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DYNAMICS AND RECENT TRENDS OF VARY INDUSTRIES IN EU AND GEORGIA: ICTS ADOPTION IN SUPPLY CHAIN MANAGEMENT

GTU AND UNIFG 1ST JOINT R&D INTERNATIONAL CONFERENCE

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INTERNET OF THINGS (IOT) AND LIFECYCLE MANAGEMENT

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ABSTRACT: Industry 4.0 allows a more flexible and modular manufacturing, through the combination of several major innovations of the digital technology area. These technologies include advanced robotics and artificial intelligence, sophisticated sensors, cloud computing, Internet of Things (IoT), digital fabrication (including 3D printing), software-as-a-service and other new marketing models.

The adoption of different and innovative devices will provide for the rapid reaction to a variable demand by manufacturing companies, in terms of both production volumes and mix variability. In the factory of the future, the physical objects will "smart" by connecting them to the Internet utilizing ubiquitous sensors. Therefore in a 'smart' factory, the humans and the machines can work closely together, for a particular task, the workers can be quickly directed to the right tool which automatically 'knows' the next step and sets the correct calibration for the specific part. The European Union supports these innovations through its industrial policy and through research and infrastructure funding. Under the Industry 4.0 model, the product design and the development, take place in a simulated laboratory and utilize digital fabrication models. The products take tangible form only after most of the design and engineering problems have been worked out. The networks of machinery become systems characterized by a highly flexible technology, able to respond rapidly to human and cyber commands.

Although scientific literature describe in depth the different aspect of Industry 4.0, nowadays the point of view about environmental sustainability is unclear. In what ways and to what extent Industry 4.0 will impact on long-term sustainability is unknown. There is currently a substantial lack of evidence between implementation of Industry 4.0 and environmental

sustainability. The aim of the discussion is to analyse how the concept of Industry 4.0 will be adopted in different European plants, evaluating the environmental impacts in industry of the tomorrow. These considerations address the following issues: How sustainable is Industry 4.0? What could be the footprint of Industrial Internet? What are the obstacles to the participation of small and medium enterprise in the supply chain of the manufacturing industry? What are the limitations to the export of smart factories equipment and services? There are, of course, many challenges associated to adoption of Industry 4.0 strategies, in particular, the need for sustainable action in manufacturing is more urgent than ever before.

THE (R)EVOLUTION OF THE FISHING SECTOR IN PORTUGAL. BUILDING A SUPPORT FOR THE COMING GENERATIONS

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ABSTRACT: Information and Communication Technologies (ICTs) are powerful tools in an extremely unstable and turbulent world, being a vital weapon in an era of electronic communication, full of unpredictability and entropy (measures of the disorder of a system). It is with this historical, economic and food galaxy interpretation of the world that we have decided to study the fish consumption supply chain in Portugal, distributing and analysing 2 different surveys on purchase and consumption behaviours. Portugal is Europe's leader in consumption of fish and ranks third in the world. The study was made in strict collaboration with Docapesca Portos e Lotas S.A. (is a government owned company, under the Ministry of Finance and the Ministry of Sea. Its mission is to provide, on mainland Portugal, the public service of the first sale of fish in auction and related activities, the

administration of fishing ports and recreational marinas, acting as port authority, in the areas under its jurisdiction). 1393 respondents participated in surveys, one survey being for the general of the population and another one specifically for generations Y and Z. A total of 221 variables were studied and results showed that, contrary to what was thought, nowadays 53.4% of the people in Portugal buy fresh fish mostly in hypermarkets. 7 segments of the generation Y and Z were identified, depending on lifestyle, relationship with fish and how they buy. Being ICTs so vital to generation Z (a generation born connected, comfortable with technology, interacting on social media and that does not know a time before the Internet or smartphones), and being generation Y and Z the future in consumption, we have focused our study on how to build a support for the coming generations. To do that we have design communication strategies for fishing sector, including point-of-sale communication, underlining the issue of shopping experience, which in the case of young consumers is, very closely linked to ICT, based on creating sustained value for society underpinned by a relation of cooperation and proximity. Following Toffler's permanent adaptation survival rule, it is vital to the food supply chain (in our case, fish) to rapidly understand that the future of consumption is in the hands of the "Z/Post-Millennials" generation, meaning that product, place, price and promotion have been replaced by Ettenson's Solutions, Access, Value and Education.

Key words: *Food Supply Chain, ICTs, Y and Z generation, fish products, permanent adaptation and sustainability.*

INNOVATIVE TECHNOLOGIES USING BIOACTIVATOR "BIORAG"

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ABSTRACT: Tendency of increased number of world population faced necessity to increase quantity of food products. To resolve the problem and to have a high productive harvest, there emerged demand to harvest natural, ecologically friendly agricultural products and to increase quantity of harvest, using ecologically friendly bioactivators.

Based on scientific studies during many years, they have studied the ways of control of live cells and adopted new generation of universal regulators, among them "BIORAG", which is known as the most effective bioactivator.

The scientific and research studies and tests carried out in industrial conditions verified that bioactivator "Biorag" is ecologically friendly and safe. The product not leaves any trace in plants and participates in a normal metabolism; Biorag can lower content of nitrates and harmful substances and enhances compensation abilities of a plant and promotes productivity.

For its unique properties, scientists of engineering started to think about practical usage of the medication Biorag. They have adopted new and innovative technological scheme for procession and usage of seed material using bioactivator Biorag (Patent of Georgia #AP201513445AJ), which combines biomechanical and thermal processes.

Technological process of bio activation of seed material includes pre-treatment using disinfection materials, humidification of seed material (among them wheat), using bioactivator solution in water, at the temperature of 8-22◦C. Humidification process is running in a special chamber, where sprayers are placed and which provide homogenous humidification of the material.

Humidified seed material is delivered to vibro pneumatic purification and enrichment device, where hot air is supplied to the sorting tray, on

which humidified seed material is moving. Air temperature must not be more than 65-70◦C, and air supply speed and vibration range is regulated according to the technological requirements.

In order to preserve internal and external humidification in the humidified seed material and not to damage the grain, the technology applies second stage of drying, through supply of new flow of air to multilayer perforated conveyor, in which they use low temperature humidified air taken from the seed material at the first stage and heating repeatedly at the temperature of 65-70◦C.

Bioactivator Biorag was successfully used for bioactivation of plants and young plants (fruit plants, vine and other). (Patent of Georgia #AP201513562A). They treat young plants or perennial plants using bioactivator Biorag, through injection of different concentrates, by mechanical effect on primary root of young plants and plants. For instance, they put 0,7 ÷ 30,0 m/l bioactivator Biorag into 0,8 ÷ 1,5 water solution at the temperature of 18-22◦C and inject bioactivator water solution in advance prepared hole of root and after injection they fill the hole with lubricant balm.

Bioactivator Biorag promotes quick grow of plants, adaptation to bad weather conditions; it promotes to freeze resistance and speeds up its fruit bearing by several years.

Bioactivation method of treatment of plants and young plants using bioactivators, among them Biorag, is as follows: primary root of young plants is drilled using 1,5 ÷ 2,0 mm diameter drill (ordinary household drill), at the length of 3,0 ÷ 3,5 up from the bottom: - and plant roots are treated using the following method – in early spring, when plant (fruit plant and other decorative plants) are not yet blossomed, they dig its bottom into the depth of 20-30 cm, before they see primary root. They use vineyard knife to remove lump of earth and area of which must not be more than 0,5 ÷ 1,0 cm^2. After, raw surface of root is drilled using Ø0,1 ÷ 2,0 mm diameter drill (ordinary household drill), length – 2,0 ÷ 2,5 cm, but in this case drilling it up from the bottom. In both cases we need to try that roots are not drilled through.

In both cases they use the same method to treat young plants and plant roots using bioactivators. They use ready medical syringe to inject different doses of bioactivator. Biorag concentrate in water solution is injected into drilled root hole. Injection is repeated three times after each 10 ÷ 15 minutes, and each time they inject 11,0 ÷ 30,0 m/l Biorag concentrate water solution.

After the injection is finished, “cut”, i.e. head of the root hole and scrap is treated using Streptocide balm and paper sheet is covered over the surface. After the plants are planted and cut soil is piled around the plants.

Key words: *bioactivation, supply chain, harvest, sustainability.*

COULD EDIBLE ROSE BE A CASH CROP?

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ABSTRACT: The main purpose of this research is to find a standardize approach towards cost optimization of edible rose crop.

Authors focused on maintenance, logistics, storage and sales costs optimization in order to ensure a continue supply for each stage of production cycle.

Data were collected from the researchers conducted in the Didactic Experimental Field of University of Agronomic Sciences and Veterinary Medicine of Bucharest, production entities, whole and retail sellers and were processed through Life Cycle Cost Assessment (LCCA).

The necessity of the field experiment was caused by development of a technology for organic edible rose crop and the main question was, besides

the qualitative and health issues, if it was economically competitive in regards to existing traditional ways of growing.

The technology brought new innovative elements and methods such as using the ameliorative species to improve the soil biological activity, climbing edible rose varieties with fragrance and repeated flowering, innovative pruning system, mulch variants etc. The technology applied registered an increase in petal production from 20-200% depending on the cultivated organic edible rose variety comparing to the traditional ones. This growth allows farmers to choose the most appropriate edible rose varieties in order to get a bigger profit.

From the processor point of view, the biggest losses are linked to transport costs, especially on the collecting phase due to relatively small scale farmers.

The final products are ”sale friendly” as do not need many specific conditions of storing, transporting and maintenance on the sellers level that make it very attractable for exporters.

The newly amended National Plan for Rural Development 2014 – 2020 encourages the production of high value added crops assuring a lot of facilities (subsidies, investment funds etc) to whole value chain. These facilities shifted the interest from tradition cash crops (wheat, corn, sunflower etc) towards walnuts, berries, edible rose etc. that could be seen in the structure of arable land usage.

As a conclusion, be considering opportune to continue the research to evaluate the impact of the newly cash crop in the market. We consider that the edible rose could be a highly added value crop through usage of recognized national or regional brands. Another way is cooperation at the farmer level to process and/or sale edible rose petals products.

Key words: *cost optimization, efficiency, organic rose, value chain management, real economy.*

RETAIL BENEFITS OF FOOD WASTE REDUCTION: SHELF LIFE EXTENSION AND ENVIRONMENTAL BURDENS SAVING

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ABSTRACT: The food sector has to deal with some complexities of the supply chain management such as products perishability. The efficient management of food waste along the supply chains is receiving a lot of attention by institutions. In recent year food wastage is a problem of increasing severity: reducing food losses and waste is considered to be one of the most promising policy measures to improve food security in the coming decades.

Wasting food in the supply chain affect consumers economically and have an unnecessary environmental impact produced in vain. According to FAO the global carbon footprint (CF) of annual food wastage is about 3.3. Gt CO_2 equivalent (CO_2). In Europe, the consumption of food accounts for about 20-30% of GHG emissions from consumption of all products, and globally, agriculture is the primary cause of increasing atmospheric concentrations of CH_4 and N_2O and produces 10-12% of total anthropogenic GHG emissions. The amount of annual food waste in Europe is estimated to increase from over 100 million tons in 2014 to about 126 million tons by 2020. Perishable products are among the most wasted food items within supply chains and households. Fruits and vegetables usually account for the highest proportion of food waste in many developed countries.

The development of shelf life solutions it is considered one of the key challenge in food industry to reduce the amount of food waste, besides to improve their quality and nutritional benefits. An increased product shelf life determines the impact on logistics assessment. Considering that the carbon footprint due to logistics that includes in almost considered cases the use of fuels for transport from the farm to the processing site and from processing to the retailer center, has a significant impact on the whole fresh

cut salad supply chain. Since the retail stage was responsible for the largest contribution to global warming emission related to food waste: the large amount of retailer waste occurs at pre-store waste phase (items rejected by the store at delivery due to non-compliance with quality requirements) due to items rejected by the store at delivery due to non-compliance with quality requirements (not in time delivered).

The study is aimed to evaluate the reduction of food waste amount obtained by shelf life extension of fresh cut salad, due to a packaging innovation, with the possible increase of global product sustainability. Furthermore, the model is aimed to assess the fill rate cost and potential CO_2 savings on increasing cooling temperature in the supermarkets considering an increased product shelf life tested at a fixed temperature. Therefore, a discrete-event simulation was used, in order to assess retail benefit of waste reduction.

***Key words**: food supply chain; food waste reduction; efficient management; environmental sustainability.*

HOW CAN ASSESSMENT SYSTEMS EVALUATE HEALTHCARE ACTIVITIES IN CARE FARMS? A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT: The issue of social farming is analyzed in many European publications and also in economic, political and environmental fields. Nevertheless, there are few arguments about the assessment systems of the activities carried out in the health field of Social Agriculture. For this reason, the purpose of research is to identify in the literature the main green activities considering people with disabilities and to define a framework useful for the evaluation and management of these actions.

In order to describe what has been analyzed in the literature, Systematic Literature Review method (SLR) has been performed. According to this methodology, the studies have been identified in two electronic databases: Scopus and Web of Science. Information for the reference articles trough reference lists and through meeting with experts, have been obtained. The keywords searched have been: “care farm” and “assessment”. Several inclusion and exclusion criteria have been used. Furthermore, the research has only considered papers in English to obtain an international validity. After a descriptive analysis, a content analysis to select the therapies used in the farm and the future scenarios of the social agriculture management system has been carried out.

The aim of this work is to provide a description of the Social Agriculture activities used in the Agricultural European System. In particular, the Authors propose to (1) identify the actions adopted by care farming; (2) evaluate how different conceptions and different assessment systems about social farming, are combined in the academic debate.

The main result is to explore the existing actions classified in order to realize an interpretative framework. It allows the assessment determining strengths and weakness of the activities performed in the care farms. In light of this, the attitude of the countries to invest in some Social Agriculture activities, considering the high value of the assessment systems implementation and the rediscovery of multifunctionality in agriculture serving the community, has been investigated.

Care farms are the most innovative expressions of multifunctional agriculture. Through the development of complementary activities related to the production of food, the farms diversify their production in the rural world. The deepening of the care farm activities’ assessment systems, allows to reach a clear definition of the services necessary for the citizens. The present review has specified more exactly the evaluation system’ role in the Social Agriculture field, identifying: (a) integrate care, social

activities and work inclusion actions; (b) the most used green therapies and the future evolutions about Social Agriculture evaluation system.

Rural context and agricultural process are assuming growing credibility to promote social integration in the communities. In this scenario, the New Rurality evolves towards a new socially useful phenomenon. The value of this new perspective based on the Social Agriculture assessment systems is obtaining great importance thanks to the increase in value for the farmer and the increase in support for social policies in marginal areas.

Key words: social agriculture, green farm, assessment system, systematic literature review

THE CARBON FOOTPRINT OF SHORT AGRI-FOOD SUPPLY CHAIN

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ABSTRACT: In the last decade both the Italian and European agri-food sector have been characterised by a deep changes as follows: 1) concentration of primary products supply; 2) globalization of the food industry that has increased the transport system and integrated logistics. This has principally led to huge use of trucks for food transportation from the production sites to the distribution centres; 3) increase in purchases at large-scale retail trade. These transformations have caused an increase of distance travelled between the farm and customers and, consequently, the kilometres travelled by trucks to transport food to consumer's tables. However, in the last years increased consumer's awareness of the environmental impacts of food production has pushed the large-scale retail trade system to propose an alternative model of production and

transportation called "short supply chains" or "local food" or "farm to table". This has many advantages in contributing to reduce kilometres travelled by the truck to delivered food, to protect the cultural heritage of a territory and to guarantee more revenue for local producers. Furthermore, the short-distance transport can be the most sustainable solution from an environmental point of view, because principally it reduces the fuel consumption. The British scientist Tim Lang has defined "food miles" (FM) the kilometres that separate the production site of a food from the sale or consumption location. So, to assess FM can be applied the Carbon Footprint (CF), a methodology that calculates the greenhouse gas (GHG) emissions deriving from the transportation of the food from farm to table.

In this contest the present paper aims to carry out a systematic review on carbon footprint applied to FM, assessing its advantages and disadvantages. The literature review was conducted by using as the keywords for online research the words "food miles", "local food", "farm to table" and "short supply chains", with "carbon footprint" in the databases Scopus, ISI -Web of Science and Google Scholar.

Results show that CF studies on FM can be used to integrate those on the environmental impact of food production processes. Moreover, this methodology can be useful to: a) exploit the suppliers that are near the production sites; b) stimulate a transport company to promote rational logistics; c) promote in large-scale retail stores the local products. It is clear that these evaluations are valid only with similar supply chains. Additionally the results of FM studies can help administrations to promote policies that aim to: 1) stimulate local agriculture and industry; 2) supporting companies that adopt a more efficient logistics organization; 2) support local market that promote products from the territory; 3) limit the use of the private vehicles to purchase food. However, quantifying separately the impact generated by the transport of food alone can be, in some contexts, a reductive concept and can lead to serious errors of assessment of sustainability.

In conclusion the CF of a food and, in particular, the assessment of FM, is becoming an important tool for a company, since it can contribute to

make choices and commercial strategies that can improve its competitiveness.

***Keywords**: carbon footprint, food miles, short agri-food supply chain, greenhouse gases, environmental assessment.*

RARE, GEORGIAN ABORIGINAL GRAPE SORTS IN MODERN WINEMAKING

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ABSTRACT: The country of ancient farmers – Georgia – is considered as an origin hearth of cultures (Wheat, grape, some fruit). It is located between the Greater Caucasus Mountains system, the Black Sea (Georgia). Legendary Colchis and Caspian Sea Basins, which create an unique, moderate environment and climate for the viticulture and winemaking. In the treasury of material and spiritual culture of Georgian, the wine and grape were held outstanding from the beginning. According to a number of the world's competent experts, Georgia is the birthplace of wine, and more than 500 aboriginal grape varieties had been distinguished by folk selection. Currently, it have been 437 vine sorts in Georgian Genepool. But, only part of them was studied by Georgian scientists in the last century according their amplographic, phenolic and agricultural technological signs.

Due to the fact that, there is a lack of information in literary about the rare Georgian aboriginal varieties, the purpose of our study was the phenological and enocaprological research of these varieties.

For the first time the study of Georgian white variety Chvitiluri were conducted by us. The total polyphenols were determined in grapes; organoleptical and biochemical features were evaluated in wine aswell.

Chvitiluri –Megrelian aboriginal white grape sort belonged to the quality industrial –technical sort.

The final product contains: alcohol - 13,2%, titrated acidity - 7,7 g / l, volatile acidity - 0,44 g / l, residual sugars - 2,75 g / l; Higher spirits - 194.2 mg / l. The total number of phenols varies from 733 mg / l to 500 mg / l, the wine is characterized by a straw color, taste with a specific aroma.

Today, Chvitiluri is protected by the International category of Amplological Collection Jigura GEO038 - Shida Kartli, 560 meters above the vertical zone of Scientific- Research Center of Agriculture.

The study includes an ampelographic and enological research methods. The sort was studied during the vegetation period (2016-2017), for monitoring of phenomenon phases was used BBCH Scale (Lorenz et.al. 1994) proposed by the COST FA1003 project (Rustioni et.al.2014a). 49 descriptors were used to assess their economic indicators, the base set was selected by the European Project COST FA 1003.

Enological study: grape was crushed and vinification process of skin-contacted wine was occurred at 16-20 C. Wine aged on Lees; wine was studied physical-chemically and organoleptically as well in two weeks' intervals,. Final, phenol compounds was determined and compared to phenols of Rkatsiteli wine 2017.

Based on the obtained data, the rare local variety presents the perspective sort for wine production; The sort will offer wine market an different, unusual aroma, caused by sort. Besides, it is a noteworthy recommendation from the international expert: due to the high acidity, 13.2% of the alcohol additives, the variety is promising to get quality brandy spirits which will surely be the subject of our next research.

***Key words**: Genepool, descriptor, phenology, polyphenolics.*

THE DYNAMICS OF THE SUPPLY AND TRADE OF CEREALS IN THE BLACK SEA BASIN

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ABSTRACT: In the last years, the international cereal market had a dynamic evolution. The objectives of the paper are to provide a coherent picture of actual and future competitiveness of the cereal market, at regional level, in the Black Sea Basin. We focus on the competitiveness of the cereals from the EU countries, especially the Balkan region, face-to-face with other countries from Black Sea Basin, like Ukraine, Russia, also Kazakhstan. The countries we have in view from the Balkan area are mainly Romania and Bulgaria as important producers, as well as Caucasian countries, i.e. Georgia.

Recently, the cereal market from Romania was confronted with a tough competition from the products originating in the main cereal producing countries, especially from the Black Sea Basin, also countries from European Union, especially producers from Old Member States, but not exclusively. This is the reason why in Balkan peninsula, Romania and especially its ports like Constanta and Braila became important key players in the Black Sea Basin and a bridge between EU and Caucasian countries. These give us many arguments to study the evolutions of the market itself and its characteristics.

The applied methodology contained a statistical comparative analysis based on the trade flows, dynamics of areas, yields, productions, etc. Also, we use qualitative analysis based on interviews and opinion of experts in the field. Mainly, we compared the evolution of the Romanian cereal production, area and trade with countries from the Black Sea Basin. The analysis compressed period from SAPARD program implementation (2002), through EU accession (2007) to nowadays. We analysed long series of data provided by the National Institute of Statistics from Romania, Ministry of Agriculture and Rural Development, EUROSTAT and FAO.

Besides these, we utilised information from media, declaration or interviews published in press, by officials from administration or business.

The Romanian cereal market shows positive evolutions underlined by the size of the internal consumption. In the same time, the evolution forced to export the excess of production. Another issue to be considered in this analysis is the lack of storage facilities. The situation was evident in the last years due to the high record yields. In this regard, the most attractive destinations seem to be Black Sea and Mediterranean countries due to considerable savings over the transport costs. Meanwhile, the yields are highly dependent of weather conditions especially in the Romanian countryside with severe draughts. That could be diminished through the renovation of the irrigation systems. All these were possible because of the CAPs and national programs. The above-mentioned ideas lead us to the main conclusion that the EU accession has had a positive impact on the cereal chain actors from Romania and influenced the dynamics of the region.

Key words: *Competitiveness, Dynamics, Cereals, Romania, Black Sea Basin*

SUPPLY CHAIN MANAGEMENT AND ITS ROLE IN INCREASING COMPETITIVENESS IN GEORGIAN COMPANIES

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ABSTRACT: Successfuly functioning market is due to economic growth and logistics plays the leading role in it. The intensification of international competition and accelerating economic integration demanded the improvement of production processes, optimization of costs and improve logistics accordingly. Nowadays logistics is the main element of

the supply chain and it provides operational, economical and safe movement of products/services from one owner to another.

This issue is relevant because in the light of globalization its necessary to improve all the process of supply chain with logistics support. With the development of the market economy, the customer's needs are changing. In order to stay competitive in the market, company's need to respond to customers' requirements and exaggerate their expectations. The supply chain is the core of operations of the company. In order to get the best decisions managers need accurate data on the supply chain functionality. The outdated technologies may interfere with their goals. Over time, new digital technologies will be fully integrated into modern supply chain management and replace traditional methods. After 5-10 years, the existing methods will no longer be effective and companies will be forced to integrate with modern technologies.

Nowadays majority of the Georgian companies supply chain process is completed on the local market and is not intended for international purposes. However, the fact that the country strives to actively engage in global logistics network and to meet certain requirements must be satisfied. Also there must be noted the requirements which arising from the process of European integration. In order to gain the international competitiveness, one of the essential requirements is to develop logistics system with European standards. This in itself means minimizing costs and simplifying the process of production.

Modern Information Technologies play a great role in supply chain management. Therefore, the aim of this paper is to study the situation in this type of Georgian enterprises. Reveal how closely they meet international requirements and what potential they have. Various studies, manuals and articles were used for research and study of these issues.

In the modern world management system is completely based on the information. Without the information its impossible to fulfill the tasks. The development of information system is a requirement of the modern work process. It provides possibility to manage supplies, plan the production process, manage transportation processes and etc. Solving these tasks can be done in many ways, but one of the most important and effective is ERP

(enterprise resource planning) system. The ERP system is introduced in Georgia and is still in the process of development.

In conclusion, company's successful functionality depends on the effective management of the supply chain. Also, the modern IT technologies play a major role in the company being competitive in both local and international markets.

Key words: *Supply chain management, logistics, informational technologies.*

SUPPLY CHAIN MANAGEMENT USING MODERN TECHNOLOGIES

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ABSTRACT: One of the most important spheres of industrial facility is supply, which consists of the chain of operations, where not only the efficiency of distribution of products, but also the quality of products, supplied to consumers, is defined. Supply chain is properly defined and efficiently managed organizational processes, creating system, and the system creates the product or service, intended for specific consumer. Its key component is productivity, which requires changes of the existing paradigms using modern technologies, which will increase the efficiency of supply.

The goal of the paper is application of radio-frequency waves (RFID) for identification of product and location and development of datamining technology algorithm, supporting decision-making, during statistical analysis of the obtained data.

Integrated information systems and innovative technologies play key role in the issues of management of organizational processes of supply

chain. Using radio frequency waves, it is possible to identify the object and its location in minimum time, which significantly reduces time-related and financial costs. In supply chain, analysis of information, related to current processes is also important, after which optimal decision is made using the so-called intelligent algorithms of data mining from the obtained results.

Modern technologies not only facilitate reduction of costs, but decreases the risks, existing in supply chain, to minimum level. Innovative method of supply chain management ensures maintenance of competitive standing of a company on international market; the number of consumers and efficiency of management increases.

Key words: *supply chain, data analysis, RFID, Data Mining.*

UNLOCKING NEXT GENERATION SUPPLY CHAIN MANAGEMENT WITH DIGITAL CATEGORY MANAGEMENT: KEY ISSUES AND CHALLENGES IN PORTUGAL

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ABSTRACT: We live in a world where physical objects in the manufacturer and retailer domains are increasingly being ransformed from isolated systems to networked internet-enabled devices that can communicate with each other and the cloud. The purpose of this research is to explore the challenges of information and communication technology (ICT) and of internet of things (IoT) for category management in Portugal.

Generally, the value of ICT and information sharing on supply chain members' strategies and revenues is widely discussed on scientific literature. Category Management can reduce cost of supplies, gain access to more innovation from suppliers, and reduce risk while increasing value in

the grocery supply chain. ICT promises a wide range of applications and devices for manufacturer and retailer environments, whereas IoT is all about connecting devices, making them smart and self-controllable. The authors present the main concepts associated to the theme based on the extant literature, considering digital business strategies, efficient consumer response, category management, retail technology, evolution of grocery supply chains into value networks, and they discuss the expected impacts of ICT and IoT at every stage from the manufacturer through to the retailer and the final customer shopping at the store. Results of the FMCG Manufacturers Survey 2018 in Portugal findings are included, and provide interesting cues to both researchers and practitioners working with grocery supply chains. Upon research, it becomes clear that most efforts to improve performance of category managers should involve changes to the ways that manufactures and retailers share information, make decisions and carry out actions they agree on. There are need to enhance business results by focusing on higher collaboration and automation in traditional category management demand-side aspects. This paper highlights the importance of the ICT and of the IoT in shaping the actions of the category managers and in articulating that vision in terms of business and technical capabilities.

Key words*: Grocery Supply Chain, Category Management.*

DEVELOPMENT OF A WEB-BASED DECISION SUPPORT SYSTEM FOR HUMAN RESOURCE ASSESSMENT AND SELECTION

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ABSTRACT: The paper deals with the development of a web-based decision support system for assessing and selection of human resources, it is

presented in it consists of the main components of the system, the functional structure of the system and its constituent modules.

The presented system provides the assessment of human resources by testing and experts, On the basis of which the system implements the selection of human resources using a multi-criteria decision analysis method.

The system presented in the paper can be actively used by human resources managers of large and small organizations in the process of selecting human resources.

Key words: *System, web-based, assessment, selection, human resources.*

BLOCKCHAIN TECHNOLOGY – THE TOOL FOR REVOLUTIONIZE THE AGRI-FOOD SUPPLY CHAIN

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ABSTRACT: In today's constantly transforming world, agriculture management, as well as other economic sectors, is becoming more complex. For instance, supply chains are getting longer, also the number of intermediaries, documents request and the parties involved in the transactions, rises. For these reasons, it is increasingly becoming difficult for the consumer to understand the traceability process of food products. Traceability is come to be the crucial factor in agri-food supply chain. In this procedure often appear the problems regarded to the real quality of food product, to increasising inefficiency of production process and to the increasing risk of fraud and adulteration.

Currently, Blockchain technology (BCT) is recognized as a significant tool to solve these problems and reduce the transaction costs as well. Thus, the aim of this paper is to analyze the different means and ways how to solve principally the traceability of food supply chain problems using Blockchain technology in conjunction with advanced technologies like Big data, RFID (Radio Frequency Identification), IoT (Internet of Things), AI (Artificial Intelligence) and other related technologies.

In order to reach the purpose of the paper, recent academic literature is reviewed. Despite being a hot topic and therefore the increasing interest by different public and private parties, the BCT continues to be far away from being well understood. Currently, there is no clear or fair scale to measure its capabilities and outcomes, or to understand how BCT can be used to enhance agricultural and food systems with their different categories.

Blockchain can benefit consumers as well, by minimizing the food contamination risks, and giving them the ability to know accurately the origin of the products. Indeed, Blockchain technology can create accurate fixed data that is locked in time, for all needs and purposes. Recently, blockchain technology has promising potential in three main areas of Agriculture, including Real Time Management, Supply Chain, and Mobile Payment and Financing.

Another field that blockchain has a promising effect on is the food waste, especially knowing that one third of the food produced in the world for human consumption (about 1.3 billion metric tons) gets lost or wasted. Through advances in blockchain technology we have an opportunity to incorporate more accuracy into the system, putting an end to processes that allow viable produce to go to waste.

Finally, it has also to be mentioned that BCT has a deep connection with algorithmic manipulation of data (consensus), peer-to-peer networks and publicly available standards and open source tools (e.g. Hyperledger Project, Ethereum) holding the huge potential to transform just about every industry. In this regard, agri-food sector may foster the open governance required for the success of this technology, being already committed to digitalization and actively using ICT tools such as IoT (Internet of Thing in

precision agriculture), BGA (Big Data Analysis for mastering the huge quantity of data produced by daily measurements), etc.

Keywords: *Blockchain, Agri-food, supply chain, food waste*

CRYPTOCURRENCY - NEW TYPE OF CURRENCY IN MODERN WORLD, EASY, QUICK, TRANSPARENT AND INTERNATIONAL TRUSTED

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One of the first Bitcoin enthusiast and miner in Georgia, Crypto investor and entrepreneur, Founder and CEO Georgia Mining Association, Honor member of Blockchain Association Georgia, Founder of A-Star Investment Foundation (ICO and cryptocurrency investment), Crypto trader & Investor, Adviser on some current international ICO-s, Teacher of Cryptocurrency and Blockchain technology in Tbilisi IT-STEP academy, WBA (World Blockchain Association) member.

ABSTRACT: Cryptocurrencies have emerged as important financial software systems. They rely on a secure distributed ledger data structure; mining is an integral part of such systems. Mining adds records of past transactions to the distributed ledger known as Blockchain, allowing users to reach secure, robust consensus for each transaction. Mining also introduces wealth in the form of new units of currency. Cryptocurrencies lack a central authority to mediate transactions because they were designed as peer-to-peer systems. They rely on miners to validate transactions. Cryptocurrencies require strong, secure mining algorithms. In this paper we survey and compare and contrast current mining techniques as used by

major Cryptocurrencies. We evaluate the strengths, weaknesses, and possible threats to each mining strategy. Overall, a perspective on how Cryptocurrencies mine, where they have comparable performance and assurance, and where they have unique threats and strengths are outlined.

A Cryptocurrency is a peer-to-peer digital exchange system in which cryptography is used to generate and distribute currency units. This process requires distributed verification of transactions without a central authority. Transaction verification confirms transaction amounts, and whether the payer owns the currency they are trying to spend while ensuring that currency units are not spent twice. This verification process is called mining. Cryptocurrencies use a variety of mining technologies, according to their particular requirements. For instance, certain Cryptocurrencies focus on restricting the number of transactions validated per unit time, while others concentrate on achieving fast, lightweight services. Some mining algorithms are deliberately memory intensive; others are computationally expensive.

Bitcoin, the world's most common and well known cryptocurrency, has been increasing in popularity. It has the same basic structure as it did when created in 2008, but repeat instances of the world market changing has created a new demand for cryptocurrencies much greater than its initial showing. By using a cryptocurrency, users are able to exchange value digitally without third party oversight. Cryptocurrency works on the theory of solving encryption algorithms to create unique hashes that are finite in number. Combined with a network of computers verifying transactions, users are able to exchange hashes as if exchanging physical currency. There is a finite number of bitcoin that will ever be generated, preventing an overabundance and ensuring its rarity. Water, despite its requirement as a life giving material, is generally accepted as being free or of little cost because it is so abundant. As long as the users maintain this faith, the valued object can be anything. Bitcoin does not have intrinsic value like gold in that it cannot be used to make physical objects like jewelry that have value. Nevertheless, value continues to exist due to trust and acceptance. Current legal and financial structures are not designed with a technology like this in mind. Financial institutions are built off of much older forms of currency. In

some ways, it is comparative to the computing industry. The baseline of computing still relies on transmitting and processing 1‟s and 0‟s, providing only two dimensions of input. Yet all of our current technology uses this technologically archaic system due to adoption, cultivation, and lack of need for newer systems. If cryptocurrencies became the global norm for transactions, long standing systems for trade would need to be completely reformed to deal with this type of competition. For this reason, cryptocurrencies could possibly be the single most disruptive technology to global financial and economic systems. Bitcoin will be mined with diminishing returns every four years until the maximum number of bitcoins are reached: a total of 21 million. This aspect of Bitcoin is important for its value. Due to the limited amount of bitcoins, it will never become inflated from an overabundance of bitcoins. Also, bitcoin and other cryptocurrencies are generally regarded as being protected from inflation originating from national government changes or restrictions. This creates a "safe haven" for investors to put their wealth into, as it generally does not lose value based on inflation. Bitcoin is quickly showing its strength as a refuge against inflating national currencies. However, as is the case with most commodities, the price can fluctuate wildly based on many other external factors.

Keywords: *BTC, Bitcoin, P2P system, cryptocurrency, distributed ledger.*

PROBLEMS OF BUILDING EFFICIENT INFO TELLECOMMUNICATION NETWORK

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The information and tellecomunication technologies are driving force of digital economy. The key issue of digital economy is the formation of vast digital data bases. The ability to process this data remotely and use the results to increase efficiency of production and services, and open invesment opportunities for theses businesses.

The recent developments in the economy has determined the need to establish new concept for the development of telecommunication networks. The requirements towards telecommunication networks are increasingly demanding, variety of new and innovative services such as Smart Grid, Ubiquitous, Sensor, Networks, Cloud Computing, Big Data and other infotellecommunication technologies are being offered. The International Telecommunication Union (ITU) is considering creation of FN-Future Networks no latter then 2020. The Next Generation Networks, currently in use does not significantly differ from FN networks, these two concepts are very close. However this is a process of evolution and in these process we will move from NGN nets to FN networks.

The thesis is concerned with objectives for realization of future networks, including managing the network, mobility, identification, information reliability and security, environmental issues. The technical solutions for future networks include environmental concerns such as environment friendly materials and energy efficiency.

The major difference between Future Networks and NGN is the provision of network through virtual resources, providing logical distribution of resources for the variety of services. This means that single physical resource would be used as multiple virtual resources. The thesis discusses LINP (Logically Isolated Network Partition).

The thesis prioritises BlockChain technology as the solution for the proposed demands. The BlockChain is an enormous shared data base without central server, which can fully ensure cybersecurity and energy efficiency.

Conclution: The recommendations produced in the process of standartization of FN networks, is a formulation of requirements towards the future networks. Meanwhile the thesis presents specific technical solutions.

Key words: *Future Networks, Next Generation Networks, Block-Chains,Logically Isolated Network Partition, Smart Grids, Ubiquitous, Sensor, Networks, Cloud Computing, Big Data. ICT - Information da communications technology, ITU - iNtenational Telecommunication union.*

PROCESSING ADAPTIVE CONTROL PWM INVERTER FOR MOBILE NETWORK BASE STATIONS

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ABSTRACT: As it is known, equipment of information and communication technology devices with solar power systems will be vital, especially in areas where traditional energy supply is impossible or not appropriate according to the economic estimation.

Modern information and communication technology devices need constant supply of electricity in order to work properly. For most Remote Base Stations (RBS), connection to unified energy system creates technical difficulties and considerable economical expenses. Mobile operators solve this problem by combined work of diesel generators and accumulator batteries, which require significant financial costs and damage the ecology of the area.

Application of modern alternative technologies can be considered as an appropriate solution of this problem, namely – RBS.

Solar energy – as a renewable source, based on direct transformation of solar radiation into other kind of energy (e.g. electricity or heat), is an eco-friendly industry and does not need significant amount of expenses. Development of solar energy is encouraged by economical factors, as well as "Green Tariff" that is used in many countries nowadays.

Most of the telecommunications equipment use power supplies, that are adjusted to the Mains Electricity (220-380v, 50Hz), therefore, constant voltage transformer inverters are the key features in solar energy systems.

For the development and perfection of the elementary base in electrical equipment, increase in reliability of these devices is progressing.

As it is known, Pulse Width Modulation (PWM) is widely used in modern systems of power electronic control. Distribution of this method is determined by several factors. In particular, modern achievements in the technology of electronic device manufacturing, creation of fast and ultra-fast field-effect transistors, with the electric parameters reaching record values (electricity - hundreds of Amperes, voltage – several thousand volts), the new type of super power IGBT appeared in the world market, etc.

Good example of using pulse width modulation is constant voltage inverter. In this case, constant voltage is transformed into determined frequency and amplitude variable voltage, simultaneously the form of the signal must be sinusoidal, or can have any other forms, (for example, sinusoidal, enhanced with third harmonicity, in motor control systems).

The Inverter's classic scheme is based on the use of transistor bridge. Main criteria that determines the efficiency of the transformer device is its coefficient of efficiency and reliability. During the commutation of transistor bridge, some energy dissipation is observed, which is the sum of dynamic and conductivity losses. Conductivity losses mainly depend on the technical characteristics of the transistors. Dynamic losses are determined by the frequency of commutation and operating speed of transistors.

The work proposes frequency adaptive management principle in commutation of transistor bridges, to achieve increase in coefficient of efficiency in the constant voltage inverter. Frequency adaptive controlled constant voltage sinusoidal PWM inverter block-scheme and voltage diagrams on the output blocks of the corresponding blocks are also displayed as well.

***Key words**: PWM Inverter, Cellular Network Base Station, RBS, Renewable energy, Coefficient of efficienci.*

LINK BETWEEN COUNTRY COMPETITIVENESS AND TECHNOLOGICAL PROGRESS

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ABSTRACT: Currently, there is a big potential in billions of people being connected through digital networks which drastically improve the efficient operation of myriads of companies and even manage assets in ways that can help to regenerate the natural environment. Commerce in the 21st century is heavily impacted by globalization and digitalization that are accelerating rapidly. According to McKinsey Global Institute's report (2016), today's digital, on-demand global economy, 44 million people work online across borders, e-commerce comprises 12% of the global goods trade, cross-border data flows contributed $2.8 trillion to global GDP in 2014. Nearly 1/3 of the world's population had a smartphone by the end of 2015. Due to the fast-developing manner of devices, mobile phones no longer carry the sole function of going online and browsing. Equipped with internet-enabled mobile computing devices and apps for almost any task,

people comfortably complete their daily routines and use innovative ways to interact with the rest of the world, as well as always learn and perceive new things. It is noteworthy and remarkable that in such a short time period, people have not been so attached to previous computer technology items on such a large, scale compared to mobile phones and their daily presence in the lives of millions.

Therefore, the development of next generation mobile communications has big importance. Consequently, the aim of the paper is to gain insight on how the evolution of current technologies enhances the country competitiveness by supporting different fields such as education, health care, government services, business, travel, etc., and to find out the factors affecting the progress of mobile communications. For this purpose, authors have revised academic articles regarding the topic and statistical data collected from open sources.

The studies show that the competitiveness of the country and evolution of next generation mobile communications are highly correlated to each other and the process is irreversible. Achievements in science, technology and innovations determine country competitiveness and competitive country with highly developed private and public sectors is crucial actor for the evolution of next generation mobile communications as it creates good environment for advancing researches. It therefore leads the innovations and technological development. However, starting point has to be "science" as it is the field where it is possible to involve intangible investment such as intellectual capital and additionally, there is less need for large financial investment. Achievements in science will lead to advanced innovations and technology that will affect countries development overall. Thus, better environment for new researches will be created.

The state plays a major role when it concerns the advancement of innovations. Innovations do not concern only companies, but also, the nations that want to increase their competitiveness in the current business environment and compete better in the future. In order to be able to boost the creation of networks, that can speed up the innovation consequently, governments can participate through creating incentives for the development and adoption of technologies. Governments can also play an

important role by sponsoring and bringing world-class expertise that can expand beyond the research phase and can develop relationships simultaneously. All of which would lead to ensuring a successful commercialization. Similarly, reaching the full potential of mobile internet use, requires not only powerful private sector but also a potent public administration and a competitive advantage of the country. Meaning, the more developed the country is, stronger government structure gets, which is able to control frequencies and other specific aspects, and if necessary, make some investments as well.

As an outcome of the article it may be summarized that innovation, in the form of scientific discovery and creation of new technologies, has been widely acknowledged as one of main drivers for competitiveness of the country. It is the source of value creation and it is critical for creating competitive advantage.

Key words: *mobile communications, technological progress, country competitiveness.*

THE ROLE OF THE COMBINATION OF ONLINE AND OFFLINE RETAIL CHANNELS AND CROSS- CHANNEL INTEGRATION AS A COMPETITIVE NECESSITY IN RETAIL SALES PROCESS

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The rapid growth of e- technologies leads to a structural change in both social and economic spheres. Nowadays Digital channels are an integral

part of everyday life. New circumstances appeared with respect to how retailers create value: they can create value not only through physical activities, moreover, through the creation of value on an electronic level.

The main purpose of the research is to investigate the role of the Integration of online and offline retail channels as a modern phenomenon and estimate movement of cross-channel integration's importance from strategic advantage for retailers to a competitive necessity as retail companies are concerned about challenges both in their consumer facing strategies and in back office techniques.

For the purpose of this research, respective number of academic articles in marketing concentrating on supply chain management and information systems have been explored. The selected literature was interpreted in order to design theoretical framework

According to insight drawn from the paper, we can state that changing consumer behavior and preferences are the main drivers in almost all industries. Furthermore, proper choice of retails and consumers touchpoints can be an integral part of a marketing strategy. Implementing and managing cross- channel strategy is a core marketing challenge for retailers who have to integrate inventory systems, marketing campaigns, pricing strategies and warehouses. Mixture of online and offline retail channels adds tremendous value to the consumer and delivers them superior shopping experience.

Findings of the research will help retail organizations to follow current trends of digitalization among potential consumers. Integration process of channels helps retails to identify not only present needs of consumers but digital natives in the future. It engages consumers' interest and supports retailers to evaluate the performance of their strategical campaigns and benefits of channel integration in measurable parameters from their online and offline platforms.

Nowadays, retail companies' online channels are no longer an experiment but a significant and growing part of their business. For these retailers cross-channel integration is giving consumers consistent experience and is creating competitive advantage in the marketplace. Thus, this research contributes to the literature on cross channel integration in the

subsequent way: for retailers it is not only a way to increase sales but also to strengthen loyalty, brand position and awareness.

Key words: *e-technologies, retail sales, cross-channel integration, competitive necessity.*

BENEFITS AND IMPORTANCE OF DIGITAL MARKETING

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ABSTRACT: In this world of digitization, digital marketing is a vogue that is sweeping across the whole world. The trend of digital marketing is growing day by day with the concepts of Internet marketing that is turning into an important platform of digital marketing along with the electronic gadgets like the digital billboards, mobile, tablets and smart phones, gaming consoles, and many such gadgets that help in digital marketing.

The purpose of this research is to underline the importance of Digital marketing in today's reality. We develop and describe a framework for research in digital marketing that highlights the touchpoints in the marketing process as well as in the marketing strategy process where digital technologies are having and will have a significant impact. Using the internet, social media, mobile apps, and other digital communication technologies has become part of billions of people's daily lives. For instance, the current rate of internet use among American adults is about 87% and is closer to 100% for demographic groups such as college-educated and higher-income adults. Social media has fueled part of this growth: worldwide there are now more than 2 billion people using social media, and Facebook alone now has approximately 1 billion active users per day.

Digital media is so pervasive that consumers have access to information any time and any place they want it. Digital media is an ever-growing source of entertainment, news, shopping and social interaction, and consumers are now exposed not just to what the company says about the brand, but what the media, friends, relatives, peers, etc., are saying as well. People want brands they can trust, companies that know them, communications that are personalized and relevant, and offers tailored to their needs and preferences.

In 2018, the average Internet user has at least 7 social media accounts. That's up from 3 just 5 years ago. 97% of US adults under 65 are on social media at least once a month. The vast majority are on it every day. Social media is strongly preferred as a means of customer care. Younger adults are at the vanguard of the constantly connected: Roughly four-in-ten 18- to 29-year-olds (39%) now go online almost constantly and 49% go online multiple times per day. By comparison, just 8% of those 65 and older go online almost constantly and just 30% go online multiple times per day. Americans ages 30 to 49 are now about as likely as younger adults to use the internet almost constantly (36% versus 39%). The share of 30- to 49-year olds who say this has risen 12 percentage points since 2015. Meanwhile, the share of constantly online Americans ages 50 to 64 has risen from 12% to 17%.

Digital marketing is going to be top on the agenda of many marketers, and they might be looking for innovative ways to market online, reduce cost per lead, increase click-through-rates and conversion rates, and discover what's hot in digital marketing.

Key words*: Digitization, Digital marketing, Innovation, Technology.*

MOBILE MARKETING – A WAY TO DRIVE SALES

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ABSTRACT: The article is based on a theoretical study of academic articles related to mobile marketing and its current status in the worldwide market. The most important area of digital marketing, is mobile space, the place where the most users are. Mobile devices are a key communication tool for most consumers in Europe. It should be noted that the growth of the mobile advertising market as well as mobile applications advertising market is growing at great rates.

The purpose of this research is to underline the importance of Mobile marketing in Sales management. The development of new technologies and digital marketing have made big revolution in sales. According to recent reports, 40% of users' internet time is spent on mobile devices, which means simply ignoring the rise of mobile just isn't an option. So it's very easy and flexible way to cre-ate mobile friendly application and advertise the business. Mobile marketing offers numerous opportunities to boost sales for any kind of business. Whether the business is small or large, it is possible to find methods of marketing via mobile that will fit your budget.

Mobile marketing consists of ads that appear on mobile smartphones, tablets, or other mobile devices. There are big variety of strategies that can help sales to boost. One of them is App-based marketing. This is mobile advertising involving mobile apps. Ser-vices like Google AdMob help advertisers create mobile ads that appear within third-party mobile apps. Facebook also allows adver-tisers to create ads that are integrated into Facebook's mobile app. Facebook has 1.57 billion mobile monthly active users and 56.5% of users only login to the platform from a mobile device. With more than 300 million daily users and over 95 million photos and videos posted per day, Instagram has an incredibly large reach. Using In-stagram ads, you can increase awareness and message association, drive traffic to your website and encourage sales. Also, there are strategies like

In-game mobile marketing that refers to mobile ads that appear within mobile games, like in the example below. One way to provide relevant information as quickly and seamlessly as possible to mobile users is through the use of QR codes. QR codes are scanned by users, who are then taken to a specific webpage that the QR code is attached to. One of the most popular uses of QR codes among consumers is for comparison-shopping. According to a 2014 Harris poll, 24% of respondents said they use their smartphone to scan an item's QR code to compare prices online and in-store.

Mobile marketing lets you reach your customers and prospects anytime, anywhere. And with sky-high open and click-through rates, your efforts are more likely to have direct, positive results. Mobile marketing allows you to directly participate customers' journey. By being present for their micro-moments, streamlining their mobile experience, and providing timely communications via SMS, mobile marketing should be a key part of every business's marketing strategy.

Key words: Mobile Marketing, Mobile devices, Sales *Management, QR Codes, Marketing Strategy.*

THE IMPORTANCE OF THE SOCIAL MEDIA MARKETING IN 21ST CENTURY

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ABSTRACT: In 21st century, there are lots of digitalization processes going on. Everyone is more interested in making life easier, so on the list of simplifying the business processes, Social Media marketing is playing quite a big role.

Social media marketing refers to the process of gaining traffic or attention through social media sites (Facebook, Twitter, Instagram, LinkedIn and etc.) and it is quickly becoming one of the most important

aspects of digital marketing, which provides incredible benefits that help reach millions of customers worldwide.

The main purpose of this essay is to highlight the main things that are happening in the recent trends of business. Right as we talk about the business, we get reminded about the Marketing and Management and how the social media comes in handy in promoting the services or the products.

There are lots of coutries, which are more developed, than the others, but the social web-site is the main way to keep up with the news around the world. As there are losts of statistics to show us how important the social media sites are, I did a research, in order for me to be able to prove how useful these kinds of web-pages are.

In order to meet the research purpose, there are a couple of things to look over. In the reviewed article, the most used social media site (which is used by 2 200 millions of people) is Facebook according to the statistics of the year 2018. In 2015 Facebook influenced 52 per cent of consumers' online and offline purchases, up from 36 per cent in 2014**.** This shows the importance for retailers to manage their social media channels which will have a direct impact on purchase behaviour.

On the other hand, the hashtag function, which simplifies seeing the posts from thousands of people about one specific event, is popular for Twitter and Instagram. Although it does not have as many users as Facebook, it can be more comfortable to use in some situations. Regarding the statistics of the year 2018, Twitter is used by 300 millions of people.

Doing the marketing over the internet is a lot easier in 21st century. It is a lot simple to share a new advertisement to the consumers worldwide, because using the social media sites, it is only a matter of a couple of minutes.

The case studies of the social media marketing are very occurate in everyday life, which brings us to a couple of examples. One of the most successful social media campaigns is Nike. In early 2012, Nike introduced its Make It Count social media campaign. The campaign kickoff began YouTubers Casey Neistat and Max Joseph launching a YouTube video, where they traveled 34,000 miles to visit 16 cities in 13 countries. They promoted the #makeitcount hashtag, which millions of consumers shared

via Twitter and Instagram by uploading photos and sending tweets. The #MakeItCount YouTube video went viral and Nike saw an 18% increase in profit in 2012, the year this product was released.

The second example might be the music app Spotify has printed out the huge billboards of the popular, talented artists writing the captions which suited them the most. As these billboards showed up, lots of people took selfies and posted them on their social media accounts. This campaign gave spotify a 13% increase of profit in the end of 2017 and the begginig on 2018.

When using social media marketing, firms can allow customers and Internet users to post user-generated content (e.g., online comments, product reviews, etc.), also known as "earned media," rather than use marketer-prepared advertising copy.

Therefore, Social Media Marketing is very important in the Business field. Unfortunately, lots of companies have not completely been taken over by the digital systems and, judging by the results of the Social Media Campaigns, it would be a very good opportunity for them to use the innovative programs to guarantee the benefits.

Social Media Marketing makes the growth of profits a lot easier. According to the statistics and the examples, the main thing is to use the social media sites in a way, that will make the product or service important and interesting for customers.

POKÉMON GO: WHAT'S IN IT FOR RETAIL?

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ABSTRACT: Pokémon Go is an online game that combines augmented reality and geomedia that was released in the second semester of

2016. Its immediate success was very expressive all over the world, but this game also stands out for the business opportunities it provides for stores and brands. In fact, while gamers frequently play in public areas, including commercial facilities, Pokémon Go's business model includes partnership and sponsoring opportunities targeted at retail companies, which can pay a fee to become a PokéStop or a

PokéGym, that is, places that players should visit to further progress in the game. These modalities have been attracting both multinational chain stores and small local businesses, as it is possible for a commercial site to sponsor Pokémon Go for half-hour periods at a cost of 50 cents. Although much has been said about both the

success of the game, both in terms of the number of users that are reported as active users and regarding the sponsorship business model revenue, there is a need to further analyze the return of investment for the sponsors, that in many cases will depend on the consumption patterns of the gamers that visit their facilities during the sponsored period. This study aims to explore the practices of consumption and retail shopping during gaming activities. It adopted a quantitative approach, by using an online survey to gather data regarding shopping behavior and consumption intentions of Pokémon Go users while playing the game. Data were collected at a

peak of game usage between December 2016 and January 2017, with 436 responses from Portuguese players.

The results show that Pokémon Go players include not only gamers but also people that do not usually play online games. The players that tend to spend more while playing are the ones that value the experience, novelty, and innovation of the game, namely the combination between real life and virtual reality. The results demonstrate that sponsoring the game enables retail companies to attract new customers and to retain them.

Players recognized that they prefer having lunch, buy coffee, and choose shopping malls that are listed as PokéStops and PokéGyms, and in fact only 26% mentioned visiting these locations for gaming purposes only.

Most players will also consume and make purchases. Moreover 90-94% of the respondents indicated that they do not spend more time in retail

facilities since they started playing the game. The impact is, therefore, essentially store they choose to go to.Overall, this study provides insights and managerial implications that are

particularly relevant for entrepreneurs and marketers interested in using virtual reality games to increase store experience, innovate, attract and retain customers, and provide differentiating experiences.

Key words: *PokéStop, PokéGym, Augmented Reality, Gamers' consumer behavior, Retail.*

EFFECTIVE WAYS OF APPLICATION OF INFO COMMUNICATION TECHNOLOGIES IN GEORGIA

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ABSTRACT: Despite the fact that Telecommunication (info-communication) belongs to the service area, in today's reality is one of the leading direction among the industry sphere.

The development of global processes of the informational-communication technologies has immediate impact on sustainable development economy, and the present Article refers to the above mentioned.

The purpose of the Article is development and application of electronic services, informational-communication technologies in Georgia, which is very dynamic nowadays. Due to the fact that its importance and abilities just runs into wide range use for the society and economy there is required fundamental modernization of government, economy and society.

The subject and object of the research is the info-communication-technologies in Georgia, effectiveness of its application in governmental ruling and electronic service supply, development of digital technologies and creation of new business-models.

Despite of the existing steps, it is necessary to be studied electronic services, mobile ID services; vision and mission of electronic Georgia implies: 1) More effective public services; 2) Development of global processes of informational-communication technologies despite the fact that the availability of secure and efficient electronic services acting on one-window principle is essential for citizens in healthcare, business and non-governmental sector by using reliable infrastructure.

Georgian electronic strategy "service" line is oriented on the increase of online service customers.

Along with the electronic services the research object are G2C, G2B/G2NGO/B2G and G2G services.

By the research has been revealed that the electronic service for citizens (G2C) conducts various services: investments for the purposes of introduction and development of electronic services, passport, ID card, address, marriage certificates, divorce certificates, adoption, change of name, death certificate, power of attorney and so on. Also the introduction of informational cards is in the spotlight.

The electronic services for business are also noteworthy (G2B and B2G) and for civil societies (G2NGO).

Informational-communication technologies are integral part of internal structure and business-processes.

Business conducts interaction with government in online mode.

Information and data supplying shall be based on the well-thought-out process; what is most important it should be fully digital with state procurement processes, value and with chain management.

The scope of application of research methods is as follows:

- The reasonable use of informational-communication technologies is beyond the transformation of existing processes in digital format, it requires analysis of processes, planning of new processes and detailing of interface of the data.

The business in Georgia are supplied with number of electronic services, for example e-declaration service of Revenue Service Centre by www.rs.ge.

One more service is Natural Resource Management System, intended for the governmental organizations and business.

By the electronic services it is possible to save time and decrease expenses.

Electronic business activity provides innovation and economical increase in business and non-governmental sector.

And finally the conclusion: 1) based on the result of e-service research about electronic governance in 2012 by UN, Georgia took 72 place from 193 countries and was award e-governance score 0.5563 and online access score 0, 6013.

2) At present according to the index of development of informational-communication technologies Georgia is among the 10 most dynamically developing countries.

Key words: *telecommunication, electronic services, digital economy, chain management, informational-communication technologies.*

DESIGN STATEMENT FOR BETTER ERGONOMIC HANDLING FOR MOBILE OPTICAL VEIN VIEWER

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Around Up to 80% of all patients admitted to hospitals worldwide will have a peripheral intravenous line inserted in the forearm or hand to administer fluids, medications, and blood products. Sometime this

procedure can be difficult for paramedics or others in such cases like infants and elderly people Vein finder devices drastically reduce the amount of time it takes to find a vein. In this Article we focus on Visible Light Transilluminator device.

This simple technology is based on LED (light emitted diode) light waves that penetrate tissue, are absorbable by hemoglobin, and are visible to the human eye. The intensity of the light reflected from the surface of the skin overpowers the transmitted light, limiting the naked eye's visualization of superficial veins. Reflected light is reduced and deeper veins visualization is increased by applying LED light waves, which are easily absorbed by deoxygenated hemoglobin in venous blood and show up as dark areas on the skin. This technology is particularly effective in children, and models have been developed for specific applications, including emergency, oncology and radiology purposes. There are many types of Visible light transilluminator (VLT) vein viewer in market with different design and structure. In this essay we try to review important commercial VLT device in market and then based on ergonomic handling, represent our design statement for better handling for this type of device. Ergonomics or ergonomic handling is all about fitting the tools to its users with an enhanced sense of safety and utility. The designing of instruments is done by professionals, who very well understand their particular use, work environment, safety and the comfort factor. We want to focus on handling of Veinlite vein finders. Veinlite vein finders are the easiest and most effective vein access devices on the market. This device is pocket size and easy to use. In our model we design our handler based on 3 finger handling (Thumb, Index finger & Middle finger) this type of handling is mostly for lighter tools or devices such as Pediatric Vein Viewer (in Veinlite PEDI the weight of devices is something about 41 gr. We use modeling clay to locate position of fingers when we grab the device handler. We use Modelling Clay for finding best position of fingers on the device handler. In our model we design our handler based on 3 finger handling (Thumb, Index finger & Middle finger) this type of handling is mostly for lighter tools or devices such as Pediatric Vein Viewer.

Key words: *Biomedical* Design, Ergonomic, Vein viewer, Visible light transilluminator vein detection, 3-D Moddeling, 3-D printing, Design Statement and Process.

A PROSPECTIVE STUDY IN ENDOSCOPIC ULTRASONOGRAPHY: CO_2 VS AIR INSUFFLATION

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ABSTRACT: Insufflation of the gastro-intestinal (GI) lumen is required in performing GI endoscopy. Room air is the most common gas used in standard endoscopic settings, however often causes abdominal discomfort because of the slow re-absorption and evacuation of the air itself. Carbon dioxide (CO_2) employment instead of air is increasing but there are no studies evaluating the outcomes of EUS with CO_2 insufflation. The main objective of our study was to compare the effects of CO_2 vs. air insufflation on abdominal discomfort in patients undergoing EUS. Secondary outcomes were to elucidate the effects of CO_2 vs. air insufflation on image quality/visual artifacts and on the amount of sedation.

This was a prospective, controlled, single blind, observational study. Abdominal discomfort intensity was assessed just before, 1- and 3-hours post-procedure and recorded as a VAS (visual analogue scale). Image quality assessment was performed and recorded.

From April 2016 to January 2017, 200 patients were enrolled. There was no statistically significant difference between the 2 groups concerning abdominal discomfort before and after (1 and 3 hours) EUS. The quality of echoendoscopic image was significantly better after CO_2 insufflation vs air insufflation ($p<0.001$). There was also a statistically significant difference in respect of visual artifacts and need of gas suction, with CO_2 correlating with

less artifacts and requiring less gas aspiration from the lumen of the gut ($p<0.001$).

We demonstrated a significant advantage of CO_2 insufflation vs. air insufflation for the quality of EUS imaging and the degree of air artifacts. On the other hand, unlike previous studies, we found no difference in abdominal discomfort and need of sedation between CO_2 vs. air.

***Key words**: Endoscopic ultrasonography, carbon dioxide, image quality, visual analogue scale.*

SIMULATION TRAINING SYSTEM FOR CORONARY ANGIOGRAPHY WITH APPLICATION OF UNITY

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ABSTRACT: Simulation has been used to train professionals in their fields. As computer technology advanced, the simulators also advanced and its applications increased. Simulation training has been adopted in training professionals in other industries such as military, law enforcement, transportation and athletics. Healthcare was not an exception.

Simulation training was adopted to train medical professionals for coronary angiography which is a procedure that shows coronary arteries. Traditional training of coronary angiography happens in a catherization lab, which requires physical resources such as space for lab, C-arm and X-ray intensifier, as well as human resources such as experienced trainers, and patients. The simulation training system was developed to reduce the physical and human resources and training time.

There are coronary angiography simulation training systems in the market. But, they are very expensive. Many medical schools and institutions cannot afford to buy and maintain them. Another purpose of the development of this system was for an affordable training system for medical schools and institutions. For this purpose, it is essential to use free development tools.

Unity is the best development tool to achieve these purposes. Unity is a free cross-platform game engine and used for video games, simulations for computers, consoles and mobile devices. For the development of simulation training system for coronary angiography, Unity provides a physics engine in addition to a game engine. Its game engine offers easy programming for GUI and computer graphics. The movements of catheter and guidewire in arteries was simulated with the physics engine that provides a mass-spring model.

The simulation training system was developed with Unity. The catheter and guidewire were modelled after a mass-spring model. Their movements were simulated with the physics engine of Unity. The contrast dye injection was also simulated in the coronary arteries. The flow of the contrast dye in coronary arteries is recorded so that the results of coronary angiography can be reviewed later. The simulation training system shows different configuration of coronary arteries, different anomalies that can be changed by an operator. This system is capable of serial communication with other control devices through which catheter and guidewire can be controlled.

This simulation training system can be used in medical schools and hospitals to train medical students and refresh medical professionals' knowledge and skills. It is also useful for educators to teach medical students. For students, this system can be a learning tool to prepare themselves for coronary angiography.

A simulation training system for coronary angiography was developed with the application of Unity, a free cross-platform game engine. The virtual experiences with this training system will help medical students and professionals to improve their performance of coronary angiography and decrease errors in a catherization lab.

***Key words:** Simulation Training, Coronary Angiography, Unity.*

SOFTWARE TESTING

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ABSTRACT: Software is of utmost importance for high quality guarantees in business, education, banking, etc. Software testing is an integral part of life cycle of software projections. It ensures to meet the customer's requirements in the best possible way. Testing also allows businesses to evaluate business risks that have been implemented in software development and identify how to use these software tools.

Software testing is a research that is conducted to provide information to the software product quality. Today, a number of public and private companies use various software applications. Software testing is essential for them to be able to work correctly and properly. The application testing is aimed at finding malfunctions in the program so that the program can work properly after their elimination. When a new software is created, the test must be an integral part of its life cycle in order to eventually get the product that complies with the customer's requirements and will be as much as possible faultless. Testing also provides objective and independent views on software development that allow the business to assess and determine the risks that have been programmed. The methods used for testing include the implementation of the programs and/or applications which are able to find errors; the testing also determines how useful the software is for consumption.

The testing gives possibility to reduce the the number of errors, their value, and adjustment time in the program that will be transferred to the client.

The paper describes the ways of testing the software, provides examples on how to perform testing and who should work on this issue. Two basic types of testing are considered: manual and automated testing. Manual testing is designed and discussed by the Microsoft Test Manager instrument as well. For automated testing, Selenium IDE, the leading tool in the world, is considered. This tool is in general used for web applications and is the Plugin of the web browser Mozilla Firefox. In the paper there are also discussed a range of software testing methods and a vital cycle of testing in general.

In the paper it is also reviewed testing levels, and application code testing, Unit Testing, Integration Testing, and System Testing are widely examined. As for Unit Testing, it contains examples that are implemented on programing language JAVA. Examples are given on framework Junit's most needed class Assert methods for testing. An example of Unit Testing is provided by Framework Mockito. Integration Testing is provided as an example, as well as on programing language JAVA and used Junit and Spring Framework. It is also widely reviewed system and security testing.

Key words: *software testing, testing tools, testing level, security testing.*

THE SYSTEM FOR MONITORING OF A CALL CENTER

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ABSTRACT: In call centers, where thousands of calls are registered every day, it is necessary to collect data and analyze them for quality control.

A traditional call center received daily reports from operators and processed these reports manually.

Nowadays, most of the call centers have an electronic system that allows managers to get instant access to critical performance indicators. Getting data real time allows the organization to take appropriate steps to

improve the productivity of the center.

The monitoring system is connected to a telephone system and can provide data in real time. By using this function, it is easy to determine the condition of the call center in a given time.

The multifunctional application described in this paper belongs to the systems mentioned above. It can present both the live and

the specified time data in the different formats through visual charts: pie chart, column, linear, etc.

In the visual part of the application elements are positioned automatically, depending on the size of the screen they are displayed on.

Besides presenting data in different forms and sorting, the system is capable of processing data with some analytical formulas. Such data is very useful to evaluate the work of the center because the data are compiled using several different parameters.

Different software technologies have been used to create the system. Main business logic and data processing algorithms are implemented using the Windows Communication Foundation application service, with the programming language C#.NET.

The service is connected to the telephone system and stores data received from it into the Oracle database. As the customer requests specific information, the system accesses relevant data from the database and returns it to the customer in the desired format.

The Front End application contains the graphic interface of the system with which the user interacts directly. Its purpose is to

visualize data with charts and boards. The application has a user-friendly design and navigation system. It has been created using the Angular 2 platform.

The advantages of the system are:

- Simple and easy to use interface;
- All critical indicators are presented on one page;
- WEB APPLICATION - Do not require software maintenance, you need only a browser;
- Responsive design - adapted to all sizes of a screen.

The recommendations for further improvement of the system

performance are:

- During the conversation, algorithms of analysis can reveal the gaps in the fields in which the operator needs more training. Then the organization can take appropriate steps to improve employees' skills and education.
- Conversation analysis system can also be used to record key phrases and provide alternative operator forms in real time.
- The system can be used to determine which call processes are most difficult for the operator; so it becomes possible to sort
- such calls to discuss them and in future to process them more efficiently.
- During the conversation, the system of analytics of real time conversation can determine emotions and satisfaction by analyzing customer's tone.
- Voice analysis can also be used to determine the age of the customer.

Key words: *call center, electronic system, database, data processing, algorithm.*

ANALYSIS OF SECURITY ISSUES IN VOIP (VOICE OVER IP PROTOCOL) TECHNOLOGY AND DEVELOPMENT OF A SECURITY MODEL

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ABSTRACT: Voice over Internet Protocol (also called VoIP, IP telephony, Internet telephony and Digital Phone) is the routing of voice conversation over the Internet or any other IP-based network. The voice data flows over a general-purpose packet-switched network, instead of traditional dedicated circuit-switched voice transmission lines. Advantages

of VoIP include toll bypass, network consolidation and service convergence.

VoIP widely evolved as the voice and data network integration reduces the effort and costs. Large enterprises are saving big money amount by placing long distance calls over an IP network instead of traditional telephone system. Network consolidation enables the transmission of data, voice, and video over one single network. The integration greatly reduces setup and maintenance costs. With service convergence, enhanced functionality can be implemented through coupling of multimedia services The deployment rate of VoIP is increasing steadily. Voip technology is an essential component for modern industrial processes and today it is necessary for all types of different organizations.

Manufacturing companies can also highly benefit from the flexibility, scalability, and competitive pricing that VoIP phone solutions offer. Manufacturing facilities are often composed of different departments (such as administrative personnel, finance and accounting, sales, and warehouse operation) that are housed at different sites. A VoIP system can provide the link these departments need to communicate and collaborate effectively. With a VoIP solution deployed across the organization, employees can take advantage of features like instant messaging, video conferencing, file sharing, and advanced call management. Companies can also integrate their phone system with a range of applications, (including customer relationship management (CRM) tools) to help teams provide better quality communication and collaboration. And because VoIP is delivered on a per seat or per user basis, a business can quickly and conveniently add and remove users as the number of staff changes. Mobile and VoIP communications are a necessity for transportation and other logistics companies with responsibilities to keep both office staff and drivers connected. Client satisfaction is greatly impacted by accurate tracking of business operations. The unique requirements of firms in the transportation sector can only be met by a flexible, reliable communications solution. One of the single most important differentiator among retailers is their ability to deliver high quality customer service. Fast foods, chain stores etc can use VOIP to deliver enterprise customer service to customers hereby bringing in

more return on Investment. Branch to Branch communication is one tool to boost service delivery.

Securing VoIP system is more challenging than securing pure data network. Since VoIP share the same infrastructure with traditional data network, it inherits all security problems from data network. Furthermore, VoIP also has its own security problems coming from new protocols and network component. SIP (Session initiation protocol) is a signaling protocol used to initiate communication between two or more endpoints on IP network. SIP-based VoIP is the use of SIP as the signaling protocol during VoIP execute. SIP protocol became popular used in the implementation of VoIP services in organization; however the protocol has no inbuilt security measures. It is crucial to provide safe and proper security solution that can ensure that SIP-based VoIP networks are fully secured from exiting security risks so as organizations information security (confidentiality, integrity and availability) is achieved at all times. The main purpose of the research is to analyze security threats directed towards organizations using sip based voip technology. Also research focuses on these VoIP specific security threats and the countermeasures to mitigate the problem. In Research there is a brief introduction of VoIP techniques: the network structure, network components, protocols and standards, data handling procedures, quality of service requirements, VoIP specific security threats using the principle of CIA (Confidentiality, Integrity and Availability). The countermeasure to mitigate these threats is also discussed.

With analyzing available SIP based VoIP security, schemas used and collecting of data, proposed a security model with intention of ensuring an all rounded security approach is taken during implementation of a secure SIP based VoIP System. through use of the proposed security model, organizations can better plan and secure their voice network not only on the technology aspect but also on the user aspect. Implementing QoS (Quality of Service) for VoIP - it is difficult to use with existing security methods. A very secure VoIP system that can not deliver good voice quality is not attractive. Through the proposed security model, research sets a platform on which future research can fully incorporate quality of service in proposed security model.

In addition, it is strongly recommended to continue subsequent research, since security is an ongoing process, as new security threats are constantly emerging.

INCREASE THE QUALITY OF VOLTE TRANSMISSION THROUGH THE RADIO NETWORK OPTIMIZATION

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ABSTRACT: The LTE (Long-Term Evolution) system has been developed in order to offer to the customer all kind of services by using IP protocols. LTE belongs to the All-IP (everything with IP) network class, where in all the precincts of the network are used packet switching. Such technology does not envisage voice communication and text message as they are in 2G or 3G networks, that's why using LTE network for voice transfer (Voice over LTE) is one of the most important tasks for mobile operators which provides LTE network to cstomers.

The voice service is an important part of the revenue of operators, so increase and keep level of voice transmission quality is crucial factor in highly competitive market. In order to be used all of the advantages provided by VoLTE technology, it is necessary to complete several phases of optimization. Let us consider the aspects of VoLTE optimization that are related to the radio network and gives us opportunity to achieve a reliable transmission of sound in a good quality with low power consumption of mobile devices.

The main indicators of radio network productivity are:

- Setup success rate
- Handover success rate
- Call completion success rate

Optimization of the radio network, together with the improving the above features, aims to reduce the number of radio resources needed for processing one voice connection and to increase the maximum number of connections that can be simultaneously processed in the sector. Such optimization includes optimization of configuration parameters and activation of various features. Such functionality can be attributed to: Header Compression, Combination / Grouping TTI (TTI Bundling)

For increase spectral efficiency between the base station and mobile terminal can be used header compression - ROHC (Robust Header Compression). When no header compression is used, the size of IP header is made up 40 bytes. The use of ROHC allows reduction of the header size to 5 bytes, which has a special importance in voice transmission, because in this case the size of the package is quite small.

Improving of VoLTE features is possible by using TTI Bundling functionality. This functionality allows the mobile terminal to repeat the same data transfer in four consecutive TTI, which increases the reliability of the transmission network and coverage of network with 4 dB. At the same time may be decreased the probability of errors (Block Error Rate, BLER) from 73% to 9%. The probability of lower errors contributes to maintenance of a good quality of voice transmission and eliminates unnecessary repeat transmissions that use a significant number of radio sources. TTI Building is used only those mobile terminals which are in bad radio conditions (for example on the cell edge).

The use of low frequency during building of mobile networks makes it possible to significantly reduce costs for network building, as for coverage of the same area there is required much less number of base stations than for using a high frequency. The use of low-frequency range (450, 800 and 900 MHz) is especially relevant for covering small populated areas where there is no need for large capacity networks that are reached when using high frequency.

In Geocell network where the 1800 MHz frequency is used, addition of 800 MHz frequency will significantly improve the current network coverage area and increase the VoLTE transmission quality.

In the work is presented current Geocell covering scheme on the example of Tbilisi city and the same network after the radio resources optimization, the comparison of which gives us clear image how much is improved the network coverage area and accordingly the quality of VoLTE transmission.

The radio network optimization and configuration methods presented in the work allow to achieve high quality voice services based on the VoLTE decision base. Geocell network surveys show that in the case of real networks, the correct set of network configuration and construction can be achieved with the necessary features.

EFFECTIVE SOFTWARE SOLUTIONS FOR MANAGING ELECTRONIC DATABASES OF INVENTORY

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Our initiative group based on the "Training and Consulting Center for Studying Engineering Tasks and Business Processes" at the Georgian Technical University, developed a project: "Effective software solutions for managing electronic databases of inventory."

This project will be implemented mainly by students under the guidance Georgian Technical University professors and with their direct participation.

This project will identify the objects of inventory, dividing them into separate groups, taking photos of inventory and buildings, categorizing and placement in an electronic database, which will functionally connect to the database of the client organization and will become an integral part of it.

In our opinion it is very important that the project results can be used in e-governance systems as private and state structural management projects, and can be used by subdivisions of the organization, including financial, property management and other departments. It may also be possible for any authorized person – in real time mode to get an electronic version of the desired information at any point of time and in any area through the Internet.

As a result of the innovative methodology proposed in the project, the inventory results databases will make it easier for customers to control the registered property, its quick identification and search.

Key words: *inventory, database, e-governance.*

WEB PLATFORM FOR "SMART CITY" DATA COLLECTION AND ANALYTICS

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The study is to show that nowadays to solve the Management of the current processes both in the regions and in cities with big agglomeration is the most important and difficult problem. A fortiori, when it concerns developed region. While designing ur-ban system development, management, and reconstruction pro-jects both managers of the cities, and urbanists, must take into account the opinions of specialists, who have different catego-ries of mindsets and they "talk different languages" (Sociologists, ecologists, businessmen, etc.). Summing up the languages in a common denominator is possible only by mathematics and com-puting tools. Nowadays, the problems of the city management are united in the concept of "Smart city", which is usually called as "informational city".

"Smart City" – this is an integration con-cept, which involves the usage of the so called "integrated imita-tive model" for systematic, stable, optimal decision making, be-cause the city is a whole dynamic unity. For today managers of

the cities, urbanists, investors, businessmen, sociologists, etc. have to deal with a huge amount of parameters, opinions and data in a nonsystematic manner. Our proposed study „Unified web platform of the region and Smart management", includes: website, Google Map, pointing object in the map, Saving the ob-jects and their parameters, mathematical and programmatic tools, cloud computing, python computing libraries, Restful API as a web service, etc. As for the web service or restful API, any software can have access to the data of the united web plat-form of the region through specially defined protocol. Objects presented in the map have assigned specialized and standard-ized parameters, which are used by the system algorithm for the analyses and the presentation of all the structural creators of the dynamic processes of the city. This gives us opportunity to see the whole chain of interactions, which are caused by the actions on any object of the city. Users are registering on the website and they can see the parameters of the objects that are set in the map. The Object in the databases are classified by the pur-pose, affiliation, destination and other marks. There is an ability for users to define the status of an object on their own. Users can also add or remove objects on the map and can manipulate with the updated parameters on the map. They can evaluate the chain of results both in the time and dimensional manner. For

the mathematical tools and the algorithms that are built-in in the system, we use Algebraic topology methods, Graphs theory Non-linear differential equations, The theory of disasters and bifurca-tions, Chaos theory, methods of mathematical statistics and more. Web platform includes all the mathematical tools and pro-grammatic packages, that are necessary for stable development of small and medium business.

key words: *platform, smart, city, management, web.*

PREDICTING BUDGET REVENUES IN THE SELF-GOVERNING CITIES OF GEORGIA

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ABSTRACT: The goal of the article is to identify the growth of budgetary revenues and to determine their perspectives in the self-governing cities of Georgia. The topic of the research is the relationships developed in the budget process and the object of research - the budgets of the self-governing cities of Georgia.

The research methodology is based on the principle of unity of history and logic, systemic approach, comparative analysis, method of induction and deduction, methods of statistical and economic-mathematical analysis. Methods of grouping, comparison and analogy are used in the research process.

The information base of the research is diverse and includes informational-analytical materials of the Ministry of Finance of Georgia, the National Statistics Office of Georgia and other structures of the executive branch; Monographs and scientific articles of Georgian authors, data published in educational literature and periodic editions; Resources of the Internet network, information and rating agencies; The results of the survey conducted independently by the authors.

As a result of the survey, the proposals for the implementation of the budgetary revenue planning of self-governing cities for the effective implementation of the measures. It is reasonable to find additional sources of revenue to find more financial resources for self-governing cities budgets. Together with other activities, the fees for tourist and taxes are offered, which will ensure the fulfillment of the tasks set before them.

It has been established that the transfer policy, despite a number of positive changes, has not been able to effectively achieve the basic goals

imposed on the transfer. That is why it is important to implement effective transparency policy by the state authorities and to protect the principle of fairness when distributing transparency, which should ensure a fair distribution, competitiveness between separate regions.

It is reasonable to note that one of the most important problems in budget planning is the optimal distribution of financial resources, separate fields and areas that are mobilized in the budget, aimed at rational and efficient use of limited financial resources. It is advisable to determine certain priorities by self-governing entities in this direction and then allocation and distribution of budgetary revenue according to these priorities.

Conclusions and recommendations received as a result of research may be used by legislative, legal, institutional and methodological provision of budgetary process by representative and executive bodies of self-governing cities. As well as research and educational institutions in preparation of appropriate scientific reports and training programs. In addition, the recommendations are brought to the concrete methodological and practical proposals that will enable to increase efficiency of the budgetary process of self-governing cities and ensure efficient use of budget resources.

Key words: *transfers, grants, taxes, taxes, transfer policy.*

"TELECOM EXPENSE MANAGEMENT"

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ABSTRACT: Spending on telecommunications services is the second largest non-production expense in most industries, the first position being taken by IT expenditure. Communications services are essential to every business, but the costs associated with such services can add up quickly.

Every company, from the smallest start-up to the largest corporation, have communications expenses. For a small firm, this may be costs associated with phone lines, faxes, mobile services

and broadband access. Each of these items will likely generate different monthly bills. As the size of an organization increases, the cost and complexity associated with its communications needs expands exponentially. With that complexity, every category of communications need, more often than not, will be provided by different telecom service providers. Simply processing bills from multiple entities is expensive, but hidden beneath the costs of bill processing are two additional problems. Getting a good deal requires research and skillful negotiating. Rates change, services are installed and removed, service providers merge, it's a very dynamic process, there are risks that make billing errors. First, there are a surprising number of invoices with errors, Second, and potentially the bigger problem to deal with, lies within the enterprise and its inefficient use of communications services and equipment.

Despite technological advances, inaccurate billing continues to be a major cause of consumer complaint. Regulators should require — truth-in-billing, and prohibit harmful business conduct and practices.

This thesis opens with a detailed description of these issues, highlighted through the results of a market survey of telecom managers. In SECTION 1: problems managing telecom exspenses in Georgia today and causative factors; SECTION 2: detailed analysis of the telecommunications services supply chain. The impact of information flows in such supply chains, the players operating in each segment, their roles and outlook for the future are discussed. SECTION 3: Understanding Your Local Telephone Bill SECTION 4: Problems facing the telecom expenditure management (TEM) Billing errors; How to Identify Billing Errors and Obtain Refunds; SECTION 5 Processing and Validating Technology Invoices all Accounting, Phone System Security, Toll Fraud and Toll Abuse.

Based on all of the above, a new management service is proposed to solve some of the abovementioned issues. This service is intended to drive optimization in telecom procurement and management for Georgian businesses. This will be important tool for all information technology

professionals, for managers who are responsible for monitoring telecommunications-related expenses and teaches them how to audit bills, negotiate favorable contracts, and find the best (and cheapest) carriers and vendors.

key words: *Telecom, expense, management, billing, error.*

ANALYSIS OF THE BUDGET OF NARROWBAND NB-LTE RADIO CHANNEL FOR INTERNET OF THINGS

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ABSTRACT: The article represents calculation of the dependence between the Link budget of *Internet of Things* realized in the next generation cellular networks and using of battery.

Research is based on empirical method. Experiment for the link budget has been conducted using Cost 231 and Egli models.

There is given power consumption for specific models when they are working in different mode and Calculated dependence of number

of information transmission to the distance of the connection and consumed energy for the specific values.

The obtained results and other information can be used to design and build similar networks, for power consumption, to optimize connection distance and speed, and select the parameters required for the relevant service.

Key Words: *Sensor, Network, Internet, Power, Band, LTE, Traffic.*

THE ESSENCE OF THE GLOBAL INFORMATIONAL COMMUNITY AND IT'S DEVELOPMENT TRENDS

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ABSTRACT: The development of informational global society is crucial for fundamental modernization of government, economy and society. Information and Communicative technologies (ICTs) affect on all aspects of the economy and are not limited to only a few sectors. It enables people to work more efficiently in agriculture, tourism, transport, logistics, international trade, banking, production and other fields.

The schemes and illustrations about informational society transition stages, description of the role of informatization in information society, dynamics of Internet users in Georgia, number of internet users by percentage, IDI Index Rating and others, will clearly be presented by author in terms of the importance of informational-communicative technologies and its development. The study is based on the IST for the development of indexes and statistical data, used for comparative and analytical methods.

The aim of this study is to illustrate the importance of ICTs and to highlight the correct usage of these technologies to achieve further success in the aforementioned fields (agriculture, tourism, transport, logistics, international trade, banking, production), referring to Georgian territory.

The World Society is trying to help developing countries like Georgia and the changes in the country are really hopeful. The issues discussed in

the article clearly demonstrates that the correct usage of ICTs leads to achieve further success in this field.

Key words: *ICTs, Internet, Information society, Statistics.*

ASSESSMENT OF THE EFFICIENCY OF FIXED BOOK PRICE POLICY IN A DIGITAL ERA

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ABSTRACT: Digitization has evolved structural changes in the book industry. This article investigates both economic and cultural arguments concerning the fixed book price policy in a digital era. Arguments are firmed by three country cases: France, Germany and UK. Digitization entailed the need to extend fixed book price to e-books, so as to maintain a distribution as diverse and healthy in the digital environment. Evidence in this paper shows that digitization has some beneficial impacts on both creators and consumers, even as it generates challenges for existing intermediaries and generally, for the policy effectiveness too.

Key words: *Cultural Policy, Digitization, Fixed Book Price Policy.*

BUSINESS REGISTER AS AN IMPORTANT FACTOR OF STATISTICS'S PRODUCTION IN THE COUNTRY

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ABSTRACT: In the case of business registrations, they are distinguished by broader groups: statistical units, legal and administrative entities, study and unavoidable units. It is important for each of the internationally recognized definitions of statistical units to get coherent economic statistics. Internationally accepted major statistical units are: Group of Companies, Enterprise and Local Area Activities (LKAU). Other internationally accepted units are: KAU and local unit (LU), which are two types - local unit of the enterprise and local unit of the legal entity.

The purpose of the work is to determine the status of the business in Georgia in the field of business in compliance with international standards. The research objective is the business register of Georgia and the subject of research is its study of the role and composition. The methodological basis for the research is the concept and proposals, analytical reviews, scientific publications, and data from the global network of the Internet based on the analysis of statistical services and world practices of business countries.

The paper uses monographical research as well as methods of generalization, comparison, analysis. The Principles of Arrangement and Functioning of Business Registry for Danish and Canadian Statistical Offices are presented and their example shows the importance of business registration in the country's statistics and offered to make certain changes in business registration in Georgia.

Key words: *enterprise, business register, statistical unit, legal entity.*

THE INVIOLABILITY OF PRIVATE LIFE IN THE DIGITAL WORLD

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ABSTRACT: This work concerns the problematic and actually issues such as privacy in the digital world, its protection levers and legal assessment of the breach.

The work is based on researches, as well as both Georgian and foreign literature. This issue will be discussed together with judicial practice assessments.

Information revolution driven by the development of computer technology and telecommunication led to rapid development of the Internet space, which will generate giant information systems in the future and will cause globalization of the public. The current trend of development creates a serious threat to the protection of fundamental rights, in particular, the inviolability of the person, because never been so easy to infringe the fundamental principle of personality in the public or private sector by using modern technologies as today.

In recent years, on the background of widespread processes in online media space, one of the main challenges of society is the expectation and safety of privacy. The violation of privacy can cause any citizen's indignation. The inviolability of private life is the basis for freedom and democracy.

The theme and problem of privacy is in the context of modern law theory and practice - especially in the context of rapid development of information technology - is a very important issue. The safety of private life is one of the most important issues currently being developed both in concrete countries and regional levels. It may be argued that the dynamics of personal data law are identical to the increase in the involvement of communication technologies in the personal life of people.

The practice of the European Court has established a broader understanding of private life. It does not cover only the inner world of person- "Internal circle", but the possibility of a person's contact with the outside world, with other people. That is why it is especially important in the modern world where digital communications are one of the most common types of communications, which facilitates a number of operations, to protect human life.

Development of personal information computer systems made it necessary to develop a mechanism for protection of personal life. The appearance of such type of programs, that provide personal data (data matching) from banks and branches, is possibility to create a practically exhaustive picture of individual's personal life. The state and private corporations are interested in creating personal data banks. In these conditions, protection of personal information requires a complex and multilateral legal mechanism, because the information about personality can be considered as an economically useful product and source of government. Despite the challenges that the digital world offers, the inviolability of private life must be protected. State, international security organizations, local human rights defenders and every citizen shall be responsible for protecting and enhancing the privacy of personal life - the "most respected right of civilized man".

The authors aim is to discuss the onviolability of private life in international legal context, make an emphasis on the main problematic and topical issues, to demonstrate legal, institutional or even political challenges for the establishment of a comprehensive system of personal security, to prove the need to ensure the adequate level of personal data protection is necessary in the context of the current development of human rights law, to provide readers with new opinions and approaches in order to form a correct position.

The critical situation in terms of technological progress causes the public to correctly evaluate the role of the "privacy" concept, and the government has to make a major effort in protecting for "personal data". It is necessary that the guarantees of safety private life shall be based on

international treaty obligations and harmonization of national legislation. In the framework of the thesis the authors shared an international experience and developed opportunities and new initiatives for securing personal life in the digital world.

Key words: *Privacy, Digital world, Data matching, Cyberspace, IT technologies, Virtual world, Protocol system, Global threat, Digital communications, Internet, Computer crime, Information security, Cyber attacks, Personal Information.*

INTELECTUAL PROPERTY RIGHTS AND THEIR PROTECTION: CURRENT DIGITIZATING CONDITIONS IN GEORGIA

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ABSTRACT: Complete implementation of reserve and management of copyright without relevant legislative base is impossible and at the same time, it is a burning issue for Georgia – reserve the copyright on some objects is not performed properly due to shortcomings in legislative norms and/or their irrelevancy to the international standards.

In this context, a role of copyright management bears more significance in current situation. In the modern constantly developing world, technology is leading filed that fundamentaly changes the way people live, work and relate to one another. Besides a lot of positive influence, digitazition coused that nowadays is harder to protect privacy and intellectual property. For this purpose, Georgia has signed a Free Trade Agreement (DC FTA) with EU and bears a liability to fulfill obligations undertaken. One of key issues under this Agreement is to reserve right to intellectual property and copyright within the country.

The aim of this research is to establish a new vision on essence of copyright management, to develop reserve of copyright and its significance in terms of developed and legally ordered market economy and to plan the ways for efficient functioning of business subject on this basis. Study and analysis of social economic significance of copyright, review of models and trends of copyright development on the basis of foreign countries example and elaboration of recommendations for development of copyright management in Georgia on this basis, plan of efficient ways for reserve, violation and prevention of copyright is considered in this research. Available and fair justice and elaboration of efficient mechanisms for enforcement, review of court decisions on the basis of national as well as European Court Practice. Theoretical and practical analysis of copyright management, study of efficient copyright management practice on the example of some developed countries and elaboration of recommendations represents the object of the research. Comparative legal analysis, theoretical and methodological research shall be used as a research method and it shall be based on national and foreign scientific literature, publications, court decisions, statistical data and etc.

Regarding to the novelty and practical significance of the research, it should be noted that we often face challenges about reserve of copyright. There is no culture of reserve of copyright in our country. Realization of copyright is unbelievable without relevant legislative base. Moreover, it is essential to bring the existing laws in compliance with the international standards; it shall be reviewed in the successive work.

Key word: *digitization, copyright, privacy, intellectual property.*

LIGHTS AND SHADOWS OF THE EUROPEAN UNION DIRECTIVES EXECUTION MECHANISMS IN GEORGIA (BY THE EXAMPLE OF BIOFUEL USE)

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ABSTRACT: The goal of the article is carrying out the analysis of EU Directives execution against the background of bioenergetics development in Georgia.

Many legislative provisions of the 2020 EU Strategy refer to the development of renewable energy sources and, in particular, of biomass. The issues of forestry, agriculture and waste management in the EU are subordinated by different environmental rules at national and EU levels. The renewable energy directive determines the support of alternate energy sources, while other specific strategies and legislations refer to the sustainable development of the biomass. The National Renewable Energy Action Plan (NEAP) was created in Georgia according to the provisions of EU Directive. It puts together the current and scheduled policy and goals of the field. NEAP establishes the national targeted indicators for the share of energy obtained from the renewable energy sources, which will be consumed by the year 2020 in transport, electric energy, heating and cooling sectors taking into account the measures aimed at energy efficiency.

The biofuel holds a significant share in the energy supply of Georgia. In 2016 biofuel was one of the biggest internal energy resources along with hydro-energy. The national strategy for the solid biofuel development has already been developed in Georgia.

Although, it is a draft version and still not approved but it gives hope to the branch specialists. The strategy goals are analyzed in our article. The study is conducted regarding the biomass use in different industry branches of the developed countries, resulting from which it is established that the biomass is an important part of energy consumption worldwide and it plays

a special role in successful implementation of measures directed against the climate changes, as it substitutes fossil fuel and thereby reduces the emission of harmful substances into the atmosphere. As of today, bioenergetics accounts for 10% of global energy consumption, though this indicator is substantially growing in the footsteps of technological development. The study conducted by us envisages the biomass use in Georgia with adherence to the principles of sustainable energy development. According to the study results the development of these resources can make a significant contribution to the poverty overcoming, economic development of the country and improvement of living conditions for the rural population.

The article estimates an annual energy potential of the biomass, which will reduce the energy safety risks of our country and will assist the increase of society's awareness on the sustainable development through implementation of up-to-date utilized technologies.

Key words: *European Union Directive, biomass, biofuel, waste management, renewable energy.*

SCHOOLS OF TOMORROW

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ABSTRACT: Technology is everywhere-entwined in almost every part of our culture. It affects how people live, work, play, and most importantly learn. It only makes sense that the modern schools are also effectively deploying mobile technology in the classroom. However, for many schools, implementing the latest technology is a difficult strategy to navigate.

There are several reasons of that. First of all technologies are taken as enemy of children, as if they replaced books. So schools are avoiding to use them. Secondly, school may have will to deploy technologies in practice, but they can't allow themselves to have expensive Technology or they are not capable of properly supporting the technologies, even more teachers have no competencies to use them.

This research claims that new technologies can be useful in school education system. As information can be taken by several channels and there are several learning styles: visual, aural, verbal, physical, logical, social, and solitary. To achieve maximum success in children's development and to give them a perfect knowledge people have to create system that fits each of them, inclusion learning has to be leading. Not only children with special educational needs but children with typical development, as in spite of status every person needs individual approaching.

In some developed countries there are a lot of technology opportunities but in developing countries and especially in post-soviet countries it is much harder to implement new technologies.

Here are 7 reasons:

1. Internet is the best way to spread information and it will be much easier for children and teacher to get information from internet.

2. Technology is the greatest invention to connect with other people throughout the world. Children can find other children with common interests and different culture and exchange information and ideas about the stuff.

3. Technology helps students be more responsible. Owning your own device or borrowing the school's devices gives students the opportunity to improve their decision-making skills as well as taking ownership of a valuable (and often times expensive) device. Again, this needs to be complemented by proper digital citizenship training to see the best results.

4. Digital citizenship skills are important for teachers and faculty members as well, as their education level greatly influences children and their development.

5. Nowadays technologies are mostly in every field, and it is impossible for children to avoid having touch with them in the future. So it

will be better for children to work on their technical skills from the early years and to do it under professionals' observation.

6. On the other hand it will be easier to adapt the educational environment for children with special educational needs: for vision disorder audio books would be helpful, while hard of hearing it can be suggested visual materials with subtitles, if child has ADHD it can be managed active learning even with dancing and singing; in case of dyslexia it can be suggested visual materials with subtitles; in case of dyslexia Java games are actually good choice and if child has some problems with fine motor development the keyboard using is not bad idea.

7. And finally,it is inevitable to have touch with technology, as information taken from books, to put it mildly, is not enough for many subjects. For example art, geography, foreign languages. If imagine that every subject has additional video lessons and of course curriculum is taken into consideration modern world will get educational system that is much flexible.

Schools of tomorrow are exactly this kind. They have touch screens, digital technologies, video lessons, audio books and are loaded with interest activities. Nowadays people are afraid of including technologies into educational process, because of prejudice that is saying "technologies are destroying new generation". It is right in case of destructive usage, but everything that will be given to child in wrong way, senseless and without dosing will be destructive. If leave stereotypes behind and look the other side of the coin, future generation will be more educated.

Key words: *Technology; education, children, school.*

THE ROLE OF TECHNOLOGY IN CONTEMPORARY ART

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ABSTRACT: Electricity, as a form of energy, operates as a very special material in art production. Painting by the hand and brush, sculpture by the tool and hand, and dance, all use energy originating from within the human body. Claim of the paper is that the arrival of electricity in everyday life produced a new space for art practice. This emphasizes, even more, the importance of thinking together and question so-called "objective approaches" in the manner of scientific knowledge, and also the necessary social and political practices shared by both scientific knowledge production and artistic research.

Technology has a major influence on the arts. One digital keyboard can take the place of an entire orchestra, recording software can make vocalist sound perfect. With just a laptop, tablet or smartphone, artist can make and share art in both the visual and musical realms.

The technology that has emerged through the years has always played a significant role in contemporary art. Experimental works created using light, sound and other non-traditional materials are beyond the limits of art. Modern people perceive a lot of different types of light and voice in everyday life. Today, in the development of technology, artists have been given new experiments that greatly changed the art boundaries. The possibility of sound and image processing, the development of computer technologies, led to the new use of artists.

The rise of interest towards light, sound or other non-traditional materials is caused by the fact that the modern artists' interest and the subject of research are beyond the scope of the arts. They try to involve scientific achievements in their work and therefore often deal with collaboration with professionals in different fields. Artists and people, who

are interested in art, have to understand the scientific approaches that have been created by these works.

New attitude towards art is the result of the achievement of modernity. It should also be noted that the active participation of the viewer is predetermined. Often the work of art goes beyond the walls and galleries of museums and public spaces, which contributes to the art and community convergence.

In general, drawing, painting and sculpting are the fundament disciplines in a fine arts education. But since technology applications, for example the Adobe Creative programs, coupled with 3-D rendering systems and printers, they are now the industry standards in commercial contemporary art fields. Also digital photography and filmmaking, plus video game design are very popular and important in contemporary art-life.

The paper results show that, there are many reasons, why the technology in contemporary art very important is. For example: Technology permits for experimentation. You can hit the reset button, start over and try again. This ability supports incredible imagination. Digital media is a 3-D experience. Because it is so very on-line, it guides to a comprehension of structure. The possibilities are endless for all people to realize the arts using technology.

Key words: *Technology, Contemporary Art, Artists.*

BUSINESS MANAGEMENT CLUSTER POLICY OF GEORGIA'S CONSTRUCTION SECTOR

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ABSTRACT: One of the new forms of perfection of the industrial structure of the country is the cluster - the organized area, that enables the development of large companies, small enterprises, suppliers, infrastructure

facilities, local governing bodies, scientific research centers, higher education institutions and other organizations. Combining them in one group gives a substantial advantage to each of them in a competitive fight. This is confirmed by the practices of the developed countries.

Based on this practice, the work is presented in Model of construction cluster of Chugureti district of Tbilisi. The company is supposedly involved in three cluster companies: "Sasko", "Arkstudia" and "Kalas"), transport company "Lile", Real Estate Agency "Meskhelish", a car-supplier company and a car-repairing agency, Copyright Project Group, Wood Sapphire Factory, Bank Respublika and TBC Bank Branches, Concrete Plant, Metaloplasty Company Ardon Uighuria district administration, arsenashi-nsipse and audit firm - 16 organizations at all.

The organizations in the model of cluster are sorted by their position:

The woodworking factory, concrete factory, metalworking firm "Ardon", project group, arqmsheninspection and branches of commercial banks will take the initial position (V1).

Vehicle supplier "Lile" will occupy a mid-line position (V2).

The third position (V3) will be occupied by the company that is a Vehicle Repair Agency.

Chughureti board and Audit Firm will occupy the fourth position (V4).

Construction companies - "Kalas", "Sasko" and "Arsstudia" as well as Real Estate Agency "Meskhishvili" will divide the fifth - final position (V5).

The work has been set up to analyze and evaluate the situation in each of them to determine whether they are ready to work in cluster conditions and cluster management. By the results of the analysis they should belong to one of the five categories of enterprise:

G_1 - High economic condition of the enterprise

G_2 - Average economic condition of the enterprise

G_3 - Low economic condition of the enterprise

G_4 - Crisis situation.

G_5 - The existence of an enterprise under bankruptcy.

The idea is that the enterprise cluster to the fourth and fifth position should not be arrived, otherwise it will destroy the cluster.

In the paper it is also demonstrated that the analysis of the activities of enterprises recruited to enter the cluster should not be conducted as 40 factor, but 40 facts will be filtered and only 14 factors are studied when the cluster is founded. These include: the mobility of organizational structure of the enterprise, the management of manufacturing processes, the introduction of new technologies, the level of production potential, the level of staff, the cost of investing in the enterprise, the risks, the level of providing resources, the investment attractiveness of the enterprise, the region's investment attractiveness, Inflation rate, living standards in the region (region) and political situation in the region (region).

The 14th factor has been removed from this list because, according to the authors, Chughureti is not a region that is faced with political perspective, the fate of Tbilisi. Recommendation has been given not to use statistical methodology for studying the remaining 13 factor but an expert method that will conduct the express inquiries on the subject of the "weight" of these factors. ‘Weight' will be measured by points. It will be enough to investigate 5-6 experts on the construction line and evaluate the future factor spaces of enterprises and organizations in Chughureti cluster by summarizing their assessments. After the cluster is developed, the most attention will be paid to the factor that has the highest average score and the lowest attention to the one that has the lowest score.

The paper shows that the factors that have received high scores from all experts must be basement for the development of each and every enterprise or organization in the cluster, and finally the cluster's future strategy, that can be either an active defense, or offensive, or demonstration of forces.

Key words: *Cluster; Construction cluster; Enterprise position; Economic situation of the enterprise.*

INFLUENCE OF INCLUSIVE BUSINESS DEVELOPMENT ON POVERTY REDUCTION IN GEORGIA

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ABSTRACT: The following paper deals with such an important problem as the poverty of the population and it is suggested that for its reduction in the initial years and in the next few years it can be effectively managed fully by a small business development.

The study notes that the life level depends on many factors, the key to which is the level of economic development of the country. It is measured by the growth of GDP and the higher it is, the higher the possibility of satisfying human needs is, i.e. their level of living.

In 2010-2016, Georgia's Gross Domestic Product (GDP) increased from 2623 USD to 3735.4 US dollars, or 142.6%. At this time, it was $47123 in the US, $80304 in Luxembourg, $ 88232 in Qatar, $32334 in Switzerland and so on. Georgia is also behind some neighboring countries - Iran (4958 dollars), Russia (8748 dollars) and Azerbaijan (3877 USD).

Poverty is the result of unemployment and low income. In Georgia it is caused by inadequate development of business, especially small business, and therefore unemployment. The paper says that if business, especially small businesses, will not evolve properly and will not transform into an inclusive business, which means the involvement of poor people in the business, the bulk of the working population will remain unemployed.

The Georgian government is obliged to provide poor people with the conditions of employment so that they can engage in business and the state should not be a supporter for a long time. This can only be done by the development of inclusive business, whose successor is the development of the network of inclusive business incubators. The paper recommends that in the regions of Georgia, especially in the regions of Racha-Lechkhumi, Mtskheta-Mtianeti, Guria and Samtskhe-Javakheti regions, the government of the country should open the inclusive business incubators for the young people from the poor families to organize business and practice their practical skills. This event is radically different from all the events that are used to reduce poverty in Georgia today. Part of them was taken, but he did not reduce poverty significantly.

Experts estimate that 15% of Georgia's population is poor and 50% is needy (R. Asatiani). Other estimates show that 42,2% - poor, 44.8% - have average income, 3,6% - rich, 2,6% - wealthy (I. Archvadze). In 2010-2016 employment in Georgia grew by 67.4%, business turnover was increased 2.5 times, the gross domestic product gross domestic product was grew only 42.6%, average real income was grew 64.7% and so on. In spite of this, according to official statistics, in 2016, 60% of the median consumption was 20,6% of the population, and below 40% - 7,1%. The first group's monthly income was GEL 145, the second - 97 GEL (respectively 4,83 and 3,23 GEL per day). This is the population of Georgia, which the World Bank estimates to the poor and needy (needy is 2 USD per day, and poverty is $1,25 USD per day).

According to official statistics, 11.8% of the workforce in Georgia is unemployed today. Like some other researchers, the author of the work does not agree with this information and considers it twice as much. This explains that a large number of unemployed are not registered in the database.

The fact that 2,5 times growth (250%) of business turnover in Georgia in 2010-2016 has not been reflected in the gross domestic product and average salaries income, is explained by a large share of goods imported into business turnover that does not fall into the overall product. Authors argue that local production is the main area where the poorest trained in the inclusive business incubator should be employed. This will strengthen the country's economy and poverty will be reduced as a result.

Key words: *Inclusive business; Unemployment; Poverty; Inclusive Business Incubator.*

MANAGERIAL PROBLEMS IN ITALIAN ENTERPRISES IN GEORGIA AND THE WAYS OF SOLVING THEM

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ABSTRACT: In the paper is discussed the list of advantages of establishing Italian companies in Georgia compared to other countries and their problems in management.

The work begins with the four reasons that make the company irrespective of whether it is Italian or other country to leave its country and establish in a foreign country. These the reasons are as follows:

- Desire to expand customer's circle;
- Desire to reduce the cost;
- The desire to expand and improve their own basic competences;
- Desire to reduce the entrepreneurial risks.

As a result of these reasons, 103 Italian companies were based in Georgia but only 43 of them are functioning still.

The paper notes that the role of Italy in direct foreign investment in Georgia, despite the establishment of many enterprises, is minimal. In 2016 it amounted to 3268 thousand dollars, or 0.22%. The first place in foreign direct investment was Azerbaijan (35.6%).

The paper states that Georgia's level of technologies is 20-30 years behind than developing countries. Liquidation of this lag is to be carried out by foreign investments in the receiving country or in Georgia, mainly through the introduction of new and newest technologies, new knowledge and experience and so on. The authors of the thesis are suspecting that Azerbaijan, who is in the first place to enter foreign investments in Georgia, has an innovative level like the European developed countries, in particular Italy, and the issue of more favorable conditions to attract Italy's investment.

Italy has a very high value technology that crosses the border. In 2016, Italy had 28912.6 million US dollars of export in high technology,

Innovations index (47,2) is ranked 29th in the world (Georgia - 53), according to living standards it is on the 8th place in the world, Global Competitiveness Index (GCI) Italy ranked 43rd in the world. The paper also emphasizes the fact that the Italian institutes have innovative centers, various techno-parks (23), technopolis (12) and business incubators who work on innovations.

The authors of the thesis assure us that such a policy is a system chain in the education system "Education - Science - Technologies - Industry", which will systematically deliver high-tech logics and will give Georgia the same charge if he will invest more large investments in it.

Italian enterprises based in Georgia operate in different spheres - in medicine, education, tourism, processing industry, restaurant networks and elsewhere. Out of their total quantity, only 10 are joint ventures (Jeep LLC, Italian Restaurant, LLC "International Innovative Medicine", "Itako-ge" and others). According to the author, it is desirable for Georgia that most of them should be joint and, above all, priority was founded in agriculture N1 priority sector of Georgia.

From the Italian enterprises established in Georgia, the managerial problems of LLC "AgriGeorgia" - low professionalism of employees, multi-tasking (hazelnuts, transmissions, logistics and etc.) concentrate on the enterprise and there are some recommendations in particular, retraining of employees and delivering non-participating activities in Italy to the out-sourcing of hazelnut, transport and logistics.

Transferring these operations to the outsourcing company "AgriGeorgia" may face the following problems:

- Trust - or how trustworthy is the trustee;
- Flexibility and quality - how quickly and in good faith he performs his trust;
- Reliability - How long will it be to trust the case?
- The possibility of the economy - how much money will get the company outsourcing;
- Management skills - Have the outsourced management professionals.

The authors of the thesis recommend the company "AgriGeorgia" from this list, especially the authenticity of the outsourcing and professionalism of the manual apparatus.

The paper describes the calculation of income of the company "AgriGeorgia" on the outsourcing of the hazelnut gardens. It was estimated at least 198500 GEL annually.

Key words: *Italian company; Priority fields; Joint venture; Managerial problem.*

PRIORITY DIRECTIONS IN MANAGEMENT OF THE INTERNAL ORGANIZATIONAL BEHAVIOR OF STAFF IN GEORGIAN COMPANIES

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ABSTRACT: The work is characterized by the behavior of people, its faces, the factors acting on them, types of people by their behavior and character. It is said that the employees in the company form their behavior on the one hand, by their character, and on the other, by external environmental factors. If the manager knows the nature of each employee employed in the company, it can improve the performance indicators.

Using scientific researches for different scholars (e. g. V. Vasenin and others), in this paper authors discuss about, what is the nature of a person in a particular case and what he should be in charge of. For example, the autistic person is the highest-ranking manager, Hyperactivity - the middle and lower level of management, Comfortable person - any head of deputy, a labler-cycloid person - as a programmer and so on.

The work emphasizes that the manager should not consider the character of the employee as a uniform system of conduct of behavior, as

the central basis of the nature of the human genealogical values that may vary.

The nature of the employee and, therefore, the nature of behavior is of particular importance for determining his motives and goals - the highest requirements for others are the purpose and motivation, and others - satisfy physiological needs. From the above, the author argue that not everyone has the same value for everyone and the manager should pay attention to it.

Study of personnel behavior is a new affair. He started abroad in the 80s. It is even more new in Georgia. It is so new that there is no single definition of organizational and internal organizational behavior. The work contains various sciences. Arsenev, t. Jazz, c. George, R. The board and the views of others on this issue and given some assessments.

The work has particular attention to individual and group behaviors. Individual behavior is considered by three factors - attributes, attitudes and learning - by the Stephen Robins and Timothy Jagi. The possibility of a human being is to do that. The quality of attitudes is expressed by the employer's loyalty to the company and the company, which is one of the most prevalent factors in learning.

Authors give priority to the performance of the case, not the individual, but the groups and the teams. It is quite reasonable. In addition, the differences between teams and groups are well known and the spheres of their use are mentioned correctly.

The work presents the results of the research, which was conducted on the behalf of the company in “TLG” company, which allowed the author to find the company's socio-psychological climate, management of the staff of the Company, satisfaction and dissatisfaction with the employees, organizational culture, satisfaction with work and labor compensation, frequency of conflict situations, satisfaction with labor organization and etc. As a result of this survey, the conclusion is that, unlike foreign countries, where the behavior of the personnel has been theoretically and practiced in the foreground, it is considered a secondary issue in Georgian companies.

Authors use the assessment of the behavior of employees in the field of service, and The formulas created by J. Nyustrom and K. Davis. The

company makes assessment of the behavior of the employees of "TLG" in both as in main activity, as well as in providing services.

The intensity, integrity of the personnel in the activity is 0.207, (0.33) less than the norm, therefore the personnel of the investigated company are not working at full load and that is not because of their laziness, but the neglect of their aims, motives and desires.

Due to the above mentioned, the authors outline the main directions of the personnel employed in Georgian companies:

1. In case of dominant and sociable people in the total number of employees, the management of the company is made by internal forces.

2. To be careful and scrupulously committed to the commitment of the employees to the company and to raise the issue of involvement in the company's intangible assets.

Key words: *Organizational behavior; Personal character; Assessment behavior.*

MISUNDERSTANDING OF DIFFERENCE BETWEEN CORPORATE PHILANTHROPY & CORPORATE SOCIAL RESPONSIBILITY IN GEORGIA AS DEVELOPING COUNTRY

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ABSTRACT: This article maps current thinking in the emerging field of Corporate Social Responsibility which has gained an increasing research attention in recent years not only in business, but specifically in the supply chain management (SCM) discipline as well. Supply chain mapping is important for businesses to realize their corporate social responsibility policies.

Nowadays CSR establishes itself more globally, but the study of CSR in Georgia, like in all developing countries is still very limited. For that results corporate responsibility has been mistaken many times for corporate philanthropy. But it is not the same, or to be more accurate, it is just one dimension of CSR, and frankly not the one we should be concentrating on when we talk and debate about the social responsibility of business.

In spite of both have positive impacts on the charity and not-for-profit sectors and offers direction to business leaders who want to increase their companies' social and economic performance, still the tendency of development and misunderstanding of difference of CSR and philanthropy in Georgia remain relatively unexplored research areas.

The purpose of this study is to identify key findings within the literature relating to the corporate philanthropy and corporate responsibility.

This article is to highlight the difference between CSR and Philanthropy, to provide examples from the other developing countries to Georgian conditions, to outline some guidelines about how to move beyond philanthropy that is largely prevalent in the developing countries to a more strategic approach, that is aligned with strategy and core competence or relevant and pressing social needs in the country.

CSR characterized by the formative factors, but in Georgia it is either new or non-existent in the current local context. Like in other developing countries in Georgia socio-economic problems are at the top of the attention as well. The main factor is that Georgian is proud of the traditions of philanthropy and the sense of responsibility of elites within broader society that engenders particular forms of social solidarity, the patterns that are perceived by many Georgians as setting certain standards for their way of life.

To take CSR to the next level in developing countries, in this case in Georgia we need to accord systematic attention to strengthening the institutional drivers of CSR, and putting more pressure on companies to move beyond philanthropy. Practical guidelines and implications in relation to how to transition to a more strategic approach to CSR are provided.

Low levels of safety and labor standards, little awareness of social investment as an alternative to charity, gaps in public governance and

transparency affect how CSR is conceived and practiced in Georgia. To increase public and organizations representatives' awareness of the core values of CSR and its benefits to stakeholders is necessary to build support for corporate responsibility among businesses and the wider public. This goal can be achieved in several ways, though the most effective one is disseminating information on corporate responsibility and corporate philanthropy through the media, as organizing round-table discussions on talk shows and covering success stories can be very effective in reaching all level of society.

Key words: *Corporate social responsibility; supply chain management; corporate philanthropy; Georgia; developing country.*

QUANTITATIVE ASSESSMENT OF ENVIRONMENTAL WATER DISCHARGE FROM HYDROPOWER STATIONS IN ACCORDANCE WITH RIVER FLOW REGIMES

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Georgia's river regimes are characterized with diversity. Rivers with summer floods are mainly fed with glacier waters, to which the precipitation in the glacial zone (such as rain and snow) is added. Gvandra, Mulkhura, Nakra, Mestiachala belong to such types of rivers.

The rivers characterized with spring-summer floods have mixed feeding (glaciers, snow and rain waters). No high floods occur due to the downpours. Kodori, Enguri, Tskhenistskali, Bzipi, Nenskra belong to such type of rivers.

The rivers that experience high water due to spring-summer floods and due to downpours during the year, are characterized with mixed feeding: glaciers, snow and rainfall. Though, the glacier feeding constituent is insignificant. Such water regime characterizes following rivers: Bzip, Kodori, Enguri and Rioni,

Tskhenistskali in the middle reach and the tributaries of these rivers.

The rivers that experience spring floods and summer-fall high floods are characterized by snow and rainfall feedings. Such regime characterizes the following rivers: Kvirila, Dzirula, Chikhura, Chkerimala, Khanistskali, Tsablaristskali. Adjaristskali belongs to the same type of rivers characterized by fall high floods.

The rivers with high floods are fed with snow and predominately heavy rainfall (they do not have a clear flooding regime). Following small rivers flowing into the Black Sea belong to them: Kelasuri, Gumista, Gaglaghi, Supsa, Natanebi, Chakvistskali, Eristkali, also lowers courses of the rivers Rioni and Enguri.

The reviewed rivers with different flow regimes are characterized by the fact that the average maximum monthly flow rate of the flood is more than three times higher than the average monthly flood rate during the low flood level.

The rivers of eastern Georgia flow into the Kura River water drainage basin, the regimes of which can be ranged into three types:

Rivers with spring floods and fall rainfall high floods, with snow and rainfall water feedings. Such rivers are Ktsia-Khrami, Debida.

The types of rivers characterized by spring high flows and that feed from lakes and soil water sources are Korkhi and Paravani.

Just like the rivers of Western Georgia (the upper reach of Enguri River, Tskhenistskali River) rivers Aragvi and Alazani River's upper reach, Samkuristskali River belongs to spring-summer flood type.

Based on the analysis of the types of river feedings and flow regimes, it can be said that the rivers of Georgia are characterized by 7 different types of flow regimes, respectively dominant types of feeding vary for different rivers. Therefore the river hydrographs differ from each other as well. To meet the main environmental requirements at the low flow river zone should be carried out, depending on which flow regime the river is characterized with.

We believe, the above stated review of the rivers' hydrographs lets us make the following statements.

1) For the rivers the flow rate of which exceeds the low flow rate period 3 times and more, during the period of floods environmental flow rate should be calculated at 10% of the average monthly flow rate for each month - the minimum observed amount of average monthly flow rate.

2) For rivers which do not have a clear flood regime, the environmental flow rate should be established at the amount of minimum average monthly flow rate observed for each month.

Processing hydrographs of rivers with different flow regimes using modern computer technologies and corresponding software will make it possible to determine the amount of environmental water rate for the specific station of the river.

This is a somehow compromised approach because it considers both economic interests as well as environmental conditions which are essential for the rational use of water resources as well as ecological considerations.

Key Words: *Hydropower, hydrology, river, river flow, ecology.*

IMPACT OF CLIMATE CHANGE ON THE FLOW OF GEORGIAN RIVERS

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ABSTRACT: The last assessment of hydropower resources of Georgian rivers performed under the guidance of academician Givi Svanidze was based on hydrological data existing before 1980. After this period, there are 7 ÷ 10 years data on river flow rate. After this period there are no data on hydrological observations for most of the rivers in Georgia,

which means that there is no complete information about the impact of the climate change on the river flow.

In recent years, studies on climate change have shown that it affects the water content of the rivers.

In order to assess the impact of climate change on the water content of rivers and consequently, with regard to the potential of water resources, at this stage of research we have allocated 10 different types of river basins from four regions of Georgia. All these rivers at the chosen sections are characterized by natural flow, so they are not affected by anthropogenic influence.

Based on our calculations, average multi-year flow rates of 10 rivers in Kakheti, Adjara, Imereti and Samegrelo-Zemo Svaneti regions have been established. In the cases of the mentioned rivers, the calculation carried out by prolonged hydrological ranges showed the reduction of average multi-year flow rate as well as its growth.

From the results of the calculation, it is clear that the average multi-year flow rates of rivers: Samkurtskali, Alazani, Ilto, Ajaristskali, Chirukhistskali, Kvirila and Khanistskali have decreased by 17.1, 5.52, 6.2, 3.2, 14.6, 4.6 and 6.9% respectively. As for the rivers of the Samegrelo-Zemo Svaneti region, in thier case, an increase in the average multi-year flow rates has been revealed, which is due to the fact that these rivers are glacier-fed.

Some of the rivers of Samegrelo-Zemo Svaneti region, which we have chosen, are fed by glaciers to some extent, which explains the fact that the prolongation of existing surveillance lines, using the observed water flow rates in recent years, has increased the average multi-year water expenditure for the rivers. This indicates that this accouting period coincided with the glacial melting process, resulting in increased river flow. In the longer term, if the global climate change will become of irreversible nature, along

with the glacier retreatment, this trend can change in the direction of decline.

It is clear from the above mentioned that climate change has had some impact on the flow of rivers and it should be noted that in order to review this impact in more details, it is necessary to carry out continuous

hydrological monitoring of the rivers and to tie the results to the climate change. Modern technologies allow us to conduct continuous hydrological observations of the rivers and have a database that will be used to determine the flow rates of the rivers, for which no hydrological observations exist. Determining the trend of water expenditure change is necessary for forecasting the hydropower potential of rivers, which is essential for the development of the country's energy sector.

Key Words: *Hydropower, hydrology, river, river flow, climate change.*

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