systems. Transport, being the most important factor in economic and social development, contributes to an increase in the competitiveness of the economy. The development of transport is inexorably leading to an increase in environmental and environmental pollution, the concept of sustainable transport development is developing all over the world.

Transportation in Kazakhstan is an important and rapidly developing sector of the economy of Kazakhstan. A modern city in the field of transport organization bears the imprint of both global urbanization processes and the unique economic and social conditions inherent in Kazakhstan.

Urban provision of public transport and the organization of movement are the main tasks for the management of the city. With the growth of the population of cities, as well as with the change and development of their economic bases and the adaptation of their housing sector to the changing conditions of life, the importance of vehicles increases, their regulation of the day on the roads more and more vehicles appear.

All aggregate vehicles on the roads form the concept of traffic flow. A traffic flow is the movement of vehicles ordered by the existing transport network.

In our country, the economically and socially developed, densely populated city is Almaty - the place of residence of

about 2 million inhabitants, and in order to ensure the proper conditions for comfortable living, it is necessary to study the experience of world megalopolises, to create the most favorable conditions for the life support of the townspeople.

2 Overview

On the issue of managing urban traffic flows in a large city of the Republic of Kazakhstan, an article was considered in the journals "Almaty Tekhnologiyak Universitetinin Khabarshysy"(in Kazakh) for 2020, "Problems of urban traffic organizations in a large city of the republic of Kazakhstan". The work is devoted to the study of the intensity of urban traffic and the improvement of the management system of urban traffic flows in a large city of the Republic of Kazakhstan (for example, Almaty). Urban road transport has become an integral part of the modern life of the population. It affects not only the economic, but also the social development of the city. A radical improvement in the conditions for traffic in the city, in the long term, can be achieved by implementing urban planning measures: building bridges, tunnels, punching new highways. And also the analysis shows that the situation will be significantly improved by a set of measures related to the improvement of traffic management.

According to the article "The main aspects and problems of road transport in the city of Almaty", the magazine "Vestnik KazATK "(in Russian) No. 1 (100), 2017, the management of traffic flows in the transport system of the city was considered. The article highlighted the main aspects for the implementation of measures to improve and efficiently manage urban transport systems.

The theoretical basis of the research is the textbook by

A.E. Goreva "Fundamentals of the theory of transport systems" 2010, St. Petersburg. The book provides basic information from the theory of systems, gives a characteristic of the main types of transport systems, the features of their structure and functioning. Much attention is paid to the methods of knowledge and research of transport systems that have become widespread in practice. Practical examples are provided for road transport systems.

3 Decision

Currently, there is a developed transport infrastructure in Almaty, represented by various means of transport: public buses, public electric transport, metro, BRT (high-speed bus transport), including "green", taxi, motorcycle and bicycle transport.

Despite this, the transport infrastructure of the city of Almaty has a number of significant shortcomings: low density and lack of roads, poor quality road surface, outdated vehicle fleet, a large flow of vehicles entering the city from the suburbs, including transit, lack of rolling stock and drivers, regularity of routes, traffic congestion, traffic jams, violations of the rules for transporting passengers and luggage, insufficient number of safe pedestrian crossings, poor quality of passenger service, insufficiently thought-out installation of traffic lights, lack of proper information support for drivers and passengers, inconsistent operating mode of organizations (advertising, landscaping etc.) leading to the creation of artificial traffic congestion, a detrimental effect on the ecology of the city (especially on the air basin) and noise pollution.

All this together forms the weaknesses of the Almaty transport. To study the characteristics of the road traffic of the city of Almaty, it is necessary to analyze the road fund, which is the basis for any transport system. The road fund of the city of Almaty is fully owned by the municipality.

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Every year, work is carried out to increase the length of roads, but despite these measures, the city of

Almaty is inferior to the comparable cities of Warsaw, Budapest and Toronto in terms of the level of road availability and the density of roads in the city. To improve the condition of the road surface in the city of Almaty, the construction of new and repair of existing highways and highways is carried out annually.

4 Conclusion

A theoretical basis for improving the management system of urban traffic flows in the city of Almaty has been completed. The length of the road fund, the density of roads, passenger traffic, in recent years, the freight turnover by road transport, the structure of the vehicle fleet and its analysis by the type of fuel used, the year of production of vehicles, tariffs for travel in public transport were considered. Field observations and statistical measurements of changes in traffic intensity during the day, days of the week and seasons of the year on the streets of Almaty were carried out. With the aim of a deep, wider understanding of the problems of transport in the city of Almaty, taking into account the geographical features, economic and social processes inherent in this city, transport flows were considered, taking into account the adjacent areas of the Almaty agglomeration. The analysis of the size and distribution of the population, taking into account the location of the main jobs in the districts of the city, was carried out to determine the distribution of the load on the road traffic network during a certain time interval. Measures need to be taken to improve urban traffic management. As mentioned earlier, the task of optimal management of urban traffic flows requires a complex impact on a complex and dynamic transport system, which includes the traffic flow of the city of Almaty.

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Image generation for solving problems of precision farming

Maryam Ospanova^{1*}, Marina Yelis¹, Abay Bekbaganbetov¹,

Jan Rabcan³ and Ravil Muhamedyev^{1,2}

¹Satbayev University, Kazakhstan, Almaty

²Institute of Information and Computational Technologies. Kazakhstan

³University of Zilina, Slovakia

*Corresponding author's e-mail: maryam.ospanova@gmail.com



Abstract

Precision farming (PF) is a promising area of agricultural development. PF requires the collection and processing of a large amount of data to conduct more accurate and timely agrotechnical measures. UAVs can be used to collect such data. However, the specifics of collecting data from UAVs lead to peculiarities in solving computer vision problems using machine learning models. Training models requires a large amount of data obtained from low-flying platforms. Game engines provide the ability to generate such data. The work describes the results of generating synthetic images using the Unreal Engine 4 game engine. A model environment is developed, and a set of images is obtained that are used for computational experiments using the FCN8s and UNET networks.

Keywords: precision farming, synthetic images, game engines, deep learning, Intelligent Unmanned Aerial Vehicle Technology (IUAVT)

1 Introduction

The economy of Kazakhstan is largely oriented towards the commodity production based on non-renewable resources. At the same time, the country is also rich in renewable resources, including agricultural products. The development of agricultural production requires a transition from extensive to intensive production methods. A system of new technologies called Precision Farming (PF) is an example of this approach. PF is based on the collection and practical application of large amounts of data on spatially distributed resources and objects. At the local level unmanned aerial vehicles (UAVs) can be used to collect such data. Moreover, UAVs can also be used to perform precise agricultural activities, such as fertilizers and herbicides application. Nevertheless, for the effective use of UAVs, it is necessary to reduce the share of manual labor for management and improve the quality of monitoring. In this regard, it is necessary to develop methods for processing images obtained from UAVs to solve classification and identification problems.

Currently, image classification problems are quite effectively solved with the help of deep learning models, which, however, require significant amounts of data for training. However, the number of marked up datasets that take into account the features of the platform (high resolution, low altitude) [1] is not large. [2]. Methods of augmentation or generation of completely artificial datasets are used to reduce the deficit in this kind of marked up data. This paper describes a method of model environment creation for generating synthetic video data using the Unreal Engine 4 game engine.

2 Generating synthetic video data

Tools for developing game and simulation environments have both common features and differences and are aimed at a wide range of needs (Unreal Engine, Unity, GameMaker, Godot, CryEngines, Blender [3]): game engines that do not require programming knowledge and skills; engines based on popular web technologies; engines that are opensource and can therefore be customized or extended by experienced users; and professional game engines. The choice of a particular engine is not trivial. But popular tools called Unity and Unreal Engine are most often used to generate synthetic data.

A comparative analysis of the functions supported by Unity3D and Unreal Engine showed that the Unreal Engine has the best functionality. It provides a more realistic light-shadow system, setting up scenes to use the CPU-GPU computing capabilities, and using the Blueprints visual scripting system. In addition, it is an opensource system. This engine was chosen for further experiments.

We have developed a simulation environment, which is a unique scene created by procedural tools of the Unreal Engine 4. The environment includes the necessary lighting, physical constraints and laws of the real world, and models for simulation (Figure 1, 2).

The movement of the UAV is modeled by camera actor, which allows you to follow the trajectory defined by the user (Figure 2). A script can be changed by adding, moving, and importing new objects to the scene, and the flight path can also be adjusted. Thus, if necessary, it is possible to quickly create a new environment for testing.



FIGURE 1 Simulation environment

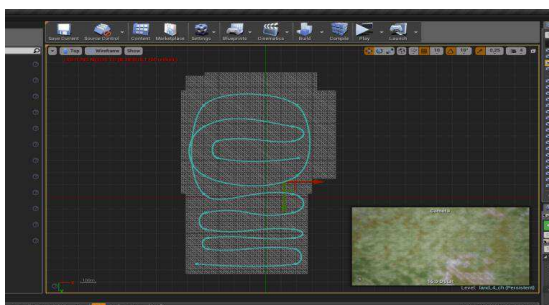


FIGURE 2 Trajectory of the camera (UAV)

Rendering system built in Unreal Engine 4 (Figure 3) was used to export the scene simulation and UAV's camera motion data in the image sequence format.



FIGURE 3 Result of exporting data from the camera

The part of the generated video data can be seen at the link:

https://osf.io/q8t2d/?view_only=d060717a6f814f128f67d249d2d5ad43

To evaluate the results obtained in the task of searching for changes in the scene, we conducted computational

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experiments using the transfer learning scheme. For the experiments, we used the pre-trained networks FCN8s [4], UNET [5]. Experiments have shown the promise of UNET in the task of recognizing changes in the scene. An accuracy score of 93-99% was achieved on a synthetic video dataset.

3 Conclusion

Game engines provide the ability to generate a theoretically unlimited number of images to solve computer vision problems. Thus, they cover the scarcity of marked-up data required for deep learning models. This paper conducts preliminary experiments on generating synthetic images using the Unreal Engine 4 game engine. As a result, a model environment was formed, and a marked-up dataset was generated in the amount of 1 hour of video. The results of experiments using the FCN8s and UNET networks show that for training and evaluating machine learning models it is necessary to:

- increase the number of images;
- perform experiments with changing lighting, season, and weather conditions in the model environment.

A special issue is the generation of multispectral images, which are widely used for calculating vegetation indices. A synthesis of multispectral data requires additional analysis because the quality of the resulting multispectral images is difficult to identify by traditional way by an expert viewing of the images.

4 Acknowledgments

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Cloud storage of big data using secret sharing technology

**Yerzhan Seitkulov*, Gulden Ulyukova, Banu Yergaliyeva,
Ainur Zhetpisbayeva**

Institute of Information Security and Cryptology, Gumilyov Eurasian National University. Kazakhstan

*Corresponding author's e-mail: erj@mail.ru



Abstract

This article is devoted to the study of a method of storing data in cloud storages using secret sharing technology. Such problems are especially relevant in the context of the rapid development of the Internet of Things (IoT). Chips, smart cards and other physically small devices, as a rule, have significant memory limitations, so there is a need to use cloud storage as an auxiliary tool for secure data storage. The idea of the new approach is to develop a method for storing big data using various cryptographic solutions, such as Shamir's secret sharing method, Diffie-Hellman key distribution protocol, etc. Note that various researchers have proposed methods for storing and safely processing data in the cloud.

Keywords: Information security, IoT, Cloud storage

1 Introduction

This article is devoted to the study of a method of storing data in cloud storages using secret sharing technology. Such problems are especially relevant in the context of the rapid development of the Internet of Things (IoT). Chips, smart cards and other physically small devices, as a rule, have significant memory limitations, so there is a need to use cloud storage as an auxiliary tool for secure data storage. The idea of the new approach is to develop a method for storing big data using various cryptographic solutions, such as Shamir's secret sharing method, Diffie-Hellman key distribution protocol, etc. Note that various researchers [1-10] have proposed methods for storing and safely processing data in the cloud.

As part of this work, we will assume that client i wants to store his data (files, drawings, photographs, etc.) in outsourcing, that is, in the cloud storage. At the same time, the data themselves are not secrets from the server, therefore, to exchange information between clients and the server, standard protocols for secure information exchange can be used. The problem lies in the fact that the cloud storage (server) is not trusted in the sense that it is possible for intruders on the server side, such as information substitution, corruption of data content, etc. In addition, suppose that the server itself does not violate the interaction protocol and does not leak information at the time of transmission and exchange of information with clients. But storing the data itself in the cloud can be unsafe, so the original data, after being transferred to the server, must be kept encrypted using standard symmetric encryption algorithms, for example, GOST, AES, etc. Thus, for each client and server, the task is to generate a shared secret key that will be used by the server as a data encryption key. In such a model, the server is interested in «forgetting» this public key, but to be able to

recover this key to decrypt the data only with the participation of the client who owns the data.

2 Protocol

So let's say client i needs to send big data to the cloud for encrypted storage.

Step 1. Client i and server choose a sufficiently large prime p and d . Client i and server, independently of each other, choose random natural numbers a and b , respectively.

Next, client i calculates the number A_i :

$$A_i = d^a \bmod p;$$

and the server finds the number B :

$$B = d^b \bmod p.$$

Here the number a is the secret key of the client i ; b is the server's private key. And the numbers A_i and B are the public keys of the client and server, respectively.

Step 2. Key distribution is carried out using the well-known Diffie-Hellman protocol:

- Client i calculates and sends to the server its public key $A_i = d^a \bmod p$, and the server sends to the client its public key $B = d^b \bmod p$.
- The server calculates the number $Q_i = A_i^b \bmod p$, and the client similarly calculates the same number $Q_i = B^a \bmod p$, since $B^a \bmod p = d^{ab} \bmod p = A_i^b \bmod p$;
- Take the number Q_i as the distributed key k_i . That is, we have a shared secret between client i and server: k_i .
- The server encrypts the original data of the client i ,

using the shared secret key k_i and stores the data in encrypted form.

- Now the server and client i delete from their storages the numbers a and b , respectively, that is, they «forget» them.

Step 3. We use Shamir's secret sharing technology:

- Let's denote by l the value of the product of two numbers: $l = Q_i A_i \bmod p$;
- Server and client independently form the same polynomial

$$f(x) = k_i + lx$$

- Server and client randomly split the shared secret k_i into two keys using Shamir's secret sharing technology. Let's denote them $ServerKey(i) = (x_1, f(x_1))$ and $ClientKey(i) = (x_2, f(x_2))$;
- Now the server and the client are deleted from their storages, that is, they «forget», the point Q_i and the polynomial with all parameters $f(x) = k_i + lx$.

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Seitkulov Y, Ulyukova G, Yergaliyeva B, Zhetpisbayeva A

Step 4. The server forms the client base, that is, for each client i , only the following information will be stored (profile of the i -th client):

- Client ID;
- $h(k_i)$;
- $ServerKey(i)$;
- $-A_i$;

Here $h(k_i)$ is the value of the cryptographic hash function from the distributed public key k_i between the client i and the server. Storing the hash function is required for client authentication. Note that this data is sufficient for the server to recover the shared secret key k_i for decrypting the data and further transmitting the original data to the client.

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Implementation of the selection function in the modified sponge cryptographic hash functions design scheme

**Yerzhan Seitkulov*, Ruslan Ospanov, Banu Yergaliyeva,
Ainur Zhetpisbayeva**

Institute of Information Security and Cryptology, Gumilyov Eurasian National University. Kazakhstan

*Corresponding author's e-mail: erj@mail.ru



Abstract

In this paper, we consider the implementation of the function of selecting an internal function from a given set for a modified "Sponge" scheme for designing cryptographic hash functions. The selection function is constructed for the case when the scheme specifies a set of three internal functions F_i , $i=0,1,2$. The choice of one of these three internal functions as part of the entire scheme is determined using message-dependent selection bits generated in a pseudo-random manner.

Keywords: Information security, Cryptography, Hash function

1 Introduction

A cryptographic hash function belongs to main and basic cryptographic primitives, such as symmetric block ciphers, stream ciphers, pseudorandom number generation, etc. It is the basis for creating effective tools of cryptographic protection of information to ensure information security in various information systems. Cryptographic hash functions are used in a huge number of applications, protocols, and schemes, such as password protection, digital signatures, message authentication, cipher text validation, proof of knowledge, pseudorandom number generators, key derivation functions, and others.

Currently, the most popular and promising scheme for constructing cryptographic hash functions is the "Sponge" scheme ("cryptographic sponge") [1], [2]. According to this scheme, the Keccak algorithm [3] was designed, which became the winner of the SHA-3 competition. The "Sponge" scheme is a simple iterative scheme for constructing a cryptographic hash function based on some internal function f , which is a fixed-length transformation or permutation that operates with a fixed number of b bits that make up the so-called internal state S . And $b = r + c$. The value of r is called the bitrate, and the value of c is called the capacity. The internal state of S is first initialized to some fixed value. Then, after the corresponding padding and division of the message into r -bit fragments, all the r -bit fragments of the message are simply and iteratively processed by bitwise adding them to the r bits of the internal state, and then applying the b -bit function f . After all message blocks are processed by this "absorbing" process, r bits of the final hash value are sequentially output by extracting r bits from the internal state and then applying the function f to it (the "squeezing" process).

To date, many algorithms have already been developed

using this scheme. Various modifications of the scheme have also been developed. Modifications use different methods of padding, implement many different state initialization options, and apply many different transformations and permutations as internal functions. The classic "Sponge" scheme and most of its modifications assume only one internal function. The internal function is the main and important component of the "Sponge" scheme, which is a fixed-length transformation or permutation that operates with a fixed number of bits that make up the internal state of the function.

2 Selecting an internal function from a given set

In [4], a new scheme "Enhanced Sponge Function (ESF)" is proposed, which involves the use of two internal functions, in contrast to the "classical" scheme "Sponge", which uses only one internal function. The order of operation of these two internal functions as part of the entire scheme is determined using a message-dependent key generated in a pseudo-random way. The key bit is generated as follows: the Von Neumann corrector is applied to the input message, then the XOR corrector is applied to the resulting sequence of bits, and we get the key bit. Using the key bit, one of the two specified internal functions is selected as follows. The first r bits of the state S are sequentially being sent to the information input of one 1-2 demultiplexer, to the address input of which the key bit is being sent, and the remaining c bits of the state S are sequentially being sent to the information input of another 1-2 demultiplexer, to the address input of which the key bit is also being sent; then the function f_0 is applied to the output bits (the converted state value) if the key bit is 0, or the function f_1 is applied if the key bit is 1.

In [5], [6], a modification of the "Sponge" scheme is proposed, which involves the use of a set of internal functions. According to this scheme, the following transformations are performed on the input message from a given set of internal functions, the function f is selected using the selection function. In the case of a set of two functions, we can apply the method described above [4].

In this paper, we consider the case when the set of three internal functions F_i , $i=0,1,2$ is given in the scheme.

The selection function is defined as follows.

The input message is divided into two parts. If the length m of the message is an even number, then it is divided into two parts of the same length, and if not even, then two parts with lengths $\left\lfloor \frac{m}{2} \right\rfloor + 1$ and $\left\lfloor \frac{m}{2} \right\rfloor$.

The first selection bit is generated. To do this, the von Neumann corrector is applied to the first part of the input message, i.e. the bits of the input message are considered in pairs: if there are two identical values in the pair, then the pair is discarded, if the bits are different, then only the first bit in this pair is written instead of the pair. Then the XOR corrector is applied to the result, i.e. all the bits of the resulting sequence are added modulo 2. The result is the first selection bit. Similarly, a second selection bit is generated by applying the von Neumann corrector and the XOR corrector to the second part of the input message.

- The first r bits of state S are sequentially being sent to the information input of the first 1-2 demultiplexer, to the address input of which the first selection bit is being sent, and the remaining c bits of state S are sequentially being sent to the information input of the second 1-2 demultiplexer, to the address input of which the first selection bit is also being sent. If the

selection bit is 0, then the output bits of the first 1-2 demultiplexer are being sent to the information input of the third 1-2 demultiplexer, to the address input of which the second selection bit is being sent, and the output bits of the second 1-2 demultiplexer are being sent to the information input of the fourth 1-2 demultiplexer, to the address input of which the second selection bit is also being sent. Next, the internal function F_0 will be applied to the output $r+c$ bits if the second selection bit is 0, or the internal function F_1 will be applied if the second selection bit is 1. If the first selection bit is 1, then the internal function F_2 will be applied to the $r+c$ bits obtained at the output.

3 Conclusion

In this paper, we consider the implementation of the function of selecting an internal function from a given set for a modified "Sponge" scheme for designing cryptographic hash functions. The selection function is constructed for the case when the scheme specifies a set of three internal functions F_i , $i=0,1,2$. The choice of one of these three internal functions as part of the entire scheme is determined using message-dependent selection bits generated in a pseudo-random manner.

4 Support information.

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On criteria and methods for generating optimal S-boxes

**Yerzhan Seitkulov*, Ruslan Ospanov, Banu Yergaliyeva,
Kuandyk Niyazaliyev**

Institute of Information Security and Cryptology, Gumilyov Eurasian National University. Kazakhstan

*Corresponding author's e-mail: erj@mail.ru



Abstract

In this paper, we consider criteria and methods for generating optimal S-boxes. The current issue is the analysis of the existing criteria for S-boxes and a reasonable choice of the necessary set of criteria for specific cryptographic algorithms or classes of cryptographic algorithms; search and develop theoretically based effective practical methods for obtaining optimal S-boxes that provide high indicators of security in symmetric cryptographic algorithms. The analysis of the criteria and methods will make it possible to build the most efficient algorithm for generating optimal S-boxes.

Keywords: Information security, Cryptography, S-box

1 Introduction

S-boxes (substitution block, s-box, substitution box) are one of the main components that determine the nonlinearity of the encryption transformation and the level of security of modern symmetric cryptographic algorithms. When designing many symmetric block encryption algorithms, S-blocks are often chosen for the purpose of implementing confusion in the cipher. Thus, the cryptographic security of ciphers strongly depends on the cryptographic properties of S-boxes. S-boxes are substitutions that map an n -bit input block to an m -bit output block. Widely used in block ciphers and the most interesting subclass of substitutions are bijective (also called permutations). To protect cryptographic algorithms from various types of attacks, S-boxes must meet a number of criteria. Due to the large number of existing criteria, their inconsistency or partial interdependence, it is problematic to form an S-box that has all the known specified properties. Therefore, in practice, S-boxes are used that meet the main criteria essential for a particular symmetric algorithm. Such S-boxes are usually called optimal.

2 Criteria

The optimal S-box criteria can be set for an entire class of cryptographic algorithms, as well as set for a single cryptographic primitive. When selecting replacement tables for new ciphers, the main criteria are non-linearity and differential uniformity. Differential uniformity is an indicator of resistance against differential attack. For example, for 8-bit substitutions, the optimal values of differential uniformity are no more than 8. Non-linearity is an indicator of resistance against a linear attack. The optimal values for 8-bit substitutions are at least 100. Algebraic

degree and algebraic immunity are indicators of resistance against algebraic attacks. In the case of 8-bit substitutions, the optimal values of the algebraic degree are at least 7, and the maximum value of the algebraic immunity is 3 for 441 equations. And in the case of substitutions of 4 in 4 bits, the criterion of algebraic immunity does not play a big role, since they can be described by a system of equations of the second degree. But at the same time, it cannot be equal to 1. Another criterion is the absence of cycles of length 1, i.e. fixed points. There are many other criteria. Most of the criteria have not yet been proven to be necessary. Many of them are not applicable to block ciphers, but at the same time they are used in stream ciphers. The properties of S-boxes of DES and GOST 28147 block ciphers are not relevant today. Modern criteria are focused on protection against existing types of cryptanalysis: linear, algebraic, and various variations of differential. Another criterion is related to whether substitutions belong to different equivalence classes of vector Boolean functions. This criterion is only applicable if the algorithm uses more than one non-linear replacement node. Many studies show that there are probably no perfect S-boxes. Therefore, the concept of optimal S-box was introduced, the criteria of which are determined for a specific cryptographic algorithm or class of cryptographic algorithms) and are optimal from the point of view of protection against existing types of attacks.

Generating optimal S-boxes is a time-consuming task. Existing methods for obtaining S-boxes can be divided into three main areas: algebraic constructions, pseudorandom generation, and a heuristic approach.

In the first approach, S-boxes are designed according to some proven mathematical relations and principles. The most well-known representatives of this approach are bijective $(n \times n)$ S-boxes (permutations) based on inversion in a finite field $GF(2^n)$. They are the best S-boxes found

and at the same time optimal with respect to most of the desired criteria. For example, an S-box in AES is an S-box that has high algebraic degree - 7, high nonlinearity - 112, low autocorrelation - 32, and low differential uniformity - 4. In [1], we propose a construction based on a linear fractional transformation and a permutation function. In [2], we consider a method for designing S-boxes based on the use of cubic polynomial mappings. In [3], we synthesize (8×8) S-boxes based on the projective general linear group $PGL(2, GF(28))$ over the Galois field $GF(28)$. There are many other algebraic methods for generating substitutions, for example, [4], [5]. Although such S-boxes are often preferred because of their excellent cryptographic properties, there are some problems related to their simple algebraic structure and possible future vulnerability to algebraic attacks. In addition, the number of these S-boxes is small, and they are all affine equivalent.

The second approach consists in constructing S-boxes from a table of random numbers and then checking its correspondence. This approach is doomed to failure from the very beginning, since most of the cryptographic criteria you are looking for often contradict each other, which significantly reduces the number of S-boxes that are good for all criteria, and reduces the probability of selecting good S-boxes.

The third approach involves iterative improvement of an S-box or a whole set of S-boxes with respect to one or more properties. Unlike algebraic constructions, heuristic methods are able to create large sets of S-boxes, since they use direct search methods. Most often, the cryptographic properties of S-boxes obtained using heuristic algorithms are not as good as those of algebraically constructed S-boxes. However, in recent years, the difference between these properties has become increasingly indistinguishable. The latter is achieved using some specific heuristic methods, such as the method of search by hill climbing, the method of simulated annealing, genetic algorithms, or various combinations of them. Although most of the methods described give good results for constructing bijective S-boxes based on only one of the main criteria, this becomes much more complex when both non-linearity and differential uniformity must be considered simultaneously.

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A known method for generating highly nonlinear S-boxes based on gradient descent [6] requires the sequential application of several criteria for each generated substitution. In [7], an improvement of this method is presented by selecting the appropriate order of criteria application, which reduces the required computing power for generating S-boxes. In [8], we propose a heuristic method for generating large sets of $(n \times n)$ bijective S-boxes with a good combination of target properties, such as high nonlinearity, high algebraic degree, low differential uniformity, and low autocorrelation, based on the use of a specific artificial immune algorithm in combination with a modification of the hill climbing method for S-boxes. In [9], the prospects for further research in order to improve heuristic methods for the synthesis of random S-boxes are substantiated. In [10], a generalized methodology for designing and testing S-boxes for symmetric ciphers is described. This methodology includes the application of three well-established tests that should be used to design or test each S-box. The study also shows that at least some mathematical methods for designing S-boxes, while safe, are no more secure than non-mathematical methods, but are more computationally intensive

3 Conclusion

Thus, the current issue is the analysis of the existing criteria for S-boxes and a reasonable choice of the necessary set of criteria for specific cryptographic algorithms or classes of cryptographic algorithms; search and develop theoretically based effective practical methods for obtaining optimal S-boxes that provide high indicators of security in symmetric cryptographic algorithms. The analysis of the criteria and methods will make it possible to build the most efficient algorithm for generating optimal S-boxes.

4 Support information.

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Mathematical models, systems and technologies to monitor the logistical values of enterprises.

Sirkebay Aizhan*

International Information Technology University, Kazakhstan

Corresponding author's e-mail: asirkebay@gmail.com

Abstract

Organizations face a variety of internal and external risks, such as high competition, labor unrest, high risk, and changes in government legislation. Thus, many of the decisions that an organization makes are subject to risk and serious uncertainty. These risks can be mitigated by monitoring your inventory values in the future. Monitoring is the systematic process of accounting for and analyzing the resources offered by an organization in the face of unpredictable and competitive forces. In this article, we use the XGBoost regression model for monitoring and analysis. XGBoost is a machine learning algorithm that uses decision trees. In forecasting problems with unstructured data, neural networks are superior to other forecasting algorithms, but in our case, the data is structured and tabulated, and the decision tree algorithms are considered the best for structured data. So we decided to use the XGBoost algorithm to predict demand.

Keywords: machine learning, material and technical values, deep learning, material and technical values, enterprise, business processes, monitoring.

1 Machine learning algorithms in business process monitoring

In business process management (BPM), lifecycle actions such as identifying, discovering, analyzing, improving, implementing, monitoring, and controlling business processes depend on data, although until now data had to be collected manually. Various approaches to monitoring forecasting processes use machine learning methods, since, unlike rule-based monitoring methods, there is no need to rely on subjective decision-making rules determined by experts. Moreover, the increasing availability of data reduces the barriers to the use of machine learning. Although the popularity of deep learning (DL) in predictive process monitoring has increased, most work still uses classical machine learning methods, such as decision trees, random forests (RF), or auxiliary vector machines (SVM) [1, 2]. However, the disadvantage of such methods is that their performance is highly dependent on manual function development in the case of low-level function representations. From a BPM perspective, DL promises to use process data for forecasting. Predictive process monitoring aims to predict the behavior, performance, and results of business processes at runtime. This helps identify problems before they occur, and reallocate resources before they are wasted.

2 Model architecture

The proposed architecture consists of five components: data reception, data preprocessing, storage, etc. Function extraction, ML model.

A GETTING DATA:

Initially, the owners of the company can log in and add information about their material and technical values, which is stored in the database. In addition, the database records historical sales data. This data, which is used to

train the machine learning model, is entered into the system. The training data used consists of several thousand rows.

B DATA PREPROCESSING:

Data preprocessing is a data mining technique that is used to transform raw data into a useful and efficient format. The resulting data is cleared before being used to train the model. Therefore, unnecessary fields are removed from the database. Preprocessing also involves converting raw data into a clear format.

D FEATURE EXTRACTION:

The data stored in the S3 bucket contains several fields. With proper feature extraction, the accuracy of the model can be increased, so only certain fields of the dataset were extracted for training. For example, training data consists of the product name as well as the product ID. Only the product ID is required to train the model. Thus, only the necessary functions are extracted from the dataset and used to train the model.

E. THE ML MODEL:

The machine learning model uses an algorithm called XGBoost. XGBoost is an ensemble algorithm that is based on decision trees and uses a gradient boosting structure. It was developed based on a basic packaging algorithm. Typically, prediction tasks consisting of neural networks with unstructured data usually perform poorly compared to other algorithms or frameworks. However, when it comes to small and medium-sized structured / tabular data, decision tree-based algorithms work well.

F. REPORT:

The usage values of certain resources for the next 2

weeks are predicted by the XGBoost model. The predicted values are real numbers. To get the actual demand values, the values were rounded up. The predicted values are displayed in the form of a report for the company owners, which contributes to effective inventory management.

We are looking at the work of a sales company, and we also have a set of products in which we are trying to determine which products should continue to sell and which should be removed from our inventory. The file contains historical sales data and active inventory, which can be seen in the column named "File Type".

3 Problem statement:

Sirkebay A

Context: The company has many inventory items in stock, and very few of them are typically used (only about 10% each year), and many items are used only once during the year.

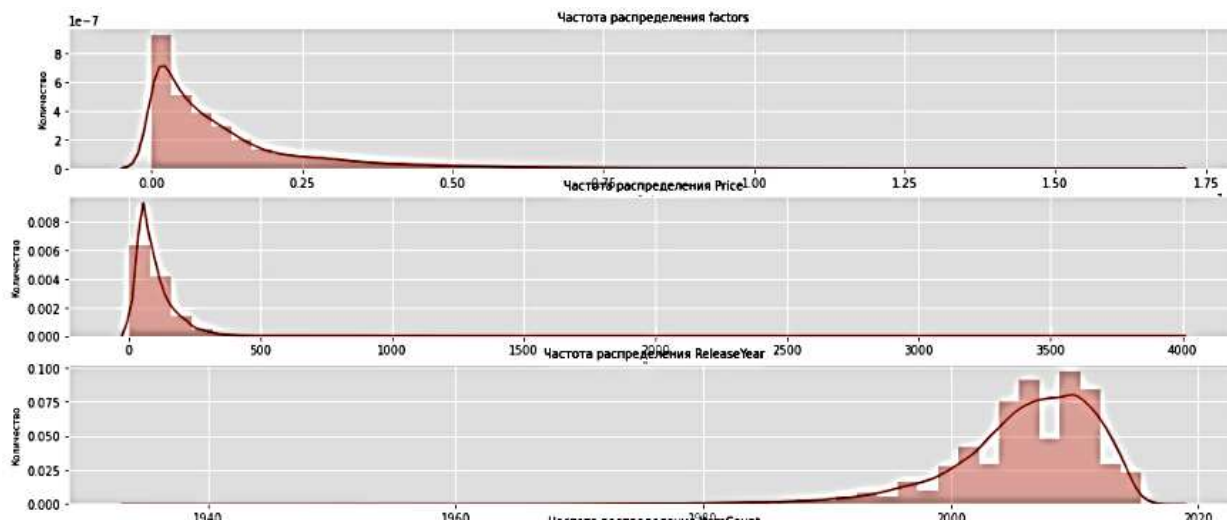
Purpose: The inventory department wants to determine which products from its inventory should be left for sale and which should be discarded. We have to create a binary classifier that gives us a list of product IDs that need to be stored in the inventory, or a list of products that need to be deleted.

Data: the data contains both historical data on the material and technical values of the enterprise, and active stocks.

We have to create a binary classifier that gives us a list of product IDs that need to be stored in the inventory, or a list of products that need to be deleted.

Zakaz	Data	id_prod	Flag_prodaj	Col_prodaj	Type_market	id_release	release_flag	factors	Price	ReleaseYear	ItemCount	minPrice	minnetPrice	
0	2	Historical	1737127	0.0	0.0	D	15	1	682743.0	44.99	2015	8	28.97	31.84
1	3	Historical	3255963	0.0	0.0	D	7	1	1016014.0	24.81	2005	39	0.00	15.54
2	4	Historical	612701	0.0	0.0	D	0	0	340464.0	46.00	2013	34	30.19	27.97
3	6	Historical	115883	1.0	1.0	D	4	1	334011.0	100.00	2006	20	133.93	83.15
4	7	Historical	863939	1.0	1.0	D	2	1	1287938.0	121.95	2010	28	4.00	23.95
5	8	Historical	214948	0.0	0.0	D	0	0	1783153.0	132.00	2011	33	138.98	13.64
6	9	Historical	484059	0.0	0.0	D	13	1	2314801.0	95.95	2010	33	90.77	46.45
7	10	Historical	146401	0.0	0.0	D	4	1	721111.0	207.80	2011	57	187.90	30.56
8	11	Historical	110568	0.0	0.0	D	11	1	436667.0	119.81	2008	36	63.99	96.92
9	12	Historical	764270	0.0	0.0	D	5	1	6652211.0	49.95	2004	19	53.99	28.95

FIGURE 1. Full data description



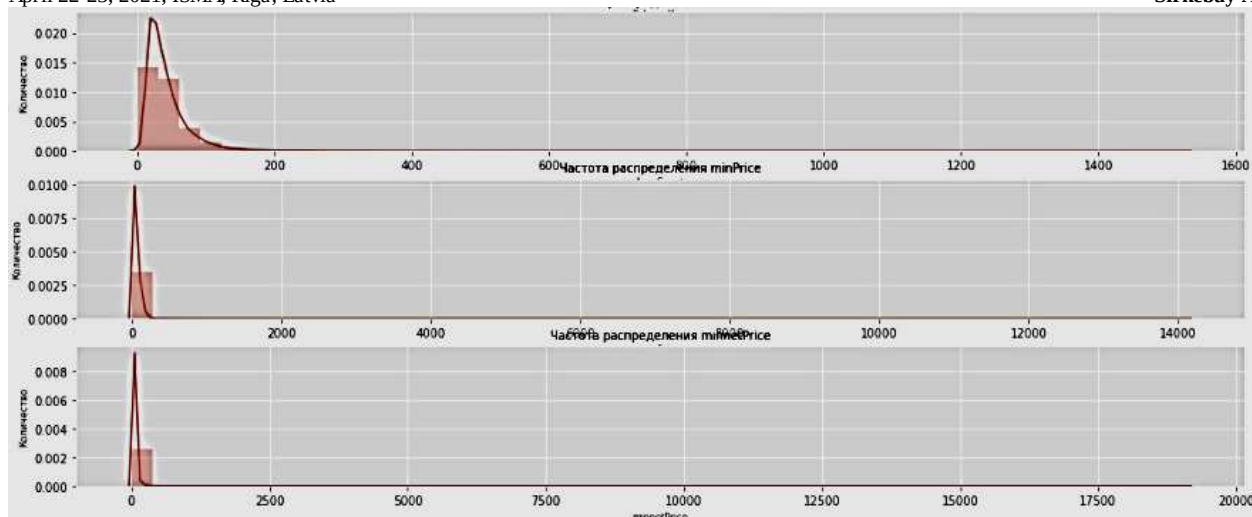


FIGURE 2. Histogram by main attribute

Plot histograms and their distributions for the following attributes: "factors", "Price", "releaseYear", "ItemCount", "minPrice", "minnetPrice".

Here the full analysis with the use of the above machine learning algorithms exceeds the scope of this work, so we have not included them.

As we understood, to perform inventory analysis, considered to consist of several attributes, a hybrid methodology is used, which combines methods of making decisions based on several criteria (MCDM)

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Leap motion as a whiteboard tool using machine learning algorithms

Tsoy D D *, Seitnur A M, Zhenisov D K, Ipalakova M T, Daineko Ye A

International Information Technology University

*Corresponding author's e-mail: danatsoy@gmail.com



Abstract

The paper covers using of VR controller Leap motion as a whiteboard. There is given analysis of current state of the market. Also described the approach to the development of the app, that allows to use Leap Motion as a whiteboard. The program uses machine learning algorithms and results of their performance also shown.

Keywords: leap motion, machine learning, e-learning

1 Introduction

Virtual reality technologies represent another step towards discoveries and applications.

The global pandemic has influenced another surge of interest in VR. In connection with the forced transition to a remote mode of operation, the question of using tools for online learning arose sharply. Today the leading platforms are Microsoft Teams, Zoom, Skype, etc. These platforms have great functionality for organizing distance learning. However, the inclusion of VR technology allows you to make learning more lively and closer to reality.

The article is devoted to the development of a virtual reality application that allows you to use a personal computer as a whiteboard. As a VR device, a Leap Motion motion controller is used, the principle of which is based on capturing hand movements for human-computer interaction. Leap Motion is limited to a 3D userspace [11]. The scope of the device is determined by IR diodes emitting light to the workspace (Figure 1).

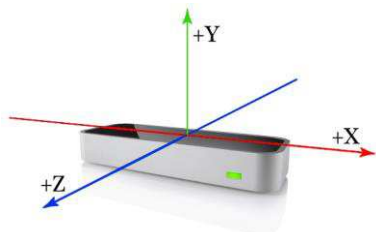


FIGURE 1 Leap Motion controller

When the hand is in this area, the reflected light rays enter the controller's IR cameras, after which the captured stereographic image is transmitted to the controller's software processor. After the algorithms of computer vision, the contours of a person's hands are distinguished, thereby determining the positions and coordinates of fingers, bones, and wrists.

2 Overview

Virtual reality (VR) implies a simulated environment, interaction with which is carried out using special hardware and software, based on signals received by a person through the senses [1,2]. Virtual reality is characterized by the properties of interactivity and immersivity, which implies complete immersion of the user in the virtual environment and autonomy, that is, the independence of VR from the real world [2].

To date, virtual reality technology has found application in many areas of human activity. In medicine, a simulated virtual reality surgical environments serve as an environment for effective teaching and surgical operations [3, 4]. The concept of computational surgery makes it possible to simulate complex structures in 3D, which facilitates the planning and execution of procedures [5]. In addition to planning operations, VRs are used directly during the operations themselves, so doctors can easily access the necessary material quickly, affordably, and safely [6].

Virtual reality is used for education in many industries where the operation of real devices and mechanisms is associated with increased risk or high costs while providing students with a safer work environment for learning skills. Methods for introducing virtual reality technology are being studied in a variety of educational institutions [7]. So, for example, the space agency NASA, as a result of several years of research, has successfully used VR for preparing astronauts [8].

VR has also proven useful for technical educators and their students. First of all, due to the possibility of replacing expensive equipment with its virtual simulator. One of the important elements is the interaction of students with three-dimensional models, which accurately respond to input, thanks to simulation, repeating the reaction of real objects. This additional tool provides the user with the necessary

experience to understand complex topics and work with real installations [9].

Very often VR is used in the entertainment industry, especially in video games and movies. The first virtual reality headsets available to a wide range of users were released by video game companies in the early to mid-1990s. But since the 2010s, Oculus (Rift), HTC (Vive), and Sony (PlayStation VR) have released headsets even more affordable, starting a new wave of app development [10].

3 Description

An application has been developed that allows you to trace a pencil, pen, or paintbrush, that is, an oblong object that looks like a pen. Tracking allows you to draw or write in the air without touching the screen, that is, without physically affecting anything. Tracking is done using the Leap Motion controller. The application was developed using JavaScript as the main front end and Python as the back end.

Interaction with the application is shown in Figure 2. The user writes some information, then the server processes the request in real-time using ajax technology and the jQuery library, and then displays the data on the computer screen.

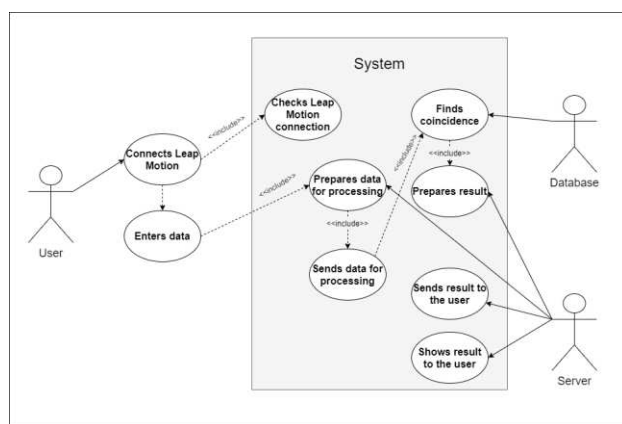


FIGURE 2 Use case diagram

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4 Result

Figure 3 shows a screenshot of the developed application. It should be noted that the writing of information takes place in the air without physical contact with the computer screen. The application interface is a white screen, a simple HTML page that makes testing easier.

This work allows us to conclude that the future of technologies is in their combination. For example, human-computer interaction can be improved by a combination of machine learning techniques, VR devices, and web services. This makes the computer more responsive to user needs for new tasks which was demonstrated in the application using the Leap Motion virtual reality device.

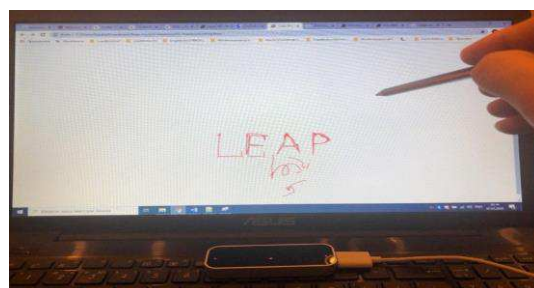


Figure 3 Application work process demonstration

5 Conclusion

This work allows us to conclude that the future of technologies is in their combination. For example, human-computer interaction can be improved by a combination of machine learning techniques, VR devices, and web services. This makes the computer more responsive to user needs for new tasks which was demonstrated in the application using the Leap Motion virtual reality device.

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Analysis of 1C: Enterprise performance based on monitoring

Balaussa Kairatova*

Satbayev University, Republic of Kazakhstan, Almaty

*Corresponding author's e-mail: Kairatova.balausa@gmail.com



Abstract

The topic of this article is "Analysis of 1C: Enterprise performance based on monitoring." The article discusses a technique for analyzing the performance and optimization of a real working multi-user system on the 1C: Enterprise 8 platform. The purpose of the study is to identify the reasons for the drop in performance and develop recommendations for their elimination. When working with 1C: Enterprise, most users face performance problems. The business scheme for supporting services requires the integration of systems for uploading data to information and business portals to check the availability of an assortment, check online payments and other regulatory procedures. The daily volume of information entered and the recording of data in the registration log about the events that occur, the dynamic generation of reports with advanced indicators and greater depth leads to performance problems for 1C: Enterprise, which depend on many reasons, including the performance of the database server. Therefore, monitoring in order to analyze the reasons for the drop in productivity is an urgent task.

Keywords: 1C: Enterprise, Performance management center, performance, evaluation, analysis

1 Introduction

This technique will be most useful in the following cases:

Performance problems are not localized to specific business processes, but are "evenly distributed" throughout the system. Users complain about insufficient system performance, but cannot name one specific operation whose performance does not suit them. The subjective assessment is formulated as follows: "everything works slowly."

The system has clearly localized performance issues that are not reproducible on a test base in single user mode. For example, users complain about the insufficient performance of the "Estimated Statement" document, but when this document is posted outside working hours and / or on a test base, the performance is normal.

The system is experiencing localized performance issues. Our task is to determine as quickly as possible, so we need to start with optimization, where exactly should we start to optimize the system. In this case, it is necessary to find the source (or sources) of all existing problems and find the most bottleneck in the system[1].

After a significant change in the operating conditions of the system. is put into operation. What we will see:

- the load on the system has changed;
- the configuration has changed;
- the version of "1C: Enterprise" used has changed;
- the used DBMS has changed;
- the hardware configuration has changed; etc.

At the initial stage of the system operation, the performance was found to be satisfactory, but as the information base filled up, the performance began to decline.

It is planned to increase the load on the system, and it

is necessary to ensure that there are no hidden problems in the system that can lead to a drop in performance when the load increases.

The system works stably with satisfactory performance. Ensure timely and accurate diagnosis of performance problems should they occur[3].

Methodology Performance analysis 1C: Enterprise based on monitoring

It is recommended to use it when conducting multiuser load testing of the system in order to evaluate performance, analyze emerging problems and optimize the system.

System performance evaluation

Evaluate the current system performance based on the application criteria. Then follow all the steps below in sequence. Depending on how the current system performance is assessed, some steps may be skipped.

Poor performance

Criteria:

The performance of the system does not meet the requirements of the business logic of the automated enterprise for a significant part of the operations.

Most of the system users complain:

Unacceptable overall system performance.

Unacceptable performance in certain operations.

Sudden degradation in performance.

Frequent occurrence of errors:

"Lock request time out period exceeded".

"Maximum lock grant timeout exceeded".

"Transaction was deadlocked on lock resources with another process and has been chosen as deadlock victim".

"Locking conflict while executing a transaction".

Insufficient performance

Symptoms are similar, but less common or less severe.

Satisfactory performance

System users hardly ever complain about performance problems. However, there is no certainty that the system is performing optimally. There may be hidden performance issues that have not yet surfaced.

Routine operations

In any case, you need to make sure that all necessary routine operations are properly planned and performed in a timely manner.

If the system performance is found to be unsatisfactory or insufficient, it makes sense to perform all the recommended routine operations once and then re-evaluate the system performance.

Recommendations for performing routine operations for systems using MS SQL Server (article in the knowledge base).

Equipment utilization analysis

If the system performance is found to be satisfactory, then this step can be skipped. Proceed to the next step: monitoring system performance.

If the system performance is recognized as unsatisfactory or insufficient, then it is necessary to analyze the equipment utilization in accordance with these recommendations of the knowledge base. If the analysis reveals an excessive load on the hardware, then the system performance can be increased by a hardware upgrade (increasing the performance of the hardware component that is the bottleneck).

If this path is impractical or untimely (for example, due to the high cost of an upgrade), then you should proceed to optimizing the system. If a hardware upgrade was carried out and did not bring a sufficient performance gain, you should also proceed to optimizing the system[2].

2 Decisions

Recommended sequence of actions

1. Connect to the investigated infobase using the

4 References

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- [2] Performance analysis and optimization of a running multi-user system **E-source:** <https://its.1c.ru/db/metod8dev/content/4052/hdoc>

MCC in the "Monitoring" mode.

2. Enable collection of the following performance metrics:

Requests \ Maximum execution time of a request;

Requests \ Average execution time of a request;

Waiting on locks \ Only DBMS locks \ Average waiting time on a DBMS lock;

Waiting on locks \ DBMS locks only \ Number of timeouts;

Waiting on locks \ Only 1C locks \ Average waiting time on 1C lock;

Deadlocks \ Number of deadlocks.

Problem types are listed in descending order of weight. Using the recommendations given in the links below, analyze and optimize the configuration code and metadata structure depending on the type of problems detected by the DRM in this line of code. If different types of problems are found in this line, then it is recommended to start the analysis with the problems that have more weight.

3 Conclusions

This article examined the situation of system slowdown when opening a "severe form".

Methods for analyzing the causes of slow opening are shown through measuring the performance of "1C", analyzing the technological log and the http-debugger Fiddler.

Techniques for analyzing a technological log for searching for "long operations" and "time lags" are given.

It is shown how unloading the form from data "unnecessary on the client" speeds up the system and reduces memory consumption.

The work of users has ceased to be uncomfortable due to the reduction of the time for opening the form of a copy of the budget by more than 3 times - from 90 to 27 seconds.

- [3] From the experts of "1C-Rarus": We accelerate the opening of a complex form in 1C 8.3 by 3 times **E-source:** <https://rarus.ru/publications/20200311-ot-ekspertov-1c-rarus-medlennoe-otkrytie-form-1c-418199/>

Automatic Software Generator for IoT Devices

Akimzhan Arystan

KBTU, Faculty of Information Technology, Almaty, Kazakhstan

*Corresponding author's e-mail: a_akimzhan@kbtu.kz



Abstract

IoT is a rapidly developing and promising technology that is becoming more and more popular in our daily lives. The future is the Internet of things, which will turn real-world objects into intelligent virtual objects. In order to free developers of Internet of things (IoT) applications from the complexity and heterogeneity of wireless sensor networks (WSN), devices, communications, protocols, and operating systems, should be developed a higher-level domain-specific visual programming language.

Keywords: IoT, visual programming language

1 Introduction

Application development challenges, a variety of devices (physical variable sensors, biometric sensors), different software implementations (Android, iOS, Linux), different interaction modes (publish / subscribe, request / response, command), and different engineering units (grad. C, degrees F, bar, N, etc.) is an ecosystem in which developers of Internet of things (IoT) applications create their projects[1].

Developers of IoT applications should be freed from most of these heterogeneities and specifics (a wide range of hardware and software objects running on specific platforms, specific middleware functions). They need to use an integrated development environment (IDE) based on a high-level domain-specific language that abstracts most of these subtleties and features of hardware, software, communications, and protocols in its entities. In addition, the language must support large-scale design of these systems by combining multiple design blocks and storing them in application libraries, importing them, reconfiguring them, and setting parameters with ease for new tags and locations, enabling reuse and scalability[2].

2 Overview

This area of very intensive research and development provides a brief overview of the current state and approaches that allow IoT designers to use higher-level languages for their design and deployment.

PervML is a domain-oriented language (DSL) designed to provide developers of a comprehensive IoT system with a set of constructs that allow them to accurately describe a propagating system in a technology-independent way [1]. PervML promotes role separation, where IOT application developers can be categorized as system analysts and system architects.

DiaSuite focuses on a specific area, namely Sense / Compute / Control (SCC) applications [4]. It consists of: - a subject-oriented design language, - a compiler that creates a Java programming environment, - 2D rendering to simulate an application, - a deployment environment. DiaSuite provides a development language called DiaSpec, which is dedicated to the SCC paradigm. The design language consists of two levels: the taxonomic level and the application development level. The taxonomy level allows you to describe a class of objects. An entity is defined as a set of data sources and Executive capabilities, abstracting from devices, whether hardware or software. The DiaSpec application development layer allows you to divide the application logic into context and control operators. Sensors and actuators are two sides of the entity described in the taxonomy.

The IBM Emerging Technology open source software Node-RED is a visual tool for connecting IOT application configurations. This allows the developer to create IoT applications that connect hardware devices, APIs, and online services. Node-RED provides a browser-based thread editor that supports linking threads using a wide range of touch nodes in the palette. Created threads can be expanded and executed at runtime with a single click.

The runtime engine is built on Node.js using its event-driven non-blocking model. Since this runtime module takes up little space, it can run on low-cost hardware such as an Arduino or Raspberry Pi, as well as in the cloud [5].

OpenHAB is a universal platform for smart home gateways and is completely based on the Eclipse SmartHome project, which allows you to create smart home solutions as the most common IoT application. The infrastructure consists of a set of Java OSGi packages that can be deployed in the OSGi runtime and that define OSGi services as extension points, acting as middleware on the server side of the WSN (wireless sensor) network [6].

3 Decision

The wide versatility of sensor types and actuators, as well as the heterogeneity of communication environments and protocols that are immanent when standards fall behind, are facing the development engineer in the areas of IOT applications. It is clear that all this puts a strain on the designer to acquire knowledge and learn many features that go far beyond the functional requirements and application requirements that he / she wants to build into the system.

Therefore, a lot of effort is being made among researchers and developers to develop a high-level subject-oriented language that abstracts many of these features and features into building blocks and library modules. He / she then develops his / her application by specifying the devices and hardware needed to purchase and deploy the developed system on the application's site.

Visual-specific language that will provide the IoT application developer with a high-level visual language should include an editor, that allows the application developer to configure the system structure, select devices,

sensors, and actuators either from the built-in library modules available in the Designer itself, or enter those that he / she chooses by parameterizing metadata available from the manufacturer's design literature. These device modules can then be saved and included in built-in library modules for future use, although these later actions require more specific knowledge and must be performed by someone who will be called the IoT developer.

4 Conclusion

Intelligent devices and systems architectures are ushering in a new era for how people work and live. The right combination of IoT hardware, software, and strategic programming can turn embedded assets into a fully realized ecosystem that can assist an operation in a variety of ways. The difference-maker for many IoT success stories is the app development process, in which teams use coding to create a winning framework off which connected devices can operate.

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Artificial Intelligence Technologies in Education

Neonila Artamonova*, Marianna Kapinos*

ISMA National Technical University, «Kharkiv Polytechnic Institute», Ukraine

*Corresponding author's e-mail: neonila.artamonova@khi.edu.ua ; marianna.kapinos@khi.edu.ua

Abstract

The relevance and timeliness of the development of strategies for the use of artificial intelligence (AI) in educational policy is due to global digitalization, which has intensified the transformation of all spheres of human activity, including higher education. In assessing the current state and trends in the development of advanced areas of research, analytical studies using science-metric methods play an important role. Analysis of the landscape of AI technologies has been carried out and issues of theoretical and practical use of them are discussed.

Keywords: artificial intelligence, scientometrics

1 Introduction

The global digitalization of the world economy has intensified the transformation of all spheres of human activity, including higher education. A significant incentive in the transformation of education is the development of information technologies, in particular artificial intelligence (AI), cloud technologies, etc.

The relevance and timeliness of developing strategies for the use of AI in the educational policies of different countries was also confirmed by the Beijing Consensus adopted at the international conference "Planning Education in the Age of Artificial Intelligence: Set the Direction for a Technological Breakthrough" (2019). This document proclaimed the international framework for the introduction of AI in education in the following areas [1]: AI planning in educational policy; the use of AI in the learning process and for performance assessment; developing the values and skills needed to live and work in the AI era; using AI to enhance lifelong learning opportunities for all and others.

In order to develop innovative strategies for the educational process in each country, it is necessary not only to know AI technologies, to have experience in their application in education, but also to know the mechanisms and trends in this direction.

That is why every year the number of scientific publications in this field increases, AI tools, methods and approaches to their application are actively studied.

There are mainly several areas of use of AI in education [3]: adaptive learning, personalized learning, automatic assessment, interval learning, and teacher assessment by students, smart campuses and examination process control.

Overview studies of large information arrays appeared, in particular with the construction of AI landscapes. It is noted that the application of AI in education mainly focuses on the aspects of learning, evaluation, cognitive sciences and intellectual technologies [4].

2 Overview

This work discusses the advantages, disadvantages and conclusions on the science-based analysis of world information resources to evaluate more than 2,000 scientific publications on the use of AI in education. Emphasis is placed on:

- Analytical tools;
- Main trends in the development of AI in education;
- Leading developers - universities;
- Most cited works
- Thematic structure of publications.

3 Decision

As an example, trends in the development of AI technologies based on the analysis of international resources of the science metrics platform Web of Science Core Collection are considered. This study made it possible to assess the trends in the development of AI technologies in education, to identify areas with the greatest activity, companies and organizations leading in the development of this area, as well as geographical points that will become centers of future growth. The leaders in this area US Ambassador are Spain and Great Britain. The University of California System, University of London, Harvard University, University System of Georgia, Carnegie Mellon University, etc., showed the greatest activity in studying the possibilities of using AI technologies in education. The main areas include Computer science (41%) and Engineering (33%). An informative indicator of the significance of scientific work is the degree of its citation. It has been found that the most cited work is "Machine learning: Trends, perspectives, and prospects" [5], which has been referred to 1,116 times. This review highlights the basic concepts and perspectives of machine learning development, as well as the architecture of the open source data analysis stack, which includes levels of interaction with basic operating systems; Layers that provide distributed data storage, management, and processing and levels that provide basic machine learning competencies (streaming, sub-sampling, pipelines, graph processing, and model maintenance. Separately allocated a voluminous cluster of works on the use of AI in training in the field of medicine.

4 Conclusion

Monitoring trends in the development of relevant scientific areas, in particular AI technologies in education, makes it possible for scientists to concentrate efforts on promising areas of research. The establishment of leading universities and scientists contributes to the development of international cooperation and cooperation of joint efforts to solve global scientific problems.

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Computer analysis of surface layers modified by chemical heat treatment

Alexander Barmin *

NTU "KhPI," Ukraine

*Corresponding author's e-mail: axel.com.ua@gmail.com



Abstract

Analysis of modern methods of research of microstructures of materials has been carried out. The possibility and evaluation of modern software for computer research tools in the processing of metallographic images is shown.

Keywords: metallography, chemical-thermal treatment, surface layers

1 Introduction

One of the main goals of metallographic analysis is to establish the technology–structure–properties relationship through the qualitative and quantitative characteristics of the structure. Along with establishing a connection, metallographic studies will make it possible to judge the stability of the technological parameters of heat treatment, chemical-thermal treatment, obtaining coatings by various methods; indirectly assess the level of strength; identify defects (cracks and discontinuities); determine the mechanisms of adhesive and cohesive destruction; consider changes in structures under various energetic influences.

The assessment of the parameters of the microstructure is carried out visually using scales, tables and classifiers [1, 2]. To quantitatively estimate the parameters of the microstructure, the existing known calculation methods are used [3, 4]. These methods have not found wide practical application at metallurgical enterprises due to a long data set, cumbersome calculations, and significant errors in determining the characteristics under study.

2 Review

The rapid development of computer technology and methods of digital image processing in recent years has made it possible to significantly expand the automation of research work in many areas of science and technology. In the practice of metallographic analysis, computer analysis of images of the microstructure of materials takes an increasing place.

The modern stage of software development is characterized along with an increase in functionality and trends such as:

- ease of use;
- increase in productivity by the system itself;

- reducing the requirements for the professional level of the user.

Today there are many different applications for image analysis. The most successful products are those that are most understandable to use.

Taking into account the functionality among the variety of software for image analysis, the following applications are the most successful - "SIAMS", "THIXOMET", "AXIOVISION", "ZEN" and many others.

In the arsenal of these programs there are all the algorithms necessary for image processing: high-frequency and low-frequency filtering, image limits extraction, arithmetic and logical operations, brightness / contrast correction, etc. Image processing in this case is aimed not at improving visual perception, but at preparing it for further analysis.

In all application programs of this specificity, the following sequence of algorithms is proposed for processing and obtaining characteristics of the metallographic structure:

- image input into a computer (digitization);
- image filtering to eliminate random noise;
- previous segmentation, which is aimed at highlighting homogeneous areas.
- object correction in order to determine the brightness threshold.
- final segmentation using a defined background value, which allows objects to be fully identified.
- analysis of selected objects in order to determine their parameters.

The ultimate task of metallographic analysis should be considered the statistical processing of the characteristics of objects obtained in the process of measuring, determining the average values of these quantities, as well as building graphical dependencies for visualizing the analysis process.

3 Solution

The results (fig. 1, 2) of determining the depth of the decarburized layer using the "Measurement of coatings" module in the "THIXOMET" software product in automatic mode [5] are given as an example. In fact, the decarburized layer is a modified surface layer as a result of chemical and thermal exposure.

This module allows to determine the depth of the decarburized layer in the cumulative mode "from field to field" or "from panorama to panorama" in manual or automatic mode.

In automatic mode, the edges of the sample and the boundaries of the decarburization zone are recognized. The fine-tuning tools can be used to set the required ferrite-pearlite ratio, according to which the decarburization boundary will be found, and also to straighten the shape of this boundary, reflecting the uneven distribution of pearlite along the boundary. The corresponding averages and measurement statistics are calculated.

This module allows to measure different multilayer structures.

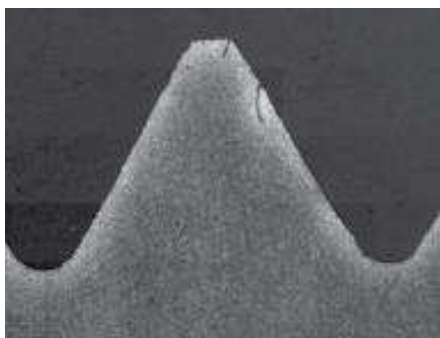


FIGURE 1 Initial image of the microstructure

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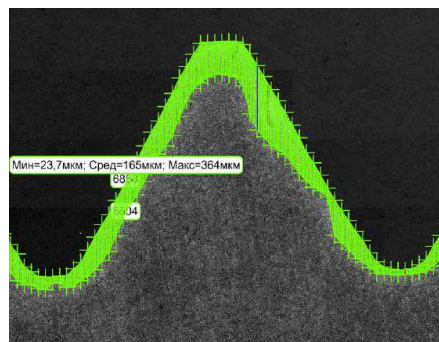


FIGURE 2 Result of microstructure image processing using "THIXOMET" software product in automatic mode

The main advantage of image analyzers is the automation of the process - it not only reduces the time of the test, but also makes it possible to eliminate the influence of the human factor on the final result of the analysis.

4 Conclusions

Thus, software products for metallographic analysis "SIAMS", "THIXOMET", "AXIOVISION", "ZEN" are quite effective in solving complex problems of modern computer materials science. This image analysis software is a universal tool for high-quality image analysis in science and production in accordance with Ukrainian and international standards.

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Computer Modeling and Integrated Forming Technologies

**Vitalii Chukhlib^{1*}, Nikolay Biba², Alexander Zakovorotniy¹,
Oleksandr Duvanskyi¹, Volodymyr Paliienko¹**

1- National Technical University «Kharkiv Polytechnic Institute» (Kharkiv, Ukraine)

2 - Micas Simulation Ltd (Oxford, United Kingdom)

*Corresponding author's e-mail: profdnepro@gmail.com

Abstract

The genesis of the view on the content of the modern development of education in the field of computer modeling and integrated technologies of forming is considered. The analysis of the current state of training of specialists at the Department of Computer Modeling and Integrated Forming Technologies of the National Technical University "Kharkiv Polytechnic Institute", as well as possible directions of scientific work at this department.

Keywords: computer modeling, integrated, forming technologies

1 Introduction

In the modern world, almost all stages of product development are closely related to computer technologies and modern software. However, specialists who have a high level of computer design and modeling knowledge in the field of forming processes began to be trained recently. In such conditions, the demand for highly qualified specialists in the field of computer-aided design of tools and modeling of forming processes for various materials and composites is growing every year.

In addition, the industry is rapidly developing not only in Ukraine, but all over the world, and requires the creation of industries using innovative technologies. The embodiment of the latest results of scientific and technological progress for the design and modernization of equipment and technology must ensure the organization of the design process itself, its optimization and integration. Manufacturing with the use of modern technologies and optimal modes of manufacturing products can reduce costs and increase competitiveness for this industry.

2 Overview

Computer modeling, design, development of technological processes can only be carried out by highly qualified specialists trained in the appropriate profile and having the appropriate direction of scientific work [1-3]. The need for specialists in this industry is growing from year to year.

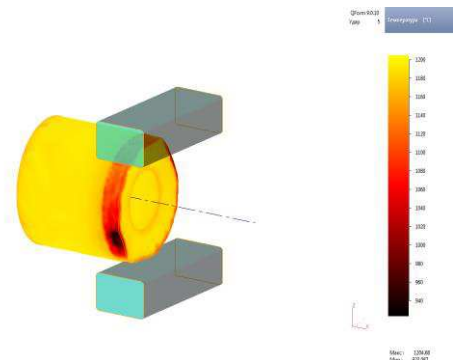


FIGURE 1 Computer modeling of the forging process in the QForm software

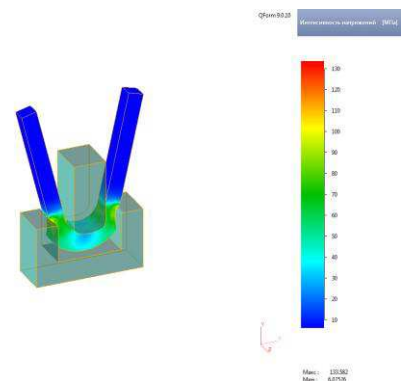


FIGURE 2 Reshaping the workpiece to form an integrated staple bending technology

Educational programs at the Department of Computer Modeling and Integrated Forming Technologies of the National Technical University "Kharkiv Polytechnic Institute" (Kharkiv, Ukraine) are designed in such a way as to prepare a comprehensively developed, highly skilled and modern specialist. Much attention is paid to both the theoretical fundamentals of the speciality and practical classes, in which students create their own 3D models, perform computer modeling using modern software [4]. The approbation of the simulation results is carried out in laboratory exercises. The laboratory of the department is equipped with modern equipment that is used in leading

factories and enterprises of the industry.

Now the department is actively using modern information technology and computer modeling of processes due to fruitful cooperation with the company "Micas Simulation Ltd" (Oxford, UK) and the department was provided with a licensed software product QFORM, which allows you to simulate the processes of integrated technologies.

3 Decision

The training provides for the study in an expanded scope of programming, modeling and optimization of technological processes, methods of finding technical solutions and experimental research, as well as the development and operation of automated systems and computer-aided design technologies.

During the training, students acquire knowledge in the following areas:

- Computer modeling and design
- Computer-integrated technological complexes
- Operation and computer diagnostics of equipment
- Computer graphics and industrial design
- Marketing of new construction materials
- Computer-aided design systems
- Development of object-oriented systems for the latest technologies

When training a computer design specialist, it is very important to use modern software systems. During training, students acquire modern software systems.

Now the department actively uses modern

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information technologies for computer modeling of processes and the department staff is conducting research in the following areas:

1. Computer modeling and experimental study of the forging process with the initial uneven properties
2. Research, development and implementation of technological processes for the production of roll-formed profiles
3. Development of an intelligent control system for robotic manipulators
4. Development and research of sheet forming technology
5. Computer modeling and development of deformation optimal modes of solid-rolled railway wheels
6. Research, development and implementation of technological processes for die forging of parts made of steel and non-ferrous metal alloys
7. Development of computer models using the finite element method

The knowledge and skills that students acquire during their studies allow them to find employment in a wide range of enterprises in Ukraine and the world.

4 Conclusion

The Department of Computer Modeling and Integrated Forming Technologies has come a long way over the years, but still ahead, the future is in the hands of those who are already working with us and those who are interested in this cooperation.

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Quantum computing. Quantum information technologies as the basis for future learning platforms

Oleksandr Hnatenko*

Kharkiv National University of Radio Electronics

*Corresponding author e-mail: oleksandr.hnatenko@nure.ua



Abstract

This paper presents the place of quantum technologies in the modern information world. The technique of quantum computing is described. Also presented is a new model of a qubit based on a nanolaser with frequency stabilization, which emits at different wavelengths, which corresponds to its different states. Thus, the work proposes a scheme of a qubit, which underlies quantum technologies and quantum computers. Quantum computing is a thousand times faster than existing ones. In the future this technology will be able to solve problems that are beyond the power of modern computers, which means it will become the basis for learning and understanding the world more broadly.

Keywords: qubit, nanolaser, quantum computer.

1 Introduction

With the advent of high-performance computing, algorithms and mathematical models are used to solve problems in many sciences: physical, biological and computer sciences.

Quantum theory has proven to be a highly successful description of physical reality and has led, since its inception in the early 20th century, to advances such as lasers, transistors, and semiconductor microprocessors. The quantum computer uses the most efficient algorithms, using operations that are not possible in classical machines. Quantum processors do not run faster than classical computers, but they work in a completely different way, they achieve unprecedented speedups, avoiding unnecessary computation. For example, calculating the total electron wave function of the average drug molecule on any modern supercomputer using conventional algorithms is expected to take longer than the full age of our universe [1], while a small quantum computer can solve this problem in a few days. Encouraged by such a promise of quantum advantage, engineers and scientists are continuing their quest to build a quantum processor. However, the technical difficulties in manufacturing, managing and protecting quantum systems are incredibly complex, and the first prototypes have only appeared in the last decade.

It is important to note that the technical problems of building quantum computers did not stop the development of quantum computing algorithms. Even in the absence of hardware, algorithms can be analyzed mathematically, and the advent of high-performance quantum computer simulators as well as early prototypes in the past few years has allowed further research to advance.

Recent claims of quantum supremacy from Google

[2], which are disputed by IBM [3], indicate that the era of quantum computing is near. The first processors using quantum effects to perform computations impossible for classical computer technology are expected within the next decade [4].

2 Quantum computing

In classical information, the fundamental unit of information is the bit, a system with two identifiable states, often denoted 0 and 1. The quantum analog, the qubit, is a two-state system, the states of which are labeled $|0\rangle$ and $|1\rangle$. We use Dirac's notation, where $|*\rangle$ identifies a quantum state. The main difference between classical and quantum information is that a qubit can be in any superposition of states $|0\rangle$ and $|1\rangle$:

$$|\psi\rangle = \alpha|0\rangle + \beta|1\rangle, \alpha, \beta \in \mathbb{C} \quad (1)$$

The complex coefficients α and β are known as the amplitudes of states, and they are related to another key concept in quantum mechanics: the effect of the physical dimension. Since qubits are physical systems, you can always come up with a protocol to measure their state. If, for example, the states $|0\rangle$ and $|1\rangle$ correspond to the states of the spin of an electron in a magnetic field, then measuring the state of a qubit is simply measuring the energy of the system. The postulates of quantum mechanics dictate that if the system is in a superposition of possible measurement results, then the act of measurement must change the state itself. The superposition system will fall apart at the measurement stage, the measurement thus destroys the information carried by the amplitudes in the qubit. Important computational implications arise when we consider systems of multiple qubits that can experience quantum

entanglement. Entanglement is a phenomenon in which a group of qubits are correlated, and any operation on one of these qubits will affect the overall state of all of them. A canonical example of quantum entanglement is the Einstein-Podolsky-Rosen paradox, presented in 1935.

Consider a system of two qubits, where, since each of the individual qubits can take any superposition of states $\{|0\rangle$ and $\{|1\rangle\}$, the composite system can take any superposition of states $\{|00\rangle, |01\rangle, |10\rangle, |11\rangle\}$ (and, accordingly, the system of N-qubits can take any of 2^N binary strings, from $\{|0 \dots 0\rangle$ to $\{|1 \dots 1\rangle\}$).

One of the possible superpositions of the system is the so-called Bell states, one of which has the following form:

$$|\psi\rangle = \frac{1}{\sqrt{2}}(|10\rangle + |01\rangle) \quad (2)$$

If we measure on the first qubit, we can only observe $|0\rangle$ or $|1\rangle$, each of which has a probability of 1/2. This does not make any difference regarding the single qubit case. If the outcome for the first qubit was $|0\rangle$, the system will collapse to the system $|01\rangle$, and therefore any measurement on the second qubit will give $|1\rangle$ with probability 1; similarly, if the first measurement was $|1\rangle$, the measurement on the second qubit would give $|0\rangle$. An operation (in this case, a measurement with the result "0") applied to the first qubit affects the results that can be seen when the second qubit is subsequently measured. The existence of entanglement is fundamental to useful quantum computing. It has been proven that any quantum algorithm that does not use entanglement can be applied to a classical computer without a significant difference in speed. Intuitively, reason is the amount of information that a quantum computer can manipulate. If the N qubit system is not entangled, then the 2^N amplitudes of its state can be described by the amplitudes of each one-qubit state, that is, the 2^N amplitudes. However, if the system is entangled, all amplitudes will be independent, and the qubit register will form a 2^N -dimensional vector. The ability of quantum computers to manipulate vast amounts of information through multiple operations is one of the main advantages of quantum algorithms and underpins their ability to solve problems exponentially faster than classical computer technology.

3. New quantum bit

If we imagine that laser radiation at different wavelengths are different states, then a semiconductor nanolaser based on quantum dots, Fig. 1, can be proposed as a qubit. The idea is to stabilize the radiation frequency of a nanolaser (NL), which emits unstably at wavelengths in the 630-650 nm range.

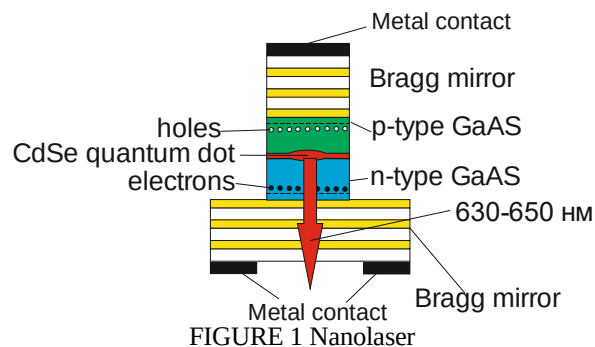


FIGURE 1 Nanolaser

To stabilize the LN radiation frequency, it is proposed to use a photonic crystal with a defect [5-6], in which the I_2 molecules are placed, which function as frequency references (Fig. 2).

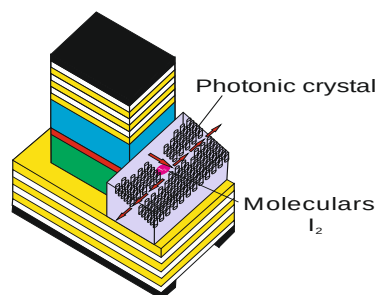


FIGURE 2 Nanolaser with photonic crystal

The I_2 molecule helps to stabilize the laser radiation frequency at a wavelength of 633 nm. As can be seen from the simulation results (Fig. 3), the LN radiation is concentrated in the defect of the photonic crystal. The emission of radiation beyond the boundaries of the photonic crystal defect is limited by the band gap for $\lambda=633\text{nm}$. Thanks to the concentrated field, it is possible to trap particles inside the defect by the Lorentz forces and to confine them due to the Kazemir-Polder forces. The particles placed in the defect are used to stabilize the frequency of the LN radiation.

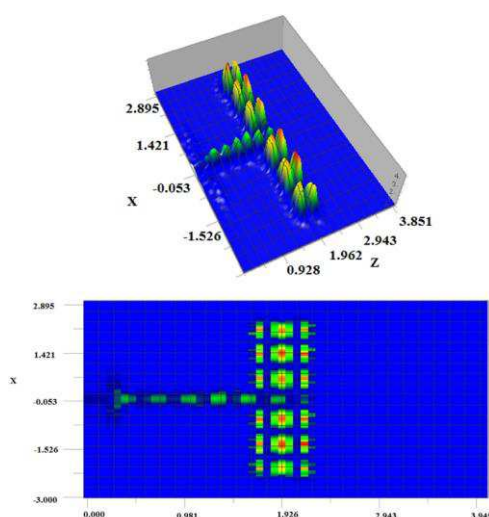


FIGURE 3 Simulation to stabilize the laser radiation

But if three different isotopes of the I_2 molecule are placed in a defect of a photonic crystal, for example, I_{2127} transition 11-3 P (48), I_{2127} transition 6-3 P (33),

I2127 transition 8-4 P (10), then the nanolaser will emit at wavelengths 612, 633, 640 nm, respectively, and these are already three different states. Therefore, this idea can be used as a qubit.

4 Conclusion

A quantum computer can store and manipulate vast amounts of information and execute algorithms exponentially faster than any classical computing

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Analysis the features of building a wireless AD-HOC network of the university

Nataliia Kharchenko*

Kharkiv National University of Radio Electronics, Ukraine

*Corresponding author's e-mail: nataliia.kharchenko@nure.ua



Abstract

Today, wireless technologies are the leaders in the construction of subscriber access networks, and self-organizing AD-HOC networks are increasingly popular. They have many advantages, but the lack of a fully developed standard for their work also leads to a large number of unresolved problems at the moment. One of the main problems in the functioning of AD-HOC networks is the choice of the optimal routing protocol. This paper provides an analysis of existing routing protocols, their shortcomings and a variant of further improvement of the algorithm of their work.

Keywords: AD-HOC, routing protocol, reinforcement learning

1 Introduction

The development of modern wireless technologies is a fundamental trend in the operation of subscriber data transmission networks or "last mile" networks. At the same time, in parallel with the development of new standards and technologies that increase the speed of data transfer, research on new principles of organizing communication between nodes is underway. One of the main directions of development of wireless networks is the construction of self-organizing networks (AD-HOC). Such networks do not require any additional infrastructure other than the nodes themselves. Connection of a node in such networks occurs automatically. AD-HOC networks do not have a single control center, so all nodes take over the network management functions

An important circumstance is that the nodes of such a network are independent from each other and can be switched on and off from it at any time, which predetermines the random nature of the network structure. In addition, network nodes of the AD-HOC type are fully or partially functionally identical, that is, they can act both as a host and as a gateway, using the terminology of IP networks. The latter feature makes it possible to classify AD-HOC networks as a type of peer-to-peer communication systems [1].

The use of self-organizing networks has a number of advantages over traditional wireless networks due to the ability to transfer data over long distances without increasing transmitter power, resilience to changes in the network infrastructure, the ability to quickly reconfigure in an adverse interference environment, as well as simplicity and high speed of deployment. In addition, the peer-to-peer principle of organizing dynamic networks determines their high resiliency by eliminating the problem of central link vulnerability, which is typical for systems with asymmetric functionality.

However, in the construction and operation of AD-HOC networks, several classes of problems can be distinguished [2]:

- the problem of ensuring noise immunity is associated with the openness of the signal transmission medium. At the same time, the transmitted packets can be influenced by both external sources of interference, by deteriorating electromagnetic compatibility in the network, and internal sources of interference that arise during the formation of a data stream, such as intersymbol and interchannel interference;
- the problem of ensuring the security of transmitted data. Since the interception of signals in the radio environment can be carried out by any device that has a radio receiver tuned to the desired frequency, information security can only be ensured using various encryption protocols;
- the problem of the total bandwidth of networks - is primarily associated with the principle of providing a node with access to the transmission medium, in which the total bandwidth of the channel is evenly distributed among all connected nodes that need to transfer data packets;
- the problem of the efficiency of the applied routing methods lies in the complexity of the topology of self-organizing networks and the dynamism of its nodes.

The features highlighted above lead to the fact that the protocols and technical solutions used in classic wired networks, for example, centralized routing with a hierarchy of pre-assigned routers, in AD-HOC networks turn out to be ineffective and do not provide the required performance.

2 Overview

In this paper, the features of the functioning of AD-HOC

networks, their advantages and classes of problems are considered. Note that when analyzing the shortcomings of this technology, taking into account the need of modern applications for the constant growth of throughput, the most important are the issues of effective information transfer and improving the operation of routing algorithms.

3 Decision

The main problem of organizing an AD-HOC network is to ensure efficient routing of transmitted data blocks. The complexity of this task is due to the dynamic, and in some implementations - and random, nature of the network structure.

Routing protocols can be divided into two large classes: proactive and reactive [3]. Proactive routing protocols are controlled by routing tables that are generated when the network is created and updated whenever the network structure changes. The most used proactive protocols are DSDV, OLSR, and WRP. Reactive routing protocols search for a route to an end node only when there is a need for mutual exchange of information between nodes. After the exchange of information between the two end nodes, the route is stored for some time in the memory of these devices. If there is a need to transmit information on the same route again, but the time elapsed since the last transmission exceeds the storage time of the route in memory, the route search process is repeated. The most used reactive protocols are AODV, DSR, DYMO.

After analyzing these protocols, we can conclude that proactive protocols have a clear advantage over reactive ones in terms of route building time. For proactive protocols,

this process occurs in advance, and you only need to read the route from the table, while reactive protocols need to send out a broadcast request and wait for confirmation from the addressee. However, proactive protocols need to constantly broadcast, which can consume a significant portion of the network bandwidth, especially in networks with a large number and high mobility of nodes [4].

The solution for further optimization of routing protocols can be the use of algorithms based on machine learning. This is due to the fact that machine learning algorithms (for example, reinforcement learning) are well suited for optimization problems for given system parameters with a large array of input data. These algorithms in multi-node transmission networks can increase the degree of flexibility in choosing the optimal route due to machine learning, which uses a scheme with assigning weights to routes and using feedback to update the route weight depending on the success of packet transmission.

Conclusion

Today, there are many problems in the field of creating wireless self-organizing networks with variable topology. And one of the main ones is the problem of routing and the definition of a specific routing protocol.

There are many standards and protocols for implementing wireless AD-HOCs, however, they also have significant drawbacks.

The solution for further optimization of routing protocols can be the use of algorithms based on machine learning theory.

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Features of the architecture of Multi-Cloud Healthcare Systems

Olga Kozina *

National Technical University "Kharkiv Polytechnic Institute", Ukraine

*Corresponding author's e-mail: olha.kozina@khp.edu.ua



Abstract

At this time, the use of multi-cloud systems is the key to sustainable development of any industry or enterprise. However, the complexity of managing and orchestrating cloud structures of various providers does not allow creating a universal architecture of such software. This work is an attempt to find the basis to select the optimal architecture of the middleware module for maintaining the consistency of real-time medical data in multi-cloud healthcare systems.

Keywords: multi-cloud, consistency of data, middleware

1 Introduction

The real value of the multi-cloud medical information systems is to organize data, provide safety storage, access across geographically disparate data sources for which offers the same read/write experience the same, as data is stored locally. Most data in these systems are real-time and life-critical, and require a strict guarantee of Quality of Service (QoS), in terms of timeliness, reliability [1].

Data consistency in any type of a cloud system is to ensure that patient, doctor, nurse, caregiver or other end-users obviously will receive from a cloud system up-to-date and in order data on time every time. All types of medical dataset should be internal consistent and renew due to last version in time, in other words, in a cloud system there should be the coherence of data.

Multi-cloud strategies will reduce alone cloud providers dependency for two-thirds of organizations through 2024 [2]. However, the question is which middleware architecture will be optimal to achieve the required consistency of medical data with the minimum cost of maintaining cloud resources. As known, that moving data around in the same cloud infrastructure is faster than having that information go across the internet. This means that network bandwidth and latency rates need to be taken into consideration when working with multi-cloud architectures [3].

2 Overview

The choice of a middleware architecture in multi-cloud healthcare systems should be based on information indexes of the effectiveness of the functioning of such systems, the semantic of which is related to ensuring the consistency of medical data in databases located at various cloud providers and is related to the temporary availability of data. In this case, the elements of the architecture of a multi-cloud system are considered in terms of distributed applications.

3 Decision

This work discusses the reasons for inconsistencies in real-time medical data stored in the databases of geographically dispersed data centers in the analyzed multi-cloud system.

As an example, a multi-cloud system that combines the capabilities of three different cloud providers for storing and processing data, in which replicas of one database are maintained in a consistent state, is considered (Figure 1).

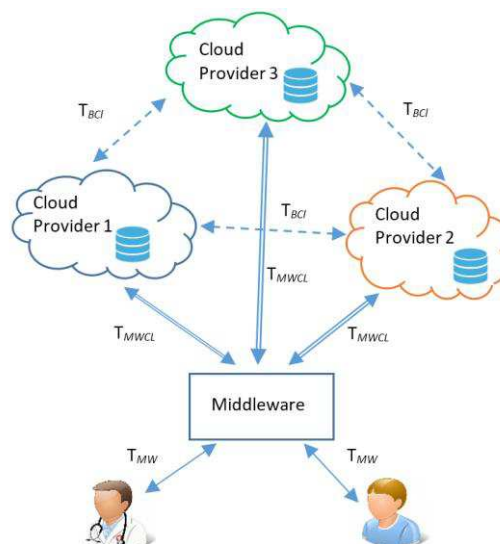


FIGURE 1 Time parameters in the multi-cloud healthcare system

As known, if all the characteristics of the different infrastructure services of a cloud provider are known a priori, for example, all the task execution times on the different virtual machines or the task communication times, the planning of the workflow is considered as an off-line workflow scheduling plan [4].

The middleware module, as the workflow scheduler, is the core of the healthcare system, so, in order to select the optimal middleware architecture, an a priori collecting of such Round Trip Times (RTT) is required:

- RTT between end-users and the middleware module, T_{MW} ;
- RTT between the middleware module and each cloud provider, T_{MWCL} ;
- RTT between end-users and each cloud provider, T_{CL} ;
- RTT between cloud providers in pairs, T_{BCI} .

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4 Conclusion

The use of cloud technologies is a leading trend in the world in providing increased requirements for the availability, accuracy and reliability of digital medical data. This determines the need to develop new architectural solutions for multi cloud systems working with medical data. The development of specialized criteria for the effectiveness of functioning, depending on the significance, origin and transformation logic of the processed data, is the basis for choosing the architecture for middleware for multi-cloud healthcare systems.

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Distance learning tools of computer systems hardware security

Oksana Lipchanska*

National Technical University «Kharkiv Polytechnic Institute», Ukraine

*Corresponding author's e-mail: oksana.lipchanska@khi.edu.ua

Abstract

Area of computer systems hardware security is becoming more and more in demand. Therefore, distance learning issues for the courses of this sphere are relevant and popular. In modern conditions, we look in a new way at the process of distance learning. Additional requirements are put forward for the use of technologies and training tools for computer systems hardware security area. In this work, the existing tools that can be used in distance learning of hardware design are analyzed, their advantages and disadvantages are showed.

Keywords: distance learning, computer systems, circuits modeling tools.

1 Introduction

Today, distance learning is one of the most effective forms of information and communication technologies [1]. The effectiveness of distance learning for computer systems hardware security sphere depends on several factors such as effective interaction between the teacher and the student; methods, technologies and tools used; feedback efficiency.

A feature of distance learning for hardware disciplines is using of specific software packages, as well as the presence of a large amount of graphic material, for example, functional and schematic diagrams, graphs of timing diagrams, tables of states, graphs of states, etc. Great emphasis should be placed on practical work, since successful mastery of the subject is possible only with the sequential execution of tasks that start with simple elementary schemes and gradually become more complex, and each new task is based on the previous ones. Thus, effective assimilation of the considered educational material is ensured and the skills of developing circuitry devices are consolidated.

In contrast to the humanities, the development of the hardware part requires the direct interactive and constant participation of the teacher since the development result is difficult to control using formal indicators, such as, for example, the use of unit or functional testing in programming.

2 Overview

Existing local packages for designing and modeling electronic circuits (such as MultiSim, OrCad, Tina-Ti) are not suitable for distance learning of the computer systems hardware security area, as they do not support network connections which means they do not have the property of interactivity for the interaction of a teacher and a student. There are many web-based platforms for modeling electronic circuits, but most of them are not free, have poorly libraries, or are difficult to use when designing circuits. The most appropriate online programs for distance learning of the computer systems hardware security area are considered [2].

3 Decision

PartSim (Figure 1) is an online circuit simulator that contains the SPICE simulation engine, a networked circuit capture tool, and a graphical waveform viewer.

PartSim advantages: it is easy to use, contains a large number of components in the library, it's completely free.

Disadvantages of PartSim: it is not a powerful simulator, the library is missing some microcircuits [3].

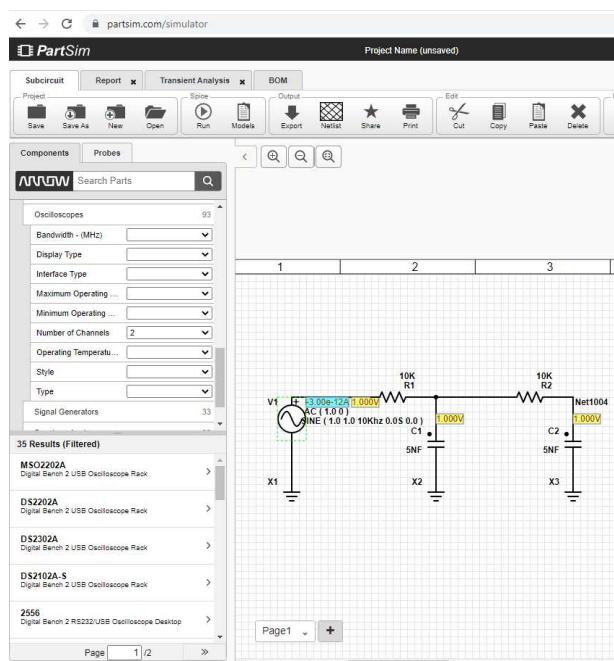


FIGURE 1 An example of circuit design in PartSim

Circuit Sims is a very simple web platform for electronic circuit simulations that works in any browser [4].

Advantages of Circuit Sims: it is a very simple simulator, that is completely free and does not require registration, and it is an open source platform.

Disadvantages of Circuit Sims: the list of library components is limited, the GUI is not user-friendly.

CircuitLab (Figure 2) is online, in-browser tool that allows to design and analyze analog and digital systems.

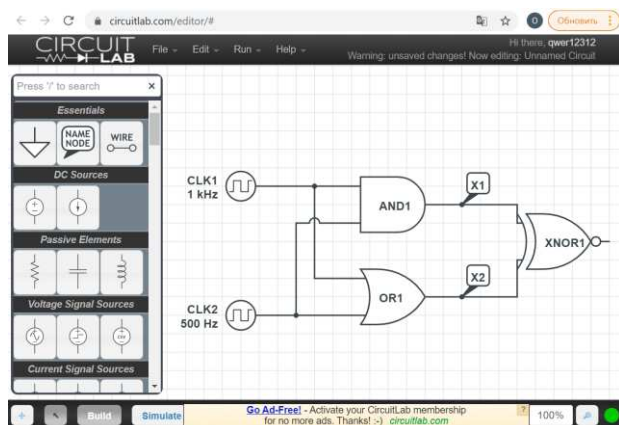


FIGURE 2 An example of circuit design in CircuitLab

CircuitLab advantages: it has an extensive library, it is suitable for both students and experienced developers, simulated plots and outputs can be exported for further analysis, circuit design is easy, it lets share designs and

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discuss them in chats.

Disadvantages of CircuitLab: it is not completely free platform, it requires registration, some digital microcircuits are missing in the library [5].

4 Conclusion

It is very important when both the student and the teacher can simultaneously work on the same circuit, that cannot be achieved using standard teaching tools and local programs for modeling and design of electronic circuits and digital and analog systems. Among the analyzed online platforms CircuitLab, PartSim and Circuit Sims are the most convenient tools for distance learning of computer systems hardware security sphere. And CircuitLab has an undeniable advantage of interactivity when students are able to share their live circuits so teachers can simulate and edit them.

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The study of cross-correlation properties of complex signal ensembles obtained by bandpass filtering with permutations of frequency segments

Volodymyr Lysechko*

Ukrainian State University of Railway Transport, Ukraine

*Corresponding author's e-mail: volodymyr.lysechko@gmail.com



Abstract

One of the main research areas of the complex signal ensembles properties obtained by bandpass filtering with subsequent permutations is the calculation of their correlation characteristics. In addition, the code division of channels is based on correlation processing, and, accordingly, the main criterion for evaluating the properties of complex signal ensembles based on sequences with improved cross-correlation properties obtained by bandpass filtering with permutations can be considered the level of similarity of studied signals and ensembles based on them.

Keywords: cognitive telecommunication systems, multiple access interference, cross-correlation function

1 Introduction

The applying of signals based on sequences with improved cross-correlation properties, which are obtained by bandpass filtering with permutations [1, 2, 3, 4] in cognitive telecommunication systems allows to reduce the level of multiple access interference (MAI) by reducing the values of the side lobes of cross-correlation functions (CCF) received signals. The maximum emission levels of the side lobes of the CCF signals satisfy the constraint given in [4, 5]: $R_{\max} \leq 3/\sqrt{B}$, where B is the signal base.

To determine the optimal value of the maximum emissions of the side lobes of the CCF signals, which are obtained by bandpass filtering with permutations, it is necessary to calculate the statistical characteristics of the cross-correlation properties of the obtained signals.

In accordance with the algorithm for implementing the method of forming complex signal ensembles, based on sequences with improved cross-correlation properties, which are obtained by bandpass filtering with permutations, ([4] Figure 1) was formed a complex signal ensemble consisting of 50 sequences with the number of pulses within from 23 to 512. The duration of the sequences- $T \approx 1.2$ ms, the pulse duration- $\tau = 10$ ns. The ΔF filtration band was chosen to be 0.2% of the total spectrum width of the output sequences.

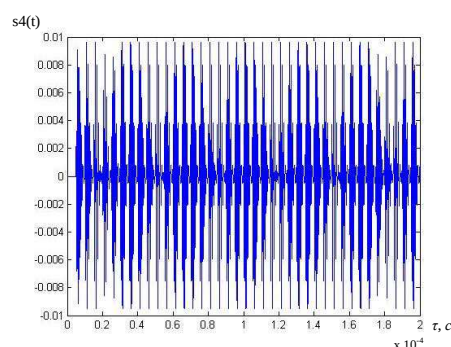


FIGURE 1 Time diagram of the signal obtained by bandpass filtering in the range f2 followed by transfer to the common frequency domain

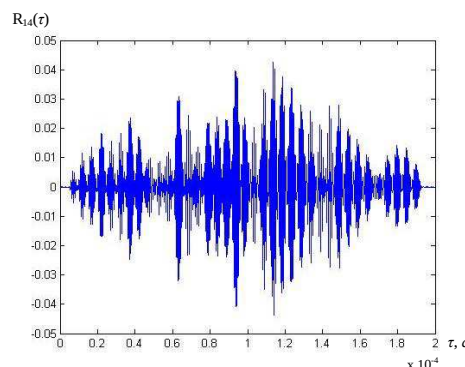


FIGURE 2 Normalized CCF of signals obtained by bandpass filtering in the frequency bands f1 and f2, followed by transfer to a common frequency domain

The type of CCF signal pair is presented in Fig. 2. The analysis of the figures shows that as a result of filtering there is an expansion of pulses in time, which leads to an increase in the interaction between them. The study

showed that the levels of maximum emissions of the side lobes of the CCF signals meet the requirements described in [2, 3, 4].

2 Overview

During the study, the statistical characteristics of complex signal ensembles were evaluated on the basis of sequences with improved cross-correlation properties, which were obtained by bandpass filtering with permutations, which simulation was carried out on the basis of the method of calculating the statistical characteristics of random variables, which is given in [2, 4] and includes the following steps:

1. Mathematical expectation calculation of maximum emissions of side lobes of CCF signals mR_{max} when changing the values of the filter bands in the range from 0.1% to 2% of the total spectrum width of the output sequences at a constant value of duty cycle and signal duration [3, 4].
2. To estimate the standard error of the average, from the mean value, the calculation of the standard deviation of the maximum emissions of the side lobes of CCF σR_{max} relative to the mathematical expectation [2, 3, 4].

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3 Decision

As a result of the calculation, the values of the maximum emissions of the side lobes of the CCF signals based on the sequences formed according to the algorithm described in [4], with the allocation of 0.1% to 2% of the output sequences spectrum width. Simulation using a complete search of the received signals shows that the volume of the received signals with a satisfactory level of multiple access interference will meet the requirements for a large volume and exceed the volume of the original ensemble up to 25%.

4 Conclusion

The obtained results allow increasing the volume of complex signal ensembles with a satisfactory level of multiple access interference, and at the same time improve the efficiency of spectrum use and, accordingly, increase the bandwidth of cognitive telecommunication systems.

Modern trends in the banking services market in Ukraine

Zuban Y^{1*}, Dehtjare J¹, Dernova I²

¹ISMA University of Applied Sciences, Latvia,

²Cherkasy State Business College, Economics, Entrepreneurship and Marketing Department, V, Ukraine

*Corresponding author's e-mails: yulyazuban@gmail.com



Abstract

The paper presents issues of development of modern banking services market in the credit market of Ukraine and to identify the main features of its evolution. The trend of development of the banking sector in the banking services market is investigated and the changes that have taken place in this market are determined. It has been established that for a modern bank, it is important to ensure effective innovation, in particular, effective investment in the development of remote banking technologies.

Keywords: banking services market, financial services, economy, banking system, innovations

1 Introduction

The research problem is that today, the Ukrainian banking sector is in a difficult position. The reform program for the recovery of the banking system, proposed by the National Bank of Ukraine has led to a significant reduction in the number of banks and a radical change in the functioning of the most important systemic banks. These processes cause an objective need to study the current state of the banking sector in Ukraine and its further development prospects.

Thus, the aim of this study is to analyze modern trends in the banking services market in Ukraine.

The object of this work – Ukrainian banking services market and the subject is the modern trends of development of the banking sector in the banking services market.

The following research methods were used in the work: methods of theoretical generalization and comparison in defining the essence of the concept of banking service and the market of banking services; methods of structural and functional analysis - when considering trends in the development of the banking services market; empirical - in the collection of statistical material, its systematization, and generalization.

In the scientific literature, the concept is highlighted according to which the composition of banking services includes a separate, relatively narrow segment of the bank's activities. In this case, a service is considered to be the activity of a banking institution, which is not directly related to active and passive operations. There is an opinion that banking services are intermediary operations of banks, the main feature of which is the receipt by the bank of income in the form of service fees [1]. N.M.

Perepechay the concept of "banking service" is defined as the result of the complex activities of the bank is economic benefits to meet certain human needs in banking operations [2]. We agree with the opinion of V.A. Shpileviy, who defines the definition of "banking service" as a complex result of the activities of a banking institution to maximize the satisfaction of the growing requirements of customers in banking operations or to attract temporarily free resources aimed at making a profit [3, p. 28].

Note that in banking it is difficult to identify clear signs of innovative services since the basis of most innovative services is traditional. In turn, innovative services are common for individual commercial banks and those that do not distinguish them into separate new ones. Depending on the influence on consumer behaviour for those commercial banks that use the latest services, there is a division of services in the scientific literature into adaptive, functional, and fundamental innovations. In particular, adaptive innovation aims to minimize changes in a product or service and does not require any changes in consumer behaviour; functional innovation presupposes the preservation of the function of a service, but the nature of the implementation of the function is changing; fundamental is aimed at the implementation of a new concept or idea, as a result of which new functionality appears [4].

In banking practice, the widespread division of services into traditional (deposit, credit, settlement, and cash and other services) and non-traditional (previously did not belong to typical banking services, appeared relatively recently) is used.

Note that the activities of Ukrainian banks are in constant interaction with the environment, which affects

The internal environment of the bank is a part of the general environment, which is located within an individual institution and directly affects the functioning of the bank. The internal factors of the viability of banking services are due to the overall potential of an individual bank. So, the development of banking services is influenced by some of factors and conditions, some of which stimulate (the development of banking infrastructure and information technologies, state support for banks in the framework of the implementation of various joint projects, insurance of deposits of individuals), while others restrain their development (political and economic factors, uneven competition conditions, public distrust of banks).

For the period 2015-2019, the number of banks decreased from 117 to 75 units, including those with foreign capital - to 35 banks, in 23 banks - with 100% foreign capital as of 01.01.2020 [5]. The reasons why banks were declared insolvent varied. Most of the liquidated banks did not cope with the challenges facing the banking sector in the crisis conditions of functioning, we're unable to adapt the structure of their assets and maintain their quality at the proper level.

In the last five years, overall, income growth amounted to 18.5% due to an increase in interest income by 12.4% and fee and commission income by a record 54.2%. Consequently, due to the growth in the volume of traditional credit and cash settlement operations, banking institutions received an increase in profits for 2015-2019, by 110.6%, despite the incredibly unprofitable 2014-2017.

As a result, it should be emphasized that there are almost no relatively stable sources of supply of resources in the banking services market, protective barriers against interventions by new market participants, and growing demand from legal entities and individuals that would meet interest rates that guarantee an adequate margin [6]. Competition in the banking sector and the economic crisis require financial institutions to introduce the most modern types of services, and this issue for many banks is not only a matter of leadership but also of survival.

2 Overview

This work discusses the advantages, disadvantages and conclusions on the following issues:

- consideration of the essence and main types of traditional and innovative products in the banking market;
- grouping of stimulants and de-stimulants of the development of the banking system of Ukraine;
- analysis of the state and development prospects of the domestic banking services market.

3 Decision

Ukrainian practice successfully combines many options for traditional and modern remote banking services. However, the basic and most widespread modern service is Internet banking, which many financial institutions in Ukraine provide. The most active and technologically leading market participants are PrivatBank, AlfaBank, VTB Bank, FUIB, Raiffeisen Bank Aval, UkrSibbank, UkrSotsbank [7]. The leader in the implementation of Internet technologies in Ukraine is undoubtedly PrivatBank, whose database has long exceeded a million people. The most important advantage of Internet banking, according to customers, is the ability to manage current accounts remotely without visiting a bank branch. An important step for the development of online banking was the support of the NBU for a unified standard for electronic remote identification of clients, BankID, which today makes it possible to receive administrative services from the state, and in the future, subject to the revision of the regulatory framework, it will allow receiving all banking services without a visit to a bank branch [7].

Ukrainians are increasingly paying by bank transfer using convenient and secure payment tools. In 2018, the volume of non-cash transactions amounted to almost 1.3 billion UAH [9]. The number of non-cash transactions increased by almost 33.0% compared to 2017 and amounted to 3.1 billion units, and the volume - by 55.4% and reached UAH 1297 billion [8]. This positive trend is associated with a stable increase in demand for non-cash transactions among the Ukrainians and the popularization of innovative financial services.

4 Conclusion

So, Ukrainian banks are trying to meet the modern challenges of global innovation trends in terms of the quantity and quality of services for their clients. The most profitable services of domestic banks today are traditional credit and cash settlement operations, the most widespread modern product is Internet banking. The main stimulators for the development of the domestic banking sector are identified as improving the banking infrastructure and information technology, government support for banks in the framework of various joint projects; political and economic factors and the traditional distrust of the population in financial and credit institutions discourage development. In the future, banks should direct their efforts to the development of consulting, information, trust, guarantee services, and ancillary operations, have a relationship with ensuring the activities of consumers of banking services, and constantly improve traditional banking products. The development of modern banking services largely depends on the willingness and willingness of the banks themselves to change and adapt to the needs of their customers and operating conditions.

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The specifics of the marketing mix for agricultural enterprises

Linchevska Elena*, Jevgenija Dehtjare, Viktor Zdir

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: lenoklinchovska@gmail.com*



Abstract

The development of the consumer goods market, active competition, changes in the forms of management, structural shifts in the Ukrainian economy create conditions for the active use of marketing by agricultural enterprises. In modern conditions, along with the problem of a production nature, the problem of the effective implementation of marketing activities becomes urgent, since the irrational management of the marketing of an enterprise, even with production advantages, can call into question the effectiveness of the activities of the manufacturers of these products. Reforms in the country's agricultural sector require a radical improvement in the functioning of the entire market economy system, primarily in the field of marketing of agricultural products. Reforms in the country's agricultural sector require a radical improvement in the functioning of the entire market economy system, primarily in the field of marketing of agricultural products. The market economic system presupposes a constant balance between supply and demand for all types of agricultural raw materials and finished products, ensuring and maintaining the high quality of marketable products, creating an equal and fair competitive environment, reducing production costs associated with the production and sale of goods, providing consumers with high-grade food at affordable prices. Perfect knowledge of the needs of the consumer and the parameters of the production of goods that satisfy is the only way to achieve goals related to profit, increase in sales, and penetration into new markets. At the same time, one of the main reasons for the unsatisfactory performance of the national agricultural market is the underdeveloped marketing of agricultural products. The enterprise marketing complex is the basis of the entire marketing system, and the marketing complex management becomes the main task for achieving success in the market.

Keywords: marketing mix, marketing complex, agricultural enterprises, agricultural products, elements of the marketing mix Management of the marketing mix.

1 Introduction

Active agricultural exports, clashes in competition with Western high-tech agricultural production and high quality products establishes a new level of requirements for agricultural businesses that require them to radical rethinking of the strategic goals and methods of achieving them. The driving force in solving these problems can be the organization of effective marketing activities that would give them the opportunity to significantly strengthen their position in the market. Therefore, at all stages of the production, sales and management activities of the enterprise, it becomes necessary to use modern marketing tools, take into account the components of the marketing complex and introduce effective directions of the marketing commodity, communication and pricing policy of the enterprise. Marketing mechanism should be innovative, flexible and apply original ideas, withstand rapid changes in the market, to be able to reorient and find the target audience.

The goal is to investigate the features and propose directions for improving the process of forming elements of the marketing mix of agricultural enterprises, which ensure an increase in the effectiveness of marketing commodity, price, sales and communication policies for

making effective management decisions.

Object of research - marketing activities of agricultural enterprises.

Subject - a set of theoretical and practical aspects of the formation and implementation of a marketing mix at agricultural enterprises.

The theoretical and methodological basis of the study is the dialectical method of cognition, the developments of domestic and foreign scientists on the marketing activities of agricultural enterprises.

In the process of its implementation, the following methods were used: historical - to identify trends in the development of the components of the marketing complex of the studied enterprises; deductive, inductive and generalizations - when studying the theoretical aspects of the specified problem; abstract-logical - in relation to theoretical generalizations, the formulation of conclusions.

2 Main part

According to the most common interpretation of "marketing mix" or "marketing mix" - a set of marketing tools, a certain structure which ensures the achievement of this goal and solve marketing problems [3]. The term "marketing mix" is a key term that defines the

The process of systematization of marketing tools began in 1948 from the expression Kallitona James (James Culliton) that marketing decisions should be the result of a specific "recipe" [3].

Neil Borden generalized them into a model called the "marketing mix" and consisted of 12 elements, such as product planning, pricing, branding, distribution channels, personal selling, advertising, promotion, packaging, demonstrations, service, physical qualities, search facts and their analysis.

Albert Frey in 1961 divided them into 2 groups, such as offering (product, packaging, brand, service) and methods and tools (distribution channels, advertising, personal sales, sales promotion, PR).

In 1964, Jerry McCarthy proposed a model of the "4Rs", that is, the marketing mix, consisting of only four elements: «product», «price», «place», «promotion» [2].

The marketing of agricultural companies differs from the marketing approaches used in other markets. This is due to the special features of agriculture [5]:

1. seasonality. Crop in agriculture is most often harvested once, maximum twice a year. The main task of marketing an agricultural enterprise is to sell a product that has not yet been developed. In such a situation, the marketing department needs to collect the necessary information about the forecasts for the volume of the crop and create a demand model. Depending on the seasonality of agricultural products, tools for promoting goods to the market are determined;
2. feature of the product. Agricultural products require careful handling due to their quality characteristics: they need special conditions for storage, transportation and packaging. The manufacturer cannot "hold" the product until better times and is forced to sell it at reduced prices or dispose of it;
3. dependence on external factors. Natural conditions, the quality of land, the state agricultural equipment and personnel to the enterprises of AIC affect the production process because of these characteristics depends the quantity, quality and range of agricultural products;
4. government intervention. In the market of agricultural products marketing often works not just a commercial product, but with the daily necessities products (bread, cereals, milk, meat), so the pricing of the agricultural enterprises not only built on the rules of the market, but also under the control of the state. The state monitors the level of prices and has the right to force the company to lower them. This affects the functioning of the company, and the marketing mix is designed with these features in mind.

Let's take a closer look at each component of the 4P model as the most optimal for enterprises:

1. commodity policy (Product). In the sector of the production of perishable agricultural products

plays a special role packaging. In the segment of finished products with a short shelf life, the packaging should have, in addition to convenience, attractiveness, also quality characteristics, that is, ensure the long-term preservation of the product and its suitability for use;

2. pricing (Price). Prices for the products of Ukrainian agricultural companies are influenced by a variety of parameters, but they are differentiated depending on whether the company belongs to any market. The main most common characteristics are:
 - costs of materials (for example, purchase of seeds);
 - the cost of wages of personnel;
 - labor costs;
 - expenses for mineral fertilizers and additives;
3. distribution channels (Place). There are two main distribution channels: wholesale and retail. Producers can sell agricultural products, for example, to grain traders, vegetable stores in bulk, or to individual buyers at retail. Also production (harvest) often pay with the holders of land shares;
4. communication policy (Promotion). In this area, the marketing of agricultural companies is poorly developed. This is due to the confidence of manufacturers in the fact that the products sold in agricultural production do not need advertising, because they belong to essential goods (meat, milk, grain products, etc.). In fact, proper promotion and positioning can increase and stimulate sales. Establish communication activities of the company are taking part in agricultural exhibitions, fairs, auctions, etc.

An important point is the ability to negotiate, correctly build the sales process and contact with consumers [1]. This affects customer loyalty to a particular manufacturer and its brand. One of the main tools for promoting the product on the market - advertising. Most of the major producers make heavy use of advertising, especially TV videos. As a rule, such communications directed to report to the competitive advantages of the company's products to consumers or to the demonstration of the production process. It is worth highlighting public relations as an important direction in the marketing strategy of agricultural enterprises. Public relations help manufacturers establish communication, increase brand awareness and generate new customers. In addition, it is public relations that contribute to a more intensive development of network relationships in agriculture.

Today, it is not enough to restrict ourselves to the directions outlined in the "4P" concept when developing a marketing strategy [3]. An important basis of the marketing complex at the enterprise in modern market conditions is customer focus. This approach assumes that high results of the company's functioning are achieved when the manufacturer maximally experiences the needs and demands of the consumer, introduces appropriate innovations in the production of products, therefore it is necessary to highlight two important phenomena:

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marketing innovation and customer focus. These topics are interrelated, since customer-oriented companies are characterized by a more active introduction of marketing innovations, and one of the prerequisites for innovative activity in the field of marketing is the company's emphasis on high quality and changes in the market [2].

Therefore, in order to improve the marketing mix of agricultural enterprises, it is worth considering a number of proposals:

1. intensify work on expanding and deepening the product range, which will allow the enterprise to enter new markets, master new segments, and also strengthen its competitive position in the market;
2. build a pricing policy in such a way that the average selling prices for products are lower than those of the main competitors of the region;
3. constantly work to improve the quality and safety of agricultural products;
4. pay sufficient attention to the development of its own trading network, to expand the number of retail outlets in the regional centers of the region;
5. conduct advertising campaigns, taking into account the motivation of the target audience in advertising messages, where it is proposed to use the quality characteristics of products, such as health, usefulness, naturalness; the advertising campaign should focus on environmentally friendly products;
6. to promote products among small and medium-sized enterprises by creating specialized service

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cooperatives with highly qualified marketers in the state;

7. the basis for the successful functioning of agricultural enterprises should be marketing research and analysis of marketing information.

3 Conclusions

Thus, in conditions of tough competition, especially with foreign producers, in a state where prices for agricultural products are extremely low, given the possibility of unfavorable weather conditions, the solution of the problems of Ukrainian agricultural companies can be facilitated by the introduction of marketing. Model «4P» McCarthy is the basis for planning and implementation of marketing activities. However, in developing a marketing strategy, a modern approach is important, in particular, reliance on the concept of customer focus and more active implementation of marketing innovations. Today, commodity producers rely on product policy, focusing on innovation in the production of products, leaving market promotion issues in the background. Undoubtedly, commodity producers also use innovations in the field of marketing, but a fundamentally important point for them should be the formation of brand value for the end consumer, while the strategic goals and objectives of forming a marketing mix relate to such key areas as production, personnel, product, price, sales channels and communication.

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Networking and digitalization: possibilities and challenges for Ukraine's economy

Yaremko Artur*

Kyiv National Economic University named Vadym Hetman, Ukraine

**Corresponding author's e-mail: artur_yaremko@ukr.net*



Abstract

This article analyzes the processes of networking and digitalization in the context of prospective trends in Ukraine's economy and its global competitiveness. Opportunities and threats connected with digital and network transformation of economic relations in Ukraine is identified.

Keywords: technologies, digitalization, network economy, digital economy, IT services market.

Modern global economy is at the stage of radical and rapid changes, which in fact have already led to the formation of fundamentally new format of economic relations. Such transformations are extremely multifaceted, have different forms of manifestation, quantitative and qualitative dimensions. However, in any case, they are based on the information and knowledge component. Incessant networking and digitalization, on the one hand, determine widespread use of information and knowledge as fundamental economic resources. On the other hand, exchange of information and knowledge forms the preconditions for further development of network and digital technologies.

Obviously, like any global economic process, digitalization and networking are ambiguous in their implications. New opportunities are emerging for global economic development, but at the same time, completely new threats are emerging too. This applies to all economic agents without exception - states, corporations and individuals. However, it should be recognized that these issues are especially acute for countries with «transitive» economies (such as Ukraine). Weakness of institutional mechanisms catalyzes the negative manifestations of networking and digitalization, and at the same time restrains their positive effects. In this regard, Ukraine has both chances to overcome existing technological «gap» and also possibility of its deepening.

The ambiguity of current Ukraine's position is evidenced by quantitative characteristics of high-tech industries' development [1]:

1. The share of the Information and Telecommunications sector in GDP at the beginning of 2020 was only 4.6% with a slight upward trend;
2. Exports of "Telecommunications services,

computer and information services" article in 2020 amounted to 2 110.8 USD (or 25.9% of all export of services from Ukraine. In turn, import of this item amounted to 364.3 million USD (9.8% of total).

3. The share of population that constantly uses the Internet varies between 60-64%.

Networking and digitalization of the economy directly determines the active introduction of innovations. At the same time, it should be acknowledged that today the national innovation system efficiency in Ukraine is extremely low - only 12-16% of industrial enterprises implement innovations, the share of innovative products does not exceed 2%.

In our opinion, in the light of global network and digital society formation, Ukraine's prospects look rather ambiguous. On the one hand, the high share of ICT services in the structure of Ukrainian export indicates the presence of significant scientific and human potential, which in perspective may become the basis for technological «breakthrough» of Ukraine. On the other hand, the functioning of the ICT sector is primarily focused on external demand and has very limited stimulus effect for domestic markets. This determines the first main task of public policy - to ensure maximum use of network and digital technologies as a provider of positive change within the country.

Economic aspects of networking and digitalization in Ukraine are closely connected with socio-cultural ones. Progress of network and digital technologies can be expected only with the appropriate economic behavior of ordinary citizens and changes in corporate strategies of business units.

If today we can talk about the perception of business environment manifestations of networking and

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digitalization, so trends at the level of individuals' economic behavior are ambiguous.

As a result, it can be concluded that further expansion

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of network and digital technologies is becoming an economic, social and cultural challenge for Ukraine in the medium term.

Smart-city in the global ecosystem

Kalenyuk Iryna^{1*}, Tsymbal Liudmyla¹, Uninets Iryna²

¹Kyiv National Economy University Named After Vadym Hetman, Ukraine

²National pedagogical Dragomanov University, Ukraine

*Corresponding author's e-mail: kalenuk@ukr.net



Abstract.

At the present stage of the world economic development, a new economic system is being formed, in which non-economic values, in particular environmental and social parameters, have become widespread. A new vision of economic activity is being formed, which acquires the qualities of Smart-economy. The purpose of this paper is reveal the features of managing the development of smart cities as specific entities of the Smart-economy. New functions of economic entities are formed within the framework of the Smart-economy concept, while their role and weight in the localities' activity or formation have changed. Determining that the key trends in the Smart-economy development are such as digitalization, greening, socialization, institutionalization, and urbanization, this is necessary to note that all these trends are most active in the formation of urban ecosystems. These trends are determined by the general population growth and the urban population growth, which requires considerable attention to planning each city's development itself. Such planning could ensure the comfort of living for all its inhabitants, quality, safe, and modern life. The Smart-city's key elements and the intellectualized approach implementation planes to the decision of these or those tasks are defined. It is determined that a new ecosystem of governance is being formed.

Keywords Smart-economy, urban population, smart city, smart city management, smartivist.

A new milestone at the beginning of the XXI century is the emergence of the Smart-economy concept. This concept embodies the spread of new smart technologies with the goal to manage efficiently economic, social, and environmental processes. A manifestation of modern development is the growing attention to social and environmental issues. This caused developing a new approach to the perception of economic phenomena and processes, namely their study as ecosystem elements. The key trends in Smart-economy formation, in our opinion, are the following: digitalization; greening; socialization; institutionalization; urbanization. The selection of the latter two is caused by the following circumstances: one of the most important problems in the formation of intellectualized economy are institutional barriers that arise in the process of the economic system transformation and modification, transition from resource economy to highly developed and high-tech. The main players of Smart-economy can be: individual; locality, city; region; country; global city. Overcoming the above obstacles becomes possible, first of all, at the level of individual localities - cities. That is why the urbanization and institutionalization processes of all stakeholders' influence on decisions within cities are becoming important and distinctive trends today.

Cities as economic entities, and in addition, global economic entities, are gaining high importance in the

context of urbanization process acceleration. The share of urban population is growing steadily, and from the second half of the twentieth century, very quickly. In the world, the share of urban population has grown from 29.6% in 1950 to 56.2% in 2020, and is projected to reach 68.4% in 2050 - more than doubling in a century. The fastest growing urban population between 1950 and 2020 was in Africa (3.04 rate of growth), Asia (2.92), Latin America and the Caribbean (1.97). In Europe and North America, the growth rate is not so high, but the share of urban population is very high - 74.9% and 82.6% in 2020, respectively. Not just the urban population is growing. There are trends in both the growing number of cities - millionaires, and the total population of cities. According to the UN website "World Population Review", in the beginning of 2020 the populations of world largest cities were: Tokyo (37 mln), Delhi (29,4 mln), Shanghai (26,3 mln), Sao Paulo (21,9 mln), Mexico (21,7 mln). Most of large cities are located in the largest countries in the world - China and India. Among European countries, the largest cities are Istanbul (14.5 million inhabitants), Moscow (more than 12 million), and Paris (more than 11 million) (World City Populations, 2021).

Smart cities are a modern and dynamic phenomenon that is rapidly developing and improving, creating new forms of communication and implementation of various aspects. There is no standard at all; each city develops

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 based on its capabilities, mental and cultural traditions. At the global level, there are leading cities that managed to implement key aspects of smart living in their community. It is also important that the management of a smart city does not remain unchanged. Boyd Cohen, who has been researching the problem of smart cities since 2011, identifies three stages, three different generations or evolutionary phases of smart city development:

Smart Cities 1.0: A technology-centric vision of smart cities, characterized by technology providers encouraging cities to apply their solutions, which have not actually been equipped to properly understand the implications of technological solutions or possible impact on citizens' life quality. Smart Cities 1.0 is also the core philosophy of most smart city projects proposed worldwide, from PlanIT in Portugal to Songdo in South Korea. These visions of the future city were driven by private sector technology companies, such as Living PlanIT and Cisco.

Smart Cities 2.0: a government-centric vision with use of technology solutions as a means to improve life quality. In this generation, the municipality - led by promising mayors and city administrators - takes the lead in determining the city's future, implementing smart technologies and other innovations. At this stage, city administrators are focusing more on technological solutions that help improve life quality. A good example is Barcelona, which has more than 20 smart city programming sites and literally more than 100 active smart city projects.

Smart cities 3.0: a citizen- and human-centric vision of smart cities, citizen- or person-centred and based on shared creativity. In this model, smart cities use citizen co-creation strategies to help manage smarter cities to improve the life quality and prosperity of future generations. Vancouver has led one of the most ambitious joint strategy initiatives, involving 30,000 citizens in co-sponsoring the Vancouver 2020 Greenest City 2020 Action Plan, while Vienna attracts citizens as investors in local solar power plants as a contribution to the city's 2050 renewable energy goals (The 3 Generations...; Redefining the smart...).

Thus, the main trend in the development of a smart city management system is the involvement of all parties, all entities to the management process. This is even called the "fourfold spiral" - the involvement and cooperation of all stakeholders: between the government, the private sector, academia and civil society (especially citizens).

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The targeting of all stakeholders to achieve important goals of urban development is a key factor in the success of all smart city indicators (Redefining the smart...).

A smart city is not only the involvement of all stakeholders in management, but also the focus of all activities (goals, mechanisms, and tools) on human. The overall goal is to create and implement a smart city solutions ecosystem that produces added value and becomes a collective good. In such ecosystem, all stakeholders take smart actions: smart people formulate smart goals, business joins to their smart implementation; the municipality smartly manages all components of urban life, operating on the basis of smart environmentally and socially oriented development.

Larger projects are Better Reykjavik, or public hackathons, such as the Barcelona CCCB Data Quality Datathon, in which people are involved in the formation of the urban areas ecosystem, planning, land management through forums, platforms and initiatives. This format allows the population to directly participate in improving the functioning of the residence place, its convenience and environmental friendliness, to find new ways and methods of management, implementation of ideas. In general, initiating some changes from people living in a certain area will contribute to the formation of their community area, which becomes more economically sound and efficient, will promote the formation of a cohesive society, reduce distrust in government, government institution, etc.

The emergence and rapid spread of the smart cities phenomenon in the world is a clear example of Smart-economy formation. The growing attention to this issue in world economic science has led to the existence of various theoretical approaches to understanding the nature and structure of smart cities. World practice provides rich experience of smart cities implementation. With it, each city is unique, because it develops and creates its history based on its capabilities, mental and cultural traditions. Nevertheless, the general trend is strengthening the human role in the management and implementation of the smart city project. This is reflected in the increasing involvement of citizens in the processes of urban governance, and the forms of this participation are becoming more diverse. This situation allows discussing the formation of the city's collective intelligence as an effective force for managing its development on the basis of environmental friendliness and sustainability.

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Some Aspects of Challenges in Innovation Processes

Konstantin Kurpayanidi^{1*}, Alisher Abdullaev¹, Akmal Khudaykulov²

¹Fergana Polytechnic Institute, Uzbekistan

²ISMA University of Applied Sciences, Uzbekistan

*Corresponding author's e-mail: w7777@mail.ru



Abstract:

In the article, the authors consider some topical issues of activation of innovation processes in Uzbekistan's national economy. Based on the research, some problems have been identified; the authors propose some elements of the "road map" for further enhancement of innovation processes in Uzbekistan's economy.

Keywords: innovation, innovation process, roadmap, scientific and technological progress, the national economy of Uzbekistan.

1 Introduction

Companies go about innovating in different ways: some strive to make a better product, others bet on streamlining production, and still, others count on customer loyalty—some work in manufacturing, others in services. Nevertheless, irrespective of their business models' peculiarities, they should follow the same basic principles because innovation alone does not solve most economic, scientific and political problems. The innovative activity of enterprises cannot be activated simply by passing a law or increasing funding. It is about the presence of basic conditions for creating innovations, their positioning, promotion, expanding the horizons of strategic planning, and the involvement of subjects of the national innovation system in international networks.

It should be noted that innovations are the most important means of solving major socio-economic problems, such as improving economic efficiency, improving working conditions, environmental protection, improving the material and technical base of production, etc. But the current situation is characterized by the fact that the availability of significant fundamental and technological facilities in the country does not contribute to the activity of innovation, this is due to lack of enterprises own funds and insufficient budget financing. There are two types of factors that hinder innovation activity:

1. economic factors that create great difficulties and are characterized by the lack of own funds, high credit rates, insufficient financial support from the state, high economic risk and long payback periods of innovation;
2. production factors, including low innovation potential of enterprises, poor awareness of new technologies and sales markets, lack of

opportunities to cooperate with other companies and scientific organizations.

At present, the system of strategic management of innovation development has not been formed yet. State innovation programs are practically absent, and scientific and technical programs are extremely vague. On this basis, we can say that the state does not fulfil its innovation function, which is unacceptable in today's conditions with the need to improve the efficiency of the economy and "enter" the world market. According to Richard Joyner, Chairman of the Society for the Preservation of British Science: "If we do not compete in science, if we do not compete in technology, then we do not compete at all, period. Based on studies of foreign practice and our own experience, it can be argued that one of the main goals of public policy should be the development of scientific and technological progress. The recommendations for innovation in the most developed countries are quite impressive and extensive - from state support of technological innovations and investments in infrastructure to supplying marketing information and subsidizing exports. In a broad sense, innovation activity involves the implementation of procedures for the creation, acquisition, development and distribution of new and improved products, services, technologies, raw materials and materials, methods of organization of production and management.

Specific features of the market economy are economic environment activity, constant change of external circumstances determining enterprise policy, change of competitive prices for products, currency fluctuations, depreciation of funds of a business entity, the appearance of competitors providing products identical or superior in quality. To maintain competitiveness, the enterprise constantly needs to reconstruct production facilities, update the existing material and technical base, increase

production activities, and master its new types. The importance of technological development determines interest in the study of modern innovation processes in the economy as a factor in the competitiveness of enterprises and the country. The complexity of certain technical, production, organizational, marketing, information operations constitutes the innovation process, which implies their development, and competition is simultaneously a driving force of innovation activity.

Innovation is now playing an increasingly defining role in the economies of developed countries. Entrepreneurial activity, highly risky and innovative, is a key aspect of creating and diffusion of innovation. An important condition for the Republic of Uzbekistan's dynamic development is the accelerated introduction of modern innovative technologies into sectors of the economy, social and other spheres with wide application of the achievements of science and technology. The country's scientific development is mainly dependent on innovative ideas, technological developments and technologies, and the consistent implementation of the tasks defined by the strategy of actions in five priority areas of the Republic of Uzbekistan were adopted.

Our research has shown that the republic still lacks effective technological intermediation structures, promoting the commercialization of the results of innovation activities, which would solve many problems of innovative development of industries. There is a passivity of domestic enterprises in using the results of scientific and technological activity, the consequence of which is their low innovation activity. All this requires certain structural changes in the management of science and innovation activity. Innovative activity of economic entities requires stimulation through the introduction of a flexible system of tax incentives. The importance of this instrument of state regulation is recognized in all developed countries of the world, and each country seeks to find its optimal model of tax incentives for innovative activity.

Simultaneously, the analysis showed preliminary work on innovative development of modernization processes, diversification, increase in production volumes and expansion of the product range of competitive products on the domestic and foreign markets. In particular:

- a low level of coverage of the population with higher education;
- inadequate interaction between the ministries and departments responsible for the development of scientific and innovation activity, inadequate coordination of the activities of research institutions and laboratories;
- low level of provision of commercialization of the results of science;
- lack of highly qualified specialists in the sphere of innovation management, allowing to promote and implement technology transfer actively;
- lack of allocated budgetary funds for R&D;
- lack of mechanisms to stimulate the attraction of extra-budgetary and private funds;

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- inadequate protection of the results of intellectual activity, lack of qualified specialists in this sphere;
- low level of implementation of innovative technologies in the sphere of renewable and alternative energy sources, energy recovery of secondary resources;
- underdevelopment of corporate relations and principles of corporate governance, especially in state-owned companies.

To solve the problems mentioned above, the Roadmap for Innovative Development of the country is necessary. "The Roadmap for Innovative Development of the Republic of Uzbekistan aims to stimulate and develop innovative activities in the Republic of Uzbekistan territory. In our opinion, the purpose of the roadmap is to create conditions for innovative growth of the Republic of Uzbekistan economy based on concentration of knowledge and competencies in the field of scientific, scientific-technical and innovation activities in the region. It leads to the formation of advanced centers of research, development, and innovation, creating a favorable environment for innovative entrepreneurship and Uzbekistan's effective innovation infrastructure.

Let us consider only some constituent elements and directions of the Roadmap:

1. Human resources and human capital. Creating opportunities for identifying talented young people, building successful careers in science, technology and innovation and developing Uzbekistan's intellectual potential;
2. Infrastructure and environment. Creation of conditions for research and development, corresponding to modern principles of organization of scientific, scientific-technical and innovative activity and best world practices;
3. Interaction and cooperation. Formation of the effective communication system in the field of science, technologies and innovations, increase of susceptibility of economy and society to innovations, development of science-intensive business;
4. Management and investments. Assistance to the formation of the effective modern system of management in the field of science, technologies and innovations, providing an increase of investment attractiveness of the sphere of researches and development;
5. Cooperation and integration. International scientific and technical cooperation and international integration in the field of research and technology.

2 Conclusions and suggestions

In our opinion, for effective implementation of the above directions of the roadmap, it is advisable:

- to integrate the efforts of the state, industries, large enterprises, private businesses, banks, scientists and employees of universities in innovation activities;

- to form a network to promote the results of scientific and technological activities in production: technological platforms, based on a partnership, focused on pooling the efforts of government, science and business in the development of priorities for long-term scientific and technological development
- to improve the regulatory and legal framework, as well as intensify economic policy measures to stimulate innovation activity participants;
- to carry out systematic reforms to improve the training of professional staff for the innovation economy, focusing on the regional level of the national economy;
- to form and implement breakthrough cross-industry innovation projects;
- to activate the financing of innovative developments by the enterprises, with the condition of preferential taxation, as well as attracting bank and private investments;
- to form a competitive national market that stimulates the transition of the economy to an innovative path of development and the effective use of limited economic resources;
- to simplify the scheme and requirements for obtaining bank package loans to actively stimulate the development of innovative enterprises, especially in the regions;

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- to develop an adequate model of tax incentives for the attraction of innovative technologies in the development of national business entities;
- to create centres of collective use of unique scientific and technical equipment;
- based on the use of the results of the evaluation of the effectiveness of the business environment, international ratings to activate production with high competitiveness and export of knowledge-intensive products;
- to introduce advanced management methods to implement innovations in industrial enterprises by focusing on reasonable integration of various management structures with individual structural components of the production structures of the enterprise, as well as their elements;
- to develop the geography of international cooperation in the sphere of mastering innovative technologies.

State support of large, systemic innovations should be carried out through the implementation of targeted innovation programs. It is necessary to pursue a well-considered policy of attracting foreign investment. Financial capital should meet the needs of the real sector of the economy, and extra measures are required to regulate commercial banks' activities, their reorientation towards lending, and investing in the production sphere.

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Modern trends in the development of internet trade

Machylskiy Yehor, Khotunov Vladyslav*, Kholupnyak Katerina

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: vkhotunov@gmail.com

Abstract

The Internet and information technologies continue to rapidly penetrate into our lives, thereby simplifying routine tasks. Due to the rapidly developing trade flows in the modern world, manufacturers have to expand the distribution of their products. Due to the development of the technological sphere, the application of the directions of Internet trade technologies has become extremely important recently. Now it is possible to order the necessary goods, pay for various services and solve everyday tasks online - this need was especially acute during the pandemic.

Keywords: utility services, information technology, online

1 Introduction

E-commerce is a fairly broad area of the economy, which includes many types of activities such as online shopping, online advertising and marketing, all kinds of payment systems, and much more.

A web application for online commerce is a website used by the user on any device with Internet access. Working in an online store is directly related to finding information about a product in a database. The database is designed to store data on the category of goods from the general group of categories, the classification of these categories and customer orders. It is understood that this information may change during the entire period of online trading.

The end users are potential customers. This imposes certain requirements on the development of a database management system, in which all methods of access, search and most of the administration functions are hidden inside the program and are transparent when working. This will affect the development of the programming interface.

2 Overview

Speaking about the prospects for the development of e-commerce on the territory of Ukraine, first of all, it is necessary to provide a legal basis. Prepare the very platform for the introduction of e-commerce, which means debug the electronic payment system.

One of the central factors in mobilizing Internet commerce in 2019 in our country was a fairly high growth rate of mobile Internet, almost a single 4G network coverage transferred a large share of potential buyers to the mobile sphere of sales. The creation of mobile platforms for various shopping sites has become an integral part of modern business. Its adaptation for mobile devices or other electronic resources today is becoming a key task of Internet commerce.

Through the use of Internet commerce in activities of his company, the manufacturer is able to obtain the

following advantages:

- additional types of advertising;
- SMS notifications;
- automation of payment for goods or services via a mobile network;
- setting the feedback function;
- expanding the target audience;
- acceleration and automation of the processes of selling goods;
- the possibility of increasing the level of service personally for each client.
- Trade, which is aimed at promoting in Internet networks, has identified the following areas:
- direct promotion of the organization's personal blog;
- use of social media accounts;
- use of photo and video materials.

In the process of using additional platforms on the Internet, the trading activities of Ukrainian companies and organizations are gradually moving to a new, higher level. The ability of companies to use differentiated platforms allows for a qualitative increase in the percentage of potential buyers' trust in the company's brand, which is presented on the network through continuous influence through indirect resources.

3 Decision

The rapid expansion of Internet commerce in Ukraine in the context of digital transformation and pandemic should be a priority for companies that plan to make their business successful. The statistics of European electronic markets enables Ukrainian companies to track global trends and apply Internet technologies on their platforms.

The creation of an online store strengthens the company's position in the market of goods and services, helps to increase the client base and increase popularity. The online store combines low cost and high efficiency. For business owners, the online store brings real profits.

Maintenance of an online store includes technical support for the parameters of an electronic resource, the

4 Conclusion

Nowadays, the Internet significantly affects our lives and simplifies many tasks. And people who value their time try to optimize simple processes. In the course of writing the first stage of the master's work, it was revealed that the online commerce market in Ukraine is quite complex and ambiguous. The current competitors providing such solutions were also analyzed, their advantages and disadvantages were identified, which will make the future

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project simple, affordable and at the same time technologically advanced. Summing up, it is possible to identify the following areas that are relevant in the electronic trading market at the present time:

- the use of video hosting for the purpose of promoting their own products and brands;
- creation of virtual platforms that will contain information about the real market, manufacturers and distributors;
- significant redistribution of the electrode market to mobile structures;
- an increase in viral marketing from the popularity of social media and video platforms

University – business - institution collaboration: case of Latvia

Marina Čelika, Marga Živitere*

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: marga.zivitere@isma.lv*



Abstract

This article aims to conduct a survey of the university - business collaboration, as well as – the role of state institutions in this process. The research methods used include both, quantitative and qualitative research methods. For this purpose was analysed scientific literature and documents, reviewed participatory methods of evaluation a good practice, its advantage and challenges in this collaboration. Overall, researches' results suggest that in nowadays the outcome and impact of the collaborations between the universities, business and state institutions will be developed and might be more effective for transformation the knowledge's/researches results to business. Based on findings had made the recommendations for improves an effectivity and quality of an overall collaboration between partners of this triangle.

Keywords: business, collaboration, public institutions, universities

1 Introduction

The collaboration university (term university is used to designate all higher education institutions) - business through the exchanges of knowledge and technology has become a central concern for economic policy. In the last years, science is exerting an increasingly large influence on innovation, especially in the fast-growing knowledge-intensive industries [1]. The most important objective is to ensure the continuation of the development of employment, economic growth and welfare. Universities would be an integral part of the skills and innovation supply chain to business, which is multi-dimensional [2]. As stated in the Communication of the European Committee, the qualitative changes are taking place in the collaboration between university and business comparing the first decade of the 21st century to the 20th century. 'Universities are the heart of the European knowledge triangle': universities, business companies and public institutions [3]. Collaboration between universities – business and state institutions is one of those sensitive issues that currently cantered on the special attention of these subjects in Latvia. In the context of far reaching changes in higher education and the labour market, role of state institutions there has been extensive discussion. This article aims to conduct a survey of the university-business - collaboration, as well as – the role of state institutions in this process.

2 Design/methodology/approach

The research methods used include both, quantitative and qualitative research methods. For this purpose was

analysed scientific literature and documents, reviewed participatory methods of evaluation a good practice, its advantage and challenges in this collaboration between partners of this triangle.

3 University – business – institution collaboration' mechanism

The review of university – business - institution mechanism draws different meaning for each side.

The status of university as a publicly oriented value defined in two ways: as an instrument, that promotes economic achievement and as a means of shaping personality and providing opportunities in later life [4].

The collaboration realized by the academic staff, creates an opportunity to put knowledge into practice and integrate the research results, and find sponsors to obtain funding for future research [5]. The survey on main transfer mechanisms evaluated by the industry in Switzerland undertaken by Arvanitis & Hollenstein. They, the first of all, the transfer mechanisms arrangement on formal and informal channels and a wide spectrum of education-related activities appear to be the most important activity forms for transfer knowledge to business and their collaboration [5].

These three subjects' most common forms of the intensification of collaboration in Latvia are the development of the study programmes and courses in accordance with the place of a practical training and pre-diploma practice at enterprise, and the transfer of students' knowledge research to companies - only the introduction of specific companies. The variety of factors make that process difficult for universities and business: state and

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 private research and development (R&D) expenditures, allocation of profit, subject interests, lack of authorization, lack of previous experience in government policy, bureaucratic obstacles, scientific and competence centres, publicity functions etc.

From a perspective, there is the need to shift scientific knowledge to applicable one, which can be carried over to the production and to promote the competitiveness of firms [6]. This would contribute to firm's growth, cost reduction, improvement of an organization's image, increase the learning capacity of an organization's staff [7] and develop a company's human capital [8]. Unfortunately, according to the latest scientific institution certification has not reached the desired results yet. The experts have found out that formal university - business cooperation may change if the situation changed in the conditions of collaborative practice and the interaction of different methods and rules, which are applied the same as in the Old Europe States [9].

Due to the transition to the science - based economic structure and the introduction of innovations the universities began to focus more and more on the new applied research for the development and transfer of production technologies on the regional and national levels [10; 11].

4 Results of study

The results of studying collaboration of the university - business – institution collaboration are:

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- the one of transfer mechanisms as evaluated the collaboration between university and business is practice and pre-diploma training at firms;
- a successful practical training at the places, may help to satisfy the needs / determinants of the labour market, and thus the companies – places of practical training can be the work places for future;
- the practice tasks should be reconsidered;
- the number of foreign companies – places of practical training should be increased;
- The policy goal should be to support and promote, with specific instruments, the relationships between universities and business.
- of the university - business collaboration, as well as – the role of state institutions in this process of the university - business collaboration, as well as – the role of state institutions in this process the institutions must complete the preparation of the normative documents on higher education and scientific institutions.

5 Conclusion

The main conclusion of the study is that in nowadays the outcome and impact of the collaborations between the universities, business and institutions will developed and might be more effective. All the three parties are responsible for the joint success in the innovative approach and creation of correct framework for cooperation and rational management of the process.

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Bankruptcy of restaurant companies before and during Covid-19 in Latvia

Olga Zhukova

ISMA University of Applied Science, Latvia

Corresponding author's e-mail: marina180@inbox.lv



Abstract

In this particular work, the author is looking in bankruptcy that occurred in the regions of Latvia during the period of the situation with Covid - 19 and the period that was before Covid - 19. The author also examines the increase or decrease in unemployment in the catering business, which appeared due to the bankruptcy of these enterprises. The restaurant business in Latvia is an important part of the service sector, accounting for 2% of the gross domestic product. This topic is very relevant and discussed in Latvia at the moment. Since in Latvia now there are severe restrictions due to the pandemic, a large number of hotels and catering places are closed due to bankruptcy and people are losing their jobs. In this particular work, the author wants to find real statistics of bankruptcy in the areas of restaurant business. As well as the presence of a problem and its possible solution.

1 Introduction

Nowadays, the restaurant business plays an important role in the development of the economy in the country. Since these services are used not only by citizens of Latvia, but also by a large number of visitors from other countries. The restaurant business can be classified as the tourism industry. Since the restaurant business is very developed all over the world, and more precisely in Latvia, new enterprises of this type are constantly being opened. Due to the fact that new enterprises are being opened, new jobs for the population appear. Because of this, the rate of unemployment in the country decreases. According to statistics for 2018, 5,297 enterprises were registered in the catering sector, of which 65.37% chose restaurant and mobile food services, 17.41% - services to order, etc., and 17.22% - bar services. 12.54% of all enterprises have attracted foreign capital. The highest performance in the industry in 2016 was shown by «AS Lido» with a turnover of 36.46 million euros. «SIA PREMIER RESTAURANTS LATVIA», which includes McDonald's restaurants, had a turnover of 36.12 million euros in 2017. The amount of taxes paid by Latvian catering enterprises to the state general budget in 2017 amounted to 109.03 million euros. In turn, the volume of income tax increased by 28.92%, to 22.78 million euros, and social tax - by 22.01%, to 42.79 million euros. At the same time, the number of employees in 2017 compared to 2016 increased by only 5.31% - from 26,759 to 28,179 people. According to these data, it is worth noting the stability in the restaurant business in Latvia. Stability in jobs, income and taxes.

But taking the data that is at the moment, during the pandemic, you can see that things are going badly in the restaurant business. For example, in 2020 alone, due to the pandemic, 734 catering places were closed. At the end of 2019, the unemployment rate in Latvia was 6.2%. Actual unemployment rate in Latvia in January 2021 amounted to 8.8% (84.1 thousand). It's level began to rise in the spring due to the introduction of an emergency regime and restrictions due to the coronavirus pandemic and has now reached a maximum.

2 Overview

This work discusses the problems of restrictions introduced in Latvia due to which the unemployment and bankruptcy in the restaurant business develops.

3 Decision

An example of a solution to this problem would be tax cuts for the restaurant business. Since the tax in the restaurant business is 21%. Considering that in other countries these taxes are much lower (9 and 12%). Also, according to the author, the solution would be to reduce the rent. Since it is very large, for such restrictions that exist in the country now. Also, to help workers who have lost their jobs, it would be good to pay full benefits for unemployment or larger payments for downtime. At the moment in Latvia such payment unemployment benefits: for the first 2 months, the allowance is paid to all unemployed in the allocated amount. In the third and fourth months 75% of the amount of the assigned benefit.

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 In the fifth and sixth months 50% of the amount of the assigned benefit. In the seventh and eighth months 45% of the amount of the assigned benefit. It should also be remembered that all these problems appeared due to the restrictions introduced due to the coronavirus. Therefore, in order to quickly end this situation in the country and defeat this virus, it is necessary to be more actively vaccinated.

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4 Conclusion

In this work, the author wanted to show the urgency of the problem in the restaurant business from the restrictions imposed as a result of the coronavirus. The government should pay attention to the problems in the restaurant business and the large number of unbearable restrictions in the country and take action.

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Subject-object disposition of trust management

Perminov Stanislav

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: psb70@protonmail.com



Abstract.

The functioning of the institution of trust management requires the identification of key participants in such relations, the peculiarities of their activities and key characteristics.

Keywords: trust management, finance, bond market, trustee

Determination of the essence and characteristics of trust management, the practice of its implementation requires the identification of the main participants and elements of this process. It is worth identifying the main subjects and objects that do not change depending on the characteristics of the country's economic activity:

- the founder of the management (settlor, the owner of the property being transferred into trust);
- asset manager (trustee, an investment manager who manages the property or assets transferred to trust, selects investment instruments, forms an investment portfolio, assesses the risks of their use, uses the founder's funds for trading or investments, determines the composition and structure of assets based on the goals of the principal when earning a profit, the reward is most often a commission);
- the beneficiary, in whose interests and towards whom the property or assets are managed, the founder and the beneficiary may be one and the same person.

First of all, the functions of the manager are implemented through:

- identification of risks of investment activity and their assessment, impact on financial instruments selected for capital;
- expansion of the investment portfolio and its diversification;
- relative independence of decision-making on relative capital in trust, in fact, there is no possibility of direct instructions from the founder or his direct influence on the trust manager;
- systematic and regular decision-making in the process of capital management, since trust management presupposes long-term cooperation between the manager and the founder;
- in fact, the manager is the manager of the investment portfolio;

- the manager acts for a certain fee or commission specified in the contract [1].

In some cases, another party takes part in the trust management system - the protector, who has the authority to make decisions that are binding on the trustee, to have the authority to issue sanctions for certain actions of the trust, to be able to change the composition or number of beneficiaries, or even change the terms of the trust agreement itself. Such a protector can be a guardianship or guardianship body (board of trustees, etc.).

An individual entrepreneur, an organization (not a unitary organization), a citizen (who is not an entrepreneur), a non-profit organization can act as a manager (however, such a manager can be an institution) [2]. However, individual entrepreneurs can only manage certain types of property or assets, for example, this type of manager cannot manage a package of securities, since this type of management most often requires a special license.

Securities as an object of management can be held by a credit institution on the basis of a special license, however, banks can manage securities without such a license, on the basis of a general license of national banks to conduct banking operations. At the same time, the license of a participant in the securities market does not provide the possibility of such management for investment funds, mutual investment funds, non-state pension funds, etc. Such companies require a separate license for the securities trust. Thus, it is banks that can be the most active in the securities market, but for them the management of such assets is quite problematic, since they require active participation in the securities market [3].

Thus, we can note that a significant number of market participants can act as a trustee, but each of them has a restriction for working with certain types of assets or property. Banks in the system of trustees occupy a special

place, since, on the one hand, they have a more reliable organizational form in the eyes of the population, on the other hand, they are rather limited in the types and number of trust management operations, which is regulated by the general legislation on banking and the specifics of the work itself. banks in which it is impossible to carry out very active actions with certain types of assets. In fact, banks on their own behalf can manage securities or financial resources intended for the purchase of securities or received from their sale [4; 5].

In the system of trust relations, participants of both one country and international participants can take part. It should be noted that the participation of international actors can lead to conflicts caused by inconsistencies in legislation and understanding of this kind of relationship in a particular country, which can lead to an increase in the cost of transactions or property management. The formation of a trust often means and presupposes the

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founder's refusal to control the assets transferred into trust [6].

Neither the founder nor the beneficiaries have sufficient control over the actions of the trustee, which requires a high level of trust in the trust, this is the key difference from a joint stock company, where the founder has the right to change the manager, appoint new directors, etc. On the other hand, the trust has features that are not inherent in joint-stock companies - the protection of property, in this case, the participation of the protector in the trust relationship is possible [7].

In general, we can note that the subject-object structure of the market for financial services and trust management services may differ depending on the history and practice of its implementation in the economic relations of a particular country, within which both the structure of market participants and their rights, and the main objects can be determined management.

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Principles and standards for social responsibility in supply chains

Rustam Aslanzade

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: Rustam.aslan@gmail.com

Abstract

The article considers the key principles of formation of global supply chains and defines the main standards of their implementation.

Keywords: supply chain, global supply chains, global value chains.

The purpose of building a mechanism for socially responsible supply chain management in companies is to implement the values of social responsibility and increase the efficiency of the company, its competitiveness and ensure balanced development at all stages of building the supply chain: from the moment of choosing a supplier to the stage of monitoring its activities.

The formation of a mechanism for socially responsible supply chain management is based on the following principles: consistency, complexity, adaptability, scientific validity, social orientation and priority of social needs.

The principle of consistency is that when building a mechanism for socially responsible supply chain management, all its elements should contribute to the achievement of the strategic goal - increasing the level of social responsibility and ensuring the balanced development of companies in the long term. The principle of complexity implies taking into account all the key factors affecting the level of social responsibility of the supply chains of companies, as well as the consequences of making certain management decisions in the process of functioning of these chains. The principle of adaptability implies the possibility of adapting the mechanism of socially responsible supply chain management in relation to changes that occur both in the external environment and in the activities of the company. The principle of scientific validity lies in the use of economic laws and theories when building a mechanism and choosing the directions of its action, analyzing modern macroeconomic trends, the socio-economic situation in the country, region, and the world. The principle of social orientation and the priority of public needs provides for taking into account the interests of the main stakeholders of the company when implementing measures within the framework of the mechanism of socially responsible supply chain management in companies, the priority of public interests over corporate ones.

To achieve the goal of the mechanism for socially responsible supply chain management, the following tasks should be implemented: 1) improvement of the supplying activities of the company on the basis of social

responsibility; 2) implementation of international product quality standards; 3) implementation of international standards for transportation, storage and delivery of products; 4) increasing the share of "eco-products" in the sales structure; 5) ensuring that the interests of key stakeholders are taken into account; 6) ensuring productive employment of the population in the region of the company's presence; 7) development of social infrastructure of companies, etc.

Within the framework of the regulatory framework for the mechanism of socially responsible supply chain management in companies, the following areas can be distinguished: implementation of international product quality standards; implementation of international standards for environmental impact management; environmental certification of the company's products; development and implementation of the company's internal standards for the management of procurement activities based on the principles of social responsibility, etc.

In September 2015, the International Organization for Standardization ISO adopted new versions of the standards ISO 9000: 2015 and ISO 9001: 2015. This is the fifth edition of the group of standards popular all over the world (the developer of international standards of the ISO 9000 series is the International Organization for Standardization ISO (International Organization for Standardization)). The previous version of the ISO 9001: 2008 standard was canceled on September 15, 2018 [1].

One of the key principles of building a quality management system in accordance with the requirements of ISO 9001 is the process approach: the company's activities consist of a number of interrelated processes that function as an integral system. ISO 14001 is the main international standard that sets out the principles of a company's environmental management system. In 2018, ISO 22000 standards were adopted, which are designed to "eliminate the potential hazard that may arise at any time from the place of production to the place of consumption of products" [2]. In general, the standards are developed for the food industry and chain management. This standard is based on a food safety approach that helps to

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identify, prevent and reduce hazards throughout the entire food chain.

In addition to ISO, there are also a number of European Council directives, which, for example, regulate the activities of manufacturers of electrical equipment

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(European Council Directive 2014/35 / EU on low voltage devices (Directive LVD). Requirements of this Directive (2014/35 / EU (2006/95 /)) designed to comply with and ensure safety in the design and manufacture of electrical equipment [3].

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The impact of artificial intelligence on modern marketing

Tursunova Sarvinoz

ISMA University of Applied Sciences, Uzbekistan

Corresponding author's e-mail: sarvinoztursunova4@gmail.com



Abstract

The article analyzes the impact of information technology on modern marketing. Identified the main trends in the growth and development deficits. The main trends of modern marketing are analyzed, among which the leading positions belong to digital marketing. A great influence on the methods of marketing research has a large number of Internet users, the widespread spread of social networks. A new direction in marketing research, based on the processing and analysis of large amounts of data, called Big Data. Big data technologies are used in almost all digital marketing tools. The features of the development of intelligent information systems are highlighted. The main directions of application of artificial intelligence in marketing are revealed. The most perspective direction of application of artificial intelligence and prospects of development of marketers who work with tools with application of artificial intelligence are defined.

Keywords: artificial intelligence, marketing, modern marketing, digital marketing, content marketing, Big Data, soft skills.

1 Introduction

To begin with, at this stage of time, the rapid development of information technologies and AI ideas has led to a highly specialized and wider use of intelligent systems in many areas of science and business, in many ways in marketing. Marketing experts believe that there have been more changes in marketing in the past few years than in the previous fifty-five [1]. Another reason for such rapid changes was the globalization of economic processes and increased competition in the markets, prompting the search for new tools to attract consumers. In the conditions of mass availability of information about services and goods via the Internet, the audience has a real opportunity to compare offers on the market from competing companies, forcing the latter to reduce prices and improve the quality of services and products. In these conditions, companies are forced to move from mass marketing to marketing focused on a narrower target audience, they use new capabilities of information systems to achieve better results and competitive advantages. Nowadays, marketers are increasingly using tools with the introduction of artificial intelligence, to process large amounts of data without a serious investment of time, to identify potential consumers by their behavior in search engines, social networks, as well as to stay ahead of competitors.

2 Purpose of the study:

to analyze the impact of artificial intelligence on modern marketing and identify the growth points of marketers working with tools using artificial intelligence.

Artificial intelligence is called a method of modeling images in the work of the human brain, and making it possible to move to non-formal learning, clustering and generalization of information. This is the ability to move from human to machine labor, without the participation of the person himself. One of the main differences of artificial intelligence is that it does not need a model known in advance, but builds it based on the information shown. For these reasons, artificial intelligence is used wherever it is possible to solve forecasting and classification problems, where there are problems for which it is difficult to construct an algorithm. Marketing specialists have a large amount of information about users at their disposal: the history of requests on the Internet, actions in social networks, information about purchases, preferences, interests, etc. To structure and rank data, the marketer is helped by tools with embedded artificial intelligence, they choose exactly the data that is needed at the right time specifically to resolve a complex marketing problem and in order to predict the outcome. For example, he can determine and suggest to the specialist what services and goods are relevant for the target consumer; the period of the day during which the user makes purchases; interests and Tone of voice communications to which he is accustomed. Big Data allows predictions, and this is one of the most important areas of use for artificial intelligence. The marketing forecast, built on the basis of such an analysis, becomes the basis for an effective company strategy in the market. Therefore, it will be very important for marketing specialists in the next few years to collect accurate data about users and their activity on the Internet.

If we talk in more detail about modern marketing,

which uses tools with the use of ai, it can be noted that this is digital marketing. Digital marketing (digital marketing) as a promotion tool is a relatively new direction in the activities of modern marketers, but in recent years it has been steadily gaining popularity. Digital marketing includes Internet marketing, but, unlike the second, it is not limited only to Internet technologies. The use of digital marketing involves the use of an integrated approach to promoting its products in a digital environment, covering both online and offline users using mobile devices, tablets and other digital means of communication.

At this point in time, AI has covered only a few digital marketing channels. For example, with regard to sites: a system that learns itself - Rank-Brain is located in the Google search engine, the modern Yandex algorithm in the Korolev search engine - is currently located in the main search results generation tools and helps to automatically select and recommend the user the result that he relevant. These tools are designed to "guess" what the user is looking for in search engines, and offer the best answers, rather than automatically giving out large amounts of information according to keyword queries. Now the intonation context of the query and voice search can also be sorted out with the help of AI. They go beyond the semantic core by recognizing the emotional state and the environment surrounding the audience. The intellect can recognize where a particular user is, what state, stress or good mood, whether in a crowded place, on the road or at home, and provide more relevant suggestions for a suitable situation. Consequently, one of the main requirements for advertising campaigns today is the optimization of key marketing and advertising materials for intelligent machine search. Every year more and more modern marketers are paying attention to the relevance of content marketing, which involves the creation and publication of useful content for current and future partners. The scientist who laid down the definition of content marketing - Joe Palazzi has developed the following definition of this direction "Content Marketing" - the possession of a media, as opposed to the ownership of a media. It is a process in marketing, attracting and retaining an audience by constantly generating useful content and maintaining posting in order to change consumer behavior~brand attachment"

Special programs for analyzing the content of social networks have been created, which make it possible to identify general information trends. In addition, social media is currently the top selling content marketing channel. In addition to identifying the preferences of network users, marketers solve the problem of placing advertisements and creating influence groups. One of the

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top social media trends is the personalization of text content. According to a specialist in strategic marketing, Mikhail Bunin, 70% of the audience of networks on the Internet said that they would most likely purchase a product or service from a brand they know, which personalizes the offer for this product or service. Whereas previously marketing professionals had to manually process large, massive data documents in order to more accurately customize the distribution of certain content, then with the development of machine learning technologies, the process has become easier. A clear indicator of development has become such a tool as One Spot, it allows you to track the interest of the audience and select content for its interests using algorithms based on artificial intelligence.

A group of researchers from Sales-force for 2017 found that 50% of marketing professionals are already using artificial intelligence in their field, and another 22% plan to start using it in the near future. This means that the competencies and skills of modern marketing specialists must be improved and specialists must be able to work in tandem with artificial intelligence. It is possible to identify several skills that a modern marketer should have: 1. Training in "soft skills" - specialists should be able to communicate empathically, develop emotional intelligence and creative skills. 2. Analyze the data obtained with the help of AI tools and build a marketing strategy. 3. Create high-quality and informative content (photos, videos, texts) that will educate, inform and entertain users. The negative side of introducing AI is a huge incentive that in the near future it will be able to help large companies plan purchases and optimize their advertising placements in - house. AI-powered tools will allow you not to attract marketers, using neural networks and special analysis to optimize media placement decisions. An example is a company in Germany producing car manufacturers - Volkswagen. Manufacturing has dared to entrust the management of media procurement in ai and claims that the tools do better than any marketer or hired agency.

3 Conclusion

Thus, the development of artificial intelligence systems, big data processing systems and other rapidly developing technologies suggests that revolutionary changes await us in modern marketing in the coming years. Today's marketers face the daunting challenge of developing their specialty field with AI: teaching new big data skills. The study of the possibility of using artificial intelligence technology is a priority vector for the development of the economy in general and marketing in particular.

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Some aspects of the organization of distance teaching in higher education institutions

Oleksandra Bellorin-Herrera*

National Technical University «Kharkiv Polytechnic Institute», Ukraine

*Corresponding author's e-mail: bellher@ukr.net

Abstract

The introduction of distance learning has become a challenge for many participants in the educational process: teachers, students. For the organization of quality distance learning requires the use of appropriate tools using digital technology, compliance with certain modes of interaction of all subjects of the educational process. The purpose of this paper is to identify the best approaches in the organization of distance learning in higher education institutions on the basis of a thorough analysis of scientific sources and our own teaching experience.

Keywords: distance learning, educational process, higher education

1 Introduction

Distance form of higher education refers to the individualized process of obtaining training, which occurs mainly for the mediated interaction of remote from each other subjects of the educational process in a specialized environment by means of psychological and pedagogical and online technologies.

2 Overview

This study makes an analysis of:

- Open source distance learning platforms (Moodle, Sakai, Litmos, Claroline, Canvas, DotLRN, BrainCert)
- distance education modes (synchronous, asynchronous)

3 Decision

The successful implementation of distance education assumes a training platform that should meet the following criteria: cross-platform; reliability and stability; ergonomics of use; modularity, scalability and

extensibility; possibility of integration with existing external and internal information systems and services; availability, materials for self-training work on the platform, technical and user documentation. The platforms proposed above, in our opinion, most meet the above criteria [1 – 3].

Distance learning allows students and teachers to cooperate both in real time (preconcluded and agreed schedule) and take advantage of flexible scheduling in asynchronous mode, which includes: e-mail, groups in social networks or messengers, presentations, slide shows, videos and the alike [1, 4].

4 Conclusion

The transition of higher education institutions to distance education in reality is not only a temporary solution, but an opportunity to improve and raise to a new qualitative level.

The solution to these issues involves large-scale implementation of online technologies, profound changes in approaches in each individual discipline and in the organization of training in higher education institutions as a whole.

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Monitoring the quality of training using multi-agent systems

Inna Khavina*

National Technical University «Kharkiv Polytechnic Institute», Ukraine

**Corresponding author's e-mail: inna.khavina25@gmail.com*



Abstract

The use of artificial intelligence in learning has spawned a new direction in intelligent training systems. At the same time, the creation of effective innovative technologies for teaching and self-education is possible in the case of revision, rethinking and reevaluation of basic didactic categories and concepts on a trans-disciplinary basis, while maintaining the cultural and historical continuity of pedagogical knowledge. The paper presents the concept of an intelligent training system based on intelligent agents. A feature of the system is the use of a system for monitoring the quality of education in order to predict success and assess the level of competencies, and form an individual approach.

Keywords: intelligent training systems, intelligent agent, predict success, individual approach

1 Introduction

Commissioner Mariya Gabriel announced the 2020 Education and Training Monitor at conference identified some of the main goals in the direction of education: continuity of lifelong learning, mobility of education, improving the quality and efficiency of education and training [1].

The development of the education system is due to the use of new technologies. The use of artificial intelligence in learning has spawned a new direction in intelligent learning systems. At the same time, the creation of effective innovative technologies for teaching and self-education is possible in the case of revision, rethinking and reevaluation of basic didactic categories and concepts on a trans-disciplinary basis, while maintaining the cultural and historical continuity of pedagogical knowledge.

The paper presents the concept of an intelligent training system based on intelligent agents. The multi-level system includes the following technologies: building a sequence of a training course, intelligent analysis of the student's answers, interactive support in solving problems, assistance in solving problems based on examples.

A feature of the system is the use of a system for monitoring the quality of education in order to predict success and assess the level of competence. Each student is individual and needs an individual approach. Therefore, the system must be trainable and store the consequences of each issued advice and, analyzing them, draw up an action plan based on the results obtained.

To assess the assimilation of information on academic performance and attitude to the learning process, it is planned to use the Kolmogorov system of equations [2]. To monitor the dynamics of educational results, use the trajectories of educational results built using data mining, namely, clustering and sequential analysis of templates for the selection of personalized recommendations [3, 4].

For such a system to function successfully, it is necessary to create a multilevel knowledge base using the PROTÉGÉ editor [5].

The concept of creating a learning system of education is still under development and requires additional time to study.

The experience gained in the development of a multi-agent control system [6] will make it possible to implement an intelligent training and learning system based on intelligent agents.

2 Decision

A concept is shown for creating an intelligent training system based on intelligent agents using monitoring the quality of education and predicting success and assessing the level of competence. An individual approach is provided by an action plan based on the results of the student and his attitude to learning. Methods and tools for the implementation of such a system are presented. The concept of creating a learning system of education is still under development and requires additional time to study.

3 Conclusion

The use of agent-based technologies makes it possible to automate the learning process, increase control of both the student and the teacher, moreover, on the desired horizon and vertical of knowledge, and thereby improve the quality of education and ensure the continuity of learning.

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The advanced e-Learning technologies at the university

Nina Kuchuk*

National Technical University «Kharkiv Polytechnic Institute», Ukraine

*Corresponding author's e-mail: nina_kuchuk@ukr.net



Abstract

The analysis of many existing e-Learning methods and the prospects for further research in this area show the need to influence the development of education in a special way. The purpose of this research is studying the advanced methods of e-Learning. Their analysis and development of information and communication educational technologies, identification of new trends in the development of e-learning

Keywords: E-Learning, university, student

1 Introduction

For the development of e-Learning technology, it is necessary to study many factors. These include improving the quality of pedagogical design. It is a systematic, holistic process for creating a learning tool. It also includes an analysis of training needs and its goals, forecasting learning outcomes, setting a task for creating an e-Learning tool, developing this tool, methods and forms of training, testing them and evaluating their effectiveness. It is necessary to present knowledge in the learning environment, taking into account the individual needs of the student. It is necessary to create a methodological base and standardization. To introduce the adaptive factor, it is necessary to study the readiness of teachers and students for a new educational paradigm of motivating students to acquire new knowledge. One of the important aspects is to ensure effective access to educational resources.

2 Overview

The most obvious advantages of E-Learning over traditional education are flexibility, relatively low cost, no additional time costs, and on-the-job training. Among other, not so obvious advantages, the authors of studies in the field of e-Learning note the following: setting the learner's own pace during the course; sequential presentation of the material - elimination of problems

associated with the nuances of the presentation of the same material by different teachers; implementation of the "just-in-time" principle; easy and quick content adjustment; more stable memorization of information and a long retention time in memory.

3 Decision

Taking the e-Learning environment as a basis and supplementing it with m-Learning elements, it is possible to create an u-Learning environment. U-Learning (ubiquities Learning) - pervasive e-Learning - ubiquitous, ubiquitous learning that develops on the basis of modern technology. Such training allows students, using wireless communication and WiBro technology, anywhere to download and study multimedia educational content.

4 Conclusion

The analysis of many existing e-Learning methods and the prospects for further research in this area show the need to influence the development of education in a special way. It must be borne in mind that education is primary, and high technology is only an instrument for its support and development. Innovations in the creation of technical tools should serve as a basis for the implementation of pedagogical technologies and methods of pedagogical design for e-Learning.

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Using augmented reality technology in distance learning

Oleksandr Makoveichuk*

Kharkiv National University of Radio Electronics, Ukraine

*Corresponding author's e-mail: oleksandr.makoveichuk@nure.ua

Abstract

Nowadays, when distance learning is transforming from a situational approach into a fully-fledged form of learning, the main task is to select methods and tools that will bring such classes closer to classes in classrooms and laboratories. Modern technologies have a variety of possibilities for visualization and virtualization of real objects used for research and educational activities. One of such technologies is augmented reality, which brings distance education closer to the traditional one, providing opportunities for laboratory and practical work anywhere and at any time.

Keywords: distance learning, augmented reality, visual information structure, AR-marker.

1 Introduction

In the terms of distance learning, the teaching of theoretical material is sufficiently well implemented by a well-known software. The problem is in the organization of practical and laboratory classes, where it is necessary to use laboratory equipment. Therefore, the main task is to replace real laboratory equipment with virtual equipment by the means of augmented reality.

Augmented reality technology introduces sensory data into the human perception field to supplement information about the environment and improve the perception of information. This technology allows to significantly expand the range of perceived data by transferring the digital information to the real world [1]-[2].

It is most appropriate in the educational process to use augmented reality based on visual markers [3]. The technology uses a camera and special passive visual markers such as QR codes. Virtual objects incorporated into the real world are extracted by detecting the markers in the video stream. The important task is to determine the position and orientation of the camera, which is carried out by the means of computer vision algorithms [4].

2 Overview

Existing augmented reality visual markers (except for QR code markers) do not contain additional informational messages and are used only to determine the spatial position of the camera, which significantly narrows their scope. Therefore, it is proposed to introduce the concept of visual information structure (VIS) of augmented reality, which generalizes the concept of augmented reality marker (AR-marker) and differs from it by the presence of an encoded message.

This paper discusses the advantages of the proposed stable mosaic stochastic AR-marker, which is a partial case of VIS and meets all the indicated requirements.

3 Decision

A stable mosaic stochastic marker was introduced in [5]. An example of the proposed AR-marker is shown in Figure 1. The marker is designed by introducing redundancy, performing stochastic permutation and mosaic containerization of data, which allows to incorporate data into the marker (Figure 2) and accurately visualize three-dimensional models (Figure 3). Note that the fact that a significant part of the marker is covered by an obstacle did not affect the decoding and visualization results.



FIGURE 1 An example of the stable mosaic stochastic AR-marker



FIGURE 2. Playing YouTube video in the AR-marker area (the video's URL was decoded from the QR code which was incorporated into the AR-marker)

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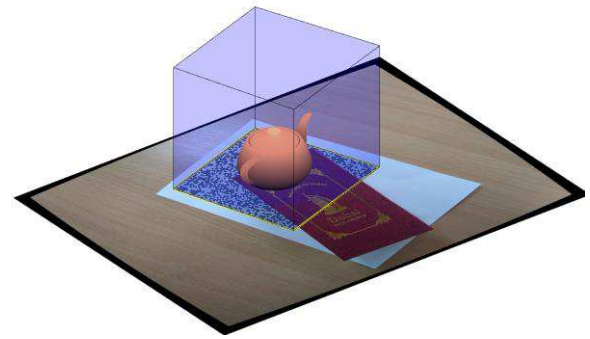


FIGURE 3 Visualizing three-dimensional model (teapot) using camera parameters obtained from the AR-marker

4 Conclusion

Augmented reality in education is becoming a popular learning tool. The use of the proposed AR-markers allows increasing the educational opportunities of augmented reality. This technology has the potential to change the location and timing of studying. It helps the students easily acquire, process, and remember information. Using augmented reality in education enhances the learning process by making students more involved.

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Intellectual capital management in conditions of education transformation

Julija Galkina, Žanna Kļeščevņikova

ISMA University of Applied Science, Latvia

**Corresponding author's e-mail: julija.galkina@isma.lv*

Abstract

Competitive position in private higher educational sector in modern conditions is determined primarily by their ability to activate their intellectual potential. The intellectual potential of the university is the most important factor in ensuring high-quality higher education, preparation of unique human resources, production of new knowledge, scientific products and technologies.

1 Introduction

Intellectual potential under the condition of effective management can be transformed into intellectual capital. Intellectual capital of any enterprise, including a higher education institution, is one of the constituent intangible assets, the value of which must be measured in order to understand the market value of the entire enterprise.

VAIC (Value Added Intellectual Coefficient) model is one of the modern methods for measuring the value of intangible assets of the company. This model involves the division of intellectual capital into human, process, innovative and client components.

The efficiency of using each of the elements of intellectual capital is defined as the ability to create added value.

2 Overview:

Effective management of intellectual resources involves analysis of the main following problems:

1. Selection and training of persons able to realize their intellectual potential in this institution. Attracting unique professionals capable of making innovative, creative solutions.

For such specialists, not only wage issues are important, but also the employer's brand, its image on the labor market, on basis of which are corporate values and corporate life. Image of the university as an employer, formed on the reviews and impressions of current and former employees.

2. Creating a system of incentives and motivation, development of creative activity of workers involved creation of intangible assets. In the system of managing intellectual capital of higher educational institution, its implementation ensures to increase personnel productivity, the competitiveness of their skills and contributes to

the productive use of human capital. Motivation should be based on monitoring needs systematically, and especially important for unique employees. The motivational system should contribute to building up and efficient use of intellectual capital, building effective communication, increasing competences and improving labor results.

3 Decision

For the last years, many alternative valuation methods have been proposed, with a particular focus on non-financial indicators. According to D. Luthy and M. Williams, these methods can be divided into the following groups: (Luthy D. Intellectual Capital and Its Measurement, Asian Pacific Interdisciplinary Research Conference in Accounting (APIRA), 1998.)

4 Conclusion:

Although much of the talk concerning human capital focuses on how a company's provision of education is an investment in human capital, individuals are the true owners of human capital. Every employee nurtures and maintains his own knowledge, set of skills, and abilities to perform and produce. Whether an employee or an entrepreneur, all individuals are in charge of their own personal growth and professional development. If your employer does not provide training, seek out avenues for growth and development on your own. Seminars, networking groups and online courses are all ways to develop yourself. And, ultimately, if you are employed in a dead-end position with no promise of continued advancement or potential to expand your set of skills and professional experience, perhaps it is time to consider a new position.

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VRability-technologies: innovative rehabilitation of military personnel with post-traumatic stress disorder

Tamara Kukhtyk, Anush Sihova*, Olena Khoroshailo

Donbass Institute of Technology and Management IHE Academician Yuriy Bugay International Scientific and Technical University, Ukraine

**Corresponding author's e-mail: anushblog3@gmail.com*



Abstract

The article examines the impact and necessity of introducing the latest innovative virtual reality technologies to the process of psychological recovery and getting rid of the consequences of military personnel "combat syndrome".

Keywords: VR technology, virtual reality, military personnel

1 Introduction

The active development of computer technologies makes it possible to use the latest technical tools in the framework of medical and diagnostic processes, to study the impact of technical innovations on the human psyche, his or her daily life and behaviour.

The problem of post-traumatic stress disorder (PTSD) is becoming particularly relevant for Ukraine and the international community as a result of psych traumatic circumstances of military nature, due to the aggravation of the geopolitical situation in the world and a large number of local military conflicts (hereinafter – LMC) and terrorist acts.

Participants of military operations in the course of professional activity are exposed to stress, which causes the appearance of various psychological states of a destructive nature, among which post-traumatic stress disorders, mental injuries, neuropsychiatric tension, military fatigue, combat exhaustion, military neurosis, which have their own symptoms, forms of manifestation and consequences. A particularly difficult type is combat stress caused by a long-term threat to life in a combat situation.

Today, it is impossible to pass the facts of indifference to veterans of the ATO (OOS) by the leadership of Ukraine, where more than 400,000 people have already become "veterans", and the state system cannot organize even elementary psychological rehabilitation for thousands of wounded and maimed soldiers [1, 2].

Therefore, PTSD is a consequence of leaving a soldier in combat conditions and it significantly affects the course of person's mental activity, and it is not only an individual problem, but also a social one.

Virtual reality immersion technologies can come to the rescue in this case, and reconstructing traumatic events

and re-experiencing them to respond to negative emotional experiences will move from the category of "painful treatment" to the category of "addictive game".

The use of medical, psychological and social rehabilitation methods as a complex allows us to solve such psychotherapeutic problems.

In our opinion, the introduction of innovative virtual reality technologies into the rehabilitation program can solve this problem to a certain extent in the comprehensive rehabilitation of ATO participants. It is obvious that the introduction and use of VR technologies in the rehabilitation process of patients with post-traumatic stress disorder is very relevant.

The main task is to pay attention to the need of introducing the latest information technologies when determining possible directions for creating appropriate psychological measures.

2 The main part

Recently, there have been many publications devoted to the problem of using VR information technologies of reality in the rehabilitation of military personnel, which is new and is now being carefully studied.

Such researchers as S. Aksenov, S. Bondarenko, N. Hnedko, A. Hoshchynskyi, A. Zasekin, Yu. Lemeshko, S. Lytvynova, A. Petrenko-Lysak, A. Petritya, R. Pavliuk and others were engaged in the issue of using and functioning of virtual reality in various spheres of human life.

Virtual reality technologies have long ceased to serve exclusively for entertainment. For example, VR glasses with simulated social interactions are used to treat paranoia, depression, and even fear of death. Scientists led by Iris Brunner from the University of Bergen (Norway) tested the effectiveness of VR in restoring motor functions.

A huge step to the development of virtual rehabilitation was the development by Microsoft of the Kinect sensor for the xbox 360 game console in 2012. The Kinect sensor has two cameras, which allow you to register movements in three-dimensional space and create game tasks, taking into account the three-dimensionality of human movements. In addition to the release of the game console and sensor, Microsoft Kinect has provided unlimited free access to the software for everyone. Thus, the sensor and software can be used to create individual game scenarios that relieve the negative effects of stress, post-traumatic stress disorder.

Diagnosis and treatment of PTSD using computerized tools in Telemental health is one of the most common areas. According to the World Health Organization, 3.6% of the world's population suffers from PTSD [3]. At the same time, the concept of PTSD was transformed from "military fatigue", "combat exhaustion", "military neurosis", "post-traumatic neurosis" [4] to the DSM-V System [5], introduced in 2013 by the American Psychiatric Association, which provides a refined system of its constituent features. PTSD is considered as a system of symptoms that are expressed in memory of trauma (flashback), evading memories of it, and can be accompanied by emotional numbness or hyper excitation [6]. The consequences of PTSD are a decrease in the quality of life in all its areas: social, work and family.

In order to improve rehabilitation activities, we have developed the program "Psychology of Virtual Space VRability – a set of technologies" for military personnel participating in military operations. The program is aimed at developing self-regulation skills to relieve the negative effects of stress, post-traumatic stress disorder and normalize the mental state. The main techniques used during VRability technologies: psychological information; breathing training; biofeedback systems; relapse prevention.

VR technology or virtual reality technology is a human – machine interaction technology that allows the user to immerse themselves in a three-dimensional interactive information environment. Virtual reality is primarily a game. However, despite all the seemingly frivolous use of games in the rehabilitation of military personnel, this method helps to diagnose diseases and treat them. Doctors and rehabilitation specialists can learn how to diagnose diseases and perform operations using virtual reality.

The video that a person watches with VR glasses can calm him down and set him up in the right way, and helps

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them fight stress. With the help of virtual reality and a specially designed program, a person enters a state of harmony with himself. In the video, 360 people see a beautiful landscape around them. Then there is thick smoke, which can only be dispersed by shouting. Shouting improves your mental state and maintains your emotional balance. Virtual reality, on the contrary, distracts the patient from difficult thoughts. Moreover, in order to enhance the effect of reality, the image on the screen can be accompanied by various sound effects and smells.

Projection of the image on liquid crystal displays mounted in a special helmet or glasses and connected to a computer also provides almost complete immersion in the virtual environment. In this case, both eyes see different images, and when combined together, they create a sense of a three-dimensional world.

With the help of virtual reality, you can "visit" the place, "get" into the circumstances that caused PTSD, and relive it all anew. The difference is that a person experiences it in comfortable environment, knowing that this is virtual reality and that he can always stop the session. Together with a psychotherapist or psychologist, a person goes through the event that traumatized him, works out his own reaction and pronounces the experience experienced.

3 Conclusions

The introduction of the latest innovative VRability technologies of virtual reality to the rehabilitation process of military personnel with post-traumatic stress disorder occupies an important place and organically complements traditional methods of treatment. Virtual reality rehabilitation makes training more effective by combining motivational, gaming, and competitive mechanics. Creating a virtual scenario in which the patient performs certain actions simplifies the course of rehabilitation itself and does not make it emotionally exhausting for the person.

Virtual reality, with its ability to model almost any space, to provide almost unlimited feedback with highly motivated game tasks, is able to fill in the missing components of a successful rehabilitation program.

Prospects for further research may include exploring less technologically advanced Telemental health techniques, from virtual reality systems to augmented reality systems and mobile apps to smartphones, as part of PTSD treatment.

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The impact of information technology development on the higher education

Evita Pilege*, Marga Živitere

ISMA University of Applied Sciences

**Corresponding author's e-mail: evita.pilege@gmail.com*



Abstract

Advances in information technologies are transforming the whole social and economic scene and changing requirements not only for technology-related industries, but also education in all levels. The Covid-19 pandemic has highlighted awareness of the strategic role that digital technologies play in underpinning the long-term success and sustainability of higher education institutions (HEI) as well as their strengths and weaknesses. Aim of this paper is to analyse, how these changes have affected the higher education ecosystem, examine the current challenges and opportunities faced by HEIs on order to adapt to already available and upcoming technologies.

Keywords: digital transformation, higher education, Covid-19

1 Introduction

The importance of digital transformation and information technology in all areas related to human activity has been discussed for a long time. Technological developments have affected all sectors. Higher education is not an exception. The more pervasive digital becomes in the economy, and the more these disruptive technologies continue to drive change, the more integral they become to the success of HEI. [1] Various studies and reports on this issue are published, policy documents and legal acts are developed on the basis of their conclusions.

As a state of emergency was declared in many countries and strict restrictions were imposed, face-to-face services including education were limited. The recent transition to online learning has been as rapid as it has been impressive. But what has been achieved so far has mostly been about adding new tools to old pedagogy rather than general digitally enabled education across the board. The next big challenge is to integrate digital transformation into the core of university strategy. [2]

2 The impact of information technology on the higher education ecosystem

Studies and reports on higher education for several years have emphasized the need for educational institutions to take in account technological developments and to provide services according to the opportunities offered by information technology, offering remote, inclusive and online learning opportunities. [3]

As highlighted in various reports, the higher education

landscape is at the crossroads of an amazing digital shift [4]. The next shift likely will be from mass face-to-face to mass digital learning where the dominant mode of delivery will be designed through technology - “digital first” – and supplemented by face to face, human support. [5]

It is important to use the experience gained during a pandemic, rather than waiting for the times when “everything will happen as in the past”, because the digital transformation in education ecosystem helps to achieve several key objectives:

1. Socio economical (e.g. ensure inclusiveness, accessibility, reduce territorial and social barriers, discrimination);
2. Quality assurance (as a result of global competition each institution is forced to constantly upgrade and improve their programmes, ensure better quality)
3. Adaptiveness (the integration of digital transformation into the strategies of organizations, as well as its purposeful implementation provide a greater adaptability. To survive the current and future shocks, digital needs to be part of institution wide strategy rather than a bolt on or afterthought. [6])

3 The impact of the external environment on higher education

In order to achieve the above objectives, it is necessary to have a favourable environment for the implementation of digital transformation activities and to overcome the various obstacles that currently exist.

The following factors are considered in this paper:

1. Legal-political. On the legal-political level the importance of digital environment and digital competencies has been well recognized. The EU has developed such a regulatory environment, a number of initiatives, platforms that facilitate the introduction of technologies and the development of digital competences in various fields, including education. A European approach to digital transformation means empowering and including every citizen, strengthening the potential of every business and meeting global challenges with Europe's core values. [7] It is supported by The European Digital Strategy, Digital skills initiatives (e.g. The European Skills Agenda, The Digital Education Action Plan), investments aimed to tackle the digital skills gap (e.g. The Recovery and Resilience Facility, The Digital Europe Programme, Horizon Europe). [8]
2. Infrastructure. Despite the various factors facilitating digital delivery of higher education services, the Covid-19 pandemic has shown that goals cannot be achieved without an infrastructure for a high-quality connectivity.
3. Socio-economic situation. Another issue that should be addressed is the ability of each household to provide the necessary technological equipment.

4 The main factors contributing to the digital transformation of HEI in the internal environment

Higher education is not isolated from the external environment which is affecting its internal environment. The more pervasive digital transformation becomes in the economy, and the more these disruptive technologies continue to drive change, the more integral they become to the success of higher education institutions. It has become unthinkable that universities would be able to effectively manage most of their biggest challenges without the use of digital. [9]

Following challenges of an internal environmental

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need to be addressed:

1. Strategy. Although the technologies available to the institution play an important role in the implementation of the digital transformation, a precondition for its successful implementation is the institution's strategy. Digital needs to be recognised as a strategic asset and as a way to help deliver the university's mission.
2. Business, operating model. Once the strategic goals have been defined, it is necessary to evaluate which organization, business model will be the most suitable for achieving these goals, since one or another model will be more appropriate for different strategic priorities.
3. Resources. The success of digital strategic initiatives will require the allocation of appropriate resources, financial as well as human. Investments in infrastructure will provide an opportunity to take advantage of modern technological opportunities, but the success of the digital components of a long-term strategy will largely come down to the willingness and ability of staff to implement it. The result will depend on the staffs capability, skills, incentives, and behaviours. Therefore addressing a lack of digital competence among staff is among the highest priorities in mitigating risks in the delivery of digital strategy. [10]

5 Conclusions

There is a clear need for greater digital awareness and fluency among all representatives of higher education ecosystem. Covid-19 pandemic have accelerated digital transformation in education at the same time highlighting the current shortcomings: 1) territorial, social and economical barriers, 2) outdated pedagogical approach – new tools applied to old approach. The current political-legal environment is favourable for the implementation of digital transformation, however, to provide a modern and adaptable services, each HEI must review its strategy, putting the digital shift in its center.

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Analyzing the development of an online learning application based on the Electron framework

Ruslan Shuranov*

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: ruslanshuranov@gmail.com

Abstract

At present, the development of ways of online learning is an actively developing direction of the educational industry. With the pandemic and the threats of quarantine restrictions, the transition to online learning in certain projects is the safest and as it turns out just as effective. This is a relatively young field, with not yet fully formulated rules and standards. Currently, there are a large number of different applications on the market with the help of which teachers carry out classes online. Most of them do not provide an opportunity to fully replace the classic classes offline. The purpose of the study is to try to find the best way to conduct classes during the transformation of learning to online learning.

Keywords: online learning, online learning applications.

1 Introduction

Nowadays, learning remains an integral and indispensable part of the process of human development and formation. It is obvious that training using the possibilities of the Internet is faster and more accessible in contrast to the classical classes, which require the physical presence of both the trainee and the trainee. Until recently, most of the training market was in the offline part. But with the development and aggravation of the pandemic, more and more educational institutions, educational projects are moving to distance learning.

The modern user is used to a fast, reliable and easy to use product, especially when it comes to education. And since the competition in the world of commercial software products is rather high, if a product won't work fast, if it isn't convenient, simple and doesn't have necessary functions, this product won't be competitive.

In order to make the learning process easier and more accessible to the teacher and the student it is necessary to give users the opportunity to use the application on different platforms, both desktop platforms (Windows/Mac) and mobile (Android/iOS).

To provide a full range of necessary functions it is necessary to consider the possibility of using a variety of tools, such as video and audio communication, assessment of students within the application during the class, the ability to provide access to documents for independent and control works, the ability to pass tests, the ability to demonstrate the screen, the ability to write notes, working in teams.

All applications currently available on the market do

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not fully provide these features within a single product.

2 General

This paper discusses the advantages, disadvantages, and conclusions of the following:

- Analysis of analogue applications
- Development of an application for desktop platforms based on Electron
- Development of an application for mobile platforms using native technologies

3 Solution

As an example of an online learning application, we recommend considering Moodle, iSpring, MyOwnConference, Whiteboard.fi. Each of these platforms has its own advantages based on which you can create a comprehensive application that combines the best of these applications.

4 Conclusion

Improving the sphere of online education is the most pronounced need of today's environment that is gaining popularity all over the world. This is due to the difficulty of physical contact, the risks involved, and online learning gives a person more mobility and an abundance of opportunities.

The field of learning is more and more moving away from the established paradigms of face-to-face learning due to the difficulties caused by the pandemic to the online space.

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Enhanced knowledge retention by spaced learning strategy

Yuliia Zabudska, Vladyslav Khotunov, Kholupnyak Katerina^{*1}

¹Cherkasy State Business-College, Ukraine

^{*}Corresponding author's e-mail: zabudska.juliia@gmail.com, vkhotunov@gmail.com



Abstract

At present, due to the glut of information, it is getting increasingly more challenging for people to filter helpful information and, more importantly, memorize information. Such informational oversaturation does not make it possible to transfer knowledge into long-term memory. New information drives out old information when insufficient time intervenes, so spacing out allows new neural connections to solidify. However, online education is the fastest-growing segment of education. The main reasons for the trend toward departure from the traditional approach to learning are pandemic, the significant increase in access to information, and technological development growth. This work attempts to create a solution to allow people to use the effective learning strategy, process new data, and transfer it into long-term memory.

Keywords: spaced repetition, education, web application, informational technologies, forgetting curve

1 Introduction

According to the National Center of Education Statistics survey, we can see an active increase in the number of people moving towards online learning in recent years. As of 2012, 13% of students took any distance education courses, and in six years, this indicator has grown to 33%. [3] These results are not surprising because online education is a flexible instructional delivery system that encompasses learning via the Internet. Students who may not attend a conventional classroom or who prefer distance education may benefit from online learning. Nevertheless, how to make learning effective despite its format?

A psychologist named Hermann Ebbinghaus became the first to tackle the analysis of memory systematically. Ebbinghaus used himself as a subject for observation and conducted experiments studying information and repeating it at different intervals. He was able to chart the rate at which memories decayed over time and called it the Forgetting curve.

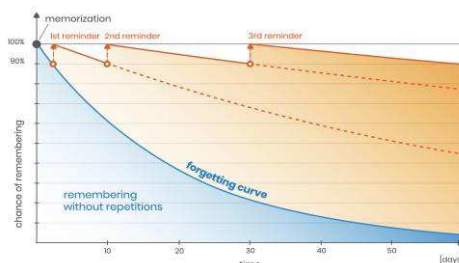


FIGURE 1 Forgetting curve with and without spaced repetition technique

The forgetting curve shows how information has lost over time if there is no attempt to retain it and vice versa in Figure 1. According to Hermann Ebbinghaus's concept, people forgot more than 50% of the information in the hour after receiving the data, and further, the percentage of knowledge decreases. [1] However, the constant repetition of information does not allow the progress of forgetting information and transfer it to the long-term memory.

The current researches result shown in Figure 2 indicates that people who used the spaced repetition method showed an average of 37% better learning outcomes. [2]

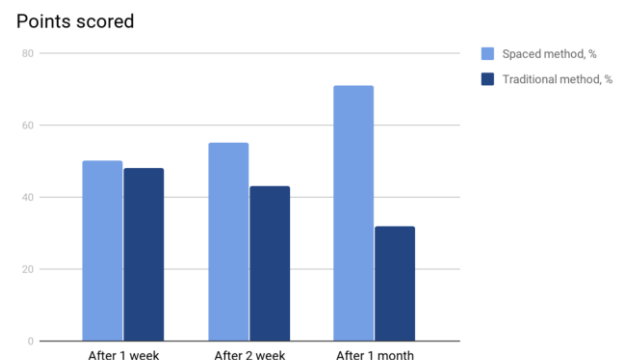


FIGURE 2 Judgement of learning

Research studies' findings back up this widespread spacing effect, particularly when it comes to long-term retention.

2 Overview

- Spaced repetition technique as a science-based approach
- Moving forward and improving the future of online learning
- Forgetting curve, short-term and long-term memory

3 Decision

The idea behind the project is to implement the web and mobile service that allows people to increase the education quality using the spaced repetition technique. Unlike other similar applications, the unique idea to create this application is basically to provide the uncommon

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offer to people to form their education process from different areas or use existing programs designed by the best professionals in specific fields.

4 Conclusion

Modern society is focused on the idea of continuous development. On the one hand, we have an unlimited number of opportunities to learn something new, and on the other hand, managing these opportunities is very difficult.

The circumstances demand to move away from outdated forms of education and become the impetus to find new and effective solutions. The market is switching from just providing information to teach using one of the best ways to achieve this - spaced repetition technology.

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Application of student learning strategies for learners' sustainable online mastering of the curriculum during the global pandemic of COVID-19.

Tatjana Lapaine^{1*}, Marija Lapaine²

¹ISMA University of Applied Sciences, Latvia

²Latvian Association of Interpreters and Translators, Latvia

**Corresponding author's e-mail: tatjana.lapaine@isma.lv*

Abstract.

The rapid spread of the Covid-19 pandemic over the globe has resulted in the significant rise of the importance of students' learning intelligence within mastering the curricula of the study programmes they are acquiring. As teaching and instruction is performed mainly remotely by the means of digital platforms, it is essential to consider the learning strategies students apply while studying and consolidating the acquired knowledge.

Keywords: language learning strategy, learning style, online learning, student-centred approach, adequate support and guidance, COVID-19

The aim of this article is to present the insight into the learning styles of the students who are mastering the Business English study course in the mode of on-line studies, and the relevant learning strategies to be applied with the aim of gaining the most efficient possible learning outcomes.

In compliance with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG), approved by the Ministerial Conference in May 2015 "the programmes are delivered in a way that encourages students to take an active role in creating the learning process, and that the assessment of students reflects this approach."

Two surveys were conducted following the terms of the Standards and pursuing the aim of respect and attendance to the diversity of students and their needs, enabling flexible learning paths:

1. Student's survey on e-learning;
2. Student's learning type survey.

The initial assessment of the obtained results enables to conclude that the learning-teaching process has been successfully adapted to the proposed circumstances of the current situation.

"The ways in which an individual characteristically acquires, retains, and retrieves information are collectively termed the individual's learning style" [Felder, R.M., FLA, 28, No 1. 21-31].

Students with different learning styles may help themselves become more effective language learners and users by applying certain learning strategies, which can be mastered as a class under a teacher's guidance.

Learning strategies are involved in the entire learning process, whether it is mathematics, languages, history, or any other subjects, either in a classroom or in a more informal environment. The concept of "language learning strategies" has been defined by many researchers, and now the greater emphasis is made on the learning process and language learning strategies characteristics.

Analysing the performance of the students of all the four learning styles, the conclusion can be made that 1) each group achieves the expected learning outcome by its specific means applying certain learning strategies and 2) general understanding and communication skills are the priorities of all students having been surveyed.

Teaching approaches and description of the already developed study assignments related to language learning styles and consideration of specific assignments for student effective mastering of all the language arts is the subject of further research, which will involve surveying not only students but lecturers also.

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The ethics of application of artificial intelligence in Human Resource management of modern Russian companies

Oksana Sobol^{1*}, Anastasiya Lobacheva¹, Jevgenija Dehtjare²

¹State University of Management, Moscow, Russia

²ISMA University of Applied Sciences, Riga, Latvia

**Corresponding author's e-mail: sobol.oks@yandex.ru*



Abstract

The article reveals the main ethical problems and contradictions associated with the use of artificial intelligence in the economy in general and in personnel management in particular. The main difficulties in the implementation of artificial intelligent systems are analyzed. The attitude of employees to the use of robots in production activities and the automation of processes that affect their work functions and work organization. Ethical issues related to retraining and re-certification of employees in connection with the introduction of new software products and robots. Ethical issues in reducing personnel as a result of the introduction of artificial intelligence and automation of production and business processes. Ethical problems of the processing of personal data of employees, including assessments of their psychological and physical condition, personal qualities and character traits, values and beliefs, specialized programs based on artificial intelligence, as well as tracking the work of employees. Ethical contradictions when using special devices and tracking technologies in robotic technology and modern software products, which also extend to the employees interacting with them.

Keywords: human resource management, ethics of artificial intelligence, labor relations

Modern organizations have to make decisions not only within the framework of development strategy, cash flow, personnel management, but also in the field of digitalization and automation of business processes. Automation is understood to mean both software products focused on performing massive repetitive operations or analyzing large amounts of data, and robotic stations that take on part of the actions that require the application of physical labor of workers. The active development and implementation of these technological solutions into production activities leads to the fact that the concept of "artificial intelligence" is increasingly used as a software product capable of independently making certain decisions based on data analysis and, thanks to self-learning technologies, to solve business problems.

The introduction of digital technologies into the organization's activities leads to the fact that new requirements are imposed on already familiar positions: competencies (knowledge, skills, abilities), functionality and key performance indicators. As a result, personnel have to constantly undergo training and certification, actively adjusting to changing labor functions and applying new labor tools. Organizational culture is changing under the influence of artificial intelligence: communications go into virtual mode, the speed of decision-making, tools and work technologies increase, which leads to a change in models and norms of behavior, the emergence of new "corporate heroes" and "agents of change". Changes are taking place in personnel management technologies: recruitment and HR administration, personnel training and development, motivation and incentives are being transformed, becoming

more and more digital.

The introduction of robotic technologies into the production and economic activities of organizations entails the emergence of social, ethical and legal problems of interaction between a robot and a person. The lack of resolution of these contradictions, barriers in perception and resistance to the growing digitalization of work processes negatively affects the socio-psychological climate in the company and can lead to deliberate or unconscious damage by employees of the organization's property: robots and software products. In this regard, ethical issues of the use of artificial intelligence in the activities of an organization are becoming increasingly acute. Violation of the ethics of the use of artificial intelligence can lead to a change in the timing and increase in costs for the implementation of projects to automate business processes, reducing the overall economic and social effect.

The study identified the main ethical problems and contradictions associated with the use of artificial intelligence:

1. The attitude of employees to the use of robots in production activities and the automation of processes that affect their work functions and work organization.
2. Ethical issues related to retraining and re-certification of employees in connection with the introduction of new software products and robots.
3. Ethical problems of staff reduction as a result of the introduction of artificial intelligence and automation of production and business processes.
4. Ethical problems of processing personal data of

employees, including assessments of their psychological and physical condition, personal qualities and character traits, values and beliefs, specialized programs based on artificial intelligence, as well as tracking the work of employees.

5. Ethical contradictions when using special devices and tracking technologies in robotic technology and modern software products, which also extend to the employees interacting with them.

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As part of the analysis of ethical issues related to artificial intelligence, it is planned to conduct a practical study. The purpose of the study is to study the attitude of workers of modern organizations belonging to different sectors of the economy to the problems of automation of business processes and robotization of production activities associated with this reduction in personnel and the need for retraining, as well as attitudes.

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Modern Management Methods in the Restaurant Business: Holographic Model of the Enterprise Structure.

Stanislavs Miscenko*

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: stanislavs.miscenko@isma.lv*



Abstract

In the presented research the author considers the modern models of organisation and management in the restaurant business, including the creation of a completely new model of organization, a holographic type of organisation. Based on the works of luminaries in management, the author shows how an enterprise can change under external influence, how it adapts to new conditions and develops. The author draws attention to the rapid economic changes and offers new management solutions in the restaurant business.

Keywords: economic change, "black swan", holography, result, innovation, model

1 Introduction

Modern approaches towards solving the issues of managing the enterprise often aggravate rather than solve them. Many enterprises are trying to change the current situation through the introduction of trending information technologies. However, many factors cause enterprises to stall and stagnate. Most businesses invest incredible effort in the way of financial incentives, go through many stages of reorganization, centralization and decentralization. The author offers to look at the situation from a completely different angle and to prove that it is possible to go a completely different new way, preserving the achievements of the past; this approach should consider that the organization is a living organism with its own unique stages of development [1, 4].

The creation of a holographic model of the organization, according to the author's opinion, could allow visual manipulations and changes in real time, without any significant material costs for the enterprise. Holography in this approach is a unique tool, permitting not only the visualization of the enterprise, but also the inclusion of other information sources in a certain schematic model.

Richard Bachminster Mueller said, that it is not possible to change anything by fighting the existing reality; on the purpose to change something create a new model, capable of making the existing one hopelessly outdated [1, 4]. This idea accurately reflects the core of the author's research.

2 General

The modern restaurant business is forced to radically change the idea of the company's strategy under the conditions of a dynamically changing external environment with a high degree of uncertainty. It happens not only due to the fact under the influence of the pandemic and economic restrictions enterprises are faced with a choice: either

complete liquidation, or the search for new ways of existence in the conditions of a new reality. The idea is completely different. The usual technologies of robotics and artificial intelligence are introduced in the field of public catering enterprises, and as a part of this introduction, 3D printers for printing food have already appeared, and they work successfully [5]. The very concept of working and building an organization requires a completely new approach, the approach of foresight, and not the classic implementation of strategic planning

The restaurant business has become more fragile than ever. Fragility means impossibility of evolving and developing. The author sees the solution to the problem in overcoming the difficulties of taking into account all the "black swans" on their way to non-fragile organization [6, 7]. There are significant contributions of the researchers to prospect methods of managing the future organisation. Gareth Morgan in the work "Images of Organization" and Stafford Beer in "Brain of The Firm" demonstrate the fact that flexibility in management and a deviation from the standard thinking allow creating the completely new types of enterprises. Special attention should be paid to the colossal research by Frederic Laloux "Reinventing Organizations" Frederic Laloux's ideas are not only new, but they force a change the approach the ways of organization behaviour under various and extremely complex conditions. These great researchers in the field of management inspired the author to put forward his representation of organisation model [2, 3].

Basing on an integral review of the literature there was identified a method that is potentially applicable for the formation of a new view of organization, which allows considering the organization as a kind of holographic self-regulating model [8, 9].

The basic principle of holography [mm] is as follows: each particle contains the entire information about the whole. The author considers the organization as a "holographic

brain” in his research. The concept of “holographic brain” has been included in the scientific use of authoritative studies of modern neurophysiologists [1, 2]. Based on modern research, the author puts forward the idea of organization holography and the application of this model in the restaurant business enterprises. The author believes that the organization, being a living organism, controlled also by the simulation modelling with elements of artificial intelligence along with other means, can instantly change both under external and internal influence [10, 11, 13].

Taking as a basis the concept of “holography” of all living things, which could also be referred to the principles of organization structure, the chain of creating a completely new type of organization has been revealed. The study helped identify a number of technologies, necessary for implementation of a successful holographic model. [2, 12]:

1. embedding the whole into each part of the control;
2. the neural networks as an energy exchange within an organization;
3. the expert systems as a sufficient internal complexity;
4. the initial minimization of conditions and requirements for natural language control processing;
5. the possibility of creative implementation;
6. statistical self-study

The holographic model of the organization created on such technologies is able to develop successfully and to create a stable material basis for business.

3 Conclusions

The preliminary theoretical research has shown that

holographic models applicable in the field of management have a great prospect. It is important to pay attention to the study of the internal principles underlying the holographic model and the possibility of applying these principles in the enterprise. The new methods of forming and managing an organization, the desire for innovation will become determining factors for the process of creating an innovative economy. the author is sure that the restaurant business will successfully integrate into such model, and will be able to overcome not only the existing crisis, but will be ready to change flexibly the business management system in the future. It should be expected that the models built on the proposed idea will gradually become a symbol of success [1].

The author is convinced that an organization built on the principle of “holography” will be very successful. In the future the proposed model, perhaps, will become a self-organizing system capable of learning, having both structural diversity and the properties of the whole in each part, which will create a vector for the emergence and spread of innovative technologies that can reproduce themselves. According to the author’s opinion, the most important thing is the correct choice of the “energy source” of the future organization, its holographic framework. It is sphere which could be revealed in the future studies by the author.

According to the author’s view, the enterprise as a holographic model is the reality of our not distant future, and those who will implement this model first will have undeniable advantages. The restaurant business, as the most creative in the service sector, is able to be one of the first to implement the proposed ideas and technologies.

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Fractional degrees in Cobb-Douglas production function

S Hilkevics¹, J R Kalnins²

¹Ventspils University of Applied Science, Latvia
 Corresponding author's e-mail: hil@venta.lv

²Ventspils University of Applied Science, Latvia
 Corresponding author's e-mail: simts@latnet.lv



Abstract

Relation between α and β in Cobb-Douglas production function $Y = AK^\alpha L^\beta$ is the subject of many investigations. One of the discussed problems is the following - the condition $\alpha+\beta=1$ which follows from the scaling requirements often is not observed empirically. Time series for GDP, labor and capital are known for many countries for long period and logarithmic regression gives the possibility to evaluate α and β from empirical data and in many cases $\alpha+\beta \neq 1$. We suggest the simple explanation of this phenomenon and explain why scaling requirements are broken.

Keywords: production function, growth theory, fractional degree

1 Introduction

Charles Cobb and Paul Douglas [1] received the Cobb-Douglas production function in 1928 from statistical evidence. Although since that time Cobb-Douglas formula $Y = AL^\alpha K^\beta$ lies in the foundations of many growth theories, including Solow theory, many questions related to this formula are not clear yet. One of the widely discussed questions is so called “ α - β problem”: the condition $\alpha+\beta=1$, which follows from the scaling requirements, often is not observed empirically.

2 Simple kinetic model

Kinetic approach to system analysis is based on the assumption that complicated system consists of large number of simple interacting elements and observed average properties of system can be described using statistical properties of elements. In the case of economic processes, we can imagine, that in some economic space “labor units” meet “capital units” and as the result of their interaction business companies are created. Companies use labor units and capital units to produce goods and services and we are interested in production function determination.

Let us suppose that we have economy, which consists of n companies. Let us suppose, that company i uses equal amounts of labor and capital units - i units of capital and i units of labor. Let us suppose that company production is equal to multiplication “labor units by capital units”. If company uses i units of capital and i units of labor it produces $i \cdot i = i^2$ units of product.

Total production Y in this case is $Y = \sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$, total capital $K = \sum_{i=1}^n i = \frac{n(n+1)}{2}$,

total labor $L = \sum_{i=1}^n i = \frac{n(n+1)}{2}$. For $n \gg 1$
 $Y \approx n^3$, $K \approx n^2$, $L \approx n^2$. For Cobb-Douglas formula $Y = AL^\alpha K^\beta$ we have $n^3 \approx n^{2\alpha} n^{2\beta}$ or $\alpha+\beta=3/2$.

This simple kinetic model clearly explains why $\alpha+\beta \neq 1$. The reason lies in fact that α and β are dependent on the firms distribution by scale. Even in the case when productivity of each company is equal to multiplication “labor units by capital units”, this is not so for economy as a whole.

The restriction that company uses equal amounts of labor and capital units is not principal. Let us consider economy which consists of n companies with arbitrary combinations of i units of capital, $i = 1, 2, 3, \dots, n$ and j units of labor, $j = 1, 2, 3, \dots, n$.

Total production Y in this case is

$$Y = \sum_{i=1}^n \sum_{j=1}^n ij = \frac{n(n+1)n(n+1)}{4},$$

total capital $K = \sum_{i=1}^n i = \frac{n(n+1)}{2}$, total labor

$L = \sum_{j=1}^n j = \frac{n(n+1)}{2}$. For $n \gg 1$ $Y \approx n^4$, $K \approx n^2$, $L \approx n^2$. For

Cobb-Douglas formula $Y = AL^\alpha K^\beta$ we have $n^4 \approx n^{2\alpha} n^{2\beta}$ or $\alpha+\beta=2$.

3 The generalization of kinetic model

Let us suppose that we have economy, which consists of n different companies with labor distribution $l_1, l_2, \dots, l_n$ and total labor $L = \sum_{i=1}^n l_i$ and corresponding capitals $k_1, k_2, \dots, k_n$ with total capital $K = \sum_{i=1}^n k_i$. Let us assume that i -th company output product is $y_i = p_0 l_i k_i$, then total output $Y = p_0 \sum_{i=1}^n l_i k_i$. How can Y be expressed by L and K ? Assuming that this dependence is of multiplicative

form we arrive to $Y = AL^\alpha K^\beta$ where α and β generally are fractional.

Let us consider three models.

1. $l_i = l_0$ for $i=1: n$ and $k_i = k_0$ for $i=1: n$. Now

$L = nl_0$, $K = nk_0$. Total output is $Y = p_0 l_0 k_0 n$ and can be expressed in the form

$$Y = p_0 l_0 k_0 n = A_1 (l_0 n)^\alpha (k_0 n)^\beta, \quad (1)$$

where $\alpha + \beta = 1$. Assuming $\alpha = \beta = 1/2$, one has

$$Y = p_0 \sqrt{l_0 k_0} L^{\frac{1}{2}} K^{\frac{1}{2}}, \quad A_1 = p_0 \sqrt{l_0 k_0} \quad (2)$$

2. $l_i = l_0 i$ for $i=1: n$ and $k_i = k_0 i$ for $i=1: n$.

Now $L = l_0 \sum_{i=1}^n i = l_0 n(n+1)/2$, $K = k_0 \sum_{i=1}^n i = k_0 n(n+1)/2$ and

$$Y = p_0 l_0 k_0 \sum_{i=1}^n i^2 = p_0 l_0 k_0 n(n+1)(2n+1)/6$$

In this case for $n \gg 1$ one gets

$$Y = p_0 l_0 k_0 n^3/3 = A_2 (l_0 n^2/2)^\alpha (k_0 n^2/2)^\beta.$$

from where $\alpha + \beta = 3/2$. For $\alpha = \beta = 3/4$ we get

$$Y = 2\sqrt{2}/3 p_0 (l_0 k_0)^{4/3} L^{3/4} K^{3/4}$$

3. $l_i = l_0$ for $i=1: n$ and $k_i = k_0 i$ for $i=1: n$.

Now labor and capital distributions differ. Simple calculation gives

$$Y = p_0 l_0 k_0 n^2 = A_3 (l_0 n)^\alpha (k_0 n^2/2)^\beta$$

with $\alpha + 2\beta = 2$ (α and β cannot be defined in a unique way).

4 Overview

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This work discusses the relation of Cobb-Douglas production function with kinetic approach to economic systems description

- Economy consists of independent producers, companies, which use labor and capital to produce goods and services.
- Company production is equal to multiplication "labor units by capital units".
- Total labor is sum of company's labors and total capital is sum of company's capitals.
- Cobb-Douglas formulas $\alpha + \beta$ can be calculated exactly for considered models and $\alpha + \beta \neq 1$.

5 Discussion

It is possible to consider several generalizations of described kinetic approach. At first, discrete model can be substituted with continuous model. Sums will be transformed into integrals in this case and it will be possible to express α and β as functionals from companies' capital and labor probability distribution. At second, it is possible to consider different company productivity functions and to analyse the relations between company productivity function and economy productivity functions.

At third, more complicated system of kinetic equations can be written for the description of the capital and labor flows between companies.

6 Conclusions

Parameters α and β in Cobb-Douglas production function are considered. Simple kinetic model for $\alpha + \beta$ determination is suggested. Several cases when $\alpha + \beta \neq 1$ are considered.

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Unemployment, which was particularly affected in the regions of Latvia during the period of Covid-19

Viktorija Gogole

ISMA University of Applied Sciences, Riga, Latvia

Author's e-mail viktorija2703@gmail.com



Abstract:

In this particular work the author is looking at the changes of the unemployment in the regions of Latvia, in the period of the Covid-19 situation. The point of this study is to determine which industries were the most affected by the Covid-19 pandemic, and also in which industries the demand for specialists has increased. To develop this research, the author used the following methods: literature study and statistical analysis.

Keywords: macroeconomics, unemployment, Covid-19, corruption index, the economy, Latvia

1 Introduction

In the period from 2019 to 2020 the rate of unemployment has significantly increased. The unemployment growth is due to the restrictions imposed in the country. A significant damage was taken by the workers, who offer service to people, such as beauty salons, restaurants, cultural and entertainment industries. In this case restaurants were able to find a way out, they were able to work on the delivery. The beauty salons were closed until 01.03. 2021. According to the author, this topic is relevant because from 2020 to 2021 due to Covid-19, many people lost their jobs and therefore unemployment in the country raised. There is also the second part of the situation with covid-19, many stores began to create and promote e-commerce, that is, to create their own Internet Delivery stores. People have started to use more Internet resources. In this regard, factors have increased the demand for occupations such as programmers, IT managers, system administrators, and so on. Thus additional vacancies have been opened.

2 Overview:

Unemployment increased, especially in the age group from 15 to 24 years old in the second quarter of 2020 in Latgale. In Latvia, there was a positive trend in the growth of the minimum wage on average +36 euros. Nevertheless, at the moment, among the Baltic countries, Latvia has the smallest minimum wage. Also, the increase in the average salary in the country amounted to 75.6 euros. Latvia in 2020 ranked 42nd out of 180 countries, also in Latvia there is an average level of corruption and there were no significant changes from 2019 to 2020, an increase was in 2020 by 1 point. According to the author, due to the restrictions during the COVID-19 period, the situation could have changed for the worse, since the beauty industry suffered greatly and many beauty salon workers were sent to benefits. This decision could aggravate the situation, because some employees could break the law and provide services at home, thus the foreman could think about the idea that upon returning to work it is no longer profitable for him to work for his employer. In this regard, the number of specialists to work in this area may fall and, in the worst case, the shadow economy may begin to grow. For the period of 2020, the shadow economy retained its percentage at 23.9 percent

3 Conclusion and decision

One of the solutions according to the author, to reduce the unemployment rate it is necessary to organise courses or extra-training on the professions demanded in the IT industry. More in-depth development of the educational programmes in the field of advanced technologies. The second solution is to increase the unemployment benefit, because of the low benefit in the country, and not everyone is able to get it, but more and more people are losing their jobs. The corruption level is increasing.

Protection of the business reputation of the enterprise

Chepurna L^{1*}, Oborenko Z¹, Kryvoruchko M²

¹ISMA University, Lomonosova Street, 1, Riga, Latvia

²Cherkasy State Business College, Department of Accounting and Finance, Ukraine

*Corresponding author's e-mail: liliachepurna@gmail.com

Abstract

A business reputation is made via the hard work and effort to ensure the company's high profitability. An excellent image will allow attracting new customers, but only with a good reputation it is possible to establish long-term cooperation with them. Many new enterprises with non-competitive products take some measures to soil the competitor's business reputation in order to attract their consumers.

Keywords: reputation, competitor, measures.

1 Introduction

Each legal entity has a certain business reputation, which is influenced by a large number of factors. A positive business reputation is a valuable asset that takes years to earn. Therefore, factors that negatively affect the company's business reputation can and should be dealt with.

The problem of business reputation was studied and researched by many scientists, in particular, by L. Kostenko, A. V. Kokhanovskaya, K. A. Mashevskaya who investigated it's legal category and determined the legal nature of the essence of business reputation, as well as the problems of its protection. As an economic category, business reputation was studied by A.S. Ostapenko, T.N. Golovchenko, A.V. Rodionov, A.N. Grebeshkova, A.V. Shimanskaya, Yu.A. Kalugin,

A.V. who identified the economic essence of business reputation, determined its components and factors of formation, established methodological approaches to assessing its level.

2 Factors shaping business reputation

1. Performance - profitable, highly effective company, stable growth perspective;
2. Products / Services - high-quality products released by the company according to the customers' needs not due to its own needs satisfaction;
3. Innovation – innovative market approach, quick adaptation to changes;
4. Workplace - fair payroll, employee wellbeing, equal work conditions;
5. Governance & Citizenship – proper environment treatment, charity, positive impact on society;
6. Leadership - charismatic Manager, Executive Management, clear fut vision. [1]

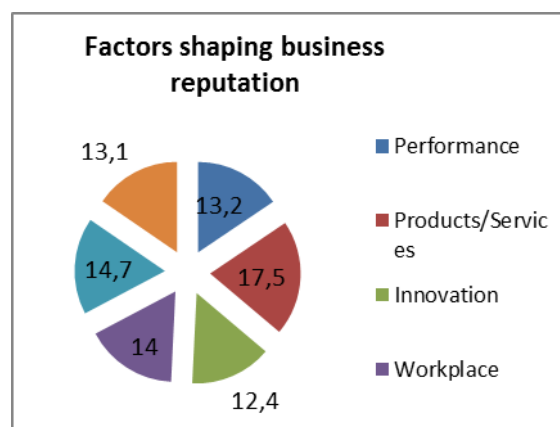


FIGURE 1 "Factors shaping business reputation"

Business reputation is valuable for the company, being an element of its market value. According to Ernst & Young, Microsoft has its 84% business reputation, Disney - 66%, Yahoo - 91%, Nike -76%.

3 Factors affecting the business reputation fall

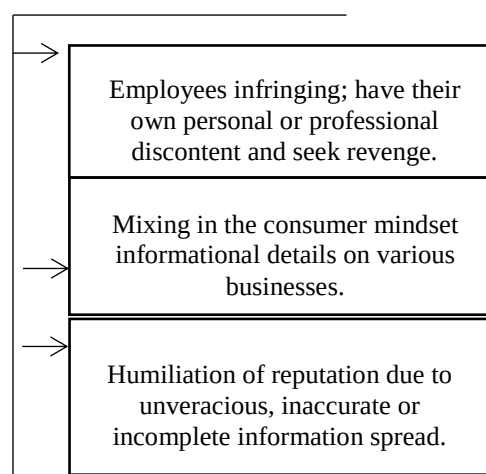


FIGURE 2. "Factors affecting the business reputation fall"

Damage to business reputation is done in order to create

conditions under which the company will not be able to make a profit, it was supposed to obtain thanks to its good business reputation.

So far, the protection of business reputation is at its legal start – not all the countries pay enough attention to this point.

Due to this fact, it is impossible to provide an explicit answer on what are the ways of the business reputation enhancement. In case there's no support from the court side it is extremely difficult to renew its previous business reputation. However, if you continue to work conscientiously, at some point the situation will improve.

[2]

How to protect your business reputation?

Chepurna L, Oborenko Z, Kryvoruchko M

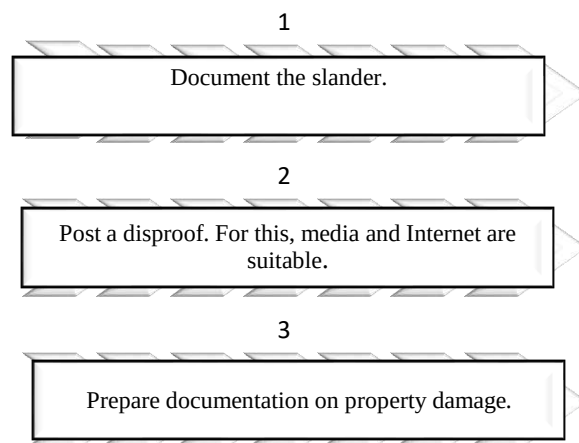


FIGURE 3 "How to protect business reputation?"

4 Summary

Business reputation cannot belong to a structural category, contain components, since it is a moral and ethical category. It should be taken into consideration that business reputation is being formed thanks to numerous external and internal factors.

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The specifics and features of competition in the field of safety and security

Skrypnyk A^{1*}, Riashchenko V¹, Zdir V²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College, Department of Accounting and Finance, Ukraine

*Corresponding author's e-mail: anzhelaskrypnyk00@gmail.com

Abstract

The paper deals with the specific features, problems and the current state of the security business. Based on the assessment of the situation in the studied sphere of business, is proved the need of optimization of competitiveness level offered services. Solutions to current problems are proposed. The significance of each solution is justified. Proving their importance is carried out on examples of current the market of security services reality.

Keywords: security business, distribution channels, management, especially

1 Introduction

In modern market conditions, the work of the security business requires a comprehensive study, as well as the development of ways to increase the level of competitiveness of the services provided.

The specifics of the security business arouses widespread interest: in the legal status, professional qualities, technical equipment and many other aspects of the activity.

Despite the variety of approaches to security topics, little attention is paid to the security business in Ukraine.

The major problems of private security business include the lack of an idea, what assumes a positive development of the security business in modern Ukrainian society, as well as the issue of inability to think rationally, based on the public-state awareness of the role of the security business. In the case of optimization of provided services, it is possible to achieve sustainability and stability in the rate of development of security business.

2 Main part

Physical security as the physical protection of assets in the form of security activities has its own specific implementation features and specific requirements for the subjects who directly implement it.

Now the Security Police (formerly the State Security Service) covers more than 25% of the security services market. Almost a third of them are their own security guards.

Private security companies cover the rest - 45% of the market [3].

Security activity has its own structural and logical scheme, principles, forms, methods of implementation and components of security.

In the system of economic security of the enterprise, it can be carried out by the forces of its own security unit or with the involvement on a contractual basis of other subjects of security activities: security units of the Ministry of Internal Affairs of Ukraine or security companies (business entities that have the appropriate licenses [2].

Speaking about the problems, it is worth emphasizing that at this stage there is a vague definition of tariffs for

security services, and competition is manifested mainly in the price field. More often than not, there is no strategic marketing approach, personnel require the improvement of professional knowledge and skills... In our country, there is no state strategy for the development of this area, there is no definition of the place and role of private structures in the public security system: on the one hand, they are the guarantee of peace, order and tranquility in society, on the other hand, security activities are a business with their own economic component.

It should be emphasized that at the moment there is a fierce struggle for corporate clients on the security services market.

Basically, about 95% of customers are not interested in the quality of services at all - they can really weigh all the risks, but the determining factor for them is the cost. And even those clients who have been doing business with a reliable professional company for a long time, successfully and efficiently, take the offer of services for consideration at a 30% discount [1].

The main and main threat to the security services market in Ukraine is non-competitiveness in relation to foreign companies. Soon, the Ukrainian market of security services in one form or another will begin to be absorbed by international corporations engaged in ensuring security.

Their advantage lies in many years of experience, new technologies, technical and financial base.

In addition, the problem of ensuring the inviolability of rights, first of all, the right of private property and the right of ownership, is becoming more acute.

This is the reason for the emergence of a significant number of various security companies providing services of a factual nature, protecting the objects of ownership (possession) from unlawful encroachments on the basis of a civil law contract.

Under the pretext of combating crime in modern conditions, it is also possible to strengthen the protection of law and order, fiscal and power pressure on economic and commercial structures, bureaucratization of tax procedures, and the introduction of total forms of control over entrepreneurship, possibly narrowing the protection of human rights.

The content of the influence of policing is intended only to complement the economic, financial and technical decisions that are made in the process of social management, but not to replace them.

3 Suggestions for solving problems

Blurred pricing of security services is part of a strategic marketing approach that creates a reliable and customer-focused security structure capable of participating in public order protection (security for public events, public areas, etc.).

To increase competitiveness, it is necessary to pay close attention to the quality of equipment. In addition, it is advisable to discuss with the technicians how it works. However, the key points in the solution will be the problems of studying the intricacies of private security companies,
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analytical analysis of market services, selection of highly qualified employees, as well as the implementation of an enterprise development strategy.

4 Conclusions

The security market in Ukraine is still underdeveloped due to the fact that the services provided are not available to all segments of the population. This is the main reason that the property of the majority of the capital's residents is under potential threat.

The introduction of high-tech innovations, the release of modern goods will contribute to the conquest of leading positions in the market. Constant monitoring of the situation in the security business on the territory of Ukraine will help maintain a steady, stable pace of development.

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State and development prospects of the bakery industry in Ukraine

Hvoz O^{1*}, Zmicerevska D¹, Kryvoruchko M²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College, Department of Accounting and Finance, Ukraine

*Corresponding author's e-mail: alena.ariel1998@gmail.com

Abstract

Baking industry of Ukraine has important social and strategic importance in life of the population, it satisfies their needs of the basic food product. Enterprises producing bread seek to meet the needs of all segments of the population, since they are engaged in the production of food, which is significant for all Ukrainians. Recently, despite the importance of the product, negative processes affecting the quality of products are observed in the area. This paper is an attempt to research the current state of the industry and determine the prospects for the development of the market of bread and bakery products in Ukraine.

Keywords: bakery products, bakery industry, food industry, market.

1 Introduction

As of today the bakery industry is one of the leading branches of food industry of Ukraine providing the population with bread and flour products. Bread products are an important foodstuff for the majority of Ukrainian population. Bread makes 15% of the Ukrainian population's diet, which confirms its status as the staple food.

Bread-baking enterprises satisfy the needs of all segments of the population with their products. In connection with recent events the activity of bakery enterprises has become less efficient. Over the past two decades there has been a significant decline in industrial production of bakery products. Today there are a number of factors from which the bakery industry is in a difficult situation. First of all it is the lack of investment, ineffective state influence on the stabilization and development of the industry and, as a consequence, low profitability of production, unfair competition, systematic price increases for the most important production resources (energy resources, raw materials and materials, production equipment). The most important factor of the difficult situation of production in Ukraine was Covid 19, which began in early 2020. Under such conditions, the activity of almost every bakery is aimed not at expanding the range and introduction of innovative technologies, but at reducing production costs and fighting for survival. There is an approach according to which the decrease in bread production clearly correlates with the decrease in population. For this purpose the dynamics of the main indicators determining this correlation is presented in Fig.1.1.

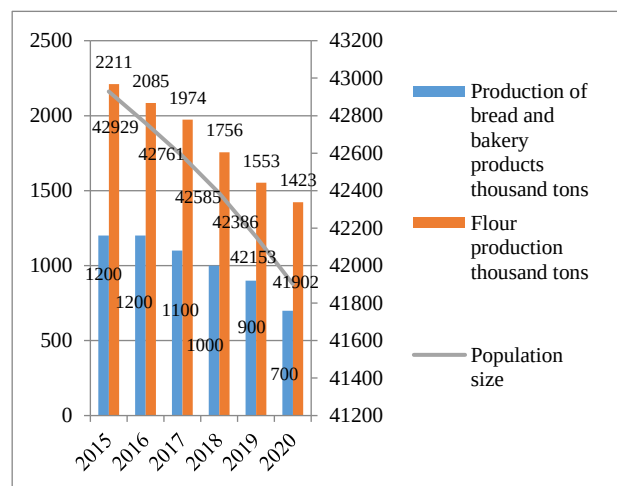


FIGURE.1.1 Dynamics of production of bread, bakery products, flour and population for 2015-2020

The decrease in dynamics of production of bread, bakery products and flour was affected by the tense situation in the country, which continues. Flour mills have lost such markets as Crimea and certain areas of Donetsk and Lugansk regions.

It is also worth noting that the situation that developed because of the coronavirus pandemic led to a decrease in the harvest of up to 70 million tons, became a driver of the high price of flour and grain. This also leads to a drop in demand in the baking market.

From the above data, the production volumes of bread and bakery products decreased by 41.6%, or 500 thousand tons, compared to 2015 in 2020. The volume of flour production decreased by 35.6% or 788 thousand tons.

The following factors can be highlighted which have influenced the decrease of bread and bakery products production volumes in Ukraine in recent years:

1. Technical factors. The present state of technical equipment and production lines at the enterprises of bread-baking industry is disastrous. Today the degree of wear makes 60-70%.

2. Ethnic and cultural factors. In some regions of Ukraine the citizens prefer home baking or products produced by small private enterprises, in turn leads to a change in the culture of bread consumption.
3. Structural factors. Experts and analysts state the increase of shadow share of bread and bakery products market.
4. The consumer factor. Due to coronavirus pandemic, the development of frozen bakery products segment is observed. There is an increase in demand for frozen bakery products from supermarkets.

In the segment of bakery products one more basic problem, which negatively affects the development of the market - the state regulation of prices, should be highlighted. Social types of bread today remain the most mass varieties of bread, the profitability of which does not exceed a few percent. Therefore, with the rapid growth of almost all components of the cost of production of bread, the bakery industry is on the verge of survival.

2 Overview

This paper discusses the advantages, disadvantages, and conclusions of the following:

1. Dynamics of production of bread, bakery products, flour and population.

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2. Factors that influenced the volume of production.
3. General perspectives of development of bakery industry of Ukraine.

3 Decision

All of the above problems indicate that the baking industry is under threat, so to improve the economic efficiency of bakery production it is necessary to implement the following steps:

1. Improvement of state regulation of prices for flour.
2. Improving the range of products: Expansion of production of improved types of bread products, increasing the output of bakery products, increasing the consumer value of bread products.
3. Introduction of resource-saving technologies of production, which is the condition for reduction of production costs.

4 Conclusion

Examining the current state of the bakery industry, we can trace a tendency to a decline in production volumes, inefficient use of technological lines, outdated production technology and material and technical base of enterprises and the like. All this indicates inefficient use of production and labor resources by enterprises of this industry.

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Modern trends in the development of the fat-and-oil industry in Ukraine

Klycheva O^{1*}, Korjuhina J¹, Dernova I²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College, Economics, Entrepreneurship and Marketing Department, V, Ukraine

*Corresponding author's email: alexa.klycheva@gmail.com

Abstract

Today, the production and processing of oilseeds is characterized by dynamic development in comparison with other sectors of the country's economy. Enterprises of this profile in terms of production volumes are among the five branches of the food industry. However, the fat-and-oil industry has a number of problems, which can be a reason to slow down further development. This work is intended to point out the existing problems and propose options for their solution.

Keywords: fat-and-oil industry, agroindustrial complex, oilseeds

1 Introduction

The market of fat-and-oil products at the moment has acquired the pace of rapid development. This is due to the growing demand both for oil and fats for food consumption and for the use of oil raw materials for technical purposes.

The main oilseeds in Ukraine are sunflowers, soybeans and rape. Sunflower takes the leading position and is grown on 23% of all sown land, while other oilseeds occupy much smaller relative areas: soybeans - 8%, and rapeseed - 3% [1].

The active development of the fat-and-oil industry requires a commensurate level of supply of appropriate raw materials, which is why recently there has been a gradual expansion of cultivation areas. If in 2010 the total area for growing oilseeds was 6.75 million hectares, in 2019 - 8.89 million hectares, 5.95 million hectares of which were occupied by sunflowers (Figure 1) [2].

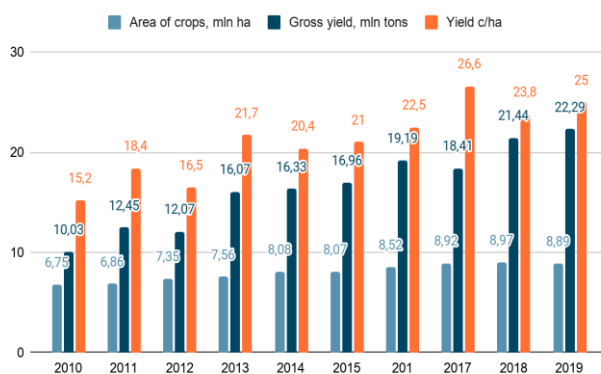


FIGURE 1 Dynamics of area of crops, gross yield and yield of oilseeds in Ukraine for 2010-2019

Lookin at the dynamics of yield over the period, one can see a significant, but not quite stable growth. The fact is that many entrepreneurs for the sake of increasing yields violate crop rotations and use too much area for sunflower cultivation. This, in turn, causes soil depletion and infestation by pests and diseases, such as gray, white dry rot, false powdery mildew, blister and others [3].

A promising direction in terms of preserving soil quality

is the use of No-Till technology, i.e. zero tillage. This technology provides the abandonment of plowing the land with traditional equipment, so that the surface remains stationary and is filled with crushed crop residues [4].

As a result of processing of oil raw materials can be obtained: oil, oilcake, meal, margarine, mayonnaise, protein meal and feed concentrates. For the production in Ukraine traditionally use their own raw materials. It should also be noted that most enterprises of the industry are engaged in complex processing of raw materials, i.e. use all types of products. By-products (husks) are burned in boilers, which largely replace gas and other fuels[5].

During 2018, the average purchase price decreased. Soybeans were affected the most. Their price decreased by 22%, sunflower - by 11.6%, rapeseed - by 4.6%.

Due to such changes, oilseeds production in the next marketing season may be reduced. Such a change in price was influenced by several factors, one of which is the expectation of a new crop in the same volume as last year. Fluctuations in the cost of purchase influenced the price of sales as well (Figure 2).

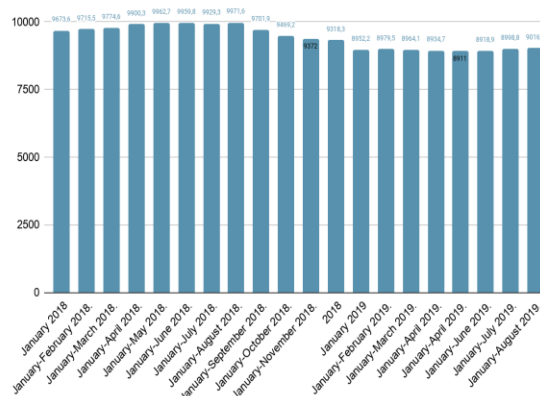


FIGURE 2 The dynamics of the average selling price of oilseeds by enterprises of Ukraine (UAH per 1 ton, excluding VAT, freight, forwarding and overhead costs)[6]

As can be seen in the graph, the selling price in 2019 has

decreased markedly compared to 2018. One solution to this problem at the moment can only be an increase in the processing of oilseeds much higher.

Products of oilseeds processing, namely oils, over the past three years have tended to increase the volume of production (Figure 3) [7].

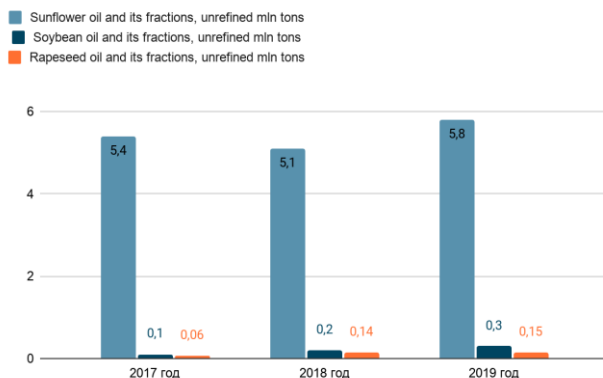


FIGURE 3 Dynamics of production of sunflower, rapeseed and soybean oils in Ukraine from 2017 to 2019

As can be seen in the graph, sunflower oil takes the leading position in production. This is due to the total amount of available raw materials and, of course, the demand for this type of products among the population.

Regarding the other types of oil, it is worth noting the growth of soybean processing. One of the reasons is that there is almost no problem to create oleic type oil from soybean oil. This type of oil fits the standards of environmentally friendly products [8].

An important indicator when considering any type of activity is its profitability (Figure 4) [7].

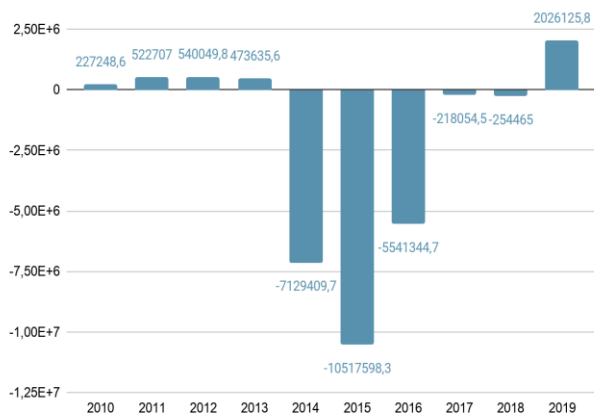


FIGURE 4 Profit (loss) of oil and fats companies from 2014 to 2018

As can be seen in the graph, in the period from 2014 to 2018, enterprises of the oil and fats industry worked at a loss. The reason for this was the underutilization of production

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capacity due to the outstripping rates of their increase relative to the increase in the production of oilseeds and the high level of concentration of the oil and fats industry.

2 Overview

This paper examines the positives and negatives, as well as the conclusions of the issues involved:

1. Dynamics of oilseeds cultivation
2. Dynamics of production of products of processing of oilseeds.
3. Dynamics in relation to the profitability of sales.

3 Decision

Enterprises of the fat-and-oil industry are highly profitable, which indicates the need to develop the industry in the direction of improving the quality and competitiveness of products, taking into account the world requirements, trends in the development of the fat-and-oil industry and consumer interests.

Based on the previously presented information, we can conclude that the main problem, the solution of which will greatly help in the development of the industry, is the lack of raw materials needed to fully load the enterprises.

To avoid its deficit it is necessary to regulate their balance at the expense of:

1. Application of better technologies for collection and storage of raw materials.
2. Adhering to the order of crop rotations and using in the necessary amount of mineral fertilizers.
3. Use of no-till, strip-till technology
4. Developing long-term relationships with suppliers and cooperation through the direct purchase of oilseeds from agricultural producers; advancing farmers to increase the gross yield of oilseeds.
5. Development of protective measures to prevent the export of oilseeds in order to load capacities inside the country, including the provision of state support only for the volumes of oilseeds produced, which will be handed over for processing inside the country, increasing the export duty.

4 Conclusion

Production and processing of oilseeds is one of the most promising industries in Ukraine. The dynamics of growth of oilseeds cultivation is high enough due to climatic and natural resources. Despite this, there are a number of problems associated with a possible reduction in the amount of raw materials due to the outdated technology of its collection and storage.

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Analysis of competitive advantages in the banking services market of Ukraine on the example of JSC "Raiffeisen Bank Aval"

Ruban V^{1*}, Zmicerevska D¹, Kryvoruchko M²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College, Department of Accounting and Finance, V, Ukraine

*Corresponding author's e-mail: viktoriaruban7@gmail.com



Abstract

The paper analyses modern interpretations of scientists on the essence of the competitiveness of a bank investigates modern approaches to managing the competitiveness of banking institutions provides a classification of the methodological foundations of organizing the management of the competitiveness of a bank, identifies the main trends in the development of the banking sector in Ukraine, analyses a comparative of leading banks in terms of basic economic indicators. It has been determined that a modern banking product, which is stubbornly fighting for the popularity it, is a plastic payment card, the volume of issue of which is increasing every year. The increase in the range of banking services based on the growth of payment cards gives the prospect for banks to raise funds, increase competitiveness and improve their image. The paper discusses the features of management of competitiveness of banking institutions on the example of JSC "Raiffeisen Bank Aval", presented its main competitors.

Keywords: banking services market, financial services, economy, banking system, innovations

1 Introduction

Today, competitiveness is an integral part of effective performance and improving public welfare. There is no consensus among scientists regarding the interpretation of this concept. For the banking sector, competitiveness is most often equated with stability. In this regard, we will give some interpretations of scientists about the essence of the competitiveness of the bank.

A.V. Zolotarev and S.A. Gura define the competitiveness of a bank as a relative dynamic indicator that makes it possible to assess the ratio of its quality and cost characteristics in comparison with competitors and to calculate on this basis the integral level of competitiveness [2, p. 37].

According to research by N.A. Litovchenko and S.M. Tatyana, the competitiveness of a bank is its ability to function effectively in the banking environment, which is achieved by the constant use of innovations to form competitive advantages of its products and services in the market in order to achieve profitability and financial stability in the future, taking into account the social aspect of banks' activities and the general economic situation of the state [3, p. 429].

So, it can be noted that the competitiveness of banks is an indicator of the effectiveness of their activities. To obtain a competitive position, domestic banks need to continuously modernize existing approaches to managing the competitiveness of their activities. Proceeding from this, the conceptual provisions of the strategic management of the competitiveness of the bank should be based on a comprehensive study of the problem of the functioning and

development of a banking institution in a competitive market, due to the high dynamism of the conditions for conducting banking business, and the need to pose the problem of strategic management of the competitiveness of the bank and the development of an appropriate set of its tools [1, p. 238].

Each factor that influences the formation of a competitive environment in the financial services market provided by banks is closely related and depends on others, and the same factor may belong to different groups. All this testifies to the rather high dynamism of the factors influencing the formation of the bank's competitive environment. In the process of development of the financial services market, not only factors that affect the competitive environment change, but also the nature of their interaction in time and space, which affects the results of the bank's activities [7, p. 232].

During the competition, banking institutions use their own funds and forces: subject - banking products; object - a group of customers, that is, the target audience of consumers; subject - market participants aiming to satisfy the consumer sector by selling their own product.

According to the individual structural component, competition between banks arises between banking

Products and between banking institutions offering similar services on the market to meet the needs of customers. Each bank strategy is constantly changing and depends on an inexhaustible list of factors, the most important of which is the final product that will compete in the market.

2 Overview

This work discusses the advantages, disadvantages and conclusions on the following issues:

- analyzed modern interpretations of scientists of the essence of the competitiveness of the bank;
- investigated modern approaches to managing the competitiveness of banking institutions;
- identified the main trends in the development of the banking sector in Ukraine;
- carried out a comparative analysis of leading banks in terms of basic economic indicators;
- the features of the competitiveness of banking institutions are considered on the example of JSC "Raiffeisen Bank Aval", its main competitors are given.

3 Decision

The banking market is dynamic and heterogeneous. So, at the end of 2019, the number of functioning banks was 75 institutions (in particular, 35 banks with foreign capital), which is two less than in 2018. In total for 2013-2019, the number of banks decreased by 105, while the number of banking institutions with 100% foreign capital increased, namely by four institutions. Most of the banks ceased their activities in 2014-2015, which is associated with the economic crisis and the forced measures by the NBU aimed at closing problem institutions [5, p. 179].

The reliability of a bank, in turn, is determined by both subjective and objective parameters of its activities. By subjective parameters we mean those that do not have a direct measure and the value of which is set by the consumer of banking services independently. They include reviews of friends, acquaintances of the client who have previously used the services of the relevant financial institution; advertising, etc. In other words, these factors make the client believe in the bank's reliability without additional verification of the real indicators. Objective parameters are either directly measured or assessed by professionals, the assessment is communicated to the consumer. This group of parameters includes various indicators of the bank's financial and economic activity (market share, equity capital, etc.), as well as ratings compiled by the professional community. So, according to the updated NBU methodology, 14 banks are systemically important in Ukraine (on July 1, 2019), namely: JSC "CB "PrivatBank", JSC "Oschadbank", JSC "Ukreximbank", JSB "UkrGasbank", JSC "Alfa-Bank", JSC "Raiffeisen Bank Aval", JSC "PUMB", JSC "UkrSibbank", JSC "TAScombank", JSC "Universal Bank", JSC "Kredobank", JSC "OTP Bank", Joint Stock Bank "Pivdenny" [4]. It should be noted that as of January 1, 2020, four banks have the status of an authorized bank to store cash reserves: JSC

"Oschadbank", CB "JSC "PrivatBank", JSC "Raiffeisen Bank Aval", and JSC "First Ukrainian International Bank" [6, p. 64].

The main competitors of JSC "Raiffeisen Bank Aval" are JSC "Oschadbank" and JSC "CB "PrivatBank", which have been operating for a long time and effectively in the credit and financial market of Ukraine.

Analysis of the structure of the Ukrainian market of payment cards shows that the undisputed leaders and main competitors of JSC "Raiffeisen Bank Aval" in the field of issuing plastic cards in Ukraine are JSC "Oschadbank" and JSC "KB "Privat Bank".

Note that after 2013, contactless plastic cards began to appear en masse in Ukraine (that is, those that are equipped with an ISO / IEC14443 microchip for magnetic-inductive information exchange).

Quantitative data show that over the past six years, the number of contactless payment cards has been steadily growing.

The increase in the range of banking services based on the growth of payment cards gives the prospect for banks to raise funds, increase competitiveness and improve their image. The increase in the use of plastic cards has significant prerogatives for the banking system of Ukraine as a whole, as it helps to increase the attraction of funds into the intrabank circulation, enhance the controllability of money circulation, increase the function of the banking system, and economic recovery, reduce the element of cash in the money supply and, thus, reduction of costs for its publication and support in circulation.

4 Conclusion

So, the main prerequisite for the successful functioning of the bank in market conditions is the formation of an effective and flexible development strategy in a highly competitive environment. Under such conditions, the development of the bank should be aimed at the formation and maintenance of competitive potential, which would ensure an increase in the level of competitiveness and its individual subsystems.

The competitive position of the bank can be used as an assessment of the current state and as the basis for the formation of its competitive strategy, to determine the strengths and weaknesses of its activities and competing banks. Assessment of the competitive position for the purpose of strategic management should be carried out for certain types of banking business, it corresponds to the position of the bank in the respective markets of banking services.

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Top 3 eurozone modern problems

Valeriya Myazgova

ISMA University of Applied Science, Latvia

**Corresponding author's email: b.a.myazgova@gmail.com*

Abstract

The Euro zone associated with the highest expectations in connection with the participation of the world's leading countries. Its currency has become a serious contender in the fight for the title of the world's number 1 currency. The study of what exactly has slowed down such a strong region in our time in development is extremely relevant, since it is based on a modern assessment of the situation.

Keywords: Eurozone, COVID-19, Development, Debt Crisis

1 Introduction

The eurozone, officially known as the euro area, is a geographic and economic region that consists of all the European Union countries that have fully incorporated the euro as their national currency. As of Aug. 2020, the eurozone consists of 19 countries in the European Union (EU): Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, and Spain. Approximately 340 million people live in the eurozone area.

This monetary union was designed to strengthen the integration of European countries by creating a single, young and extremely promising currency-the euro. The euro zone was initially associated with the highest expectations, it is enough to mention only that in the process of its creation, one of the leading world economic powers of that time – France and Germany, as well as regional economic leaders – Italy, the Netherlands, Belgium, Spain and others were directly involved. Experts unanimously declared the emergence of a strong competitor to the dollar in the fight

for the title of the world's number 1 currency. However, the monetary union has so far failed to fully meet its expectations.

In my work, I will talk about three main problems of our days, such as different stages of the economic growth in the Eurozone countries, the European debt crisis and COVID-19 crisis.

2 Conclusion

In conclusion, it can be noted that the problems of the Eurozone at the present stage of development have a different nature of occurrence and are extremely deep in nature. The attempts made to eliminate them were not successful – the "rush of new blood" in the form of Latvia and Lithuania joining the Euro Zone in 2014 and 2015 did not give the necessary results in the fight against the stagnation of the monetary union, since it was rather formal, because the rates of the lata and lita were fixed against the euro. Therefore, we do not exclude the possibility that a number of problems will be solved with the help of further expansion of the Eurozone.

Features of the organization of a call-center in the bank office

Tymoshnichenko Denys, Khotunov Vladyslav*, Olifirenko Vitalii

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: vkhotunov@gmail.com

Abstract

In modern society, communication and mobility play a key role, since when any problems arise, the main task is to find a solution as soon as possible. In such cases, people try to solve it over the phone, because this method is one of the fastest. The same applies to enterprises, firms, organizations that need to establish contact with their client. In such cases, call centres are used. Due to this, the client can always turn to the operator for help, or the operator can turn to the client with suggestions from the organization.

1 Introduction

In modern times, organizing a call centre for a bank plays an important role in its work. Indeed, thanks to him, firstly, the influx of customers increases, and secondly, the number of problematic questions to specialist's decreases, whose task is to solve questions and requests of customers sitting in the offices, since most of the issues can be solved thanks to the hotline.

The use of such a tool as a call center allows the bank to obtain the following advantages:

- constant communication with the client;
- constant influx of customers;
- remote consultation on the use of bank services;
- emergency assistance in cases of theft / blocking of the card;
- consultation on the local location of branches and a minibus to it;
- notifications about special offers for regular and VIP-clients;
- access to the bank's network, which allows you to fully view the client's history.

The bank can also use the already created center of the outsourcing company, with its specialists. But in this case, the operators will have many times less information about the client or the bank's offers, since they will not work with the bank's system and network, as this can lead to leakage of information about both clients and the bank itself. Which can negatively affect the reputation and financial position of the bank.

2 Overview

The main problem of organizing a call-center in a bank office is that a separate network and electrical channel is not

created for it. A key aspect is the fact that a call-center is also connected in a room with a ready-made wiring closet configured for the department's load. Of course, at the same time, only the switch is used from the separate equipment for the center, since the rest can be borrowed from the office, which already creates problems. Shared Internet, which slows down the work for specialists, the load on the closet and the flow of information to the server, as information flows from both the center and the office. It also creates additional stress on security features such as an uninterruptible power supply. In case of emergencies, the entire building will be evacuated, and it doesn't matter, the problems concerned only the first or third floor (where specialists work) but also the call center, which is located on the 4th floor, which will clearly affect the productivity of work.

3 Decision

The solution to this problem lies in the fact that for a call center it is better to use a separate office, in which you can install a wiring closet configured for the bank's system. In such cases, the financial burden of the organization and the launch of the center increase, but at the same time it increases the reliability and security of the system.

4 Conclusion

When organizing a call center, it immediately becomes clear its disadvantages and problems, which in the future may be faced or already encountered not only by operators, but also by technical support staff. But despite the problems of a technological nature, there are positive aspects that have a positive effect on the financial component of the bank due to the increased flow of clients.

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Innovative Product Management

Inese Spica, Baiba Berzina, Ernests Spics

ISMA University of Applied Science & Scientific Institution Business Competence Centre, Latvia

*Corresponding author's e-mail: inese.spica@gmail.com

Abstract

At the present time the creation of innovative products and its testing is actively developing field of marketing management. The creation of innovative products and its management is relatively young field, there are no best practices and standards formulated main directions for innovative products development in Latvia. Currently there are many approaches and tools on the technological business environment used by different enterprises and organisations for creation of innovative products management. This work is an attempt to find the best way of doing innovative product management on the technological business environment in Latvia.

Keywords: innovative products, management, marketing, technological business environment.

1 Introduction

Taking into consideration the present technological business environment situation in Latvia it is important to make use of these conditions for further improvement and development of the innovative products and its management.

The object of the present research paper is innovative products. The subject of the research paper is the management of innovative products. The objective of the paper is to study the integration process of technological business environment and innovative products management problems, to elucidate the factors influencing the innovative products management effectiveness, to develop proposals for solving problems and for innovative products management mechanism by making use of relationship between these factors in investigation of innovative products management in Latvia.

2 Overview

The tasks advanced in order to reach the objective:

- Identify the concept of innovative products management;
- To carry out analysis of the factors influencing innovative products management in the process of the technological business environment integration;
- To carry out analysis of indicators characterising innovative products management effectiveness on the technological business environment.

Theoretical study methods are reported analysis of

innovative products management, technological business environment management, study of correlation between innovative products management factors and the technological business environment. Empirical pilot methods are observation for the purpose of studying mutual influence between innovative products management factors and the technological business environment, study of documents regulating innovative products management in Latvia, analysis of the technological business environment management in Latvia, economic and statistical analysis of the innovative products management results on the technological business environment, economic experiment, study of public and non-government institutions data in Latvia.

Research basis are innovative products management, business and its technological business environment in Latvia. The research period is from the year 2010 till the year 2020, separate themes have been studied for a shorter period of time or by way of comparison.

3 Conclusion

In Latvia the most significant problems of innovative products management are shortage of R&D personnel and expenditure, shortage of business competence of innovation management and marketing.

The solution of innovative products management problems is based on the study of technological business environment, innovation management and marketing, and ensuring effective solution of innovative products management problems in Latvia.

Features of marketing communication policy in the restaurant business

Sumtsova Y^{1*}, Odinkova T¹ Kuznetsova N²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College; Economics, Entrepreneurship and Marketing Department, V, Ukraine

*Corresponding author's e-mail: ysmtsv@gmail.com

Abstract

The development of information technologies and communication tools has formed a new look at the philosophy of the formation of marketing concepts for managing domestic enterprises in the restaurant business. The use of modern channels for promoting products has influenced the forms of competition, communication with consumers and the expansion of the scope and range of services in the restaurant business. Marketing technology experts note changes in the forms and trends in the use of communication channels, including the restaurant business. Today, it can be claimed that media inflation is flourishing on the Ukrainian market, in which there is a decrease in the effectiveness of advertising through classical marketing tools due to an increase in the average cost of one advertising contact, which indicates their inability to respond to the challenges of modern business, the state of development of information technologies [1].

Keywords: marketing research, restaurant business, marketing communications policy.

1 Introduction

Marketing communications policy in a restaurant is interconnected with the concept of a restaurant product. A restaurant product is understood as the complex attractiveness of a restaurant, expressed in the perception and feelings of visitors, as a combination of cuisine (assortment of available dishes and drinks on the menu), quality of service (speed, helpfulness and other professional skills shown by the staff), created interior (coziness, comfort) and the atmosphere reigning in it (the possibility of relaxation), which are paid by the visitor at a certain price (the total amount of the average check) [2].

Regardless of the dynamics of economic transformations in the country, restaurant establishments have always faced the problem of positioning in the market. The determining factors of such a situation are the specifics of the market and the nature of the institution itself in such a sphere. In addition to the menu and prices, an important factor in the competitive struggle of restaurants is not only the location and arrangement of the premises itself, the target audience, related services and products that the institution can provide, as well as the way of delivering information to its target audience. This encourages restaurant establishments to use the marketing communications system in a slightly different way in their activities.

2 Decision

Attraction of guests is the key goal of the restaurant's marketing communications, precisely in order to achieve the final result - customer loyalty, it is necessary to consistently carry out all the stages that are indicated on the picture 1.

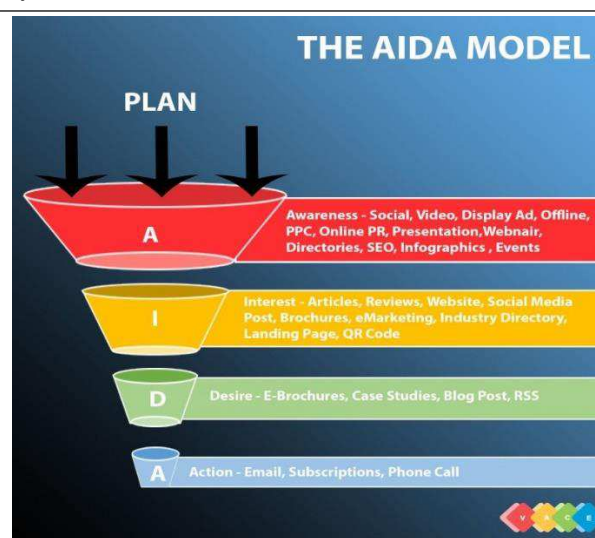


FIGURE 1. Model of marketing communications [3]

At the first stage, it is very important to solve the problem associated with increasing the level of awareness among the target consumers, it is difficult to count on something if no one knows about the existence of the restaurant.

At this stage, it will be a great option to organize various webinars, exhibitions where the restaurant will be mentioned, and it will also be effective to set up SEO optimization and launch video advertising on Facebook and Instagram social networks [4].

The next goal is to form the "correct" attitude to the project, brand, concept. The "right" attitude in this case will be evidenced by the perception of the brand by consumers. At this stage, the restaurant's website and social media are important because it is the most effective channel for attracting visitors. Nowadays, it is very important for the website of the restaurant to be easy in use. Social media posts should be published every day, because today social media marketing allows you to build a loyal audience, effectively advertise events or services, inform about promotions and news, as well as create viral promotions and advertising campaigns. Having achieved the targeted

awareness and formed an attractive image for our target audience, we can proceed to the final stage of communications - stimulating demand for restaurant services. In this phase of the process of advertising and information communication with the target guest, it is necessary to encourage him to visit the restaurant. At this stage, you can already use email marketing and pleasant promotions for regular visitors of the restaurant.

3 Conclusion

A competent choice of the scale of the goal allows you to use those marketing communication tools that will make

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Sumtsova Y, Odinokova T, Kuznetsova N

important information contacts with consumers the most effective. If you need to promote one restaurant of a "regional" scale, there is no expediency for the entire population of a country or a metropolis to know about such a restaurant; it is enough to achieve a high level of fame among those who are physically able to frequently visit this restaurant in the future. If we are talking about a network project with distribution throughout the city, then the main goal will be to inform all target consumers living in this metropolitan area. In the process of further development of the chain, the high level of brand awareness will facilitate the promotion of the services of certain new restaurants

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The role of marketing communications in improving the efficiency of insurance companies

Sumtsova A^{1*}, Odinkova T¹, Kuznetsova N²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College; Economics, Entrepreneurship and Marketing Department, V, Ukraine

*Corresponding author's e-mail: asmtsv@gmail.com

Abstract

Marketing of insurance organizations plays an important role in ensuring the stable operation of insurance organizations in the face of passive demand for insurance services, since it affects all areas of insurers' activities. Marketing communications help to promote insurance services, stimulate demand for them, activating the incoming cash flows of insurers. Classic insurance organizations can use marketing communications to form balanced insurance portfolios and strengthen their position in the market. This allows the Ukrainian insurance market to be freed from pseudo-insurance companies and pseudo-insurance operations.

Key words: insurance services, marketing communications, insurance market.

1. Introduction

Through marketing communications, insurers increase their ability to accumulate the financial resources needed to meet their insurance obligations.

The decisive factor in the formation of the marketing strategy of the insurer is the insurance market, the development of which requires a quick response from participants for a profitable and stable activity. Therefore, systematization and reliable knowledge of the insurance market in modern conditions of crisis trends are of particular importance for the success of the insurer.

The development of requirements for insurance products is the process of determining their properties that best suit the needs of policyholders and match the preferences of consumers in terms of the form of organization of the insurance product. [1]

This list includes:

- interest accepted for insurance (insurance objects);
- insured risks (insurance coverage);
- the price of the insurance product;
- additional services provided by the insurer, in addition to compensation for damage (legal services, repair of damaged property, etc.);

The ultimate goal of marketing communications in insurance in a narrower sense can be expressed by the following formula: "To find such policyholders who bring the company more than it is worth attracting and satisfying their existing insurance needs. It is the art of pleasing the client. while satisfying the owners of the insurance company. Consequently, marketing communications in insurance cannot be effective if they are not based on an analysis of potential and existing insurance markets. [2]

In the competitive insurance world, customers seem to have unlimited access to tools to help them weigh their options and make informed choices. Insurance marketing communications strategies should focus on impressing potential customers and outperforming competitors'

offerings; allowing insurers to make a profit.

To help insurers understand what can help them stand out on comparison sites, I've done a quantitative survey of opinions on the various factors that motivate people to subscribe. [3]

Table 1 below shows how the four main motivations for registration vary depending on the type of insurance.

	Life	Home	Vehicle	Travel
1				
2				
3				
4				

Key

- Free gift when you join
- Payment plan options
- Easy to understand terms and conditions
- Low deductible rates
- Promise of a no claims bonus
- If a financial advisor recommended it

Tbale 1

1) free gift

Using a free gift to promote your services is the most versatile motivator, as it is great for getting noticed and increasing your response rate.

2) Payment plan option

Competitive pricing will always be an important part of an insurance marketing strategy.

3) Bonus for no claims

With that in mind, it makes sense for vehicle and travel insurance marketers to highlight this in their marketing and, of course, make it visible on all comparison sites they post.

2 Overview

The paper examines the marketing communications methods in the practice of insurers and some tips that help insurance marketers increase responses on comparison sites.

3 Decision

In modern conditions of the development of market relations, many problems of the functioning of the insurance market are solved with the help of marketing communications, which gradually became the basis for organizing the activities of modern insurance companies. The main criterion for the effectiveness of the use of marketing communications and methods in insurance companies is the financial result, which is formed as a result of the competently performed work of the marketing service.

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4 Output

The modern theory and practice of insurance marketing is inextricably linked with the growing importance of communications, the role of which in the context of heightened competition in the market is increasingly becoming the basis for developing a marketing strategy for an insurance organization. At the same time, marketing communications, being a way of delivering messages to the target audience, are aimed at informing consumers about the insurance company and its products, and also form an attractive image of the insurance company.

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Intellectualization of the production management systems of the enterprise

Sofiia Khrustalova *

Kharkiv National University of Radio Electronics, Ukraine

*Corresponding author's e-mail: sofia.khrustalova@nure.ua



Abstract

The work shows the necessity of intellectualization of management systems of the enterprise. A number of generally accepted systemic solutions in the field of production management systems are considered. The problems in developing intellectual systems of management of production activities of enterprises are determined and the ways of overcoming them were elected. The approach to forming the knowledge base of the intellectual system of management of the production activity of the enterprise is given, the choice of the intellectual method for the process of removing knowledge is substantiated, the use of a limited selection method with the use of an additional algorithm for processing and analysis of data is proposed, a model of knowledge submission (production model) is determined.

Keywords: intelligent system, production management, knowledge base, knowledge model

1 Introduction

Today, more and more manufacturers companies introduce various production management systems. In recent years, a number of generally accepted systemic solutions in the field of production management systems are formed - these are systems of SSP classes (system planning systems), PPS (production planning systems), and PMS (production process management systems).

By combining all classes the only information structure of the enterprise, which includes: shop level, sensors and executive mechanisms, programmable logical controllers, dispatcher management and data collection, management process management system, enterprise resource planning.

One of the basic elements of the organization and management system of the enterprise are MES systems that are intended for synchronization, planning, coordination, documentation and analysis of production processes: from the launch of the party to the release of finished products.

As a result of the integration of industrial production and IT technologies, a colossal effect is provided in terms of optimization and automation of business processes.

Intellectualization of production management systems of enterprises is the urge of the need for modern enterprises, in which, in addition to the possibility of automation of their management systems and organizations in the framework of virtual enterprises to combine distributed resources of participants [1], there was an opportunity to use experience and knowledge of managers and personnel.

2 Overview

The following main stages of formation of the knowledge base of the intellectual system of managing the production activities of the enterprise are considered in the work:

- An approach to the development of bases of

knowledge of the intellectual system of managing the production activities of the enterprise is chosen

- The choice of the intellectual method for the process of removing knowledge is substantiated
- Proposed use of a limited selection method using an additional algorithm for processing and analyzing data
- The model of knowledge submission (production model) is determined

3 Decision

To date, research in the field of development of intellectual systems that perform the role of an expert and consultant lie on the main direction of computer IT development. At the same time, there are undoubted issues that are relevant to the formation and submission of knowledge, the identification of laws in knowledge, the formation of decisive rules, acceptance and substantiation of decisions.

A distinctive feature of intelligent information systems is the presence of a knowledge base. A knowledge base (KB) is a special kind of database that is designed to manage knowledge (metadata), that is, the collection, storage, search and delivery of knowledge. A set of facts and rules of output that allow logical output and meaningful processing of information is understood by the KB. There are three knowledge strategies [2, 3]: 1) knowledge acquisition; 2) knowledge extraction; 3) knowledge identification. The process of taking away knowledge at the initial stages of designing intelligent expert systems is one of the most complex and time-consuming, and it does not always end successfully, since databases in subject areas that are poorly structured and contain incomplete, fuzzy, diverse and contradictory information. Therefore, one of the promising approaches to solving these problems is the use of Data Mining intelligent methods - modern incarnations of the

main ideas of artificial intelligence, the main tasks of which are the search for functional dependencies and logical laws in accumulated information, the construction of models and rules that explain the found laws.

BZ can be represented by a set of rules based on which the logical output algorithm determines the source data. For processing and analysis of data, it is proposed to use a limited selection method using an additional “Apriori” algorithm, which excludes the analysis of low frequency logical events. The use of a production model, unlike others, attracts it’s visually, high modularity, the ease of add-ons and changes, a simple mechanism of logical conclusion.

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4 Conclusion

The need to intellectualization and informatization of management processes is due to a sharp increase in the requirements for the flexibility of production and efficiency of acceptance of managerial decisions.

The use of methods and algorithms of artificial intelligence in the construction of production management systems of the enterprise, which are based on expert knowledge in the subject area, allows you to take into account the specifics of technological and production processes, to increase the efficiency of the enterprise as a whole.

Self-employment of the population of Latvia as a basis for the development of small business and the formation of the middle class in society

Elena Sventitskaya*, Yuri Kochetkov

Baltic International Academy, Latvia

**Corresponding author's e-mail: elenasventicka@inbox.lv*



Abstract

In terms of the level of self-employment development – the number of enterprises and self-employed persons –, Latvia is very close to the average for the European Union. Self-employment is a transitional form from hired labour to entrepreneurship and contributes to the formation of the middle class in society. Self-employment of the population in Latvia has a positive effect on the level of employment in the country, the rate of economic growth and tax revenues to the budget. This takes place in the absence of government aid to self-employed persons. There is a significant unevenness in the development of the country's regions and there is a need to pay more attention to the development of self-employment, primarily in the lagging regions.

Keywords: self-employed persons, unemployment, expert assessment, lagging regions

1 Introduction

The world experience of the past decades of the 20th century and the beginning of the 21st century shows that small and micro entrepreneurship is an important condition for the recovery of not only the economy, but also of the entire social life of society, especially during and after economic crises. Therefore, increased attention has been paid to the development of small business. The European Union (EU) has developed and applied tools to support small businesses in accordance with the European SBA (Small Business Act) [1]. In the European Union, micro and small enterprises account for 98.9% of all enterprises, where micro enterprises that employ 1–9 people make up 93% [2]. According to statistics, micro-enterprises employ 29.5% of all workers in the EU. The number of self-employed persons in the EU exceeded 33 million in 2018. This amounted to about 17% of the total number of employees. In Latvia, 105.5 thousand people are self-employed (13.1% of all employees) [3]. The share of self-employed workers in the workforce is linked to economic cycles, shrinking in good times and increasing in bad times. In terms of the level of self-employment development – the number of enterprises and self-employed persons –, Latvia is very close to the average for the European Union.

2 Analysis of situation

In international statistics, the employed population is usually divided into three groups: self-employed people, employees, unpaid family workers. Since self-employed persons organise their own business, they are classified as entrepreneurs. Unemployment is a socio-economic phenomenon in which part of the economically active

population is not employed in the production of goods and services. Unemployed persons, along with the employed, form the labour force that is offered for employment in the labour market, but may not be in demand by employers. A potential employee (unemployed) may not find a job offer that is worthy in his/her opinion and a job with the appropriate characteristics, including the offered salary. Thus, a situation is created in which hired labour can be replaced by self-employment [4]. Under certain circumstances, a person, both unemployed and employed, may have a desire to start his own business, to become a self-employed person. Self-employment is a type of employment based on labour activity without formal labour relations (with an employer or as an employer), and which is often associated with small business in trade, services, etc. [5]. The state is interested in the development of self-employment of the population. Having organised his/her own business, the unemployed or simply unemployed employs him/herself and can gradually increase the number of jobs, helping the state reduce unemployment and ensure economic recovery.

Self-employment is a transitional form from hired labour to entrepreneurship and contributes to the formation of the middle class in society. Therefore, the stated research topic is relevant for Latvia. The aim of the research is to identify the specifics of self-employment of the population in Latvia. The object of the research – the enterprises of self-employed persons in Latvia. Research methods: analysis of statistical data, expert assessment.

To determine the desires and wishes of self-employed persons in Latvia and identify their reasons, at the end of 2020 – the beginning of 2021, a survey was conducted both among self-employed persons and among employees of micro and small enterprises. In total, 217 respondents were

interviewed, of which 113 were self-employed persons. Almost half of the respondents – 49.68% – assessed the assistance from the state as unsatisfactory giving only 1 point; 31.45% of respondents gave 2 points (very bad) and 17% – 3 points (bad). Less than 2% of respondents gave positive assessment: 4, 5 and 9 points (according to a 10-point scale). It can be said that the European System of Small Business Assistance (SBA) practically does not work with respect to the self-employment sector of the country's population. Among the employees of micro and small enterprises, more than 2/3 of the respondents did not express a desire to become self-employed persons. Most of these employees expressed a desire to move to larger enterprises. State registration of self-employed persons is carried out as an individual entrepreneur or legal entity [6]. The fundamental point that distinguishes a self-employed person from an individual entrepreneur or company owner is the absence of employees. As soon as a self-employed person takes on an assistant under a contract of employment, s/he actually buys labour and appropriates surplus value, therefore, moves from personal labour or craft relations to the exploitation of the labour of other people. This person is

no longer a self-employed person, acquiring the classic characteristics of an entrepreneur. The rise in self-employment has reduced the unemployment rate and stimulated the development of small businesses in many EU countries [7].

3 Conclusion

Self-employment of the population in Latvia has a positive effect on the level of employment in the country, the rate of economic growth and tax revenues to the budget. This takes place in the absence of government aid to self-employed persons. It is very difficult to get the necessary financial resources for aspiring entrepreneurs. Most of them do not use borrowed resources due to the lack of the possibility of obtaining profitable loans. There is a significant unevenness in the development of the country's regions and there is a need to pay more attention to the development of self-employment, primarily in the lagging regions. The main factors hindering the development of self-employment of the population in Latvia are rather high taxes on employees, instability of tax policy and a cumbersome reporting system.

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Improving of the branch management structure of a commercial bank

Elena Koptseva*, Ivars Linde

ISMA University of Applied Science, Riga, Latvia

*Corresponding author's e-mail: elena.koptseva@gmail.com



Abstract

At the present time the trends in the market of the banking products and services are determined due to intensive development of modern information technologies. The use of such technologies allows banks to expand the range of simultaneously provided services, bring them closer to the client, reduce customer time and bank transaction costs. In this work the new approach to improve the branch structure of a commercial bank was defined.

Keywords: commercial bank, branch, management structure, development and improvement of the management structure, information technology

1 Introduction

Recently, the number of branches of various banks has decreased by 2-3%. This is primarily due to the development of remote customer service. But this situation prevails mainly in large cities. There is even an increase in the number of branches in sparsely populated areas and rural areas. Representatives of many banks report that they are not planning to reduce the branch network, but are developing an optimization of the regional network. For example, the Russian bank VTB has opened more than 50 new branches; the whole bank's network includes about 1,500 offices.

In the United States in recent years, there has also been a tendency to reduce the number of physical branches of banks. Most of the issues related to the bank account can be solved at home using a computer or smart phone. Attendance at a branch is required when opening an account, making a loan or making changes to accounts. Just like in the USA, the main part of branches in China, about 40 thousand, are in rural areas. In many cases, there is integration with post offices or large supermarket chains.

Downsizing branches and switching to online services is not always advisable. The introduction of online banking requires customers who are provided with an Internet connection. In addition, the installation and maintenance of ATMs and terminals can be costly. However, the greatest negative effect for the bank may have a decrease in customer confidence due to the massive closure of branches.

2 Decision

The purpose of this work is to describe the author's approach for improving the branch network of banks. The main idea of this approach is incomplete, but partial opening of a branch, which involves several stages.

At the first stage, the so-called "raw" branch should perform no more than one third of all functions. At the same time, the list of functions must be determined according to a

special calculation methodology that provides for the study of the market, industry, customer base and many other factors in a given region. A geo-marketing model should also be developed, on the basis of which the spatial location of the new branch is determined.

The number of client managers and loan officers is also calculated using a special method. The main principle of this technique is that each manager is a specialist in all operations. These universal specialists are mobile and are in a certain branch only at the first stage. The total number of specialists should not exceed four people. Moreover, their functions are equal in the hierarchical ladder. Subsequently, they are replaced by a new team of personnel.

At the second stage, a real assessment of the branch's capacity should be made, which verifies the theoretical calculations. In case of efficiency, this "raw" branch is transformed into a mini-branch. This model is used for optimal cost-benefit ratio.

In the next step, the mini-branch does two-thirds of the work of a standard branch. At this stage, the general-purpose specialists are replaced by the core team of workers. At the same stage, banking products are expanded and activities are standardized. The main criterion for the effectiveness of the second stage is positive profitability.

At the last stage, the mini-branch is upgraded to a full unit. At this stage, the main part of the portfolio investment takes place from the parent bank, which gives more flexibility to the branch. Regular optimal performance audits of the branches should also continue.

3 Conclusion

This partial opening of a branch in several stages minimizes risks and allows the branch to instantly adapt to the specifics of the given region, while increasing the branch's profitability and customer confidence in this bank as a whole.

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The impact of Leadership and Internal Communications in Organizational change

Olga Verdenhofa, Jasmeetsingh Tuteja*

ISMA University of Applied Sciences, Latvia

*Corresponding author's e-mail: willjasmeet@gmail.com



Abstract:

The research what academics shows that 70 percent of the Change projects fails. Resistance in the broader workforce but also resistance in the leadership team in the company is often very high to make kind of changes. There is an alternative approach of change management by considering organizations as complex structures. Also, how storytelling and efficient communication plays an important part in efficient change. The systematic critical review allows to understand how a change can be resisted by an employee if there is lack of effective leadership in the change management process. Gradually in the finding section of this review, how leaders play an important role in Organizational change by overcoming factors such as resistance, behavior and emotions is depicted.

Keywords: Change Leadership, Employee Resistance, Organizational Agility, Organizational Change, Organizational Behavior.

1 Introduction:

Briefly stated, it is that change occurs when one becomes what he is, not when he tries to become what he is not. Change does not take place through a coercive attempt by the individual or by another person to change him but it does take place if one takes the time and effort to be what he is – to be fully invested in his current positions. (Mark Hughes, 2019). Recently many articles have suggested to focus on the emotions of the employees and tackle them during the transition period and that requires a good leader to do so. If a leader is unauthentic it's hard to connect and get inspired and get motivated by them (Emma Bell). We don't always spend enough time thinking about what it takes to actually make the changes we seek. Organization agility towards the incoming changes makes the project execution successful. Change management plays a very critical part to make an Organization agile towards the changes. The readiness of the organization for the incoming change; organizing training and development where necessary; handle resistance and positively reinforce the change overall demonstrates the good management of change in an organization through good leadership forces. The assumption made about the change that it is resisted and therefore it is all about overcoming resistance. 2A company transformation is a holistic, top-priority endeavor that requires aggressive focus from the management team to reach the full potential of a business.

CHANGE CHARACTERIZED BY HOW IT HAPPENS:

Theories of planned change:

Planed linear models provide logical and sequential prescriptions for Organizational change and attempt to

codify and simplify the process in a planned sequence of stages. These models do provide useful checklists for managers and leaders in terms of what needs to be considered when planning change as they map out the process from the first recognition of the need for change through to the practicalities of implementation. By attempting to laydown various steps, objectives and methods in advance, it is suggested that the theory of planned change is too dependent on senior managers, who in many instances do not have a full understanding of the consequences of their actions (Hodges, 2019:44).

Complexity theories:

The origins of complexity theories can be traced to physics, mathematical biology, meteorology, computer science and system thinking. The essence of complexity is the idea that natural systems are characterized by dynamism, non-linearity, and unpredictability, rather than simply equilibrium, order, and predictability. Within the context of complexity theories, organizations are viewed as natural systems as natural systems that do not necessarily follow the strategic plans of managers and within such systems Organizational change is viewed as emergent, unplanned, and iterative. This kind of change tends to be impossible for leaders to effectively identify, plan and implement because, unlike planned change, it is not based on pre-defined steps and top-down leadership approach. Instead, emergent change is unpredictable and includes a great deal of uncertainty (Hodges, 2019:46).

Contingency theories:

Instead of Organizational change being either planned or emergent, the contingency theory advocates creating

synergy between the two and adopting the most appropriate approach that matches the context/situation in which the organization is operating. The contingency approach to Organizational change is founded on the premise that the structure and performance of an organization are dependent on the situational variables that it faces since no two organizations are alike, and will not necessarily face the same contextual variables as their operations and structures may be different.

Processual theories:

Processual theories of Organizational change are based on the assumption that change occurs as a complex, dynamic, non-linear, temporal, and emotional process. Such theories recognize that unplanned, unforeseen, and unexpected events will happen and that, consequently, Organizational change cannot be reduced to a list of sequential steps. In other word change is continuous rather than as a movement form one state to another. The processual perspective is not making a statement against planning for change, rather it is pointing out that change is unpredictable and, consequently, that there will be a need to accommodate and adapt to the unexpected, the unforeseen twists and turns, the omissions and revisions that are all part of managing the process of change overtime (Hodges, 2019:49).

Theories of cyclical change:

Implicit and often explicit in the Organizational change literature is the notion that each theory of Organizational change is an improvement on earlier theories. The cyclical theory of change fits this view as it provides a more realistic perspectives I terms of a better understanding of Organizational change. A cyclical model for Organizational change can also serve as a continuous and holistic approach and one that accelerates momentum and agility. This approach is, therefore, a more realistic way to view Organizational change than the traditional approach (Hodges, 2019:50).

CHANGE CHARACTERIZED BY SCALE:

Discontinuous change:

Discontinuous change refers to change which is characterized by rapid transformations that can be triggered by major internal issues or by external crises. Discontinuous change is often a one-off event that takes place through large, widely separated initiatives, which signify a single, abrupt shift from the past and is followed up by long periods of consolidation (Hodges, 2019:50).

Gradualism:

Gradualism posits that change is continuous and occurs through a process of successive, limited and negotiated gradual shifts. Such incremental change is about doing things better through a process of continuous fine-tuning, adaptation, and modification (Hodges, 2019:51).

Transformational change:

Transformational change means doing different things that impact on the strategy, such as Amazon moved from being an e-commerce bookseller to a content publisher, to a producer of programmes. This pattern of change is also referred to as strategic, radical, or revolutionary (Hodges, 2019:52).

Punctuated equilibrium:

Neither gradualism nor transformational patterns of change work well in isolation; instead the change history of the average organization tends to involve long periods if incremental tweaking punctuated by occasional bouts of frantic, crisis-driven change. This more dominant pattern of change is known as punctuated equilibrium which means that rather than change being either incremental or transformational, there is an interplay between the two.

2 Discussion

CRITIQUE OF KOTTER'S EIGHT STAGE CHANGE:

The main challenge in evaluating Kotter's Eight Stage vision of leading change in the academic context is where is the evidence? (1) establishing a sense of urgency (2) forming a guiding coalition (3) creating a vision for change; (4) communicating the vision (5) empowering people and removing obstacles; (6) planning for and creating short-term wins (7) consolidating improvements and producing more changes and (8) institutionalizing the changes and anchoring the new culture.

In Hughes (2019), seven weaknesses were highlighted in Kotter's (2012) Leading Change. 1. Employee depicted as change resisters. 2. Ethics, power and politics underplayed. 3. Overemphasis upon a sequence of linear steps. 4. Disparaging history limits learning and an appreciation of incremental change. 5. Leader and leader communications overemphasized. 6. Under emphasis on unique cultural contexts. 7. Rhetorical treatment of organizational success/failure.

CRITIQUE OF LEWIN'S THREE STEP CHANGE:

In order to understand the value of any shared reality, we need to observe what people actually do and how they respond to the world around them. Those who resist change do not have any explicit, rational plan to block change. They are simply responding to an unconscious feeling of threat to their reality. So, change leadership or management is an ongoing, continuous activity. The notion of unfreezing and refreezing the process in a 'one step at time' sequence does not work in reality. So, change leadership or management is an ongoing, continuous activity. The role of the leaders should be to be get the best outcome from the interaction of the networks that make up the organization by strengthening the connections within them, creating a culture of change by choice where individuals are challenged to influence the thinking and actions of their colleagues and enable effective change. We can change the process, improving

them through lean design or by creating new ones, but the adoption of those changes and the way in which they are implemented is a choice based on past experiences 'just another management fad!' and future expectation 'it'll never work!' (David Bentley, 2018)

3 Findings:

To understand and respond to how individuals react to change, a key principle for engendering Organizational change engagement is empathy. Leaders and managers have a key role to play in supporting the emotional side of Organizational change. However, many may find managing the emotional side of change daunting and mistakenly believe that emotions have no place at work and should be relegated to the personal or social realms of life. Emotional intelligence can support managers in empathizing with and addressing reactions to change. (Hodges, 2019:170)

The story telling method can have various concrete effects on an organization. Those who had previously felt left out or ignored got a chance to express their ideas and recommendations. The stories appeal to their emotional side and make them happy, angry, compassionate, or understanding. Story telling can also initiate change processes in an organization because learning histories encourage active dialogue about processes and behaviors among employees that can result in transformation. Story Telling in change process develops a vision of the future that is shared by managers and employees. Also, it can also be used for the analysis of Organizational Culture and conflict management (Their, 2018). In brief, Storytelling creates

awareness, sensitizes employees to the culture of an organization and colleagues in other branches, benefits communication, and act as a catalyst for concrete changes.

Leaders and managers need to understand the power and politics within the organization, especially as power and politics can be used to impact on change either positively or negatively. Leaders and managers who use their expertise, knowledge, skills, and capabilities to engage stakeholders with organizational change are more likely to gain their commitment, rather than those who will their power to coerce and threaten them. (Hodges, 2019:124).

4 Conclusions:

It is vital for business to understand there is no 'one size fits all' approach to change management. No two organizations, stakeholders, or change initiatives are ever the same, and every situation will require different interventions at different times to make the change successful. A linear set of activities, planned in detail at the beginning of the change and executed at pre-determined times in a pre-agreed way, will not result in successful change. Leaders and consultants need to be aware that their team members are not entering change situations with a blank slate (Tasler, 2017). That is why change leadership and effective communication plays a vital role in successful change. However, Organization must understand the need to hire right leaders so that the agility of an Organization during the transition can help any internal or external risks. The uncertainty and complexity of organizational change requires individuals to be able to make sense of it and it will only make sense through effective internal communications.

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Charity as an effective marketing tool

Vadim Shiryayev*

ISMA University of Applied Science, Latvia

*Corresponding author's e-mail: vadbaltic@gmail.com



Abstract

With the growth of consumer interest in social topics, the attention to it from the side of marketers increases as well. For brands, working in the area of philanthropy and social responsibility is not only one way to build customer loyalty, but also a way to increase sales. However, contrary to popular belief, the development of a corporate social assistance program within the company can solve a much wider range of tasks, in addition to image challenges. The article examines the image effect and the increase in sales from the placement of the emblem of NPO charitable organizations on food packaging.

Keywords: charity, NPO, marketing, PR, reputation advantage

1 Introduction

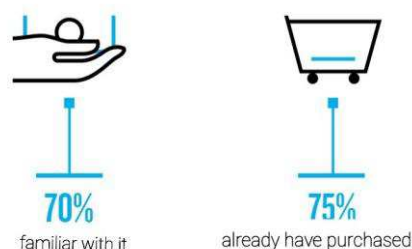
At present, 7 out of 10 consumers in Russia actively support the idea of charity and social responsibility and make donations personally: with money, things or bonuses - these are the conclusions of the Pro Bono study by Nielsen for the Life Line fund to help seriously ill children. Of these people, 44% donate money to charitable foundations, while every fifth (21%) prefers to participate in charity only in a non-monetary way [2].

Often, the audience of charitable foundations is promising in terms of age and ability to pay consumers, who are of interest to manufacturers of mass goods. Marketing mechanics of interaction between funds and brands can lead to a win-win effect, when the brand, the fund, and the consumer receive benefits. And for the brand, the advantage lies in both the image effect and sales growth. A particular example is the launch of products with special "charitable" designations on the packaging.

Charitable foundations are an important and promising audience for marketers, especially considering that 84% of family purchases are made by women. And women, in comparison with men, when buying, pay more attention not only to the benefits and quality of products, but also to the opportunity to contribute to charitable or socially significant programs. Supporting such areas can become an additional advantage over competitors and one of the ways to increase sales for brands.

The customer awareness with charity brands and emblems is shown in Figure 1 [3].

Joint projects for brand placement on packaging



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FIGURE 1 Awareness with charity brands on packaging

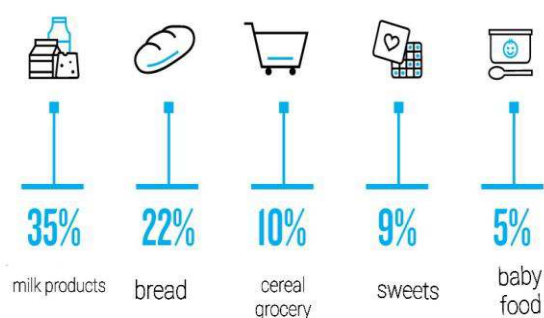
Half (50%) of the respondents admitted that for them the social responsibility of the company and deductions from purchases to charity are an important criterion when deciding whether to buy a particular product. And one of the simplest and most affordable ways of marketing interaction between brands and foundations is joint projects to place their logo on the manufacturer's products, which transfers a certain amount from each purchase in his favor. This way of participating in charitable activities is relevant for every third respondent (30%). Moreover, 70% of respondents said that they have seen products on sale, and 75% of them bought such products.

There is great potential for this approach, but it can be difficult for foundations to convince a brand's marketing team that a joint initiative will have a positive impact on sales, which is why few use this solution [1]. One of the organizations that approached this on a large scale was the Life Line fund for children, which launched a campaign with the manufacturer Belaya Dacha. As a result, this initiative not only attracted consumers' attention to charity, but also had a positive effect on sales: every third participant in the Nielsen survey admitted that they had seen products

with the Life Line logo on sale, and 65% of them bought this particular product [4].

The most popular groups of goods for placing an emblem of a charitable foundation or mentioning that part of the proceeds on sale will go to the needs of charity are shown in Figure 2.

The most popular products for charity brands placement



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FIGURE 2 Group of products

The most popular were the essential products: milk and dairy products (35%), bread (22%), cereals and groceries (10%), chocolate and sweets (9%), baby food (5%). Those products in which the strongest competition and additional attention-grabbing will come in handy [2].

2 Overview

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This paper discusses the advantages, disadvantages and conclusions on the following issues:

- The need to use marketing in the work of non-profit organizations and foundations:
- Additional benefits for corporations: increased profits and increased customer loyalty:
- Benefits of mutually beneficial cooperation:
- Ready-made solutions for placing the logo of a charitable organization on certain groups of goods.

3 Decision

The fund audience is a promising consumer segment in terms of key characteristics.

For the successful integration of the brand and the fund, it is important to find the right category, the greatest potential is seen in the categories of essential goods (in particular, everyday food products) and “emotional” categories (due to their relatively high cost and logic, “I not only pampered myself, but also made Good deed”).

4 Conclusion

Charity participation in Russia is high, and in the context of limited opportunities to donate money, consumers may find meaning in alternative charitable processes, such as buying goods that contain information about the transfer of part of the funds to charitable foundations. Collaboration between corporations (in particular, those producing food) and charitable foundations can provide an additional competitive advantage. Collaboration between corporations (in particular, those producing food) and charitable foundations can provide an additional competitive advantage.

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Competitive strategies in the covid-19 pandemic

Vladislava Belitskaya¹, Tatyana Fedartsova²

¹The Belarusian State Economic University, Belarus
Corresponding author's e-mail: excellent2018@bk.ru

²The Belarusian State Pedagogical University named after Maxim Tank, Belarus
**Corresponding author's e-mail: fedartsova_t@mail.ru*



Abstract

The article examines changes in the competitive strategy of organizations during the COVID-19 pandemic

Keywords: competitive strategy, business strategy, digitalization of the economy, optimization, pandemic, COVID-19

1 Introduction

In a progressively developing world, the topic of competition and competitive strategies is becoming more and more relevant. Progressive competitive relations are just beginning to develop in Belarus and there is a need to develop strategic plans and apply competitive strategies.

2 General

Competitive strategy is a set of solutions required to achieve set goals within a specific business. By implementing a certain competitive strategy, the firm determines its position relative to its rivals, which in turn contributes to a competitive advantage [1, p. 35]. In the need to begin work on the competitive development strategy that characterizes the competitive environment of the firm, Michael Porter developed one of the first and best-known classifications of business strategies. Today's industries can be viewed as complex adaptive systems that develop through several stages of the life cycle (birth, growth, maturity and death) [3, p. 127].

The speed of the transition from one stage to another can decrease or increase due to the influence of a number of factors affecting each life cycle of the industry, such as technological changes, environmental uncertainty, competitive dynamics, changing consumer preferences. These factors must be analysed by each firm in order to organize and establish the most effective competitive behaviour for implementation in its industry. Understanding these factors is required for all firms, as their influence can change the structure of the industry. These changes can force firms to rethink their strategies, for example, to adopt a different technology or to try to create new sources of competitive advantage. For these reasons, current industries and competitive environments are viewed as adaptive systems: in such systems, products and production methods develop in accordance with new models, which are often completely different from those adopted in the past [2, p.85]. However, developing systems should not only be viewed

from a negative point of view. Whereas change can pose a threat to the competitiveness of a firm, it can present an opportunity to exploit its rivals.

It is difficult to find an enterprise that does not change its business strategy in connection with the COVID-19 pandemic. For many companies, the already developed development strategies become irrelevant: companies are looking for new formats of trade and communication with customers, the demand for goods and services is changing. Now the situation is stabilizing, but the conclusions drawn from the restrictions regime in connection with the closure of the borders became the starting points for making a decision on the strategic planning of the development of Belarusian companies.

The COVID-19 pandemic has affected the economies of all countries of the world. Globalization has contributed to the rapid spread of economic problems around the world. In some countries, the humanitarian goal of saving as much of the population as possible was achieved by restricting movement. The economic costs of this decision, which led to a decline in the economic performance of these countries and destroyed the global market, led to an economic crisis lasting several years, the consequences of which are difficult to predict.

As recommendations for maintaining the competitiveness of Belarusian companies, we can offer:

1 COST OPTIMIZATION

During a pandemic, business spends all its energy on optimizing costs: with the onset of the crisis, payroll funds began to be revised, employees were transferred to part-time or paid leave, or the size of wages was reduced. The second effective way to optimize costs is to explore opportunities to reduce rental payments. For example, providing rental vacations or reducing rates. For this, personnel were partially transferred to a remote format, and logistics flows were redistributed.

2 DIGITALIZATION OF THE ECONOMY

During the pandemic, companies felt an urgent need to move their businesses to the digital economy. Companies have become acutely aware of the need for online transactions. This has become a key criterion by which a client chooses a particular product or service. The company will gain a competitive advantage by digitizing its business: online ordering, online payment, remote consultations, etc.

The pandemic has intensified the development of electronic payment technologies. The growth of e-commerce has prompted an increase in the demand for electronic payments. Pneumonia (SARS) of 2003 in China, provoked the first increase in the need for digital payments and showed the world their importance. [4, p.56]. A striking example was the Chinese company "Alibaba, which launched Taobao - an online e-commerce resource, and then Alipay was created.

3 ELECTRONIC DOCUMENTATION

The remote format of work, which has become in demand during the pandemic, has increased the importance of electronic document management for the market. Thanks to the advance digitization, the companies managed to keep the terms of payments to their partners at the same level.

4 FLEXIBLE APPROACH TO WORK

The surging demand for certain services during the

quarantine period has led to an increase in demand for effective digital customer relationship management services in various industries. Companies will be able to maintain competitive.

7 Conclusions

To maintain competitiveness, Belarusian companies must adopt new competitive strategies, such as:

1. Optimization of costs
2. Digitalization of the economy (online ordering, online payment, remote consultations),
3. input of electronic documentation,
4. flexibility in the work and interaction of the state and business (business support by the state). These recommendations run counter to our usual medium-term planning. Since usually, the priority for commercial companies is not so much cost reduction as income growth and business expansion. But in this situation, these recommendations are fundamental for maintaining the viability of the business sector and the economic well-being of the state. Those companies that will be able to quickly respond to current challenges in the industry and make adjustments to the work of the organization will retain their positions in the market.

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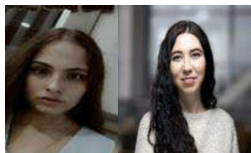
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The role of innovation in business development

Eleonora Doronina^{1*} Gulnara Tashmatova¹

¹ISMA University of Applied Sciences

**Corresponding author's e-mail: lanamitchell@gmail.com*



Abstract

The changing world and global trends present both challenges that must be met and opportunities that can be seized by creating and implementing innovations. This once again underscores the relevance of the topic of innovation. The experience of economically developed countries shows that the winners in the competitive struggle are those who build their activities primarily on the basis of an innovative approach and the main objective of the strategic plan is the development of new goods and services. Implementation of innovations is more and more considered by them as the only way to increase competitiveness of goods produced, to maintain high rates of development and profitability level. Therefore, enterprises, overcoming economic difficulties, began to conduct their own development, the field of product and technological innovation. Around the world, innovation today is not a whim, but a necessity for survival, maintaining competitiveness and further prosperity. The purpose of this article is the study of innovative development, considered the effective development of business with the help of innovations.

Key words: innovation, innovation development, innovation potential, innovation policy, sources of innovation, competitiveness,

1 Introduction

Modern trends, such as the emergence of breakthrough technologies and digitalization, are leading to a radical transformation in all industries. Today it can be considered unequivocally proven that innovation plays a huge role in any entrepreneurial activity. Innovations can concern any aspect of the entrepreneurial process. These sides can be the creation of fundamentally new products or products of improved quality, the introduction of new technological processes, the use of new materials, the expansion of markets and/or the creation of new markets, the introduction of new organizational forms. In such an environment, companies in any industry need to develop and implement innovations more and more quickly to ensure sustainable competitiveness. Innovation is essential for business development in a digitalized environment. According to studies, companies around the world believe that the implementation of innovative technologies plays a crucial role in business development. At the same time, 41% of managers believe that radical innovations pose a significant risk in business

2 Main part

Success factors in the development of innovation

1. Innovation strategy is a key factor of innovation success. Business strategy and goals should include innovation priorities, key tools to achieve them.
2. It is important for companies to search as widely as possible for opportunities. They can look for ideas by monitoring trends and working with customers to identify early opportunities and threats to the

business, create and develop, new business models based on existing competitive advantages, and systematically work with a wide range of external partners, such as companies from related industries, startups, laboratories and research institutes. This is necessary to ensure access to a large number of advanced approaches and technologies.

3. For successful development of innovations, companies need to have the appropriate organizational structure and resources - finances, personnel and skills. Creating a separate structure to implement non-core projects also helps in systematic work with innovations. At the same time, it is important for companies to be very flexible in reallocating resources for innovation development from year to year and in the medium term.
4. To work successfully with innovation, companies need to pay special attention to the management system and processes. It is important for businesses to have effective processes for dealing with innovation projects, including the phasing out and timely stopping of projects that are not effective enough, as well as risk management principles and a portfolio management mechanism.
5. The role of corporate culture and motivation is extremely important. Successful companies create a culture of innovation within the organization, prioritize it, involve all employees in the process, and stimulate the search for and elaboration of new ideas. According to a study of effective innovators, a culture of innovation exists in all business functions, including human resources, finance, sales, product marketing, five times more often than in competitors

who are not so successful in conducting innovation. It should be noted that obstacles to the creation and development of innovation in companies are observed in the area of each of the five key success factors.

1. At the level of goal-setting, companies often lack an innovative strategy for winning target customer segments and targeted customer outreach, from which an innovative strategy would follow
2. The work with sources of ideas for innovation is chaotic and reactive, and is conducted only as a result of negotiations with customers or after a competitor has introduced a new product to the market. In addition, companies do not prioritize the search for specific narrowly focused innovations, such as joint work with a supplier to reduce production costs. Also, work on innovation is often confined within the company, which does not sufficiently involve external partners in the innovation process.
3. There is often a lack of resources and personnel with the right skills to work on innovation in the organizational structure of companies.
4. In the corporate culture there is a weak understanding of common goals, necessary for effective functional interaction, as well as a low tolerance for risk in testing innovation at all levels of the company, and especially at the level of managers.

In its essence, any strategic measures taken by an organization are innovative because they are based on innovation in one way or another. Today's market is won by those whose supply outstrips demand. It has turned out to be more efficient to first create consumption structures for high-tech and knowledge-intensive innovations and then start research and development than to make a product and then struggle to implement it. In essence, the innovative way of change means the interruption of gradualism by replacing some elements of the process: goals, methods, principles, while the monotonous way is not only stretched over time, but also conservative. Also innovative development is understood as a chain of implemented innovations. It is more successful when it covers not just one narrow area, but also includes areas affecting the overall result (management, marketing, personnel training, finance, sales, etc.).

Consequently, innovative development must be comprehensive. Any innovative development is not only the main innovative process, but also the development of a system of factors and conditions necessary for its implementation, i.e. innovation potential. Innovation potential includes the availability of financial, economic and intellectual resources, as well as a set of legal, organizational and managerial, material and technical, social and informational factors that determine the level of readiness of the economic system for successful innovation activities. The two main components of the process of innovative development are the implementation of innovative projects and the development of innovative potential. Underestimation of this approach leads to the fact that the characteristics of innovation potential are often considered as indicators relating to scientific and technical, production and technological, personnel or other components of the overall potential of the enterprise or organization. In such cases, the innovation potential of an enterprise is not singled out, not measured and, as a consequence, not purposefully

developed. As a result, the result is not achieved - the growth of new competitive goods and services.

Innovation policy turned out to be a very promising invention, and not only economic, but also social. The point here is that, relying on a flexible mechanism of innovation; firms were able to take over the initiative from the market in shaping demand. The task was no longer to keep up with its variability, keeping ahead of competitors, but to create, even provoke the needs of the mass buyer for new household items, services, etc. by periodically releasing such novelties, of which the potential consumer had no idea yet, but willingly "gulped" them down.

In a broad sense, innovations do not act as a form of controlled development. Many changes arise spontaneously, not purposefully - then they are not considered innovations. But even in the managed sector of development not everything is carried out through innovation. For example, a gradual or one-time increase of the same quality or quantity (increase in the number of staff, improvement of product quality) is not innovation. That is, the appointment of a new manager is not an innovation, but it is the establishment of a new position.

The main purpose of management is the intensification of production, scientific and technological development, and planned innovations.

The following changes, or sources of innovation, are distinguished:

- A sudden dramatic change in the situation: someone's unexpected success or,

On the contrary, a failure, or some impetus from the outside, and as a reaction to this - the emergence of innovation.

The revealed contradiction, incompatibility:

- a) Between some realities of life,
- b) Between reality and people's changed expectations,
- c) Between the changed values and expectations of the consumer (as in the first of these is the "subjective perception," as well as the objective, reality,)
- d) In the course, rhythm, logic of some process.
- The changed needs of some process of production or consumption.
- Market niches or changes in the structure of production.
- Changes in the structure of the population.
- Changes in public consciousness (opinions, attitudes).
- New knowledge (discovery, invention, rationalization), but not per se itself, namely as an impetus for innovation.

Systematicity. Systematic innovations are

1. The result of an analysis of innovation opportunities.
2. Relevance. Innovations must meet the expectations and habits of potential consumers.
3. Focus. Innovations should be focused on a specific need, a specific end result. Simple and directed innovations are the most effective. The more complex the innovation, the higher the risk associated with its implementation.
4. Feasibility. Innovations must be consistent with strategy, technological capabilities, and resource potential.
5. Organizational security. The organizational structure of the firm should correspond to its innovation policy

and changes occurring in the market.

Innovations are connected with a certain share of risk; the possibility of failure is a normal feature of the innovation process. When a business discovers a new need on the market and decides to occupy a niche to meet this need, it develops and masters the production of new goods and services. This, of course, also requires new tools. So there is a necessity of the second type of activity aimed at providing business with updated or absolutely new tools for gaining profit which at the same time are tools for producing updated or absolutely new goods and services. One of the main innovative risks is competitiveness, which is a characteristic of goods (services) reflecting its difference from the competing goods both in the degree of meeting a concrete need and in the cost of satisfying it. To manage competitiveness means to provide an optimum ratio of the named components, to direct the basic efforts on the decision of following problems: improvement of quality of production, decrease in production costs, increase of efficiency and level of service the driving force of competition is stimulus to innovations. It is on the basis of innovations that it is possible to increase the quality of products (services), to improve the useful effect of goods, thereby achieving a competitive advantage of a given product. Thus, ensuring the competitiveness of goods requires an innovative, entrepreneurial approach, the essence of which is the search and implementation of innovation.

3 Conclusion

Thus, let us conclude that purposeful systematic innovative

activity requires a continuous analysis of the possibilities of the sources of innovation it must, correspond to the needs, desires, and habits of people who will use it. You should ask yourself the question: "What should this innovation reflect, so that future consumers have a desire to use it?" The innovation should be simple and have a precise goal. It is more effective to innovate with little money and few people, and limited risk. An effective innovation should aim for leadership in a limited market, in its niche. Otherwise it creates a situation where your competitors will beat you, but also keep in mind that ordinary people will use the innovation, don't throw it around, and don't try to do several things at once. Innovation requires concentration of energy. It is necessary that the people working on it understand each other well. Innovate for the sake of meeting the needs of the moment. Innovation is a job that requires knowledge, ingenuity, and talent. It has been observed that innovators mostly work in only one area. Edison, for example, focused his energies only on electricity. Successful innovation requires intense concentrated work. If you are not ready for it, neither knowledge nor talent will help. Innovation starts small, but the results must be large-scale. The enterprise should be managed in such a way as to create an atmosphere in which new things are perceived not as a threat, but as a favorable opportunity. Each employee must realize that innovation is the best means of preserving and strengthening his enterprise. Moreover, it is necessary to understand that innovations are a guarantee of employment and well-being of each employee. The organization of innovative activity on the basis of the specified principles will allow the enterprise to advance, to achieve success.

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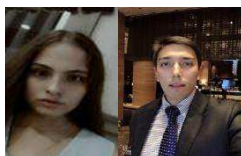
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The principles of time management in the management activities of business organization leaders.

Eleonora Doronina*, Akmal Khudaykulov

ISMA University of Applied Sciences, Uzbekistan

**Corresponding author's e-mail: lanamitchell7902110@gmail.com*



Abstract

Guided by the principles of business organization managers based on time management techniques, it is possible to make decisions more quickly and increase labor efficiency. A set of principles can be compared to a well-constructed manual for achieving results over a specific period of time. The purpose of this article is to identify the main principles of business organization managers' activities when using time management techniques aimed at improving efficiency. The main directions of the Manager's principles are analyzed and the influence of time management on the success of management activities is revealed

Key words: time management; time management principles; time management manager; delegation; planning; goal setting; control; manager; social responsibility; economic responsibility; competitors; staff; partners.

1 Introduction

The rhythm in which most of us live can hardly be called calm and measured. The severe time pressure is a challenge that not everyone can handle. To manage your time rationally and successfully, it is necessary to use the mechanism of planning. Time management is a set of planning techniques used not only by the manager, but also by the employee of the organization to increase the more efficient use of working time. But, we must not forget that every day the head of the organization makes many decisions, most of which must be developed in the shortest possible time. The relevance of this topic is that the time spent on the adoption and development of management decisions should be minimized for more operational work of the organization. This condition is fulfilled through the application of time management tools. Before starting to apply time management, a manager should ensure the efficiency of his work. According to Gleb Arkhangelsky, the components of a senior manager's effectiveness are:

- delegation of authority
- a system of assignment control;
- the secretariat of a top manager.

Currently, the problem of using, selecting the right techniques, time management methods is being studied by various sciences. Interest in the study of time management occurs in areas such as management, sociology, psychology, pedagogy, which consider diverse aspects of the principles of human activity. Of great importance are studies on the identification of the basic principles of managers, aimed at the competent use of time resources and the implementation of time management in the activities of different social groups. The basis for the formation of time management managers are principles based on the allocation of time

resources, the main of which interact in the principles of the manager, considering which increases its effectiveness of employees, and gives certain results in the training of managers. If we analyze the principles of time management in terms of modern management theory, the existing practices of time management identify several basic principles that are repeated from one technique to another regardless of the structure of the organization, the number of employees, cultural, moral and value principles of the head of a business organization, including prioritization, goal setting, planning, making to-do lists, concentration and focus, time management, delegation and preservation of organizational. These principles are mentioned in the works of almost all experts in the field of time management: Alan Lacan, Taylor Frederick, Gleb Arkhangelsky. These principles are based on the management functions of business organization leaders and can be applied in absolutely all organizations. At consideration of principles of the head connected with time-management, as social activity of the individual, to emphasize a number of principles directed on construction of a number of interactions of the head with other subjects (employees, customers, partners, competitors). Properties of these social groups and institutions are important for this sequence of actions itself. Taking as a basis the criterion related to interaction, we can distinguish the principles of time management, implemented in the relationship:

- with partners (principles of punctuality, principles of cultural attitude to time, considering the difference in time zones if required, mutual trust, equality, adherence to commitments, finding compromise solutions in case of conflicts, etc.)
- with competitors (principle of timely identification of new competitors in the market, principle of

cooperation, principle of correct calculation of time costs for performance of a particular type of activity, principle of loyalty)

- Personnel (principle of corporate troubleshooting, principle of delegation, principle of punctuality, principles of clear determination of time costs for work performance and its payment; principle of proportionality; forming of comfortable labor conditions, contributing to social welfare and creative growth of employees, principles of publicity, clear realization of obligations to colleagues, overtime payment)
- State authorities (principles of interaction, timely implementation of the requirements of the legislation);

It is possible to divide the principles of time-management related to the consideration of the head, namely, his role in the interaction with different groups, organizations:

- depending on the personal characteristics of the head (principles of dignity, respect for the opinions of employees, respect for the time of participants in business relationships, etc.)
- characterize him as a professional qualified manager (principles of planning management activities with the available funds, the principle of timely response to materials received from partners, etc.),
- are manifested in his actions as a citizen (compliance with legitimacy, legislation, timely payment of taxes, benefiting society, etc.)

If we consider the principles of time management from the perspective of economics, we should note the principles of competition (getting ahead in order to obtain competitive advantages), manifested in the timely correct response to new information, innovation. The principle of efficiency, competitiveness, preservation and development of business. In the case of consideration of time management from a social position, the principles of reliability are formed, which, can also serve as a social utility to society. If the source of formation of time-management principles is cultural values, then the principles of morality, norms of morality and respect in labor and business interaction. The principles of time-management, which are the rules that determine the norms of behavior of its subject, have a number of characteristics: dynamism, since they can change considering the time resource, modality, since they express the need to comply with the prescribed norms of behavior. Taking advantage of more inherent to him criteria, the manager builds a prototype of his professional behavior, resorting to one or another of the principles of time management in his practice. One criterion is the compliance of an organization's economic system with legislative requirements, which implies the implementation of the principle of legitimacy. Another criterion may be the accuracy, the explanation of the content of which may be particularly individual. Another important criterion can be considered a criterion related to the assessment of the specific market environment in which the business organization is in a given time period.

The principles of time management, which are the rules that define the norms of behavior of its subject, have several characteristics: dynamism, because they can change with

the time resource, modality, because they express the need to comply with the prescribed norms of behavior. Taking advantage of more inherent to him criteria, the manager builds a prototype of his professional behavior, resorting to one or another of the principles of time management in his practice. One criterion is the compliance of an organization's economic system with legislative requirements, which implies the implementation of the principle of legitimacy. Another criterion may be the accuracy, the explanation of the content of which may be particularly individual. Another important criterion can be considered a criterion related to the assessment of the specific market environment in which the business organization is in a given time period. Thus, having assessed the level of competition, the manager takes the principle of timely approach as a basis for his activities. A coherent combination of social and economic goals in the managerial activity of managers contributes to the establishment of interactions, building mutual benefit between society and business, which is achieved by following not only the principles of economic rationality and social suitability, but also the principles of time-management. Let us consider the principles of time management with social responsibility:

THE PRINCIPLE OF THE SOCIAL SETTING OF TIME MANAGEMENT.

Even A. M. Stolyarenko in his works fixed that the laws of the system of any social structure consist of social laws and properties of society with which they are interconnected. For effective management and functioning of any organization its activities should reflect the ideals of a developed society, spirituality, humanity, universal norms and values. In this regard, through the use of time management, the head can make decisions, management actions aimed at the development and maintenance of an appropriate organizational culture, which pays due attention to the management of time resources

THE PRINCIPLE OF UNIFIED PURPOSE.

This principle was substantiated by A. Fayol. He believed that the alignment of personal, group and general interests of the company is one of the most important management tasks. Creativity and efficiency of a business organization will always be at the highest level if individuals (staff, managers) in a particular social group direct their actions to solve common problems not under pressure, not because of fear of punishment, but with the desire to do the job with the right motivation, interest, desire and appreciation of all responsibility. In this regard, time management helps to implement the principle of unity of organizational and personal goals will be the right motivation aimed at effective, creative, fast execution of the task, as personal interests and goals of the individual will coincide with the goals of the business organization. The convergence of interests of the business organization and the staff of the company, when using this principle of time-management, assures not only a professional result, accomplished in a shorter period of time, but also the moral satisfaction of the employee from the work done, which, in turn, positively affects the emotional climate within the

business organization and provides favorable conditions for the functioning of the social group, which greatly affects its productivity.

THE PRINCIPLE OF HUMANITY.

This principle is based on the fact that the management of time resources of employees in all its forms and methods should be based on the rights, characteristics and personal advantages of each member of the team. According to the humanistic principle, the human factor is decisive and the employee is the highest value of a given social group. Consequently, the selection of appropriate time-management techniques for employees of a business organization should consider the values, individual characteristics and preferences of each individual (employee), not only all kinds of methods to achieve the effectiveness of the business organization. Given this principle, managers of business organizations should not only provide the conditions for the rapid completion of tasks for employees, but also consider the value priorities of each individual (employee).

THE PRINCIPLE OF CONSIDERING THE MENTALITY OF EMPLOYEES WHEN CHOOSING APPROPRIATE TIME MANAGEMENT TECHNIQUES.

The social orientation of time management of employees manifests itself in its interaction with the social conditions of society, mentality, cultural traditions in which it is implemented. The choice of appropriate techniques,

time-management methods should consider national peculiarities in absolutely all interacting parties. As A.M. Stolyarenko notes, there is no type of management which is suitable for all companies, which can be applied in any state and at any time without losing its efficiency. There is only the basics of management, which must be adapted to the specifics of the company, to the individual characteristics of employees and also consider the mentality of the people of the country. In this regard, the principle of accounting for the mentality of this social group will be very important in developing an effective strategy with the use of time management practices.

2 Conclusions

Thus, we can conclude that all of the above principles of time management in the right combination and application are to form a professional managerial activity of the head, determine his personal psychological idea of management and are regulators of managerial activity. Not unimportant is the study of principles of time-management by managers, which can act as a tool for planning the management process and the formation of a professional managerial outlook. It should be noted that, on the one hand, the principles of time-management of managers are universal and can be applied both to influence a certain individual and to manage any social group. It is desirable to consider that the principles and their combination can vary in the correlation of the specifics of the organization's activities and the influence of external and internal factors. Also, they will vary depending on the hierarchy of the leadership position, age and gender characteristics of the leader.

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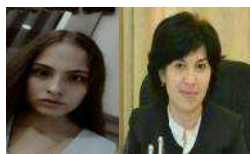
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The use of digital technologies as a factor to improve the quality management system

Eleonora Doronina* Khilola Sattarova

ISMA University of Applied Sciences, Uzbekistan

**Corresponding author's e-mail: lanamitchell7902110@gmail.com*



Abstract.

Any enterprise, irrespective of its scale and form of ownership, in the conditions of market economy has to constantly search for the ways of increasing its competitive advantages and improving its efficiency. Such situation is connected with the necessity of quality management system implementation and thereby improvement of all internal processes. Experts note that the quality management system in the conditions of the XX century is one of the most popular systems of internal corporate management. Undoubtedly, the modern development of quality management system involves the active use of information and communication and digital technologies, networking of stakeholders, their direct participation in the activities of the enterprise in building its value and image in the market. Digitalization of the economy forces to improve the principles, conditions and methods of management of the economic entity in order to create and promote high-quality products and thereby increase the profitability of the enterprise. [2,7,12] In recent years, foreign and Russian scientists and practitioners have published many interesting scientific and practical papers on the problems of improving quality management in the conditions of digitalization of the economy. However, a number of theoretical and methodological issues of determining the peculiarities of the quality management system and the impact of digitalization on the performance of enterprises require further research.

Key words: market economy, competition, quality management, digitalization of the economy, quality management system development factors.

1 Introduction

The analysis of special scientific literature on the problems of development of the quality management system allows us to talk about the ongoing multidimensional research. It concerns, in particular, the study of intrafirm characteristics concerning its scale, personnel potential, technology development level, etc.; external environment parameters, etc. [1,5,10] For example, the Mc Kinsey Institute conducted a large-scale empirical study of the impact of digital technologies on the development of economic entities in the Russian Federation. The initial information base for this study was the materials of the Federal State Statistics Service of the Russian Federation and scientific papers on the problems of digitalization of the economy. Among the results obtained, it can be noted such an economic phenomenon - it was found that at the present stage of development in the banking and telecommunications spheres, digital technologies have not only changed their operating model, but have already increased cost efficiency by 40-60% and identified new opportunities in the relevant markets. [2] In our opinion, this is a natural process, because the practice of implementation of information technologies and innovations in Western countries convincingly demonstrates the effectiveness of these innovations. It is noteworthy that the process of introduction of technologies related to quality management is intensified due to the pressure of consumers rather than competitors. Specialists of the Higher School of Economics also studied the impact of digital technologies on the

production and financial activities of more than one hundred large enterprises. It was found that the achieved effect from the involvement of innovative projects on the use of digital technologies, in general, corresponded to the plans of the companies and even exceeded them. Among such effects, the respondents noted simplification and acceleration of processes, and improvement of work quality. Among the costs of implementing the product in question, the lack of relevant experience, errors in determining the deadlines for project completion, and inconsistency among departments were mentioned. We can also add that the Russian system of higher education is still not engaged in the search and preparation of talents for the knowledge economy, and the Russian society itself is more characterized by a preference for stable growth of particular interest are the results of an international study conducted by the Institute of "Daylot" with the participation of recognized world-class experts. Among the priority areas of digitalization of large companies, they identified:

- Strengthening of human resources regarding robotization, artificial intelligence automatization;
- cognitive employee selection;
- building digital leadership;
- continuous innovative personnel training. [4,9,11]

The point is that the use of digital technology to improve the quality management system will not only improve the quality and availability of products (services), but will be accompanied by the expected growth of profits and competitiveness, increasing the overall innovation potential of the enterprise. At the same time, it should be noted that

the digitalization of enterprises, like any new business, is fraught with the possibility of risks of this activity. They (risks) are of the following types:

- organizational risks;
- personnel risks;
- technological risks.

(Another problem of digitalization is the rapid growth of fraud in this area). Regarding the subject of our study - it should be noted that the digitalization of business entities the quality management system itself forms the flow of transformation processes. In particular, it concerns the relationship with stakeholders, principles of the quality management system, processes of analysis and target indicators of its performance, etc. It is also appropriate to note that digitalization of the quality management system implies active use of a number of principles - flexibility, innovativeness, technological effectiveness, etc. Remarkably, digitalization changes the principles of diagnosing the effectiveness of the quality management system towards regular analysis, constant monitoring of all elements of the system in question, etc., which makes their results more valid and accessible, including in the Internet space. These conditions actualize the importance of reputational resources (relationship resources), which contributes to the establishment of a business climate, the conclusion of long-term and effective contracts, etc. [3,6,11] It is clear that all this is associated with the presence of digital competence, formed on the continuous achievement of competencies. The analysis and systematization of various approaches allowed us to highlight their main manifestations:

- development of the quality management system as part of overall organizational excellence (comprehensive approach);
- development of the system under study as a source of enterprise potential (managerial sub-move);
- development of the quality management system as the basis for improving the quality of goods and services consumer living (marketing approach). [3,8,13]

Undoubtedly, talking about improving quality in the context of the formation of consumer appeal, it is impossible not to mention the need to properly ensure economic security, and above all, personnel security. The enterprise, in order to have a pronounced competitive advantage, should build its own quality management system, based on the improvement of the organizational and personal characteristics, working on the creation of a unique advantage.

Digitalization, the process of implementation of information and communication technologies in enterprises is faster than in society. According to the Besot coefficient [5], the sustainable development of any enterprise is possible only when the speed of response of the enterprise protection system (we are talking about basic benchmarks) will be greater than the speed of development of an external threat (in this case - the speed of digitalization). There is another side of the coin - the development of quality management system on the basis of digitalization is associated with high costs for the purchase and installation of software, for training employees on this topic, for improving the economic security of the enterprise. It is

noteworthy that according to the Innopolis University specialists, the heads of VTB, Rostelecom, Rosneft, Russian Railways, Lukoil and other major Russian companies see the key threat to their security in former employees (27%), 42% see it in hacker groups, etc. All these companies are determined to raise the level of development of IT competences. It is appropriate to remember the old party slogan - "the personnel decide everything"... A distinctive feature of the largest companies in the Russian Federation, such as Sberbank, Lukoil, etc., is the creation of their own corporate universities, which use non-standard programs for accelerated training of employees. Digitalization has outlined the framework for the development of the quality management system, focusing it on the creation of innovations that can significantly improve the quality of goods (services) produced, increasing the efficiency of enterprise management. Under these conditions, companies began to actively use crowdsourcing to actively create value for their business. For example, its use in Sberbank's system made it possible to create a set of virtual platforms for fruitful interaction with their personnel, partners and the scientific community. All this is possible if there is a strategy for the development of the quality management system in the digital economy. The structure of such a strategy, in general, may consist of a given goal and the tasks arising from it; a plan of the main activities of the strategy; the expected end results of the strategy implementation.

The implementation of the strategy should ensure:

1. Coordination of the interests of the subjects of the construction and implementation of the quality management system. This means that the coordination of the interests of the above-mentioned subjects forms the core of the enterprise and helps to increase the effectiveness of the system in question.
2. Increasing the level of technological sophistication of the quality management system. This, in turn, acts as a driver of the growth of the effectiveness of this system and ensures the quality growth of products (services). All this speaks of the need to automate the processes of quality management, implementation of electronic systems and everything that will have a positive effect. We are talking about CRM-systems, ERP-systems, SCM-systems, which allow to form a type of lean production.
3. Development of digital competences of company employees. Undoubtedly, the growth of the qualifications of company specialists is a key factor and the key to ensuring digital leadership.
4. Cognitive selection of specialists in the quality department. This approach allows companies to significantly reduce transaction costs.
5. Organization of constant monitoring of the level of development and performance of the quality management system. The company's desire to ensure sustainable development requires regular diagnostics of the effectiveness of the system under study. In the course of its performance the level of customer satisfaction is assessed; the level of resource provision; the level of digitization of the quality management system, etc.

2 Conclusion

In conclusion, it can be noted that if properly implemented,

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all of the above recommendations will have a positive economic effect.

Some aspects of business planning strategy

Durdona Valikhanova*

ISMA University of Applied Sciences, Uzbekistan

*Corresponding author's e-mail: durdona_7809@mail.ru

Abstract

The importance of business planning is high, in those activities that require both the long-range foresight and the qualitative preliminary research that needs to be done before starting a fledgling enterprise. The article defines the structure of a business plan at the present stage, the significance of planning within the framework of entrepreneurial activity is noted.

Keywords: business plan, planning, strategy, investment, financial plan

1 Introduction

Business planning is considered a necessary tool for managing a company. Regardless of whether you are restructuring an existing company on the market, opening a new company or purchasing a ready-made company. To a greater extent, business planning is necessary for small companies which have less margin for error and operate in an environment of high uncertainty, which is sometimes related not so much to environmental factors as to the economic inefficiency of managers. Recently this factor is more and more strongly felt in the practice of fierce competition in business development. Strategic tasks in management today are set more often not for the company as a whole, but for managers planning to engage in this development. Business planning is better analyzed as the integration of managerial work, i.e., the mechanism which aims at creating a strategically managed company, where close interaction of operational and strategic planning is required. These skills should be of managers at the level of vocational training at universities, because corporate realities leave no time for scientific work realities leave no time for learning, and require the use of already formed business-skills.

A significant proportion of private companies today are small businesses because fewer employees are required and much less time is needed for a simple company formation process. The key resources of the enterprise improvement process are increasingly personnel and their knowledge, as well as the mental capital and increasing competence of the employees. The less prepared a company's management is for the business planning procedure, the greater the risk of managerial incompetence increases. The majority of companies neglect the fact that a thorough elaboration of the stages of the intended goals is one of the main components of business planning for small businesses, paying only attention to the long-term perspective without breaking down the stages of achieving the goals.

Lack of human resources

- the first feature of business planning in a small business enterprise. Therefore, the manager or manager must keep them within the maximum limits.
- -the second feature of business planning in a small enterprise is the relationship with suppliers. Limited financial resources

- the third special feature of business planning in a small enterprise, which follows from the very notion "small business".
- -the fourth special feature is the special susceptibility to all changes in the economy, because small businesses have insignificant reserves (reserves). Therefore, it is very important when the formation of a business plan to include the possibility of rapid reprofiling.

Organization. Business plan, as a form of short-term planning of the company, serves as mandatory document to be submitted to lending institutions, and largely provides a business plan is an obligatory document to be presented to credit institutions, which to a large extent provides a positive decision of a creditor on the financing of innovative projects. Managers who do not managers who lack the skills of effective business planning become an internal threat to the company. Formation of managers' competence in the university today can become a factor of development competitiveness of the whole company. That is why the main feature of planning in small business today is not so much the consideration of the financial capabilities of the company, as the consideration of its managerial potential.

In order to start an entrepreneurial project, whether commercial or social, in most cases a business plan is needed. A business plan substantiates the most important aspects of a new venture or project and allows for investment and innovation in society. As a rule, the business plan explains the goals of the new enterprise, their achievability and specific plans to achieve them. When starting a business, it is necessary to clearly understand the need for material, financial, human and intellectual resources, to clearly understand their sources, as well as to calculate the effectiveness of these resources in the enterprise as accurately as possible. For To achieve stable success in modern market conditions entrepreneurs need to plan their activities effectively and accurately, regularly collect and analyze relevant information about both their own states and prospects, and about the general state of the market and competitors. Theoretical and methodological aspects of the study of the problems of business planning in the implementation of entrepreneurial activities are reflected in the works of foreign scientists N. I. Ansoff, M. Albert, P. Doyle, F. Kotler, I.W. Cavern, J.J. Lambin, G. Armstrong, F.H. Knight, M.H. Mescon, A.A. Thompson, Peter F.

Drucker, etc. Issues of development and functioning of business planning, as a sector of market economy are considered in the works of domestic scientists: S.N. Andreeva, V.A. Barinov, O.N. Beketova, V.P. Burov, V.D. Gribov, M.I. Dudin, A.S. Pelikh, E.A. Utkin, I.I. Ushakov, Y.N. Lapygin, etc. Analyzing the opinions of the authors, it follows that business-planning is Ordered cyclicity of techniques and actions associated with the tool of environmental forecasts, setting business - planning objectives, development and implementation of the business - plan, promoting it on the intellectual property market, exercising control over the implementation. Long-term studies of foreign firms and Uzbek enterprises have noted that the underestimation of business planning in market conditions, reducing it to a minimum, incompetent implementation or neglect, often lead to unjustified economic losses and, often, bankruptcy Carefully compiled business plan will not only help to set the course of the company, but also serve as a guide to ensure the activity. The value of business plan is determined by the fact that: gives the opportunity to determine the viability of the project in a competitive environment, contains a benchmark for the development of the organization, serves as an important tool in obtaining cash support from investors. From the statements of the authors can be concluded that the business plan is a comprehensive plan for the development of the enterprise. A business plan is drawn up for the next 3 - 5 years. It defines the objectives of the enterprise and its policy in the field of products, marketing, production, management, financing. This document analyzes all the problems that the enterprise may face, and identifies ways to solve them. The size and content of the plan depends greatly on the purpose for which it is written, as well as the area in which the business is conducted. For example, for the opening of production, it is desirable to prescribe in great detail, step by step, the entire process of its manufacture, from the warehouse of raw materials, to the transfer of the final consumer-customer. Whereas for the construction of a store or a property for rent for rent, you can get by with a less detailed and less detailed plan. Here, on the contrary, simplicity is important, and it is necessary to the project itself and the calculations with its payback period are important here. World experience shows that the business plan is a document adopted in most countries with progressive market economies. In Uzbekistan the concept of "business plan" appeared at the beginning of the XXI. At first the business plan was viewed only as a tool to attract investment from abroad. At the moment the necessity of making business plans has been mastered at the state level and is required. at the state level and is needed to justify the activities of many entrepreneurial structures. A business plan has been introduced into the practice of Russian entrepreneurship as a strategic planning tool. Strategic planning tool and an essential document for business negotiations. The importance of this document is confirmed in a number of countries in Central Asia as well as in Uzbekistan without providing, which it is impossible to register a new enterprise. Competently developed business plan accompanies the growth of the firm, the conquest of new positions in the market market, promising plans for its development. Requirements for the business plan are as follows: the document must be easy to understand,

functional, informative, easy to use, and of course the truth. The main purpose of a business plan - to show how realistic chances of success for a particular business idea and business model. After all, this is where the calculation of all possible risks, growth potential, and resources are taken into account, the need to attract outside investment. A well-crafted and prepared business plan reveals the prospects for its development, which answers the most important question: Should you invest money in this business, whether it will bring a large profit, which will pay back all the money spent. Depending on the focus and scale of the project, the amount of work on the development plan can change in a wide range, the degree of its detail is very different. If the plan requires non-voluminous the main part of the sections may be absent. If the plan is to be developed to a greater extensive, time-consuming, and complex research, the plan must be carefully edited. In today's practice, the business plan has four functions. The first is to use it to develop a business strategy. The second is the formation and implementation of planned programs to assess the potential for the development of a new line of business, to control the processes taking place within the business. The third one is attraction of finances from abroad for development purposes. Fourth - involvement of business partners who can invest personal funds and technologies in the implementation of plans.

In planning, there are several types of business plans with their own distinctive features. Four types are distinguished:

- Business plan for obtaining commercial loans;
- Investment business-plan;
- Business plan for financial recovery of the firm;
- Internal business-plan.

The main merit of business planning is captured in a properly compiled detailed business plan, which gives a perspective on the development of the organization, thus, answers the feasibility of investment and the feasibility of ideas and projects of any type, and viewing the likelihood of implementation of the most complex problems. Today, the business plan is an obligatory document for acquiring investments, justifying the relevance of this or that activity of enterprises, their reorganization and restructuring. In a market economy business plan characterizes itself as a necessary tool for technical, economic and financial, managerial justification of the business, incorporating relationships with the bank, investors, marketing and intermediary organizations.

The purpose of a business plan is to justify a model for the operation of a business and to communicate the behavior of this model in the market with services or a group of services. Business success is usually diagnosed by the "three whales":

1. the competitiveness of the organization;
2. thorough development of the idea;
3. sufficiency of means.

In Uzbek conditions, two approaches to the business planning process are clearly visible. The first one provides for the development of a business plan by an external consulting company, where project initiators are involved by preparing the initial data. However, the second approach seems to be the most preferential, where the entrepreneur works independently on the business plan, getting advice

from specialists (e.g., marketing experts) or potential sponsors and investors, if necessary. Because the initiators of the project have little competence in financial and marketing matters, a group of specialists usually works on the development of a business plan. Much more difficult is the situation with novice entrepreneurs, who have to develop a business plan alone, using the relevant literature, and in the most difficult cases to get advice from experts in the field or more experienced colleagues.

Most domestic authors such as E.A. Utkin, I.I. Ushakov, and V.P. Burov emphasize that for Uzbek organizations the most popular and relevant areas of business planning in current economic situation are

- generating business lines (investment projects), as a set of continuous privileges and competitive premiums, specialized and universal property, technologies, which guarantee the possibility to get the intended income;
- development of business plans of special purpose, financial and economic nature. Despite the economic and social changes taking place in Uzbekistan, which have brought to life a new style of planning and management, have remained virtually unchanged. The lack of proper competencies for the development of business plans in common planning

systems do not allow them to effectively use the tools offered. Thus, the importance of business planning in organization's activities is fixed in its economic component, as a tool capable of attract and competently use investments in the context of limited resources of the organization.

2 Conclusion

The marketing plan can be presented in different ways depending on the type of business and the complexity of the market. The marketing technique used by the seller of mathematical software is significantly different from that used by the manufacturer of industrial equipment. Similarly, the relative humidity of the marketing section depends on what the business is supposed to be.

The competitiveness of products, the right pricing policy, effective measures to promote products, the definition of the target group of potential buyers, the volume of planned sales, designed for the target audience, the total market capacity-issues that should be decisive for the marketing plan. The marketing plan is an integral part of the overall development plan of the company. Therefore, the elaboration of the above issues should be in line with the overall objectives of the planned activity

Electricity market development trends

Stoiko D^{1*}, Riashchenko V¹, Zdir V², Dmytro Diachkov³, Mykola Somych³

¹ISMA University of Applied Science, Latvia

²Cherkasy State Business College, Department of Accounting and Finance, V, Ukraine

³Poltava State Agrarian Academy, Ukraine

**Corresponding author's e-mail: soloveydi@gmail.com*

Abstract

This paper addresses such global problems of modern civilization as the depletion of non-renewable energy resources, environmental pollution and global warming, which occurs due to the production of electricity in thermal power plants (TES) at the expense of traditional energy resources (coal, gas, fuel oil, peat, shale, etc.) This paper discusses the main producers of electricity in the world, the main problem of modern energy and ways to solve it through the development of alternative energy.

Keywords: energy consumption, energy market, electric power, alternative energy.

1 Introduction

The electric power industry is the basic infrastructure industry that supplies electricity and heat to all other sectors of the economy. The level of socio-economic development, general business activity and the life of each person are directly connected with the energy consumption. Over the last decade alone, energy production in the world has increased by a factor of nearly 1.5.

Economic characteristics of power generation depend on the type of power plant, its load and operating mode, and type of fuel. All other things being equal, the electric power of those plants that generate it at the right time and in the right volume at the lowest cost is in the highest demand.

2 Main part

The main producers of electricity in the world are:

- 1) Thermal power plants (TPPs), where thermal energy generated by burning fossil fuels (coal, gas, fuel oil, peat, oil shale, etc.) is used to turn turbines that drive an electric generator. The possibility of simultaneous production of heat and electricity has led to the spread of district heating in a number of countries by CHP plants;
- 2) Hydroelectric power plants (HPPs), where the mechanical energy of the water flow is converted into electricity using hydraulic turbines that rotate electric generators;
- 3) Nuclear power plants (NPPs), where thermal energy produced by a nuclear chain reaction of radioactive elements in a reactor is converted into electricity.

These three main types of power plants determine the types of energy resources used, which can be divided into three groups: non-renewable, renewable and nuclear.

Thermal power plants (TPPs), which use chemical

energy of fossil fuels, are the mainstay of the energy sector. As of 2010, fossil fuel-fired power plants produced more than 67% of the world's power plants.

Today's energy industry is more than 90% provided by non-renewable fossil fuel resources: oil, natural gas, hard coal, lignite, oil shale, peat.

Coal plays the leading role in the world's fossil fuel reserves (up to 60% in terms of fuel equivalent), while oil and gas account for about 27%. Estimates of reserves distinguish between proven reserves and final (inferred) reserves.

About 91 % of the humanity's energy created on Earth in 2010 was derived from burning fuels, the lion's share of which is made up of non-renewable fossil fuels. According to the US Energy Information Administration (EIA), the fossil fuel share will only drop to 78 per cent by 2040, with energy use increasing by 56 per cent between 2010 and 2040[2]. Global problems of modern civilization such as the depletion of non-renewable energy resources, pollution and global warming are related to it.

Thermal power plants emit enormous amounts of carbon dioxide (about 30 billion tons/year) which is the main greenhouse gas adversely affecting the earth's climate and polluting the environment. Most of the expensive measures to reduce carbon dioxide emissions, such as carbon dioxide capture and storage, will inevitably lead to steep rises in energy costs. But even these costly measures will not guarantee stabilisation, or at least a significant reduction in the rate of climate change, before the end of this century, when fossil-fuel resources will already be largely exhausted.

3 The solution to the problem

The problem of depletion of non-renewable energy resources, environmental pollution and global warming can be solved through alternative energy, in particular one of its types is wind power. Wind energy is considered a renewable energy.

The essence of wind energy is to convert the energy of air masses in the atmosphere into electrical, mechanical, and thermal energy, suitable for use in the national economy. Such conversion can be carried out by such units as wind turbine (for obtaining electric energy), windmill (for conversion into mechanical energy), sail (for use in transportation) and others. Wind generators do not consume fossil fuels in operation. The operation of a 1MW wind generator saves approximately 29,000 tonnes of coal or 92,000 barrels of oil over 20 years. Thereby it considerably reduces emission of harmful substances into the environment.

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4 Conclusion

The future of renewable energies lies in their environmental friendliness, low operating costs and the expected fuel shortages in the conventional power sector. The European Commission estimates that the renewable energy industry will create 2.8 million jobs in the EU by 2020. The renewable energy industry will generate 1.1 percent of GDP.

According to the UN report, \$140bn was invested globally in alternative energy projects in 2008, compared to \$110bn invested in coal and oil extraction.

Competitiveness SWOT analysis franchise network of Eurotop stores on the Ukrainian market

Ketskalo S^{1*}, Grinchuks M¹, Kryvoruchko M²

¹ISMA University of Applied Science, Latvia

²Cherkasy State Business College, Department of Accounting and Finance, V, Ukraine

*Corresponding author's e-mail: snizhana53@gmail.com



Abstract

Competition has become an integral part of doing business today. In the world, offers are only growing, and it is very difficult to keep the buyer's interest. In this regard, each enterprise needs to be able to defend its position in the market and retain its customer base. It is also very important to be able to attract a new audience and make them regular customers. To be profitable, every company needs to keep up with the times and provide goods and services that are relevant at the moment. From this we can conclude that the success of each business project depends on many factors that are interrelated.

Keywords: competition, market position, doing business, modern business market.

1 Introduction

Competitiveness is determined, on the one hand, by the quality of the product, its technical level, consumer properties, and, on the other hand, by the prices set by the company selling the goods. In addition, competitiveness is influenced by fashion, service, advertising, manufacturer's image, market situation, fluctuations in demand and many other factors. [one]

EUROTOP is a franchise network of MTI footwear stores, which have a single corporate style. EUROTOP offers a unique product range of world famous brands such as ECCO; GEOX, CLARKS, HOGL, DUMOND, DR.MARTENS, ARA, LLOYD, CAMEL, VAGABOND, SKECHERS, LOBSTER, TIRANITOS, BRASKA, RESPECT, RIEKER, GABOR, CONVERSE, EL TEMPO, RALF RINGER, PIKOLINOS, FABIOS. Today this chain has more than 30 stores in different regions of Ukraine.

Each business has its own pros and cons that need to be considered when working in the market. Based on the SWOT analysis (Table 1), you can see the strengths and weaknesses of the company, the threats and opportunities that are provided at the moment. For the success of further development in the conditions of the financial crisis, the EUROTOP chain of stores has a chance to correct its weak side, the "weakness of the advertising campaign," by placing advertising signs on the streets of the city, and to launch advertising on Internet networks.

Table 1.SWOT analysis based on materials from Eurotop store

S (Strength)	W(Weakness)
1. Significant experience in the market, trust from customers 2. Qualified personnel, adequate level of service 3. Well-functioning delivery system 4. Representation of well-known brands and manufacturers 5. Ease of navigation in the store 6. Availability of an online store 7. Loyalty program for regular customers	1. Insufficient level of customer service 2. Insufficient level of development of distribution channels 3. Outdated leadership style and company structure 4. Unfavorable location 5. Low advertising activity
O(Opportunities)	T(Threats)
1. Expansion of the sales market 2. Changing stereotypes in relation to advertising 3. Growth of wages of the population	1. Slowdown in the pace of economic development 2. Increased tax pressure (land tax) 3. Rising prices for imported footwear 4. Rapid change of fashion trends

In this example of a SWOT analysis, the main threat is a slowdown in the pace of economic development. In this regard, purchase prices for products can vary sharply, thereby making them higher, losing customers. However, the search for new suppliers with more favorable terms of supply (for example, with a longer grace period) will allow finding a reserve for reducing purchase prices for products. A bank loan will allow you to pay suppliers on time for the delivery of products.

2 Overview

This paper discusses the advantages, disadvantages and conclusions on the following issues:

- Development of all distribution channels;
- Poorly formed marketing campaign;
- Unrecognizability of the company in social networks;
- Due to the rise in prices for imported footwear, the loss of a large number of sales.

3 Decision

For good product promotion, you need to use Internet resources to the maximum. Launch advertising on popular city sites, strengthen the store's social networks by hiring an SMM specialist, thereby starting online sales and getting new customers.

Also find new suppliers who will make concessions to

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the enterprise and reduce the prices of goods (for bulk purchases) in order to retain regular customers. Discounts for large orders can be negotiated with old suppliers, so you can reduce the purchase price of popular brands and sell them at a price lower than competitors.

4 Conclusion

Competition as one of the important elements of the functioning of the market mechanism operates through demand, supply and market price. So, if prices for goods and services grow (all other things being equal), then demand decreases, if with increased competition between producers, the supply of goods and services increases, then prices for them may decrease. So, the market price of goods and services is formed as a result of competition between producers and consumers (buyers).

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Features of the communication activities of tourism enterprises in the context of the COVID-19 pandemic

Kushnir P^{1*}, Riashchenko V¹, Kuznetsova N²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College, Economics, Entrepreneurship and Marketing Department, V, Ukraine

*Corresponding author's e-mail: pavlikk.2901@gmail.com



Abstract

In the past few decades, tourism has been one of the fastest growing industries in the world. In this regard, studies of the nature and characteristics of the development of tourism, tourism activities and services began to attract increased attention of researchers. Marketing communication is an integral part of the tourism business, since the quality of tourism services and the effectiveness of the implementation of tourism activities largely depend on the effectiveness of its conduct. Recently, the ways and nature of communications in all industries have changed in the world, thanks to the dynamic development and spread of information technology (IT), and especially in tourism, since the industry itself is directly dependent on information technology. Also, the COVID-19 pandemic has a detrimental effect on the development of the tourism industry, so the role of marketing communications in ensuring the normal marketing activities of tourism enterprises is growing even more.

Keywords: communications, tourism, tourism, marketing, pandemic, communication tools.

1 Introduction

The tourism market is actively restructuring, besides, innovative changes are rapidly modernizing both travel technologies and the structure of demand and the content of the tourism product. The change in the target sales markets for tourism services occurs both according to the general principles of the evolution of markets, and according to factors specific to the tourism sector: changes in the technologies of operational content, mobile applications and online service booking platforms, package tourism offers and personalization in the organization of individual travel programs, program tourism in accordance with target market segments, and the like. Following the changes in sales markets, communication technologies in tourism are also changing.

2 Main part

Competition between the subjects of the tourism market requires the construction of such a sales system that will make the tourism product available to the modern consumer, facilitate access to the product at the destination. In the competition for the consumer, tour operators use various sales channels, both in the domestic and foreign markets. The marketing activities of enterprises in the tourism industry depend on various degrees of cooperation of the participants in the counterparty distribution network, in particular, outbound,

inbound, local tour operators, travel agencies, subagents and regional representatives.

The tourist market of Ukraine in 2019 consisted of 4664 entities, of which: 1867 legal entities and 2797 individuals who received a total income of 31,948,701.20 thousand UAH. (approximately 970 million euros). In 2020, amid the COVID-19 pandemic, the market of tour operators and travel agents in Ukraine suffered heavy losses. Among the experts, there are different indicators of the downward dynamics of tourism development. Thus, according to the data of the Ukrainian Association of Travel Agencies, the tourism market has decreased by 60 - 70% [6]; and according to UNWTO, the tourist flow in 2020 fell by 72% and returned the industry to the level of the nineties [4].

With regard to Ukraine in 2019, the situation was relatively stable thanks to open borders and relatively affordable trips to Turkey and Egypt. But, nevertheless, already by the end of 2020, the sales volume fell by 60-70%. According to preliminary estimates, losses in the tourism industry in the world amounted to about 730 billion US dollars [4].

Over the past three decades, the role of communications for the successful operation of a tourism enterprise and the effective promotion of goods and services has increased significantly, which has become a consequence of serious changes that have occurred not only in the world of marketing, but also in connection with the change in the way of life of people around the planet.

In this regard, traditional marketing communications tools have become less effective, and the role of communications using information technology has increased.

The development of information technologies and the increase in the number of digital communications have become the reasons for the transition from a post-industrial society to an information society, in which knowledge, data, telecommunications as a way of delivering and disseminating this information have become the main factors of success. Today, it is information and technology that are the main production forces, and the struggle for consumer attention occurs long before the purchase is made.

An important characteristic of the modern market is the general information space, in which marketing communications become crucial, since they act as one of the types of information consumed by people, but the increase in the amount of information has led to a decrease in the effectiveness of advertising and consumer attitudes towards it.

For example, if in 1965 the average buyer remembered 34% of commercials, in 1990 this figure decreased to 22%, then in 2007, according to the global survey of buyers conducted by AC Nielsen, on average from all ever seen people could name only 2.21% of commercials [3, p. 269]. In this regard, there is a need to diversify marketing communications to convey information to consumers using various means of communication, as well as to receive feedback.

New technologies are blurring geographic and intercultural boundaries, making it much easier to access and information about various goods and services, especially in the tourism industry. People are becoming more mobile, labor migration and specialization of certain regions of the world are gradually increasing.

Now researchers distinguish three main forms of communication, namely: mass communication and promotion, personal communication and propaganda, each of which is relevant for event activity.

The Internet greatly simplifies the process of analyzing data about a tourist product or service for buyers, speeds up and changes the buying process. The Internet is now a platform for business activity, a tool that is rapidly evolving to help promote services. The ways of providing services, that is, the rules of marketing are constantly changing, companies are increasingly resorting to using information technology to find ways to influence both existing customers and potential ones.

Today there are a large number of Internet communities where the activities of people with similar interests are carried out using Internet communications. The following Internet communities are distinguished: public on social networks, blogs, also author's diaries, forums, guest books, small chats on websites. Several of these communities can be used by travel agencies for effective marketing. For example, research by UNWTO [1] shows the effectiveness of using such media for the promotion of tourism services as social networks Facebook, Twitter, Instagram, YouTube, online

advertising platforms with the help of bloggers.

Aggregator sites are also very popular, since they have a search system, filters, they provide collection and sorting of the necessary information.

"Aggregatorization" of travel occurs everywhere and the most popular aggregator sites are the following [5]:

- AirBnb - aggregator of rented houses and apartments;
- Uber and Lyft - aggregators of private taxi drivers and carriers;
- CruiseBe - aggregator of leisure activities during a cruise;
- Booking - aggregator of rented houses, car rental, ticket booking, transfer;
- Google Trips is a leisure aggregator for standard travel.

The key leader in the travel market now, oddly enough, is Google.

Also, social networks are used for analysis, monitoring and communication with clients in real time. They provide the environment, exploration and analysis of marketing data, sales strategy, advertising campaign and direct customer relationship.

Due to the fact that most companies now advertise their product precisely through social networks, it becomes necessary to take online marketing activities to promote a product or service through communication with representatives of the target audience in social resources. Tourism is one of these areas of activity.

Communication tools in tourism can be:

- –creation and further advertising of thematic products;
- –work to promote the existing product in social networks of the same subject;
- –product promotion through mobile applications;
- –integration of the company's website with social networks;
- –creation of unique links;
- –maintaining and promoting corporate blogs;
- –holding conferences and webinars online.

It is thanks to social networks that many travel companies have the opportunity to reach great profits from the sale of their product, a new level of doing business and form a certain reputation thanks to customer reviews on social networks. Services can be represented by the following works:

- –conducting the necessary research and developing a strategy;
- –creation of a brand platform and its high-quality content;
- –attracting an audience and working with it;
- –PR in social networks;
- –control of the effectiveness of promotion.

When using social networks in the activities of a travel company, it must be borne in mind that there are certain mistakes that should not be made. Such errors can be: long answers to customer questions, lack of your own style (uniqueness), description in one post of all the company's proposals at once, a large number of unnecessary elements in the text (stickers), broken links, lack of analysis of

It should be noted that for many enterprises in the tourism industry, financial opportunities are limited and do not contribute to the full use of the potential of marketing communications. In this regard, a promising direction for the functioning of tourist enterprises is the interaction and combination of efforts of tourist enterprises with public organizations and the authorities.

This will make it possible to effectively use both financial and labor resources in the complex of marketing communications, to ensure that the demand for the tourism product and services offered by the enterprises of the tourism industry is met.

3 Conclusions

Thus, we can conclude that tourism in the world today is more scalable, exercising a strong impact on the world economy. The effective development of the tourism

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business significantly increases the flow of foreign citizens to other countries, affects the growth of tax payments to the budget, helps the development of related sectors of the economy, increases the percentage of employment of the population, and also gives travelers the opportunity to get new impressions and positive emotions.

The effectiveness of the marketing activities of tourism products is influenced by various marketing communications tools, but studies show that the most effective, especially in a pandemic, are such as: aggregator sites, social networks, various thematic communities on the Internet, mobile applications.

In modern conditions of active development of tourism, marketing activities are becoming one of the most important for maintaining a stable position in the market and stimulating product sales. Each enterprise in the tourism industry, forming a marketing communications system, must focus its activities on profit and development, using various communication tools.

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Key skills for the future in the era of global transformations

Nataliya Kuznetsova*

Cherkasy State Business College, Ukraine

*Corresponding author's e-mail: nataliya.kuznetsova14@gmail.com



Abstract

The paper considers the issue of developing professional skills that will be in demand in the global labor market in the future, as well as the importance of developing key soft and hard skills. The author identifies the need for the development of core competencies during the COVID-19 pandemic and the post Covid-19 period. The role of the education system, in particular virtual learning, in ensuring the development of the main competencies of the future is considered.

Keywords: modern professional skills, future, globalization, world labor market, soft and hard skills, virtual learning, education, the Covid-19 pandemic.

1 Introduction

The modern world is living in the era of global transformations, changing the decades-old social patterns and rules of the game in the world market. These changes are due to the global impact of digitalization, intellectualization and creativity of socio-economic processes in the global economy.

The dynamics of modern technologies development brings the need for the formation of new knowledge and skills, adapting them to the ever-changing conditions of the world labor market. In addition, such mega-trends as globalization, dynamics of demographic change, political uncertainty, growing asymmetry of socio-economic development of countries and regions, the environmental situation, urbanization, etc. will have a global impact on the world of labor and demand for talent [1]. All changes today are based on automation and machine learning. Such factors as data and artificial intelligence will be key factors for growth in the nearest future [2].

It is important to understand that in the context of the Fourth Industrial Revolution, the boundaries between the physical, digital, and even biological realms are virtually blurred by the ability to connect different information and digital platforms to different digital media. Therefore, the ability to grow a business in difficult conditions and often in unforeseen circumstances, knowledge of modern technologies, work with huge databases and communication will be key skills in demand by employers in the labor market in the near future.

By 2025, 85 million jobs can be replaced by machines, due to changes in the division of labor between humans and machines. At the same time, 97 new jobs that do not exist today require knowledge of new technologies and digital skills [2].

Taking into account the accelerating trends in the development of innovative computer technologies and their impact on the dynamics of the world economy, the

World Economic Forum formulated TOP-15 skills for 2025 (Fig.1).

TABLE 1. TOP-15 skills for 2025

1	Analytical thinking and innovation	9	Resilience, stress tolerance and flexibility
2	Active learning and learning strategies	10	Reasoning, problem-solving and ideation
3	Complex problem-solving	11	Emotional intelligence
4	Critical thinking and analysis	12	Troubleshooting and user experience
5	Creativity, originality and initiative	13	Service orientation
6	Leadership and social influence	14	Systems analysis and evaluation
7	Technology use, monitoring and control	15	Persuasion and negotiation
8	Technology design and programming		

Source: Future of Jobs Survey 2020, World Economic Forum [2]

The formulated skills are grouped into four types:

1. Problem solving – №1, 3, 4, 5, 10, 13, 14;
2. Working with people – № 6, 10, 15;
3. Technology use and development – № 7, 8, 12;
4. Self-management – № 2, 9.

Accordingly, the importance of soft and hard skills is increasing, among which, according to expert research [3], employers' priority belongs to 61% of soft skills and only 31% of hard skills. Soft skills, unlike hard skills, are transferable skills that characterize the working relationship between people, but are both difficult to measure and difficult to learn. Hard skills, on the other hand, are easy to learn and measure. Soft skills include social, communication, and emotional skills. It is important to note that they are most important for the global work environment, especially during the COVID-19 virus crisis, when the emotional load increases because of remote work.

Hard skills are now considered easier to acquire, as

they can be obtained through training and education. This group of skills includes technical, language, computer skills, etc. The top 10 key soft and hard skills that will be in demand in the labor market in the next 5 years are shown in Fig. 2.

TABLE 2. TOP-10 most important soft and hard skills for 2025

	Soft skills		Hard skills
1	Teamwork	1	Analytical skills
2	Communication	2	High-level IT skills
3	Time management	3	Basic computer knowledge
4	Problem-solving	4	Customer service skills
5	Creativity	5	Presentation skills
6	Leadership	6	Team management
7	Organization	7	Project management
8	Emotional intelligence	8	Marketing
9	Decision-making	9	Writing
10	Stress management	10	Graphic design

Source: Top Skills Employers Look For 2021[3]

The year of 2020 was difficult and extraordinary for the world community due to the crisis caused by the COVID-19 pandemic, which practically blocked the vital activity of business for a while and brought enormous losses to states, both financial and human resources.

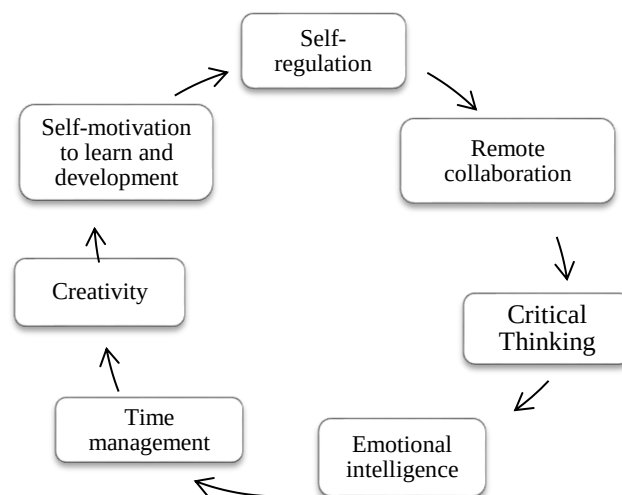
The COVID-19 pandemic has made the labor market situation even more complicated in a dynamically changing world. The need to use remote work has changed employers' views on the priority of key labor factors. The factor of hourly measure of labor has given way to the factor of higher quality of work performance. There have been changes in views on the concept of competence, which is seen today not only as the key skills and knowledge of employees that determine their level of professionalism, but also as a "dynamic combination of abilities, attitudes, behaviors and knowledge that are fundamental to skill use related to the learning outcome" [4].

Among the most important competencies for the post-Covid world should be the following competencies (Fig. 3):

1. Self-regulation as the ability of people to plan tasks independently, control their implementation, thinking in advance about the result;
2. Remote collaboration – teamwork regardless of the geographical location of its members to achieve the company's goals using various digital tools;
3. Critical thinking and problem solving as the ability to think complexly, systematically and apply the acquired knowledge and skills accordingly;
4. Emotional intelligence – the ability of a person to realize, control, express their emotions, professionally, competently and sensually manage interpersonal relationships in a team or team;
5. Time management – the ability to plan and organize the process of distribution of personal working time between specific actions or delegate their tasks to other professionals, according to the existing organizational structure in the company;
6. Creativity – the ability to develop and successfully implement innovative ideas to develop solutions to complex problems;

7. Self-motivation to learn and develop as the ability to understand the dependence of personal and team success on lifelong learning to gain new knowledge and develop new skills, including digital.

FIGURE 3. Competencies for a Post-Covid World



Source: developed by the author by source [4]

Defining new work skills is the main vector of qualitative transformations in the field of education. Taking into consideration the current situation with the COVID-19 pandemic, the world community needs to develop new approaches to the formation of basic principles of national economies in the new virtual business environment, the development of virtual cooperation and, consequently, the need to shift to work to remote space. Therefore, the main task of the transition to virtual cooperation and staff training should be the use of modern digital tools. Development of new curricula, including virtual in accordance with certain labor market key skills, through formal and non-formal learning are already a priority of the education system. The transition from personal to virtual learning, the involvement of students in the discussion, interactivity instead of the content of the course – these are the principles that should be the basis for the organization of modern online education. Virtual learning should emphasize the speed of technological change (technological fluency) and problem solving in accordance with the content provided by them.

2 Conclusions.

The development of modern information technologies, artificial intelligence radically changes a person's life, the principles of organizing work, nature of work, its functionality and quality indicators. Not only the business environment is undergoing significant changes, but also the field of education, which at such a difficult time must succeed in producing modern knowledge, integrating it into people and the economy. Fourth Industrial Revolution transforms jobs significantly, which in turn predetermines the need to acquire new skills and knowledge. An important task facing the world community is to unite efforts for successful

transformations, maintaining physical activity of human resources and its adaptation to new conditions of labor market and business development, rapid training of new

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skills to form a competitive workforce that can withstand global challenges and develop the world economy effectively.

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Road quality as one of the main problems of the Ukrainian transport market

Pyliavska I^{1*}, Odinkova T¹, Zdir V²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College, Department of Accounting and Finance, V, Ukraine

*Corresponding author's e-mail: pilyavskaya19@gmail.com

Abstract

Every year more and more transport appears in Ukraine, it includes cars, transport for passenger transportation, and trucks. But the quality of roads and compliance with safety regulations leave much to be desired. This work will highlight ways to improve transport infrastructure in order to avoid such a high rate of road accidents.

Keywords: transport services, passenger transportation, road accident rate

1 Introduction

Ukraine is now in the process of developing and consolidating the transport sector, which is significantly lower than Western European countries in terms of both quality and complexity of services provided by national transport companies.

Further development of the Ukrainian transport market and changes in competitive conditions on the market will be directly dependent on external and internal environmental factors. Transport occupies a special place in the economic life of the country. Firstly, it provides connection between different sectors of the economy. Secondly, there is a movement of products from production to turnover, and thus transport activities are a continuation of the production process within the limits of turnover.

The transport industry is faced with the following problems:

- insufficient quality of transport services;
- inadequate level of transport security;
- poor road conditions;
- increased negative impact of transport on the environment.

The largest part of all freight traffic in the country falls on road transport, which negatively affects the quality of roads, on the one hand, and on the other hand, heavy load of freight transport often leads to driver fatigue, which in turn reduces their attentiveness and also leads to accidents.

been a massive motorization of the population, which is becoming an alternative to public transport, creating a new lifestyle and providing mobility for the population. It should be noted, however, that the increase in the number of vehicles on the roads of Ukraine also has a negative effect - growth

According to the National Police, 168,000 accidents occurred on the roads of Ukraine in 2020, i.e. 4.6% more than in the previous year, 2019. [1]

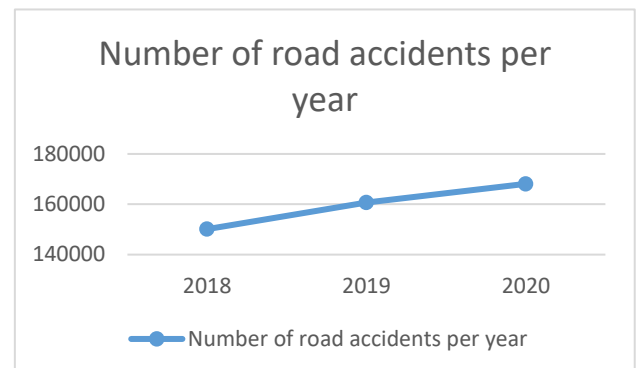


FIGURE 2. Number of road accidents per year

The number of accidents with injured persons remained almost unchanged. 26,100 people were injured, 32,000 people were injured and more than 3,500 people died.

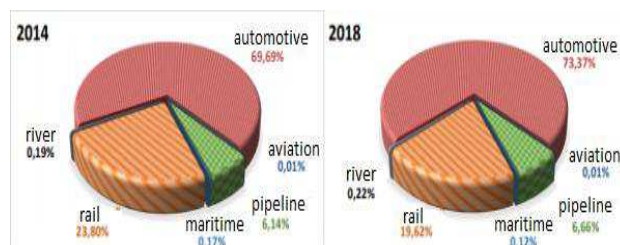


FIGURE 1. Modal weight of transport in 2014 and 2018 [2]

Along with the increase in freight traffic, there has

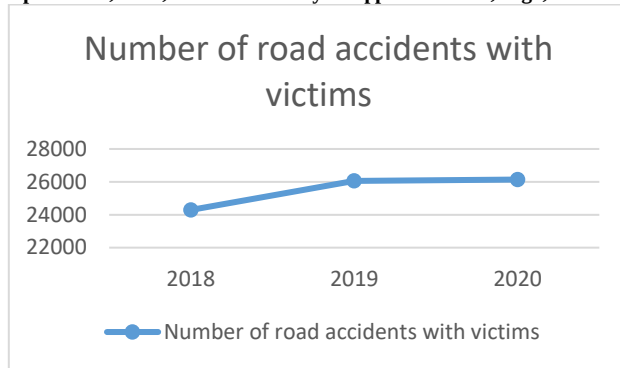


FIGURE 3. Number of victims of road accidents

The main reasons for the high number of accidents are as follows:

1. Negligence of drivers of vehicles.
2. Poor road conditions.
3. By pedestrians, including children.

2 Overview

This article discusses the advantages, disadvantages and conclusions on the following issues:

- mass motorization of the population;
- quality of roads;
- high accident rate.

3 Decision

The study showed that Ukraine's transport industry is important and dynamic, and road transport plays a leading role. At the same time, it should be noted that the increase in road traffic is due to various reasons, among which the

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poor condition of roads is the second most important one, which indicates the need for improvement. In relation to the above, it is proposed that:

- develop a modern road network. Ensure the full implementation of the commitments made for the expansion of new construction and development (taking into account euro-standards requirements) of roads (e.g. 2-4 thousand km annually);
- develop a mandatory program of road maintenance after the completion of repairs. The company that has won the tender for the repair of the road section undertakes to maintain the section for the period specified in the contract (snow removal, updating of road markings, periodic road surface checks);
- set up an independent commission on compliance with construction standards in the sector (verification of compliance with the requirements concerning the strength of the ground, the elasticity of the base under the asphalt concrete and the calculation of possible shifts in the ground);
- increase the number of automatic weighing points to avoid congestion, which has a very negative impact on road quality.

4 Conclusion

In Ukraine, every year the number of transports on the roads only increases, the number of both passenger and freight transport is growing. In order to avoid such a number of accidents and injuries of people, the quality of roads, safety regulations, weight regime and building standards should be monitored more closely

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Counterfeiting as one of the difficulties in forming a positive image for a company in the alcohol industry in Ukraine

Stepenko O^{1*}, Dehtjare J¹, Dernova I²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College; Economics, Entrepreneurship and Marketing Department V, Ukraine

*Corresponding author's e-mail: okstepenko5@gmail.com



Abstract

Currently, our world is developing and transforming at a very fast pace, and the global pandemic has further accelerated these processes. Nowadays, just a good product is not enough for business development and systematic sales. Competition is growing every day, small / local business is developing more and more. And in order to stay afloat, you need to qualitatively prescribe a business development strategy, pay special attention to the marketing component and, in particular, to the company's image. But how to form a positive image for companies, which are in increasing demand and competition every year, as well as, based on this, more and more unscrupulous manufacturers who use the names of well-known brands and make fakes. In this work, I will try to find ways to solve this issue.

Keywords: image, digital technologies, fight against brand fakes

1 Introduction

This paper discusses the challenges and opportunities:

- Growth of the company in the alcohol market in Ukraine.
- Formation of the image in the alcoholic industry in Ukraine;
- Installing the necessary programs that will help maintain a positive image of the company.

The object of this article is the image of the alcohol industry company in Ukraine.

The subject of the research is the prospects and obstacles to the formation of a positive image of companies in the alcohol industry in Ukraine.

Objectives of the article:

1. To study statistical data and legal basis of the alcohol market in Ukraine over the past years.
2. Identify the main problems in the formation of a positive image of companies in the industry in Ukraine and how these problems can be solved.
3. Study the issue of authenticity of the product and develop appropriate digital recommendations to combat this problem.

The study used both theoretical and empirical methods of analysis.

2 Overview

Referring to the statistics, the alcohol market in Ukraine has grown significantly over the past year. During the

period from January to March 2020, the sale of alcoholic beverages increased by 13.8%, and the epidemiological situation only had a positive effect on this [1]. Based on this, we can conclude that the demand in the alcohol market will only grow and business development in this industry is quite profitable. But it is worth considering that competition is increasing, and in order to get a large part of the market, a company needs, in addition to a strong strategy and marketing activities, to form and maintain a positive image. The following can harm the image of a company in the alcohol industry: 1) information in the media with statistics of people with alcohol dependence and the harm of alcohol to health when consumed in large quantities; 2) counterfeit products, 50% of the alcohol market is in the shadow, the sale of counterfeit alcohol in Ukraine is 10-12 billion UAH per year [2] [3]; 3) dishonest marketing of competing companies - similar packaging and the name of a cheaper substitute wine are used, which we can see in Figure 1.



FIGURE 1. An example of a fake

Also, another difficulty in the company's growth in the alcohol market in Ukraine is the increase in the excise tax rate, for example, in 2021 this percentage will increase by an average of 12% [4].

The company cannot independently influence the first points, but there is a solution for the second and third points. First, the company needs to officially register its TM, corporate colors and name. Secondly, to track the original of the drink, you need to create a website, applications with the ability to check the product by serial number, or start cooperation with partners that provide this type of service.

3 Decision

VDCARDS will be considered as an example of a program for checking the authenticity of a product. This is a ready-made mobile application in which the buyer can scan the QR code and see all the information about the seller's product. The manufacturer himself assigns each

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product a unique DAT code and QR code, which are then glued to the packaging, hiding with a top protective layer. After purchase, the top layer can be removed and the product can be checked. Immediately after the purchase, you can check the goods, if the buyer has purchased a fake, information with a warning will immediately be displayed on the screen and without leaving the checkout, the buyer will be able to return the goods.

4 Conclusion

Automation of checking goods for authenticity will help maintain a positive image of the company, and will not allow competitors with lower quality alcoholic beverages to pass off their products as competitors' alcohol. The products of this industry are very specific and basically the client always comes back for the taste and quality of the product. Having once bought a fake, not knowing about it, and causing harm to his health, due to low-quality raw materials, the client will never buy other goods from this company. Therefore, it is very important to fight counterfeiting in this industry.

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Ways to maintain the competitive position of the enterprise on the polyurethane foam market in Ukraine

M Taranenko^{1*}, D Zmicerevska¹, Dernova I²

¹ISMA University of Applied Sciences, Latvia

²Cherkasy State Business College, Economics, Entrepreneurship and Marketing Department, V, Ukraine

*Corresponding author's e-mail: maksontaran@gmail.com

Abstract

Recently, various types of polyurethane foam (PPU) have been very popular in construction, furniture production, as well as in the production of refrigeration equipment, cars, ships and the iron-building industry. It is a universal and environmentally friendly material, which is durable and doesn't cause any inconvenience during application and operation. But in 2020, enterprises for the production of polyurethane foam, due to the COVID-19 pandemic, could not operate at full capacity, as they faced interruptions in the supply of raw materials, instability of raw materials prices, and border closures in most countries. All these factors continue to strongly influence the PU foam industry. Despite this, the demand for polyurethane foam continues growing, especially in the furniture and bedding sectors, so manufacturers are forced to look for ways to maintain their competitive position.

Keywords: competitiveness, competition, competitive position, polyurethane foam, production.

1 Introduction

In the process of solving the problems of survival and future development, each organization must be able to withstand attacks from competitors, timely determine the appropriate prerequisites and objectively assess its own capabilities in the competitive struggle. It is necessary to assess the current situation and business prospects in a qualified manner, to be able to identify and formulate competitive advantages thanks to the support and development of which the company is able to successfully withstand the competition and obtain the necessary prerequisites for development.

From year to year in Ukraine, the demand for upholstered furniture is constantly growing, as well as the construction market in Ukraine, and this trend continues. With such a scale of market development, the foam rubber business has good prospects, because it is elastic polyurethane foam (polyurethane) that is widely used in the furniture industry for the production of upholstered furniture, office chairs and armchairs, in mattress production, in the automotive, textile industries, etc. In addition, it is used as a packaging material, as well as for technical and domestic purposes. In furniture production, about 80% of foam rubber is used, and 20% is used for other purposes. Rigid types of polyurethane foam are widely used in the construction business.

There are many types of foam rubber on the Ukrainian market, which are used in various spheres. For the production of furniture and mattresses, the following types are used: standard (ST), increased hardness (EL) and hard (HL), soft, super soft (HR), highly elastic (HS), special (non-combustible and viscoelastic) (PHD). According to international standards, foam rubber is marked by type, density and stiffness. All brands of polyurethane foam are in demand on the Ukrainian market in equal shares.

The main problem of the market is competition from foreign companies that import polyurethane foam to Ukraine at lower prices. The share of imported polyurethane foam is 39% of the market. According to the data of the State Border Service of Ukraine, imports of polyurethane foam of various types in 2020 amounted to more than 163 billion dollars. Poland - 22.04%, China - 12.69%, Germany - 10.64%, Italy - 8.36%, Turkey - 6.55%, Russian Federation - 4, 62%, Belarus - 3.53% and Hungary - 3.48%. These 10 countries import more than 75% of polyurethane foam to Ukraine. In the structure of exports of polyurethane foam, Russia occupies almost 46%, another 15.67% - Moldova, Belarus - 10.44% and Poland - 8.64%. In total, the export of polyurethane foam in 2020 amounted to more than \$ 18 billion.

The leader on the Ukrainian market is the INTERFOM Group of Companies - the leading manufacturer of flexible polyurethane foam (foam rubber) in Ukraine. Has been operating on the market since 1997. The Group includes four production sites of Interfom-Dnepr LLC, Interfom LLC, Interfom-Zapad LLC, Interfom-M LLC and its own trading structure, which is represented by:

1. Trading house "ASAT", which sells polyurethane foam;
2. Trading house "Yu.EN.PI. Trading"- sale of household goods and goods for sleeping.

The market share of these group of companies is about 40%.

In addition to Interfom-Dnepr LLC, Interfom LLC, Interfom-Zapad LLC, Interfom-M LLC, the production of elastic polyurethane foam is also carried out by the following domestic manufacturers [4]:

1. Limited Liability Company "Flexstyle", which is located in the Alexandria city, Kirovograd region, Ukraine. Produces 2 grades of flexible polyurethane foam, such as standard (ST) and rigid, but the main activity remains the production of

2. LLC "ART-PROM" (Dnipro, Ukraine) produces polyurethane foam for its own consumption, but some brands, in particular such as increased hardness (EL) and highly elastic (HS), are purchased from LLC "Interform".
3. SUNPLAST LLC (Dnipro, Ukraine) produces and sells high quality polyurethane (foam rubber) of standard brands.

Foreign manufacturers are widely represented on the Ukrainian market, in particular: ANDALUSIASp. zo.o. " (Poland), "EurofoamHungaryKft." (Hungary), Genterm (W.E.T. Automotive Systems MagyarországiKft.) (Hungary), Vita Polymers Poland (Poland), Vitafoam Romania S.R.L. (Romania), "EUROFOAMPOLSKA" (Poland) the largest foreign manufacturers, which are actively developing their own dealer all-Ukrainian distribution networks and over the past 5 years have significantly increased their presence in the Ukrainian market.

The main problems in the polyurethane foam market are following:

- interruptions in the supply of raw materials for the production of polyurethane foam;
- inflated prices for raw materials. According to PlasticsInformationEurope, the average price of TDI, for example, increased from 2,300 euros per tonne in June 2020 to 3,300 euros per tonne in mid-November, while for some deals at the end of the year the price was about 5,000 euros per tonne and, accordingly, this price is unbearable for a Ukrainian manufacturer;
- due to the pandemic, most factories in Ukraine have worked and continue their working at much lower productivity. In Europe, in order to compensate for the losses from production standstill, most manufacturers have focused their attention on the production of goods for online sales or medical mattresses.

But, despite temporary difficulties, Ukrainian manufacturers have competitive advantages, namely:

- own developments of new grades of polyurethane foam, which have not been presented on this market yet, namely, Interform LLC introduced to the market 2 new technological marks of polyurethane foam HIGHFOAM® SAFE and HIGHFOAM® SENSE.

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- support from the state, namely the regulation of the import duty on foam urethanes of European manufacturers in order to increase the competitiveness of the goods of the Ukrainian manufacturer;

2 Overview

In this work are discussed the advantages, disadvantages and conclusions on the following issues:

- problems in the polyurethane foam market both in Ukraine and in Europe associated with the COVID-19 pandemic;
- competitive advantages of Ukrainian producers of polyurethane foam;
- ways to maintain the competitive position of Ukrainian manufacturers.

3 Conclusions

So, Ukrainian manufacturers of polyurethane foam need:

1. Enter new markets for new PPU brands. In particular, it is necessary to conclude a supply agreement for such a brand as HIGHFOAM® SAFE, developed by Interform LLC, and which was developed for the machine and car-building industry, with such car-building enterprises as: State Enterprise "Aurum Group", OJSC "Dneprovagonmash", Kryukovsky car-building factory. These factories won a tender for wagon construction in 2021 for PJSC Ukrzaliznytsia. For the HIGHFOAM® SENSE brand, it is necessary to develop an active marketing strategy, which should be aimed at increasing the demand for this brand, which is also developed by Interform LLC.
2. to establish relations with new suppliers of foaming agents for PU foam from countries such as China and India;
3. to constantly improve their products, namely to develop scientific research in the field of polyurethane foam production by creating a research center in the structure of Interform LLC. The creation of such a scientific center in the structure of the largest manufacturer in Ukraine will significantly increase the quality of products and their competitiveness in the international market.

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Features of a Particular Initiative and Scientific Research Project

Djakons Romans, Kopitov Rostislav*

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: rostislavs.kopitovs@isma.lv*

Abstract

This study draws upon the results of a comprehensive analysis carried out at ISMA of a proactive research project “Supporting Control Algorithms” over the period 2013-2020. The project involved 159 developers who participated in 19 ISMA conferences and presented 332 papers in specially organized sections. The key results of the research were presented within those sections.

Keywords: initiative, tools, stability, loss, causes, neutralization, effectiveness

1 Introduction

The need for this project is not only driven by the progressive times but also by the desire of entrepreneurs and managers alike to have objective tools to recognize loss of stability in organizations within their early stages of development. This is confirmed by the large number of participants who have taken an active part in the project and maintained their interest over the last 5 years. Among the total number of developers, 43% repeatedly presented and contributed results of their research to this project.

2 Main part

Focusing on the topic of supplementation as opposed to that of support allows for systemic thinking by exercising the skill of picking up subtle signals occurring in the external environment [1]. As a result, 2.5% of the participants have taken part in more than ten reports [2]. The important aspect that highlights the current times is the practical value of the

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results made in the algorithmic management process, which can be summed up as: ‘Isolation of key elements of the system undermines the effectiveness of its rectification’. Such contradiction reflects the inefficiency problem of modern management systems, condensed into twelve words: “It is impossible to improve the system without management algorithms that have been proved functional in the real environment”. The insight from the project has proven that students can be productive participants of the project as well. There are several publications, which have been published by students throughout 2018-2019 regarding the creation of NIC “Search”.

3 Results and perspective

The practical value of the study lies in the fundamental approach of identifying the causes of disruption in the company’s operating sector, in the case of introduction of new projects at all stages of business operations.

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Loss Prevention Technology

Grinberg Sevil

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: sevila.grinberga@inbox.lv

Abstract

The paper explores ways to renovate the operability of the organization. Such procedures are confined to the development of a special program on the basis of which the organization is improved. As a result, the skill of conducting effective changes throughout the life cycle of entrepreneurship is being practiced.

Keywords: inactivity, crises, diagnosis, methodology, changes, concept, operations

1 Introduction

The relevance of this research study lies in the awareness about weaknesses of an organisation that are threatening to destroy it. Such knowledge is generated by the measures ensuring sustainability under extensive circumstances, which results in the possibility to undertake activities on crisis response. Considering that measures on crisis response contradict the norms of sustainable functioning, the problem of the research study should be formulated as follows: "it is not possible for an organisation to avoid entering a crisis without the means for timely neutralisation of the destructive forces".

2 Approach

The subject of the research study is the availability of means to prevent disorganised consequences through diagnosis before and after the generation of knowledge and prevention of organisation's entering the crisis. The purpose of the research study is the elaboration of the procedure to ensure the measurability of an organisation's integrity in the course of conducted changes. The following research tasks have been formulated according to the purpose of the research:

1. to analyse the current deficiencies causing management inactivity;
2. to choose the effective version of the diagnostic system;
3. to implement the medium-term plan of organisational changes;
4. to organise an effective interaction between the members of the organisation under special circumstances.

3 Conclusions

In terms of practical outcomes of the research, the activities to prevent potential losses throughout the life cycle of an organisation should be mentioned. The novelty of the research is in implementing an improved technology supporting organisational development under the new conditions.

Analysis of the Venture's Business Consequences

Elena Santhirasegaram

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: jelena.santhirasegarama@gmail.com

Abstract

The relevance of this study lies in the knowledge of the weak points in the organization that can lead to its destruction. This knowledge is accumulated through measures that provide increased controllability in the implementation of extremely large-scale circumstances. As a result, an opportunity is provided to adjust highly effective means of overcoming a crisis situation.

Keywords: destruction, reconstruction, plan, program, efficiency, position

1 Introduction

Considering that high profitability contradicts the collateral schemes, the problem of the study was expressed in the following formulation: "It is impossible to ensure the implementation of a highly profitable proposal in the absence of a well-functioning program for engaging a special group of users" [1]

2 Problem State

The object of the study is characterized as a set of forces that make it possible to invest capital, demonstrating the ability to manage its change during the implementation of a medium-term scenario of a highly profitable business [2]. The purpose of the study is aimed at developing a procedure that provides a system of measures for getting out of difficult situations. In accordance with the goal, the

following tasks were formulated:

1. conducting an ongoing analysis of proposals that interfere with the achievement of the ultimate strategic goal;
2. choice of a variant of systematization of requirements;
3. implementation of the medium-term scenario in conditions of deviation from the loyalty program;
4. development of strategic guidance for the interaction of the organization's participants in special conditions.

As a practical result, it should be noted that the timely detection of deviations from the strategy makes it possible to justify the scale of averted losses throughout the entire life cycle of the organization. The novelty of the research lies in the implementation of the multi-user loyalty program in crisis conditions.

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Loyalty Sense-making Meaning Technology

Kelsina Dina*, Kopitov Rostislav

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: d.kelsina@gmail.lv*

Abstract.

Defining the concept of "Loyalty" shapes the effect of development scale of an organisation, if there are means to measure it. Aside from preventing the application of ineffectual loyalty programs, existence of such means also allows reducing unforeseen losses.

Keywords: device, design, constructs, concepts, metalanguage, metaphor, structure

1 Introduction

Conceptual approaches to describing loyalty are not just diverse, but essentially controversial as well. As a result, the problem of the study is expressed by the fact that numerous definitions and interpretation of the content of loyalty were caused by the use of various methodologies of measurement thereof within the boundaries of the same enterprise. Moreover, efficient control of changes in value is impossible without objectively defined standards. Identification of the problem accentuates the subject of the study. Its essence is that each unit of an organisation must use a single loyalty assessment methodology. This is where the so-called "sensemaking" approach is used. Change of conditions in the circumstances of neutralisation of large-scale conditions allows improving the quality of a system by means of improving its integrity.

2 Methodology

The object of this study is allocated as the elimination of uncertainty existing between the actors as pertains to loyalty. Such elimination uses the result measurement method of furling an extensive information space into a succinct form in the context of fixation of peculiarities that determine the

change of conditions of the system.

The goal of the study is aimed at the development of a means of assessing loyalty by different users regardless of an organisation's life cycle that would be set up to target the whole process.

This requires one to solve a number of objectives aimed at designing the process in the setting of its current analysis, which allows selecting an option for development of an enterprise in the context of its implementation. Application of the technology is addressed from the standpoint of appearance of a new measure that ensures the integrity of the system's object. Such measure provides an opportunity to confirm the manifestation of an essential aspect thereof by means of determining the position of the advanced version of the system before and after the research of the space of implemented changes.

3 Conclusions

The proposed approach allows assessing loyalty over different time periods, with orientation towards various user requirements.

The proposed means allow assessing the superposition of the new loyalty program onto the operation of an existing enterprise.

Understanding the idea behind a self-tuning metasystem

Irina Kazina

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: irinakazina@gmail.com

Abstract

This study determines the ability to elaborate the consequences of entering a crisis state in a timely manner. Every crisis event needs to be justified in the context of the damage caused to the organisation if left unresolved. Hence, a concrete analysis on the crisis event shortens the instability period of the organisation.

Keywords: sense, unexpected, source, cycle, resources, productivity

1 Introduction

Aforementioned points have helped to highlight the problem of the research, which is associated with the lack of means to control unknown circumstances that spiral an organisation out of control during important moments in its life cycle [1]. As a result, this led us to focus on understanding the limitations of an organisation's management, which in turn enabled the acquisition of productive skills by consolidating facts before and after the confirmation of measures involving the operations that affect the whole organization.

2 Problem Statement

Thus, an objective was defined, oriented towards the development of a procedure that ensures the idea is implemented upon proving its efficacy in removing the uncertainty state of the organization. In accordance with the objective, four tasks were outlined:

1. Analysis of the current state of the organisation, with a record of disruptive events.
2. Development of a preventative measure to negate the spread of negative events in the short term.
3. Creation of a regulation framework for implementation of an idea in the context of the medium term scenario.
4. Improvement of crisis management methodology in the long run.

3 Results

Solution of the above mentioned tasks has removed uncertainties regarding the large scale events. The practical applicability of the method stems from the novelty of the proposed approach, which is tuned to the state "organization in the state of continuous crisis", thus raising the effectiveness of the management system.

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Reconstruction of the Organization under Decreasing External Support

Kalejevs Andrejs

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: andej-73@inbox.lv

Abstract

An approach is proposed to ensure the management of the whole process at the level of responsibility centers. The core principle behind the approach is to hold the individuals responsible for the task they have control over. This will reduce internal waste and downtime caused by structural changes within the organization.

Keywords: duplication, depreciation, changes, improvement, performance

1 Introduction

However, gaps of responsibility within the structure of the organisation, results in a problem that is due to the organizational structure of an organisation being unable to ensure effective management. As a result, to restore management functions of the organisation, changes in the organisation's structure in the form of power and responsibility redistribution have to be made, hence ensuring the “withdrawal” of the organisation from an unstable state.

2 Main Part

The aim of the study is to develop a procedure that ensures a change in the organisational structure, taking into account the effective means of managing the whole process.

Research objectives:

1. Continuous analysis of violations in the distribution of powers.
2. The choice for adjusting the organizational structure in the short term.
3. Implementation of the scenario for assessing the full performance of the organisation in the medium term.
4. Development of a manual on what steps to take in the conditions of internal self-organization.

3 Results

As a result, the proposed approach makes it possible to improve the implementation efficiency of the taken decisions until the final goal is achieved. The novelty of the approach is in the mechanisms of internal self-organisation that is accompanied by the changes in the organisational structure.

Analysis of the Business Making

Vadum Gailis

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: vadisg@inbox.lv

Abstract

The relevance of this study is to know the weaknesses in the organization. It allows to overcome obstacles in the implementation of the medium-term scenario within given norms. Such knowledge, ensure effective management in the context of multiuser loyalty, adds value to the organization. As a result, there are effective means of increasing the rate of capital turnover, tested in the context of established regulations.

Keywords: areas, efficiency, downtime, violations, changes, effectiveness

1 Introduction

Considering that the focus on long-term value growth is in contradiction with short-term profit accumulation schemes, the research problem was expressed in the following formulation: "It is impossible to create enterprise value - added in conditions of limited knowledge about production". The object of the study is revealed in the identification of organizational growth factors, which provide an opportunity to identify the symptoms of inhibition of production by taking responsibility for the abandonment of productive entrepreneurship (going beyond) before and after justifying the loss of value due to the focus on short-term gain.

2 Approach

The subject of the study is considered from the perspective of production stoppages, causing losses incurred by the enterprise due to effectively oriented (inefficient) its organization [1]. The purpose of the study is aimed at

developing a procedure to ensure the system of effective business production. In accordance with the target, the following objectives were formulated:

1. Current analysis of the reasons that inhibit production [2].
2. Choice of variant of exclusion of effectiveness [3].
3. Implementation of the medium-term scenario of effective performance [4].
4. Development of guidelines for overcoming violations during the full life cycle of production [5].

3 Conclusions

As practical results, it should be noted the reasoning for changes that allow to produce valuable through the mastery of unique technology before and after the agreement of the regulations of all work and how to pay for it. The novelty of the study is to implement a program of the sustainable growth of the organization in a difficult environment (inhibition) [6].

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Methodology for Strengthening the Vulnerability of the System

Olga Kamforina

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: oljga2005@inbox.lv

Abstract

The study is oriented towards the improvements in the system through locating and understanding the weak points of the system. The methodology for performing diagnostics is accumulated through constant monitoring of the system, hence resulting in an increase in its performance. As a result, implemented measures targeted at improving the system, positively affect the characteristics of the systemse.

Keywords: decline, constraints, problem source, transformation, efficiency

1 Problem

The requirement for continuous diagnostics of introduced modifications to the system are in conflict with the reluctance of developers to locate the vulnerabilities in their patched version of the system, hence the research problem was expressed in the following formulation: "It is impossible to make effective changes to the system without being able to reveal the hidden causes for its quality deterioration". The research has the means for detecting vulnerabilities in the system, hence making it possible to detect hidden reasons for system instability in a timely manner [1].

2 Methodology

The aim of the study is to develop a procedure that allows you to recognize the necessary measures and be able to initiate and implement them, eliminating issues as they emerge. As a result, the following four tasks were

formulated:

1. Conduct a continuous analysis of the barriers responsible for complacency in the management team.
2. Select a new set of measures for the next version of the system.
3. Implement a middle term scenario for the system transformation.
4. Development of a manual for the operation of the system in special conditions

3 Results

In terms of the practicality of the system, it should be noted that the implementation of measures targeted at identification of system vulnerabilities, helps to improve the system as a whole. The novelty of the research is in the full-scale implementation of an improved version of the system, which ensures the development of an organization under updated conditions.n.

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Analysis of the Delayed Call Syndrome

Rostislav Kopitov

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: rostislavs.kopitovs@isma.lv

Abstract

An approach is proposed, which based on a combination of acts of insignificant importance, will attempt to identify the reasons for complications in an organisation, resulting from the negative impact of large scale events. In particular, the reasonably justified allure of short term gains has a negative impact on the development of the organisation as well as its individual members. The heightened attention to the breach of management principles, prevents serious repercussions which may result in future stability loss. In the times of increased workload, the acquisition of the skill “mandatory answer of every phone call” not only improves the efficacy of work rules implementation, but also benefits with finding unexpected solutions out of critical situations, which includes taking into account the real help of “call to a retained friend”.

Keywords: responsibilities, environment, benefit, skill, measures, disruption, indecisiveness

1 Problem

The aforementioned points have determined the existence of a contradiction, encompassed by the gap in perception of reality, which is reduced to a rudimentary analysis of the scenario on the level of a well-known method. Such analysis, which is built upon the well established habits of staying in the comfort zone, in fact results in the inability to understand the principles of management. Hence, the so called incompetence “indecisiveness skill”, can be formulated as: “It is impossible to reach a set level of performance when there are no means for identifying faults that disrupt the unity of organisation’s activity”. The current iteration allows for description of the object of study, which is centered around the synthesis of trends for organisation’s recovery. The simulation identifies the reasons for the stagnation of the professional development of key employees in the organisation. Primary reasons behind such stagnation are found in the medium-term scenario of the organisation’s functionality. The assessment of the functionality is carried out under the conditions of deviations from false alternatives before and after establishing order in the parts of the structure by eliminating the mechanisms that cause the loss of control, resulting from insensitivity towards important circumstances, hence leading to inaction and confusion during the critical moments.

2 Tasks

One of the tasks of the study is directed towards uncovering the reasons for the stagnation in the professional development of an employee engaged in managerial work. The purpose of the study is the development of a procedure targeted towards overcoming obstacles encountered throughout the development process of the organisation. In order to accomplish such a task, an ongoing analysis on the prerequisites for management inaction in crisis situations will have to be conducted. Hence, the choice regarding the effective resource allocation has to be made. This will allow for a transition towards an applicable scenario with room for improvement. In the implementation process and upon its completion, a guidance protocol will be developed to protect the organisation for unauthorised interference.

3 Conclusions

The applicable results of the study will be considered at the level of consolidated and agreed-upon rules of the organisation, hence unveiling the penalties for untimely prevention of disruptions or problems detected throughout the mechanism of the organisation’s working process. The incorporation of the system will make it possible to implement a full-scale procedure to suppress a “delayed call syndrome” that manifests itself when “action in lieu of effectiveness” is prioritised. The program includes a set of warning measures to prevent the loss in productivity, diagnosed during a fundamental investigation, thus ensuring that the mismatch between performance results and standards is captured and recorded.

Capitalisation of Large-scale Responsibilities

Akimov Gleb*, Amangeldiyev Abilkhan, Mikryukova Zhanna

ISMA University of Applied Sciences, Latvia

*Corresponding author's e-mail: glezz@inbox.lv

Abstract

An approach is considered, which will focus on recovering the loss of value to the organisation due to unreasonable postponement of important business for "one day". Putting off such tasks is often the result of business managers being overloaded with other responsibilities.

Keywords: losses, revenue loss, transformation, value, potential, improvements

1 Introduction

However, it is possible to tap into the growth reserves of an organisation, when managers end up failing to follow the principles of an effective business management. The location of such failures is an effective validation tool. The methodology of the value oriented management is the best approach for monitoring unsustainable operations for the organisation [1].

2 Formulation of the problem.

Hence, hidden vacancies in the organisational structure of the company can be recognised. In reality the potential is realised in accordance with accepted capitalisation norms

[2]. Shifting the algorithms to focus on the key factors and the symptoms of organisation's development, allows managers to identify the consequences of tasks that were unjustifiably pushed aside due to the negative impact of the external environment on the organisation's development at the time.tics [3].

3 Conclusions.

As a result, this determines the degree of loss and assesses the willingness of the organisation management team not only to implement their existing and future plans, but also take corrective measures to restore the lost operational potential.

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Venture Business Assets' Maintenance

Galamovs Renats, Santhirasegaram Elena

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: r.galamovs@gmail.com, jelena.santhirasegarama@gmail.com*

Abstract

The approach used in this study is devoted to the accumulation of experience in the field of assessing the value of an enterprise, most of which are intangible assets (IA). Understanding the content of their formation ensures the constancy of the strategic goal in the long term..

Keywords: risk, core competencies, amortization, cost, contribution, correction, development

1 Formulation of the problem

Knowledge of the structure of intangible assets makes it possible to identify the most important types of assets for a particular organization that makes the main contribution to the value. The listed advantages become especially relevant in conditions of loss of stability due to the amortisation of resources invested in the high-risk group [1]. The revealed contradiction causes the problem of research, defined as: "There are not enough forces to ensure the protection of an organization in a crisis state" [2].

2 Description of the approach

In this regard, the object of the study is focused on the development of the organization in the long term by eliminating the used resources of the organization. At the same time, the main emphasis is placed on ensuring the life of the organization in the course of working out the way out of unfavourable large-scale situations. The purpose of this

study is to develop a procedure that provides the calculation of the full-scale market value, including accounting for intangible assets in crisis conditions. To achieve it, it is necessary to conduct a current analysis of deviations that lead to disruption of the stable operation of the enterprise. Choose an option for getting out of an unstable state. Implement a mid-term scenario that allows the enterprise to operate in conditions of the depreciated resources.

3 Results

Finally, build long-term leadership to ensure that the organization is retained in its core competency areas. The practical results of the study are concluded in the development of a methodology, which describes the actions that allow assessing the contribution of intangible assets to the total value of the enterprise. The novelty of the research lies in the disclosure of uncertainty in the course of systematizing the types of IA.

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Full-scale Protection of the Organization

Amangeldiyev Abilkhan, Djakons Romans, Kopitov Rostislav

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: ab080161@gmail.com, romans.djakons@isma.lv, rostislavs.kopitovs@isma.lv*

Abstract

This study shows that full-scale performance measurement is based on a set of well-established mechanisms. Such mechanisms that are primarily focused on the neutralization of disruptions in the management principles can be considered as an effective antidote in preventing a crisis within an organization.

Keywords: symptoms, benefit, disruption, loss, change, efficiency

1 Introduction

In the terminology of creating sustainable “Deming” principles, this means that the presence of effective cures for business illnesses is an adequate immune protection for the organization. Meanwhile, the defense is built upon identifying contradictions, that can be summarized as following: “Seeking higher return on sales without considering the control in the management, exhausts the resources of the enterprise”. Primary problems this research is addressing are the unproductive means of management in the formation, distribution and use of capital during its turnover process.

2 Problem

The solution requires maintaining the initial goal through a set of management tools which make it possible to identify the controlling forces of management that deviate from the goal by uncovering the mismatch of assets and liabilities in the working capital cycle before and after establishing order between the rate of capitalization and return on resources. Main objective of the study is to develop a procedure that will encompass the measurement of an organization's current assets along with the means of recovery of its

depreciated resources whilst taking into account the future revenues towards the current value. To accomplish the task, following objectives have to be executed:

1. Ability to detect and record all attributes of breaches in management principles until completion of the objective.
2. Select an option with the best value for the company out of choices available.
3. Implement a value boosting management scenario, considering the medium term potential growth capacity.
4. Develop an effective protocol for entrepreneurship evaluation in the long term.

3 Conclusion

The results of the study suggest, increasing the evaluation mark leads to a more efficient redistribution of functional responsibilities among those involved in the capital cycle. The novelty of the study is due to the results framework, which incorporates a set of fine-tuned mechanisms to ensure that instances of loss in value due to disruptions in management principles, are captured throughout the life cycle of an organization.

Software Production Labour Cost Evaluation

Kelsina Dina, Kopitov Rostislav, Muromcev Sergey

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: d.kelsina@gmail.lv, rostislavs.kopitovs@isma.lv, muromcev.sergej@gmail.com*

Abstract.

Resultative means of assessing the labour intensity of software production are focused on the sustainable management of interaction between the participants of the development process. Prevention of delays in the course of works improves the accuracy of performance of the developer's liabilities to the customer.

Keywords: methodology, efforts, need, necessity, changes, performance

1 Introduction

Identification and rectification of planning drawbacks at early stages reduces financial losses and improves the developers' reputation [1]. However, inefficient production of software products stems from the disproportion between the allocated resources and the amount of labour done by the developers [2].

2 Description of the Approach

The goal of this study is to develop a procedure that would ensure responsibility for the delivery of objective findings on the anticipated labour intensity of software development. The goal set herein required classification of the metrics of software production assessment, systematisation of the means of assessing labour intensity and control over the

software production process, development of a procedure for full-scale assessment of labour intensity of software development, as well as approbation of the effect of this procedure by means of a practical example [3, 4]. Based on the objectives set within the boundaries hereof, recommendations on the use of resultative means of assessing the labour intensity of software development were delivered [5,6].

3 Conclusions

The obtained approbation results give evidence of adherence to the organisational standard and the presence of a complex approach, which allows assessing the efficiency of a project in general and identify the faults of specific stages thereof.

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Remedy for an Unstable Process

Vsevolod Karayev

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: karajevs@inbox.eu*

Abstracts

Suggests an approach to dealing with the phenomena that cause the loss of organizational performance. Finding means to counteract the complications caused to an organization after it has been in an unstable state. Timely prevention of the consequences of crisis situations causes a reduction in downtime and inactivity.

Keywords: circumstance, norms, obstacles, measures, compliance, growth, cost

1 Introduction

The listed actual moments allow to reveal a contradiction which is reduced to the formulation: "Striving for unreasonable increase of a level of profitability breaks speed of circulation of the capital". This contradiction caused the problem of research, the essence of which is the impossibility to effectively manage the use of capital in the absence of means of control over its formation and distribution [1]. The knowledge of the problem makes it possible to identify the object of the study, which is a goal-oriented activity of the enterprise. Ensuring such activity leads to neutralizing cases of getting the organization into difficult situations by finding ways to improve the management of changes in working capital before and after identifying the causes that cause destabilization in the formation of future income".

2 Approach

The construction of the object occurs in the disclosure of the features of the subject. Their analysis has established that the use of outdated methods of counteraction to the emergence of new large-scale circumstances causes an

unwarranted change of strategic course [2]. The aim of the study is to develop a procedure to increase the value of the enterprise over the entire distance of the development of the organization. Based on the set goal, the following tasks were formulated:

1. Conducting a current analysis of the prerequisites that cause the exit of the organization from a stable state.
2. The choice of a variant of productive formation and distribution of resources of the enterprise.
3. Realization of the workable scenario of transformation of the future income into the present value.
4. Development of the management of prevention of distribution of negative phenomena

3 Conclusions

Practical results include the means of constructing a management system in which the principles of cost management do not conflict with the rules of responsibility [3]. Scientific novelty consists in the implementation of the program to increase the value of the enterprise in the long term, tuned to the growth coefficient of capitalization.

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Value Chain Technology in a Special Environment

Elena Santhirasegaram

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: jelena.santhirasegarama@gmail.com

Abstract

The relevance of this study lies in the knowledge of the weak points in the organization that can lead to its destruction. This knowledge is accumulated through measures that provide increased controllability in the implementation of extremely large-scale circumstances. As a result, there is an opportunity to debug effective means of overcoming a crisis situation.

Keywords: crises, diagnostics, methodology, changes, efficiency

1 Introduction

Considering that the focus on increasing the value contradicts the schemes of justified setting of standards, the problem of the study was expressed in the following formulation: "It is impossible to create added value in the absence of means of promptly neutralization of the forces that destroy it."

2 Main part

The point of research is characterized as a set of forces that make it possible to overcome the increasing disruptive influence, demonstrating the ability to manage changes in the course of implementing a long-term program for creating additional value [1-3]. The purpose of the study is aimed at developing a procedure that provides a system of structural restructuring of the organization, taking into

account the way out of difficult situations. In accordance with the goal, the following tasks were formulated [4-5]:

1. Proceeding a routine analysis of the factors that prevent the achievement of the final goal.
2. The choice of the effective means to use.
3. Implementation of the long-term scenario of structural adjustment.
4. Organization of synergistic interaction of the organization's participants in special conditions.

3 Results

As a practical part, it should be noted the substantiation of changes that allow to restore the scale of the incurred losses throughout the entire life cycle of the organization. The innovation of the research lies in the implementation of a program for the sustainable growth of an organization in crisis conditions [6].

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Production of Loyalty-predisposed Devices

Dina Kelsina

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: d.kelsina@gmail.lv

Abstract.

The ability of an expert to identify loss areas in a timely manner is characterised by his/her pursuance of actions that strengthen and develop the organisation. Extra concentration on increased-comfort sites allows preventing an organisation from falling into a chronic condition. In this regard, reasonably performed changes enable an organisation to deal with critical situations without losses.

Keywords: habit, inattention, damage, detection, acts, performance

1 Introduction

A contradiction stands out in the setting of the stated facts, distilled down to the concept that inattention to the most well-tuned parts of the management system at the guidance stage causes the loss of an expert's professional competencies [1]. This results in the identification of a problem, which manifests itself as inability to ensure implementation of impactful scenarios in the absence of mechanisms for full-scale assessment of operation in the setting of detection of responsibility loss aspects [2].

2 An approach

The object of the study is aimed at the preparation of a qualified expert capable of efficient guidance of an organisation by means of timely improvement of the process before and after the implementation of responsibly substantiated changes [3]. The goal of this research is to

develop a procedure that would provide an organisation planning system in the circumstances of dealing with complicated situations [4]. The first step towards the achievement of this goal would be a current analysis of deviations that cause the loss of sustainability. The second stage is the choice of an option for eliminating irresponsible elements. The third one is the fulfilment of a mid-term scenario in the context of process improvement deviation. The fourth stage is the implementation of a new version of the strategic planning system.

3 Conclusions

The practical utility of this study is the improvement of a situation performed at the level of individual activities, considering the contribution thereof into the efficiency of the entire operation. Its novelty unfolds through the comprehension of reasons that cause the loss of vigilance in experts acting within a well-tuned system.

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Examination of Financial Engineering

Melnikovs Jevgenijs

ISMA University of Applied Sciences, Latvia

**Corresponding author's e-mail: melnikov.jeevgenij@gmail.com*

Abstract

Effective means of assessing the financial condition, in the context of relevance, are focused on the sustainable functioning of enterprises. Continuous use of these tools improves the performance of the organization. Identifying in the early stages the deficiencies that caused the inoperability, reduce the financial losses of the enterprise.

Keywords: purposefulness, decision making, conclusion, efficiency, improvement

1 Content of the Task

However, the methodological tools used for different periods of time are contradictory [1]. The reason for this discrepancy lies in the partial, "choice for oneself", the nature of the assessment carried out by various services of the enterprise based on various business information [2].

2 Specification of the Task

The purpose of this study is to develop a procedure based on an objective conclusion about the current state of the analysed enterprise. This kind of procedure can help to identify the shortcomings of the project and implement a program to restore the missed steps of financial engineering

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[3]. Therefore, it is required to demonstrates meanings of tools of examination of financial engineering, conduct a full-scale examination of the financial activities of an enterprise, and test the operation of the procedure at a specific enterprise [3-5]. Taking into account the tasks put forward, a complex of recommendations has been developed to use effective financial engineering mechanisms in a specific case.

3 Main Results

The practical value of this research is to develop recommendations based on an actual set of symptoms to determine places of loss of performance and eliminate them.

Research of a Regional University Branch Contribution to the Development of the Region

Djakons Romans, Kelsina Dina, Kopitov Rostislav

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: romāns.djakons@isma.lv, d.kelsina@gmail.lv, rostislavs.kopitovs@isma.lv

Abstract

The object of the study is the index of committed sustainability, which associates two important parameters – competitive performance and investment appeal. The measure of efficiency was defined as the current value of an association comprised of three potential members: the higher education institution, investors, and business representatives. Assessment of the current value was carried out through the expansion of Reichheld's three-loyalty effect.

Keywords: purposefulness, sustainability, value, loyalty, contribution, technology

1 Introduction

This effect suggests inclusion of three loyal participants into an association to provide the maximum result: tutors (employees), employers (customers), students (investors). Its expansion required the identification of three values, each of which presented a certain determination of the contribution of representatives of loyal participants. Identification was carried out using the respective instruments.

2 Contribution

In order to assess the current value of contribution of the higher education institution to the social capital of the region, a business plan was prepared in advance in a 10-year perspective, in adherence to the UNIDO standard. The following course of action consisted of determination of cash flows (the working enterprise model), calculation of the discount rate and capitalisation rate (CAPM model, WACC model SGR), calculation of the further value of the higher education institution (direct capitalisation model and the Gordon growth model). Then, the value potential (value pentagram) of the higher education institution was determined. As a result, adduction of future values as of the beginning of 2019 was carried out (discount model).

Assessment of loyal investors included a study of the dynamics of enrolment / distribution of alumni of the higher

education institutions to three directions (hotel business, tourism, other business) over 10 years. Dynamics of investments into education was determined over a ten-year period as well. Funds of withholdings from investments were assessed (taxes, development, infrastructural investments, etc.)

The final stage was the assessment of the contribution of loyal customers to the image of the region. This involved the development of a number of business plan options for hotel business, drawn up in a ten-year perspective in accordance with the UNIDO standard. These were used as a basis for determination of the value potential of hotel business and assessment of the value of intangible assets of hotel business.

3 Conclusions

The result was the calculation of the share of intangible assets contributed by the students and alumni of the higher education institution employed in hotel business, as well as the alumni who opened their own hotel businesses. Similar actions were taken in the domain of tourism. The share of intangible assets for other forms of business was also assessed. The findings showed the distribution of the contribution of business to the social capital of the region.

Thus, using the prospective management technology, it was determined that by 2027, alumni of the higher education institution employed in business would contribute 29 343 thousand Euros to the social capital of the region.

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The military economy as an important component of the country's military security

Kaspars Kikste

ISMA University of Applied Sciences, Latvia

Corresponding author's e-mail: aspars.kikste@gmail.com

Abstract:

The article considers the military economy as an important part of national economy and the country's military security.

Keywords: military economy, military sector, national security, military security.

The military sector is an important component of the economy of any country, since security is one of the key issues of national security. In economics, defense refers to the so-called "public goods" that should be provided to all citizens equally. Organization and financing of defense is a direct function of the state, and the goal is to ensure the security of the country and its citizens. Military security is understood as the state of a country in which there are opportunities to neutralize or stop destructive attempts to harm or threaten an individual, society, country, the world community, and destabilize peaceful coexistence. In general, this type of security is designed to ensure the gradual development of a country or society (economic, technological, etc.).

Based on this, we can determine several key levels of military security: international, regional and national security. International military security consists in maintaining stable relations between countries or peoples, the absence of external military threats, the ability of countries to independently and independently choose their development paths. An important aspect is also the prevention of threats, their neutralization and minimization of negative consequences.

The key principles of international security are renunciation of diktat, violence, equality of rights and interests, reduction of military forces or weapons. Development in accordance with these principles is intended to form a global equilibrium system, however, taking into account the financial capabilities of countries and their participation in the global redistribution of financial flows (including those involved in the military

sector). Such a model is quite complex and requires widespread attention and cooperation of key players in this market.

Regional military security is implemented on the same principles, but concentrates exclusively on the countries of a certain region, is focused on achieving stability in the development of countries and resolving or preventing conflicts at the regional level.

The military security of the state in this context is understood as the state of the country's security and the availability of opportunities to neutralize external threats or internal tensions. In this regard, it seems urgent to strengthen interstate military cooperation, designed to create a system of collective defense and ensure the interests of a particular state at the regional and world level. In general, timely identification of threats and forecasting of conflicts is a key priority of military security and military policy.

In this context, it is important to identify the key players in this market, the countries with the largest financing of the military sector and the formed market. So, the first place in the world in 2021 for the level of financing of the military sector is occupied by the United States of America with a budget of \$ 740.5 billion, followed by China with an amount of \$ 178.2 billion and closes the TOP-3 India with a budget of 73.65 billion dollars. In general, the US budget is more than the budget of the rest of the TOP-10 countries in terms of the level of funding for the military sector [1].

Thus, in the modern world, the military economy and military security are an important part of the country's functioning and the formation of global stability.

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Analysis of tourism in Netherlands

Amalia Khamraeva, Jūlija Mironova

ISMA University of Applied Science, Latvia

*Corresponding author 's e-mail: xxxxxx.gyyyyyy@isma.lv, julija.mironova@isma.lv

Abstract

Despite the small size of the country, every year Netherlands are one of the top visited countries in the Europe. Amsterdam, as a capital of the Netherlands, is attracting more and more visitors every year. Travel and tourism sector in Netherlands is considered as extremely important to Dutch economy. Of course, pandemic caused by Covid-19 affected tourism industry in Netherlands since it happened in the spring of 2020. The aim of this study is to analyse tourism industry in Netherlands, as well as to analyse impact of Covid-19.

Keywords: tourism, Netherlands, statistics

1 Introduction

Analysis of the tourism market nowadays is essential for start of any business within this industry. Every idea of the business start with the investigation of the tourism market and potential target audience. Authors business idea is to develop an itinerary - tour from Riga to Amsterdam. In order to develop this tour, it is crucial to investigate market of the destination country.

This research is based on the newest statistical data provided by the official authorities.

2 Overview

The Netherlands, a country in northwestern Europe, is known for a flat landscape of canals, tulip fields, windmills and cycling routes. Amsterdam, the capital, is home to the Rijksmuseum, Van Gogh Museum and the house where Jewish diarist Anne Frank hid during WWII. Canalside mansions and a trove of works from artists including Rembrandt and Vermeer remain from the city's 17th-century "Golden Age." In 2017 the Netherlands was visited by 17 million foreign tourists (with more than 5 million coming from Germany), making it the 20th most visited country in the world. The Netherlands recorded a total of 20 m tourists in 2019, ranking 26th in the world in absolute terms. That smaller countries regularly perform lower in a comparison of the absolute number of guests, is obvious. By putting the tourist numbers in relation to the population of the Netherlands, the result is much more comparable picture: With 1.2 tourists per resident, the Netherlands ranked 64th in the world. In Western Europe, it ranked 7th. The Netherlands generated around 25.85 bn EUR in the tourism sector alone. This corresponds to 2.8 percent of it's the gross domestic product and approximately 12 percent of all international tourism receipts in Western Europe. The most popular city in the Netherlands for international travelers is Amsterdam. In 2019 it reached the 26th place of the world's most popular cities with 8.84 m tourists. On average, each of the tourists arriving in 2019 spent about 1,305 EUR. Conversely, the inhabitants of the Netherlands spend only around 1,100 EUR a year when they themselves spend vacations abroad. Amsterdam is the capital city of the Netherlands, and with its historic buildings, canals and

famous museums it is attracting thousands of visitors from across the world. Furthermore, Amsterdam hosts numerous large meetings and trade fairs, therefore also welcoming visitors with a business purpose. In the Netherlands, the travel and tourism sector has become increasingly important to the Dutch economy. In 2019, the total contribution of travel and tourism to the Dutch GDP reached over 45 billion euros, its highest value since 2012. This sector is comprised of three major components: domestic, inbound, and outbound tourism. In terms of the tourism expenditure in the Netherlands, domestic tourism, which includes Dutch citizens traveling locally within the Netherlands, reported the highest expenditure in 2019. The second highest expenditure in 2019 came from inbound tourism, but this was heavily impacted by the coronavirus (COVID-19) pandemic in 2020. The health crisis caused the number of inbound tourists in the Netherlands to decrease by nearly two thirds, thus resulting in a sharp drop in international tourism receipts in the Netherlands. International tourists and domestic travelers that were able to travel in the Netherlands in 2020 showed a strong preference for the city of Amsterdam, which has long been a popular travel destination. The number of international hotel guests in Amsterdam reached over two million in 2020, while there were also nearly one million domestic hotel guests in Amsterdam the same year. Other popular destinations in the Netherlands for tourists included Rotterdam, The Hague, Maastricht, and Utrecht, though domestic travelers accounted for twice as many hotel guests in these cities than international tourists. Prior to 2020, by far the most international tourists to the Netherlands arrived from the United Kingdom (UK) or Germany. The number of overnight guests in the Netherlands from the UK who stayed in Amsterdam in 2019 reached roughly one and a half million, and the number of overnight guests in the Netherlands from Germany followed close behind, with nearly one million guests also staying in Amsterdam that year. The COVID-19 pandemic has had a lasting impact on the travel and tourism industry worldwide, as travel restrictions and social distancing measures forced many people to stay at home or travel only within their local community in 2020. The massive decline in tourists was reflected in the tourism industry's revenue loss. While the Netherlands was not the country with the highest tourism

revenue loss due to the pandemic, the country still reported a loss of nearly 15 billion U.S. dollars in 2020. At the beginning of the pandemic, the number of international tourist arrivals in the Netherlands sharply declined, and while international tourism fluctuated during the remainder of 2020, the number of international arrivals never came close to the previous year's values. International arrivals from all countries were affected by these travel restrictions. The number of international hotel guests in the Netherlands by continent of origin in 2020 reflected this, showing significant drops in arrivals from every continent, including the Netherlands' home region of Europe.

3 Conclusions

Netherlands remains one of the most visited countries in the

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Europe. Amsterdam, as it's capital, attracts tourists with an amazing architecture, various museums, magnificent city canals and many other attraction possibilities. Based on the statistical analysis, locals usually spend their vacations abroad, which could be explained with the small size of the country and high population. Travel and Tourism sector is considered to be one of the most important sectors of the economy, which has a significant contribution to the GDP of Netherlands,

Pandemic, as it can be concluded from the analysis of the statistics, affected tourism industry in Netherlands a lot. It has a long lasting impact on the travel industry, and it is now very difficult to forecast when and how tourism and travel industry can be back with the same force as before the pandemic.

COVID-19 Impact on the Tourism Industry in Italy

Aziz Ergashev, Jūlija Mironova

ISMA University of Applied Science, Latvia

*Corresponding author's email: azizerkinovich01@gmail.com, julija.mironova@isma.lv

Abstract

During the last year pandemic caused by the new virus Covid -19 affected whole world and people around the world are still experiencing new way of living. Pandemic started suddenly and there was no industry what would be ready for such a risk what the whole world would ever expect - closure of the borders all around the world. Tourism industry is not an exception. Currently there are many investigations done all over the world, to explore and understand the affect of pandemic and to forecast new ways of developing business. Main goal of this work is to analyse the impact of Covid - 19 on the tourism industry in Italy and to forecast future directions of it's development.

Keywords: tourism, Covid-19, Italy.

1 Introduction

CORONAVIRUS (COVID-19) IN ITALY - STATISTICS & FACTS

The coronaviruses are specific types of viruses which affect the respiratory tract. They cause several illnesses, ranging from colds and pneumonia to Severe Acute Respiratory Syndrome (SARS). The outbreak of COVID-19, as the new coronavirus discovered was named, started in the city of Wuhan, China, at the end of December 2019. On March 11, 2020, the World Health Organization officially declared the novel coronavirus a pandemic, when the virus reached more than a hundred countries, causing over four thousand deaths. Today, there are over 100 million registered cases of COVID-19 worldwide and over two million deaths.

In Italy, the first two cases of coronavirus (COVID-19) were registered at the end of January 2020. Then, since February 22, the virus started to spread quickly among the Italian population. As of March 14, 2021, Italy recorded 3.2 million cases of coronavirus (COVID-19), representing one of the most affected countries worldwide. Currently, the regions with the highest number of cases are Lombardy, and Veneto, located in the north of the country, followed by Campania, in the south. Demographic data on the infected patients show that COVID-19 in Italy has hit every age group uniformly. However, the mortality rate appears to be much higher for elderly patients. Nationwide, 2.6 million people recovered from coronavirus or were discharged from hospitals as of March 14, 2021. Italy has been among the countries most impacted by the coronavirus outbreak. Also, the number of deaths due to coronavirus recorded in Italy is significantly high, making it one of the countries with the highest fatality rates worldwide. In particular, a very high mortality rate was recorded among patients aged 70 years or older.

The outbreak of the pandemic has caused recession and severe economic downturns in several countries. Among the consequences of the economic crisis, nations might experience an increase in unemployment rates and government debt, stock market crash, food insecurity, collapse of some industries, and other. In Italy, the gross

domestic product (GDP) is estimated to decrease significantly. Since the outbreak of coronavirus, different estimates on the GDP growth based on various scenarios and methodologies have been released. According to a forecast from December, by the end of 2020, the Italian GDP decreased by 8.9 percent. Nevertheless, the impact of coronavirus on the Italian economy might vary according to the industry. During the months of strict measures and rules, some sectors have seen their consumption volume slightly increasing, such as those of food, media, and electricity. On the other hand, many sectors experienced a massive drop in consumption, with contraction by over 80 percent. Hotels, gastronomy, leisure activities as well as transportation are among the sectors which recorded the largest losses during 2020.

In this sense, the tourism industry in Italy has been seriously affected by the spread of COVID-19. A study published in December 2020 shows that the country has register a decrease of over 40 million international tourist arrivals in 2020 compared to the previous year. In addition, the consequences on the tourism branch are estimated to extend until 2023 or 2024. Similarly, Italy is expected to have lost roughly 30 billion euros of international spending. In terms of domestic tourism, it is forecast that tourist accommodations in Italy had a drop of over 60 million domestic overnight stays in 2020 compared to the previous year.

2 Overview

IMPACT ON THE ECONOMY

The lockdown imposed during the Spring 2020, and other measures taken in the following months to contain the pandemic, forced many businesses to shut their doors and caused industrial production to slow down significantly. As a result, consumption fell, with the sectors most severely hit being hospitality and tourism, air transport, and automotive. Several predictions about the development of the global economy were published in recent months, based on different scenarios about the development of the pandemic. According to the latest figures, it appeared that the

coronavirus outbreak could cause Italy's GDP to shrink by approximately nine percent in 2020.

FIRMS IN THE TOURISM INDUSTRY AT RISK OF CLOSING DUE TO THE CORONAVIRUS IN ITALY 2020

Due to the impact of the coronavirus (COVID-19) pandemic, several companies of the tourism industry in Italy could face the risk of closing down permanently in 2020. According to the estimates, over 45 thousand restaurants and bars are expected to be at risk of shutting down definitely during the year. Moreover, about 7.5 thousand businesses in the accommodations sector are forecasted to probably close down in 2021.

PERCENTAGE CHANGE IN THE HOTEL INDUSTRY'S EMPLOYMENT IN ITALY DUE TO CORONAVIRUS 2020

The coronavirus (COVID-19) pandemic hit the hotel industry hard in 2020, as travel was limited due to restrictions and stay-at-home measures implemented worldwide to face the health crisis. In the hotel industry in Italy, the number of employees with fixed-term contracts decreased by roughly 45 percent in 2020 over the previous year. Overall, total employment in the hotel industry in Italy dropped by 36.3 percent in 2020.

IMPACT OF THE CORONAVIRUS (COVID-19) ON TOURISM REVENUES IN ITALY BY HOTEL ACCOMMODATION SECTOR

A forecast from March 2020 analyzed the potential impact of the coronavirus (COVID-19) pandemic on revenues of different sectors of the tourism industry in Italy. The outlook considered two potential scenarios for 2020. In the best-case scenario, the pandemic is supposed to end in May 2020, while in the worst case-scenario it is supposed to last until December 2020. In the first case, hotels in Italy are expected to generate revenues of 7.8 million euros in 2020. By contrast, in the worst-case scenario the estimated revenues will amount to 3.3 million euros in 2020. In both cases, hotel revenues are expected to decrease significantly, considering that this sector generated revenues of 12.5 million euros in 2019. And in addition, unfortunately, the pandemic isn't over yet here in 2021 still it's lasting.

ESTIMATED IMPACT OF THE CORONAVIRUS ON TOURIST ARRIVALS IN ITALY 2020, BY REGION

Due to the impact of the coronavirus (COVID-19) pandemic, it was estimated that Italy recorded a decrease of approximately 67 million tourist arrivals in 2020 over the previous year. As estimated, Veneto was the region experiencing the highest drop with a decrease of roughly 12 million arrivals. Lombardy registered the second-highest decrease, losing about 9.5 million tourist arrivals between January and December 2020

LOSS OF TOURISM EXPENDITURE DUE TO THE IMPACT OF CORONAVIRUS IN ITALY 2020, BY SECTOR

A forecast from April 2020 reveals that the tourism expenditure in Italy could register a dramatic drop in 2020, due to the coronavirus (COVID-19) pandemic. The estimate, considering a scenario in which the emergency lasts until October 1, 2020, shows that the catering sector will be significantly damaged by the COVID-19 outbreak. In fact, this sector was expected to record a loss of roughly 28.3 billion euros in 2020.

NUMBER OF INTERNATIONAL TOURIST ARRIVALS IN ITALY 2015-2019

From 2015 to 2019, the number of international tourist arrivals in Italy increased constantly. According to the study, this figure rose from about 81.6 million tourists in 2015 to roughly 96 million tourists in 2019.

NUMBER OF DOMESTIC TRIPS TAKEN BY ITALIANS 2014-2019

From 2014 to 2019, the number of domestic trips taken by Italian tourists fluctuated significantly. In 2014, Italians made roughly 50 million domestic trips. In 2018, the number of domestic visits peaked at 62.8 million, before decreasing to about 54 million in 2019.

CORONAVIRUS IMPACT ON INTERNATIONAL AND DOMESTIC ARRIVALS IN ITALY

A study from December 2020 analyzed the impact of the coronavirus (COVID-19) pandemic on international and domestic tourist arrivals in selected Italian cities in 2020. According to the research, Venice could register the highest drop, as tourist arrivals are expected to decrease by 71.5 percent over the previous year. In particular, international tourist arrivals are estimated to go down by roughly 66 percent. Florence followed on the list, recording the second-highest drop in international arrivals. Overall, it is forecast that tourist arrivals in Italy could go down by almost 60 percent in 2020 over 2019.

PERCENTAGE CHANGE IN TOURISM EXPENDITURE DUE TO CORONAVIRUS IN ITALY 2020, BY SECTOR

In 2020, the tourism expenditure in Italy is expected to drop significantly due to the impact of the coronavirus (COVID-19) pandemic. A forecast from March 2020, considering a scenario in which the emergency lasts until October 1, 2020, reveals that the tourism expenditure of accommodations services in Italy could decrease by 22.5 percent compared to 2019. In this sense, accommodations services would lose roughly 5.9 billion euros. However, it is estimated that the catering sector records the highest loss of tourism expenditure in 2020.

IMPACT OF CORONAVIRUS (COVID-19) ON TOURISM VALUE ADDED IN ITALY 2020

In March 2020, it was estimated that the lockdown in Italy, caused by the coronavirus (COVID-19) emergency, will have a significant impact on the tourism value added. If the country's lockdown will last until April 2020, Italy is expected to lose approximately four billion euros of tourism value added. However, if the lockdown will end in June 2020, it is estimated a decrease of roughly 7.7 billion euros.

IMPACT OF THE CORONAVIRUS ON TOTAL TOURIST ARRIVALS IN ITALY 2020-2024, BY SCENARIO

A study from December 2020 analyzed the impact of the coronavirus (COVID-19) pandemic on international and domestic tourist arrivals in Italy from 2020 to 2024. It presented three alternative scenarios. According to the baseline scenario, Italy would experience a drop of 68 million international and domestic arrivals in 2020 over the previous year. Then, tourist arrivals would return to the 2019 level not before 2023.

IMPACT OF THE CORONAVIRUS ON TOURIST SPENDING IN ITALY 2020-2024, BY SCENARIO

A study from December 2020 analyzed the impact of the coronavirus (COVID-19) pandemic on international and domestic tourist spending in Italy from 2020 to 2024. It presented three alternative scenarios. According to the baseline scenario, total tourist spending would experience a drop of 95 billion euros in 2020 over the previous year. Then, the international tourist spending would return to the 2019 level only by 2022.

The upside scenario, which considers a faster recovery, forecast a decrease of 82 billion euros in 2020. But the downside scenario, supposing a slower recovery, estimated a decrease of 120 billion euros in 2020.

ITALIAN TOURISM TO DECLINE IN THE FIRST QUARTER OF 2021

The Covid-19 pandemic has had an unprecedented effect on the tourism industry globally. This is especially the case for countries which are more dependent on the sector than others, for example, Italy. The country is now counting its losses for the year as well as predicting how 2021 will unfold.

Italian tourism has struggled greatly this year and was struck severely by the pandemic. The year will be closed with 53 billion euros less in turnover in contrast with 2019. The main reason for this development is the drastic reduction of international tourism.

2021 also promises to be a problematic year. At least this is what the analysis developed by Isnart-Unioncamere indicates.

According to the report, a loss of 7.9 billion euros for the first quarter of next year is expected compared to the turnover from 2019. The data was elaborated assuming a scenario in which Covid-19 will continue to impose strong restrictions both nationally and internationally.

Thus, between January and March 2021 there will be a 60% reduction in domestic tourism in the country and a fall of 85% in terms of international arrivals.

Moreover, next year will also continue with similar trends. Between July and October 2020, a fifth of consumers worldwide declared that they wanted to give up international travel, citing among the reasons that they want to reduce the environmental impact.

Furthermore, last summer as many as 81% Italians chose destinations based on safety criteria and sporting activity was the main reason for their vacation. These trends are destined to persist over time, strongly influencing the destination choices.

3 Conclusion

In this research we learned the impact of COVID-19 on the Tourism Industry in Italy in sector by sector. 2020 already passed and now here in 2021 quarantine restrictions are still there. Country GDP loss from the last year due to this Pandemic was more than enough and this year even though the COVID-19 is still among us, Italian Government is looking at easing restrictions in a major way in this May and could reopen tourism businesses in June partially. According to the report of "Agenzia ANSA" NEWS, Prime Minister Mario Draghi confirmed that they are working on this case. From the month of June Tourism restrictions will be lifted for only Domestic Tourism for now, after some time considering the situation then International Tourism might also be allowed. Prime Minister is claiming that this year result is not going to be as the previous year's, from last year we have seen this, we've been through this and this year we have experience and we have vaccine programs ongoing so it's time to kick recovery process off in the Tourism Industry. Of course, it takes some time, accordingly to the experts forecast, full recovery can last up until the end of 2023 only if the Country starts focusing on it from now.

Italy is one of the most suffered countries from COVID-19 in EU and in the World as well. Even though the GDP loss is huge and the number of registered cases is high, they are managing to handle the situation and the results are showing up closer to the expectations according to the taken actions. There is no accurate information on whether tourism from non-European countries might be allowed this year. Also, no information is indicated where or not Italy is planning to join the European "health passport" scheme which is a green digital certificate, not a vaccine passport. It could involve letting people prove their COVID-FREE status. This will show whether the person has either been vaccinated, or has a recent negative test, or has recovered from COVID or thus has antibodies.

With all been said, Italy might be lifting the restrictions for travellers soon. But for now, the whole of Italy remains under the tightened restrictions until at least the end of April, with all non-essential travel between towns and regions forbidden and a nightly curfew in place by the end of this month.

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The place and role of the organization in management

Mokhinoza Khamidova*, Maftuna Saydamatova

ISMA University of Applied Sciences, Uzbekistan

**Corresponding author's email: mokhinozakhamidova@gmail.com*

Abstract

It is necessary to be in demand, and therefore the priority sphere for the implementation of the provisions and developments of the organization's science is management. The close and diverse interconnection of concepts and categories of organization and management, their semantic and synonymous interweaving, intersections and relationships in the theory and practice of the formation and development of socio-economic processes and systems necessitated subject comparison, determination of the place and role of the organization in management, development and presentation of the mechanism their interactions.

Keywords: Basis, relationship, genesis, unity, dependence, complex, concept, place, methodology, science, area, orientation, basis, practice, continuity, productivity, principle, system, sphere, function.

Introduction

Modern studies of manifestations of organization in management reflect both the traditional approach to the classification and formalization of their expressions and innovative conceptualizations of the relationship between these concepts. Today they are not only scientifically substantiated, but also widely disseminated and adequately perceived. Scientific justification aims to theoretically clarify the essence and content of the formation and development of their relationship and to propose specific forms and procedures of their practical interaction. Even though this task has already been posed and solved many times in several scientific studies and textbooks, its conceptual resolution from the position of developing a universal concept of organization needs an actualized, comprehensive justification and presentation. First of all, they must answer questions about the primacy, primacy and derivation, place and role, forms, systems, mechanism, and procedures of the interaction of these concepts.

On the one hand, the application of these concepts in the processes and systems of modern management is well established and characterized by a wide, albeit rather formalized, spectrum of use. The most common assumption is that organization and governance are processes of some kind of practical activity, carried out, as a rule, within and about a particular organization as a social system. At the same time, organization and management are also carried out concerning other specific processes, ensuring that their formation, functioning, and development objectives are achieved more effectively. Finally, it is quite common to understand the mechanism of organization or management cooperation as reflecting the design of the interaction of the components, the algorithm, or procedure for the implementation of a specific process. A comparison of the systemic representations of the two concepts inevitably leads to the conclusion that the organization system is primary and its management system secondary. Such a comparison is most effectively justified by analogy with the clarification of the question of the primacy of the organization within the genesis study. Such an approach makes it possible to verify the validity of the assertion about

the primacy of the organization system over the management system. This manifests itself in the fact that not every organization as a system is created and considered under the conditions of implementation and perception of purposeful influence, but at the heart of any management is the organization as an interconnection of components.

Active improvement and development of the theory and practice of management in market conditions, formation of the essence, and formation of the content of national management necessitate determining the place and role of the organization as a process, system, mechanism in such a relevant field of knowledge and sphere of practical activity as management. From these points of view, the use of different variants of combinations of the concepts of organization and management acquires an expansive character, repeatedly transforming and intertwining when used concerning a variety of processes or systems. The implementation of the management process is not only impossible without the process of its organization, but also without a system that is organized in a certain way. This determines the object approach to the study of the construction and development of the organization, carried out by the modern theory of organizations. Recently, a whole complex of scientific directions and disciplines has been formed, expanding the ideas about the relationship of organization and management, various modifications of their correlation and use.

In the area of the combination, overlapping, and interaction of the concepts of organization and management, a rather broad and extensive range of theoretical and practical areas of public interest are actively formed and developed. The definition of the concept of management as a purposeful impact of the subject on the object already indicates the priority of the presence or implementation of a certain organization. It is manifested both in the allocation and construction of a specific hierarchy of direct participants of interaction in the form of a system of subject-object relationship and in the content and characteristic of the purposefulness and certainty of the impact process itself. A specific organization may be established not only and not so much for effective management, but also other purposes. This is particularly characteristic of market-based models of

communication organization, where the main objective becomes equality of rights and opportunities for free participation, for example in switching activities. But this means that at some stage or throughout its operation such an organization does not need to change, and therefore does not need to be purposefully influenced.

Constructive analysis of the content of the interrelations of the concepts under consideration, based on the primacy of organization, should reflect one or another of its manifestations in particular management. This will not only highlight the widest range of such manifestations but also reveal the formation of interconnection and continuity between them, reflecting the prospects for the development of such interaction in modern management systems. The basis for such an analysis can be a systematic structuring of the reflection of the forms of manifestation of the organization in management. Such classification will reveal the complex system of manifestations of the various roles performed by the organization in the process of developing, presenting, applying the theory and practice of modern management. It is projected onto a consistently two-dimensional evolving representation of the organization, on the one hand, as a methodological basis for the formation, application, and development of systems of management principles, functions, and methods, and on the other hand, as a form of reflection of subjects, objects, and their structure, process, and management procedure. Moreover, if the organizational framework characterizes primarily the theoretical application of the organization, the form of expression reveals more of its practical implementation. The transformation of the approach applied in this model in the three-dimensional dimension allows the formation and comparison of configurations of such relationships across several diverse research objects and, on this basis, the replication and adaptation of effective organization models directly, in their practical testing, implementation and use in

the specific conditions of real-life enterprises. Such an approach involves refining and implementing a previously implemented organizational model based on a new customer's terms of reference, adapting it, and applying it to specific purposes and conditions.

Conclusions and suggestions

The basis for such an analysis can be the systemic structuring of the reflection of the forms of manifestation of the organization in management. Such a classification will reveal a complex system of manifestations of various roles performed by an organization in the process of developing, presenting, applying the theory and implementing the practice of modern management. It is projected onto a consistently two-dimensional development of an organization's view, on the one hand, as a methodological basis for the formation, application and development of systems of principles, functions and management methods, and on the other, as a form of reflection of subjects, objects and their structure, process and management procedure. Moreover, if the organizational basis characterizes primarily the theoretical application of the organization, then the form of expression largely reveals its practical implementation.

A consistently applied two-dimensional approach to building a model of the ratio of the concepts under study allows us to reveal and present the entire spectrum of implementation of the manifestations of organization in the theory and practice of management. It is positioned on the basis of parallel identification of theoretical meaning and presentation of real forms of expression of certain relationships between organization and management. This makes it possible to present one of the options for structuring the manifestations of an organization in management in a sufficiently substantiated and detailed manner.

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