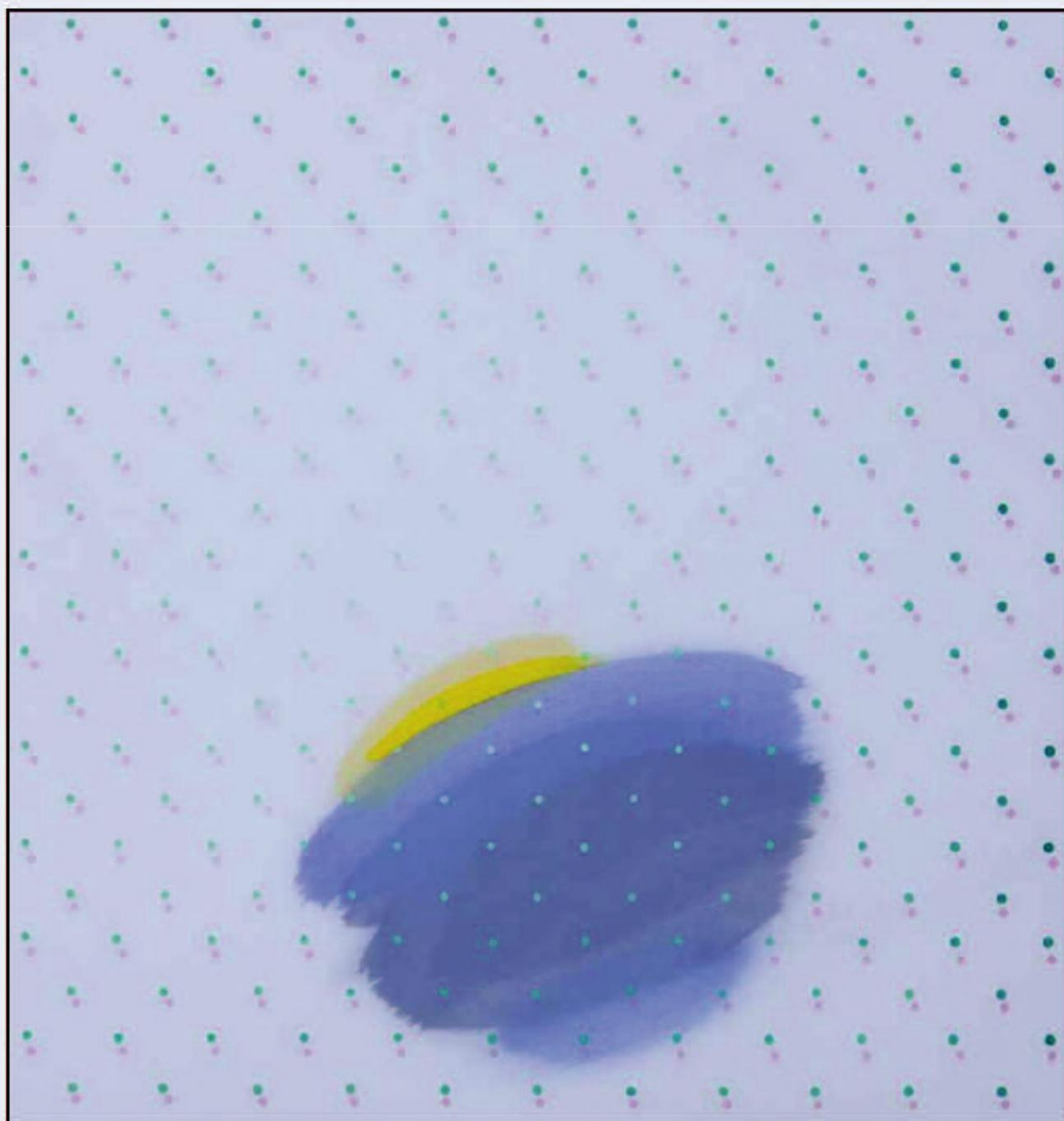


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EDITOR'S MESSAGE

SEEJSD is again on a board. This time, in front of you is its fourth edition. It takes some time to receive, review, consolidate and publish 19 articles from vast number of disciplines which somehow are closely related to sustainable development. In fact, sustainable development is one of the most important challenges of modern society interconnected with climate changes and a newcomer - *green deal*.

In that sense, it is difficult to manage a journal like SEEJSD where every single topic in the articles which pretend to be published are from very heterogeneous fields and can be linked to sustainable development as top human priority. It was the main reason for Editorial board to undertake a measure of so called clustering of received and approved articles for publishing in this issue of SEEJSD.

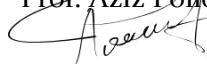
Namely, we decided to split this issue in two parts, having in mind that still there will be overlapping in the published manuscripts from both parts. So, part A is containing articles from technical, biotechnical and natural sciences, while part B is composed by the articles from humanities, health and social sciences. Doing this, the Editorial board is hoping that in such way it will be more convenient for SEEJSD more easily in enter in the process on international indexation of scientific journals and publications.

Regarding the disciplines, in this issue of SEEJSD in Part A the majority of the articles are from the field of information and communication technologies, more popular as ICT (5), followed by the ones from the environmental sciences (3) ending with the technical sciences (2). In Part B, there are mostly articles from an economy and humanities (4 of each) and one from health sciences. Nevertheless, we divided the SEEJSD in two parts; the articles in each part in some cases are overlapping in term of disciplines which implies multidisciplinary and interdisciplinary approach in most of the studies. SEEJSD is welcoming that reality as precondition for better understanding in wider publicity.

Related to the type of manuscripts, most of the manuscripts are original scientific papers, and few review papers and few professional articles. This composition of this issue is expressing its openness for different types of research activities and the promotion of their findings and recommendation.

In this occasion, let me express my optimistic expectation that in the new format, SEEJSD will continue to be attractive media for publishing of the scientific articles with appropriate quality which will accelerate the process of international indexation. At the end I would like to thank to the authors and coauthors who publish their manuscripts in this issue of SEEJSD and to the Editorial board members for their extraordinary efforts to finalize the completion of this issue of SEEJSD.

Editor in Chief,
Prof. Aziz Pollozhani, PhD



Analyses of Online Virtual Learning Lab for Promoting Higher Education Courses and Collaboration between Universities

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ABSTRACT

The research study investigates the benefits of the virtual laboratories as a key factor in technical and scientific education, since traditional laboratories are costly to maintain, limiting possibilities for practical exercises. The study analyses virtual labs as proposal to reduce cost and simplify maintenance of lab facilities, while offering students a safe environment to build up experience and enthusiasm for different sciences like chemistry, biology, informatics, and math's as mayor subjects. Virtual labs are science labs offered on computers and smart devices. Modern developments have enabled the inclusion of gamification, virtual worlds and augmented reality into virtual labs, bringing the user experience to a new dimension. In order to analyze all this, a background research has been analyzed focusing on published research and afterwards a survey of student and their experiences and feedback is realized. Insights from identified issues and positive aspects of virtual labs are presented. Conclusion of the study is that virtual labs support effective constructivist learning because they enable the learners to act like investigative scientist undertaking different investigation using the virtual labs to conduct different experiments. This can open new horizons in the learning approaches and widen this approaches and usage of virtual labs.

Key words: evaluation of virtual labs, real physics lab, blended labs, usage of virtual labs

1 INTRODUCTION

As a relatively new model of instruction virtual laboratories can effectively provides students with the chance to develop critical thinking, innovative and team working skills, all of which are highly valued in today's job market. Virtual labs use the power of computerized models and simulations and a variety of other instructional technologies to replace face to-face lab activities.

An example of a virtual lab is a collection of digital simulations supported by discussion forums, video demonstrations, hyperlinked glossaries, and e-mail lists produced by an authoring software. The most intricate virtual labs include highly interactive virtual reality simulation. Current developments in ICT-information and communication technology can be successfully embedded in the pedagogical design of virtual laboratories. This can open new horizons in the learning experience and widen the approaches and usage of virtual labs. Virtual labs can ease the pressure brought on universities and schools by cost and maintenance of real labs, while utilizing the extensive technological knowledge of students today. The development of virtual laboratories are examples of embedding modern ICT in education which are becoming more and more widely accepted in engineering education.

2 LITERATURE REVIEW

The aim of the literature review is to determine the trends in publications concerned with the virtual labs (VL) concept.

An important affordance of virtual laboratories is that reality can be adapted. Designers of virtual experiments can simplify learning by highlighting salient information and removing confusing details [8], or they can modify model characteristics, such as the time scale, that make the interpretation of certain phenomena easier [9]. Students can conduct experiments about unobservable phenomena, such as chemical reactions, thermodynamics, or electricity [10–13].

Furthermore, many authors think that VL provide interesting advantages over hands-on labs. For example, VL are available 24 hours a day, 7 days a week. In contrast, hands-on labs are often only available for short periods of time due to logistical and economical reasons. Forming and understanding scientific concepts is the result of an iterative learning process that requires experimenting repeatedly with the lab [13, 14]. For that reason, hands-on labs are sometimes insufficient to fulfill the desired impact on students' learning [9, 12]. Regarding the particular advantages virtual labs have, they support experimentation about unobservable phenomena, such as thermodynamics, chemical reactions, or electricity [17]. In addition, they can adapt reality, i.e., properties of the underlying mathematical model of the virtual lab can be changed to make easier the interpretation of certain phenomena [8]. Moreover, experiments can emphasize prominent information or remove confusing details [9]. Virtual labs are also an ideal tool to enable pre-laboratory preparation [10, 9, 11], which is essential to improve the lab learning experience of students [12, 13]. Finally, virtual labs favor students' engagement into "what if" explorations where the outcomes of the virtual experiments can be immediately accessed [14].

In remote labs, students handle actual physical apparatus and get real data from physical experiments, i.e., from the same type of experiments that would be run in hands-on labs. Hence, students learn about the complexities of the real world, e.g., dealing with measurement errors whose simulation is far from trivial [15, 3].

Our belief is that virtual, remote and hands-on labs are not exclusive alternatives, but valuable educational resources that can be combined in one integral and complementary learning unit. Such belief is supported by experimental evidence, as the pre-post comparison study design performed by Zacharia [6], which showed that the combination of remote and virtual experimentation enhanced students' conceptual understanding more than the use of remote experimentation alone. In this line, Abdulwahed et al. [9] propose the blended usage of VL and

hands-on labs to foster the Kolb's constructivist cycle [7], and thus, enabling high order learning. In particular, Abdulwahed et al. advocate (1) using virtual labs in preparatory sessions, (2) utilizing hands-on labs in interactive lectures that involve experimentation, and finally (3) using remote labs to support students' repetitive experimentation.

Nowadays, the use of VL is spreading across all educational levels: from primary schools to higher education, from vocational learning to universities, and from self-education to technical colleges [10]. Likewise, their application domain is widening: control engineering [7, 8], robotics [5], spectroscopy [1], thermodynamics [2], etc. As a result, their research community and its scientific paper production is rapidly increasing.

The goal of this paper is guiding the stakeholders involved in the research, design, implementation and usage of VL (i.e., researchers, developers, lecturers, and faculty/university administration [6]) through the vast literature available at the moment to identify the most researched topics, how the interest on that topics has evolved, the most relevant papers (in general and for each of the identified topics along a given period of time), the main sources of publication, and the most prolific/relevant authors.

Somehow related to our work, several literature reviews have been published on VL. Those reviews are mostly focused on particular aspects. To the extent of our knowledge, the only attempt to offer a panoramic view of the whole literature on VL is [10], where Zappatore et al. analyze 2,389 bibliographical records.

To characterize the VRL literature, Zappatore et al. follow a quantitative approach, i.e., their analysis is limited "to count papers" to find the most prolific authors and sources of publication. Our work enriches that analysis by providing a qualitative dimension, e.g., identifying not only who/which authors/sources have written/published most papers, but who/which of them are the most relevant for the VRL community.

Many well-controlled comparison studies report no differences between physical and virtual laboratories. For example, Wiesner and Lan [6], compared virtual and physical equipment for measuring heat exchange, mass transfer, and humidification and found no differences in the performance of chemical engineering students on a test measuring underlying principles. No differences between virtual and physical experiments on tests of conceptual understanding are reported by (7) for seventh and eighth graders designing a car or by (10) for undergraduates learning about heat and temperature. For measures of inquiry skills, (8) found no difference in virtual and physical experiments for fourth and fifth graders investigating the behavior of springs. These studies illustrate that, for acquiring conceptual knowledge, virtual laboratories can replace physical ones. These studies also suggest that tactile information does not appear to be a requirement for the development of conceptual knowledge or inquiry skills with the exception of students, especially young children, who do not have previous relevant physical experience with the phenomenon or concept under study; for example, (7) found that young children (aged 5 to 6) learning about the working of the balance beam gained more knowledge from physical laboratories than from virtual laboratories. Many studies show the advantages of virtual, interactive exploration of unobservable phenomena compared with physical experiments of observable phenomena. For example, university students who investigated simulated electric circuits showing moving electrons acquired more conceptual knowledge than those using physical materials (14). Similarly, students using virtual optics materials displaying light rays outperformed those using physical materials (15). Studies show that virtual experiments can enable students to use complex inquiry practices to separate variables that might be difficult to

use in physical experiments (16). The idea that virtual experiments support the acquisition of conceptual knowledge because they produce clean data is also supported in research. For example, first-year secondary students conducting virtual chemistry experiments outperformed those using a physical laboratory on conceptual understanding, which was partly explained by the messy data produced by the physical lab (13). In the domain of heat and temperature, (15) found that the use of virtual laboratories offered students more time to experience an experiment and to concentrate on its conceptual aspects than the corresponding physical laboratories, because the virtual laboratories allowed faster manipulation of the materials involved in the experiments of the study's curriculum. On the other hand, this ease of experimentation may also lead to less-structured investigations by students as recently found, in a situation without guidance for experimentation, by (13). These studies show advantages for each type of laboratory, as well as trade-offs. Benefits of virtual laboratories arise when students can investigate unobservable phenomena that are not found in the physical investigation, conduct many more experiments than are possible in the physical setting, link observable and atomic level phenomena, or contrast different depictions of similar phenomena. Physical, real laboratories have advantages when the instructional goal is to have students acquire a sophisticated epistemology of science, including the ability to make sense of imperfect measurements and to acquire practical skills.

3 RESULTS AND DISCUSSION

In order to capture the learners feedback and assess the impact within the research study used and devised a questionnaire. The questionnaire covered 4 (four) major fields: chemistry, biology, informatics and math.

They compared real physical laboratories with virtual laboratories and blended laboratories that included combination of real physical laboratories with virtual laboratories.

There were 50 participants that were included and filled in the questionnaire that had 4 questions in total and they each evaluated each category. The results are given below.

Table 1. Q1. What is your opinion about virtual labs?

Q1. Compare and show your preference between real labs, virtual labs and blended labs?			
	Real Labs	Virtual Labs	Blended Labs
1. chemistry	100%	80%	85%
2. biology	100%	75%	80%
3. informatics	90%	100%	95%
4. math	100%	60%	90%

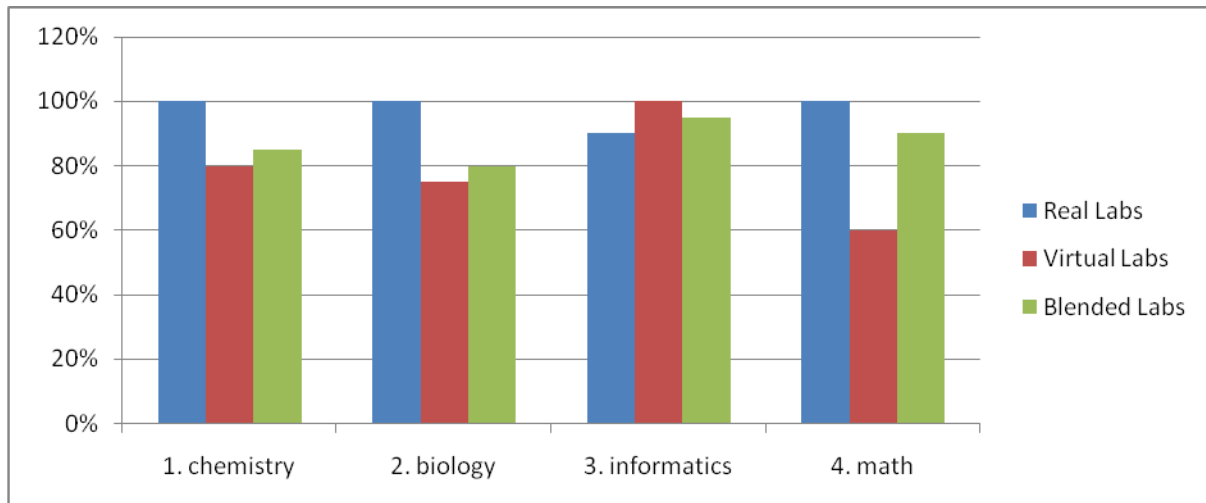


Fig 1. Results from assessing the real labs, virtual labs and blended labs

Table 2. Q2. The lab environment simulated to a good degree?

Q2. The lab environment simulated to a good degree ?					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. chemistry	34%	43%	8%	13%	2%
2. biology	29%	39%	14%	17%	1%
3. informatics	39%	47%	14%	0%	0%
4. math	11%	34%	39%	15%	1%

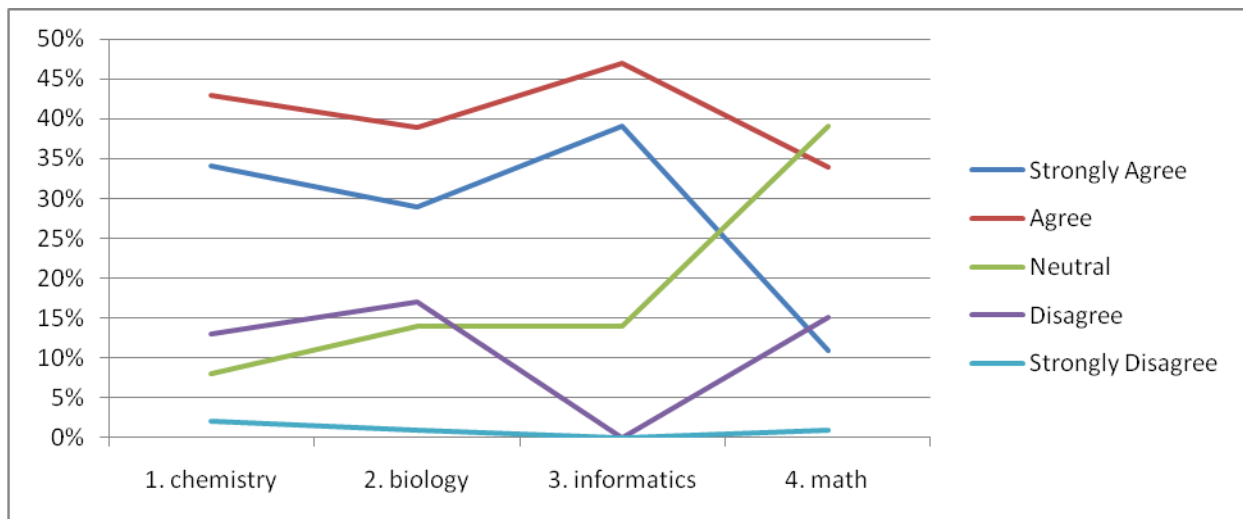


Fig 2. Results from assessing the methodology and approach undertaken

Table 3. Q3. The measurement and analysis of data was found to be easy?

Q3. The measurement and analysis of data was found to be easy?					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. chemistry	27%	41%	17%	11%	4%
2. biology	21%	39%	20%	17%	3%
3. informatics	37%	49%	12%	2%	0%
4. math	11%	34%	39%	15%	1%

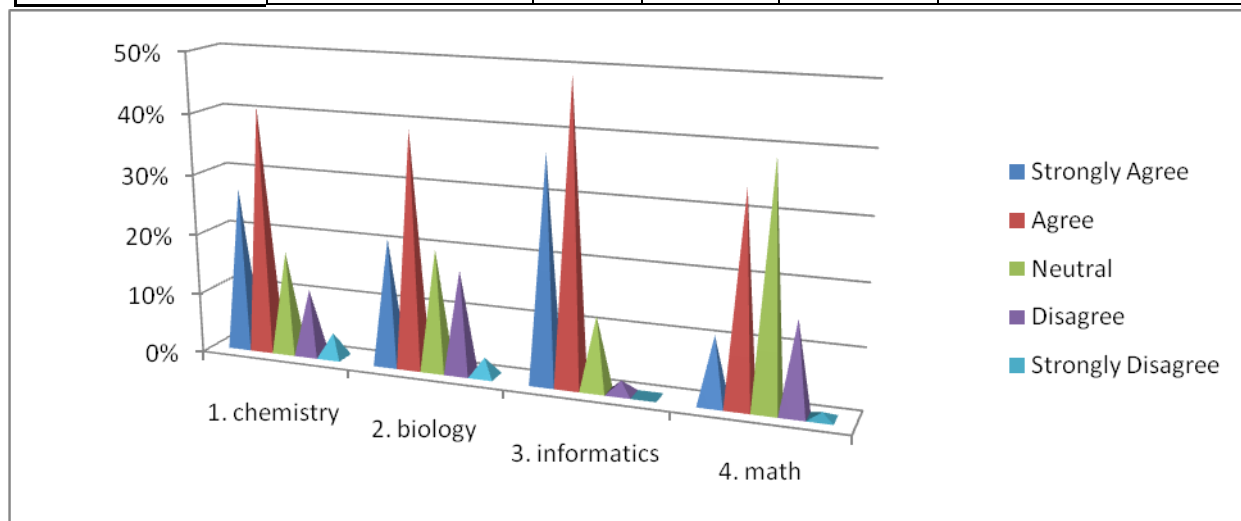


Fig 3. Results from assessing the analysis of data.

Q4. A clear understanding of the virtual lab experiment and related topics was gained?

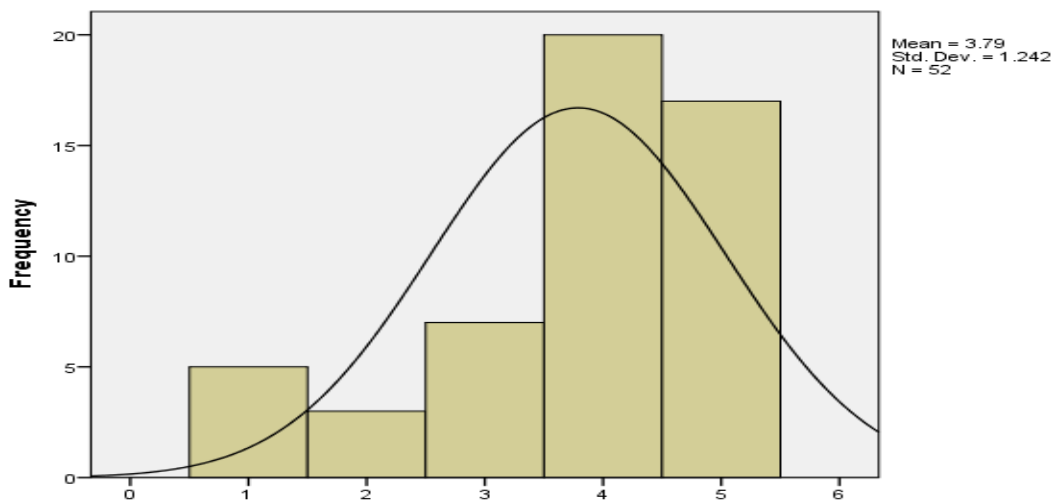


Fig 4. Histogram distribution of the data Q4

4 CONCLUSIONS

The importance of this research study is that it may help educators to realize that integration of virtual lab is possible and can improve level of knowledge and transfer of knowledge by realizing previously only class activities now also outside class using the virtual labs. Doing

homework or class work using virtual labs outside class time provides additional learning opportunities for students.

Virtual labs enable students to participate and interact in inquiry-based classes where they can implement and analyze their own experiments, learn by using virtual objects and apparatus.

Utilizing virtual labs provides students with the chance to develop critical thinking, innovative and team working skills, all of which are highly valued in today's job market.

The major issues identified in using virtual labs where:

- 1) Generate data which relies on the underlying assumptions, thus lacking the level of natural variation, and therefore students do not become familiar with poor or uncharacteristic data, nor will they learn how to deal with issues rising from these types of data .
- 2) Students have raised concerns with not being able to handle real equipment, and feeling as if they are losing out on some stages of practical training available in traditional labs.
- 3) However, even though in some cases handling real apparatus would be beneficial, such as in chemical and biomedical studies, virtual labs offer students the opportunity to make mistakes without real cost or danger.

The positive aspects of virtual labs that have been identified are:

- 1) modifying or simplifying real-world models to make phenomena more visible to learners and adaptable to multiple cognitive levels,
- 2) perform a wide range of experiments faster and more easily, providing immediate feedback about errors to the students and thus the opportunity to repeat the same experiment immediately,
- 3) helping students to visualize objects and processes that are normally beyond perception,
- 4) undertaking experiments too expensive or difficult to carry out with real plants, etc.

Table 4. Comparison of Advantages and Disadvantages of the 3 (three) modes : real, virtual and blended labs.

Settings	Advantages	Disadvantages
Real physical Lab	Real data, supervision, visual and feeling of reality	Time/place, restrictions on real equipment interactions, security, cost
Virtual lab	Security, good for concept explanations, no time/place restriction,	Equipment, calibration, idealized data, bias, lack of collaboration
Blended Lab	Equipment low cost, real equipment interaction, realistic data,	Calibration, idealized data, bias, etc

The results from this study can help to open new horizons in the learning approaches and widen this approaches and usage of virtual labs. Virtual labs support effective constructivist learning because they enable the learners to act like investigative scientist.

That is, learners undertake investigation using experiments to discover different relationships between phenomena, and construct models to express their understanding or compare things that

previously was hard to achieve. Thus, learning activities are more constructive by nature than, for instance, listening to lectures or solving paper and pencil physics problems.

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Importance of Visualization in Math Problems at the Universities

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Abstract

The small desire to learn mathematics among students, difficult to master the material can be solved if we approach their visual representation. Mathematical books that contain only problems without their visual representation are hardly acceptable by students. So, demonstration and visualization play an important role in the teaching process of the subject mathematics in primary, secondary schools and universities. They make the teaching content interesting and accessible, especially when technical devices are used.

This paper is the beginning of the research in which we will have two groups of students, at two Universities: Mother Teresa Skopje and Goce Delchev Stip, which will process mathematical content (algebra, geometry, analysis) in two different ways (some with GeoGebra and on a computer, and others without visualization and GeoGebra) then will be done testing, the results will be compared and a conclusion will be drawn. For this purpose, a student questionnaire was made to see what their thinking about learning mathematics with visualization in both University and the results from questionnaire are given in this paper. Complete results of a whole research will be published additionally.

The software we chose to be GeoGebra because it is easy for use and is offered free of charge. It is dynamic mathematics software, supporting science, technology, engineering and mathematics education.

Keywords: Mathematics, GeoGebra, Visualization.

Introduction

GeoGebra is an interactive mathematics software program for learning and teaching mathematics and science from primary school up to university level. Constructions can be made with points, vectors, segments, lines, polygons, conic sections, inequalities, implicit polynomials and functions. All of them can be changed dynamically afterwards. GeoGebra was created by Markus Hohenwarter in 2001/2002 as part of his master's thesis in mathematics education and computer science at the University of Salzburg in Austria. During the past years, GeoGebra has developed into an open-source project.

The history of visualization within mathematics education is a long one and the role of visualization in mathematics learning has been the subject of much research.

Visualization is the ability, the process and the product of creation, interpretation, use of and reflection upon pictures, images, diagrams, in our minds, on paper or with technological tools, with the purpose of depicting and communicating information, thinking about and developing previously unknown ideas and advancing understandings. Visualization, as both the product and the process of creation, interpretation and reflection upon pictures and images, is gaining increased visibility in mathematics and mathematics education.

Visualization is important for all sciences and can be applied in all sciences. The goal is to make it easier to understand the problems students and researchers face in order to solve them in an easier way.

The history of visualization within mathematics education is a long one. Since the beginning of the 1980s mathematics educators are interested in the practical challenges of teaching visualization, in visualization of mathematics as exhibits in school or aligned with educational psychology and are looking for theoretical frameworks.

In [2] the purpose of paper is to provide pedagogical strategies and discuss ideas about teaching mathematics using GeoGebra that promote effective use of visualization in a technology-integrated dynamic environment. The author describes his work with prospective secondary mathematics teachers enrolled in a methods course. The results of the study revealed that their perspectives on teaching and learning mathematics with technology were enriched as they worked individually and in small groups to develop and lessons with GeoGebra, suggesting that creating a collaborative environment for our prospective teachers is an important as incorporating dynamic mathematics software into our teacher education courses. In book [5] an

introduction to GeoGebra is given. Paper [8] is an attempt to define visualization and to analyze, exemplify and reflect upon the many different and rich roles it can and should play in the learning and the doing of mathematics. At the same time, the limitations and possible sources of difficulties visualization may pose for students and teachers are reconsidered. In [7] you can find a tutorial on how to use GeoGebra in more areas of mathematics.

Visualization in Mathematics

Mathematics teachers from two universities: University “Goce Delcev” - Stip (UGD) Faculty of natural and technical sciences in Kavadarci and “Mother Teresa” University - Skopje (MTU) at classes in lectures and exercises in mathematical subjects, a distinction of hours worked on mathematical topics using computers and visualization of problems. The goal was for students to see the difference when teaching is complemented by software for visualizing problems which are solve. Here are some of the examples that were considered at those math lessons:

In the first example we had illustration with GeoGebra how two functions can be adding, subtracting, dividing and multiplying, and also were given the value of functions at given point. This example was taken from <https://www.geogebra.org/m/NGgtXByQ>.

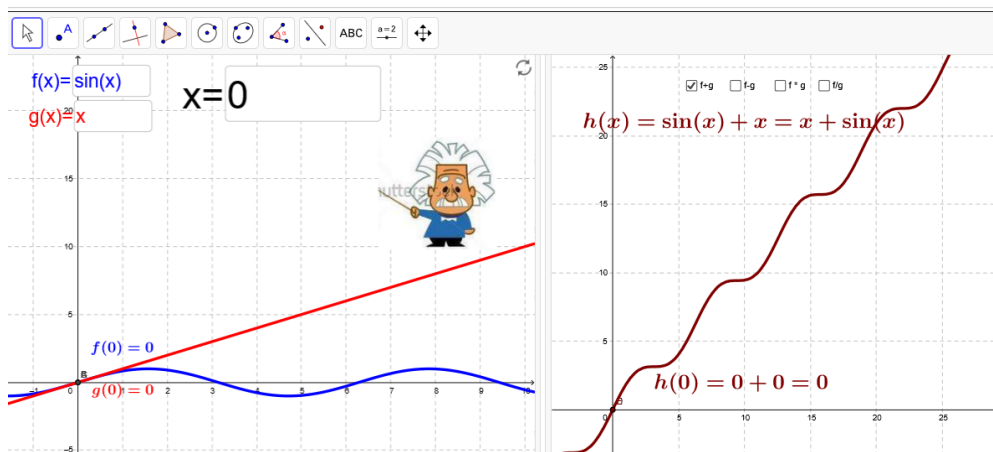


Figure 1.

In the second example taken from <https://www.geogebra.org/m/YCqpX8dt> we had Cone and Cylinder by revolution. Here we saw how the Cone and the Cylinder change with the change of radius and rotation angle.

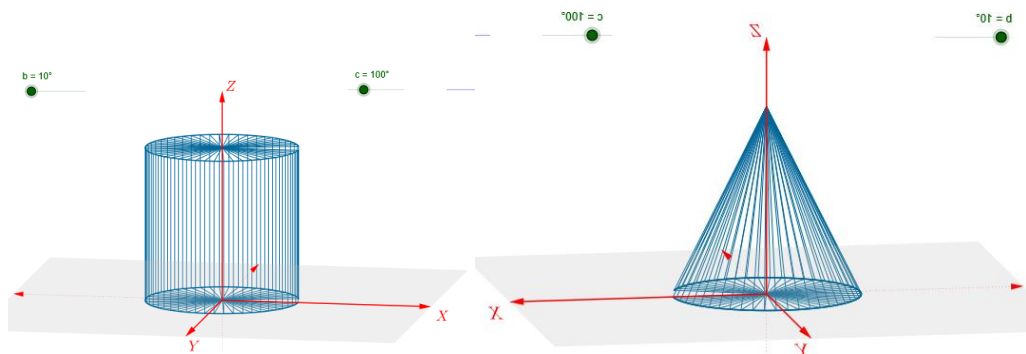


Figure 2.

Figure 3.

In the last example we visualize an example from the set of complex numbers, where we were seen complex number operations and their geometric interpretations. This example was taken from <https://www.geogebra.org/m/nxBcCV6T>.

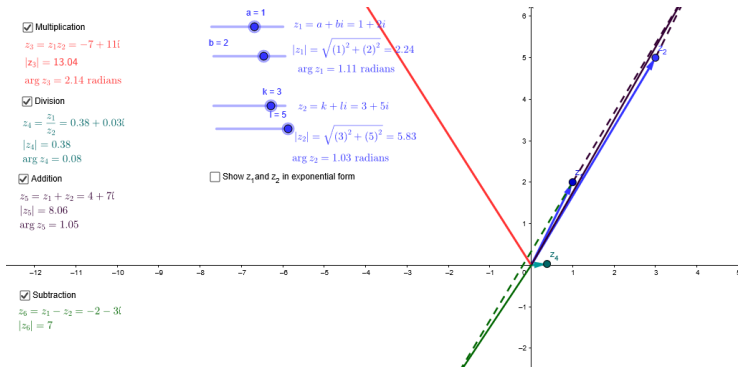


Figure 4.

Then, the teachers decided to make a questionnaire which should be solved by the students who followed the classes in which the visualization software was studied in order to determine whether their motivation for learning mathematics changes if software and computers are used for visualizing the problems which they need to solve.

The questioned students were the first year from two universities: UGD Faculty of natural and technical sciences in Kavadarci and MTU Skopje. Students had the task of completing a questionnaire consisting of 10 questions related to the visualization of mathematical problems. The goal is to see student thinking. Their thinking will help us to conclude on what in future mathematical textbooks we should write, and to recommend to other mathematic teachers to write.

Among the interviewed students there are those with very good results in mathematics, but there are also students who have achieved poor results. This situation is the same on both universities.

The students had

30

minutes to answer the questionnaire.

Both student groups completed the questionnaire in less than 20 minutes.

The results of the testing will be analyzed, the results obtained from the two universities will be compared, and finally a conclusion will be drawn.

Next, student questionnaire follows:

Student questionnaire

1. Do you want to study mathematics?
2. Do you know how a mathematical problem can be visually presented?
3. Have you seen mathematical books in which are visually present mathematical problems with software for visualization explained in that book.?
4. Do you think that learning will be easier if you learn from mathematical books in which the mathematical problems are visually presented?
5. Do you know any software that can help visualize mathematical problems?
6. Do you want to study mathematics with visualization?
7. Do you think that if mathematical problems are visually presented, the interest in mathematics among students will be greater?
8. Do you want to have more books in which mathematical problems will be visually presented with software for visualization and explanation who to work in it?
9. Do you want to learn some software that can help you to visualize mathematical problems?
10. Do you think that the visualization of mathematical problems will improve your results in mathematics?

The data was collected by a sample of 40 students, 20 of University “Goce Delcev”- Stip (UGD) Faculty of natural and technical sciences that is the group of students who studying in Kavadarci and 20 from students of “Mother Teresa” University - Skopje (MTU).

Students' results from Faculty of natural and technical sciences University “Goce Delcev”- Stip for student questionnaire are:

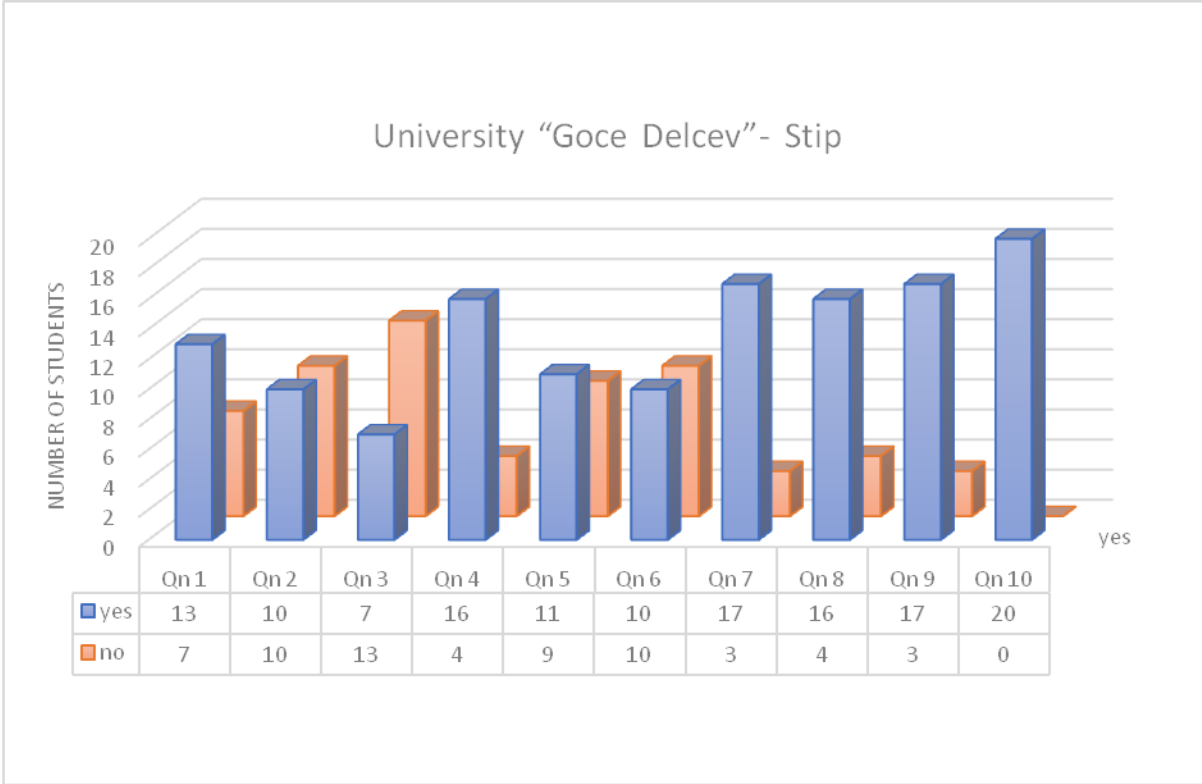


Table 1

Students' results from "Mother Teresa" University - Skopje for student questionnaire are:

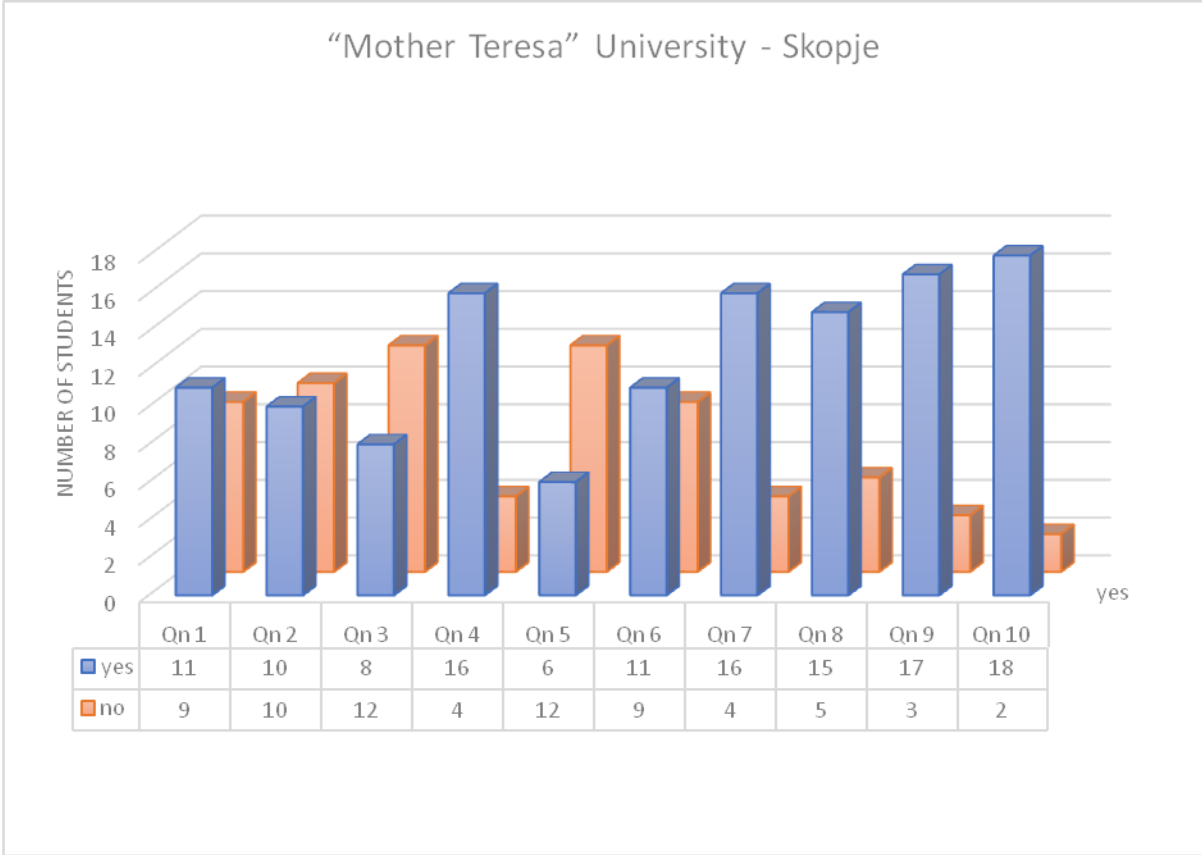


Table 2

From Table 1 it can be seen that most of a students from University “Goce Delcev”- Stip Faculty of natural and technical sciences Kavadarci do not have much interest in learning mathematics. They do not encounter many mathematical books in which problems are visually presented with some software for visualization explained in that book. They want to study mathematics with visualization and it would be good to provide visualization software in the mathematics curriculum. Our proposal is the GeoGebra software. Some students know how to use it, and others can easily overcome it.

Students believe that the visualization of mathematical problems can improve their weak mathematical results. Therefore, their opinions should be taken into consideration and changes made in order to improve the results in mathematical subjects.

Very similar are the results of a “Mother Teresa” University - Skopje, i.e. from Table 2. They also do not have much interest in learning mathematics. The opinion of these students coincides with the opinion of UGD students. Their opinion is that they need to visualize problems in mathematical problems so that they can be easily understood by students and thus improve their results.

Conclusion

The importance of visualization in general for all problems in all areas is great.

Any problem would be resolved more quickly, simpler and easier with visualization. Of course, this also applies to mathematical problems. Therefore, visualization would also help to raise the desire to learn mathematics.

This would increase the number of students at the technical faculties and there would no longer be a deficient staff in the technical sciences.

From the analysis above, we can say that some measures must be taken to increase students' interest in mathematics. Our proposal is the visualization of problems, introduction of visualization software in the curriculum, introducing students to the importance of mathematics and its extensive application. So, GeoGebra software must be used from all students and must be applied to it.

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ABSTRACT: The mathematical model and numerical methods as an essential tool for the design and analysis of steam turbines for sustainable energy solutions are put forward in this paper. The last two decades have seen a continuous increase in turbine inlet pressure and temperature. Modification of the turbo machinery parts, definitely require reliable and accurate predictions of the main flow dynamics characteristics and the heat loads imposed on the blades. The numerical computation is conducted on the turbine model with two stages using the CFD commercial computer code CFX-TASCFlow, based on solving of Navier-Stokes equation with applying a standard $k-\varepsilon$ two-equation turbulence model. Results of the numerical computation are discussed in the paper. One way to contribute to the sustainability of the environment and its energy resources is in the implementation of industrial steam turbine solutions for alternative energy applications. In that way the objective is to classify the influenced factors that affect the efficiency of the work of the turbine stage and defined thermodynamics properties of the flow.

KEYWORDS: Mathematical and Numerical Model, Finite Volume Method, CFD, Numerical Computations.

1. INTRODUCTION

Turbomachines are the heart of industry sectors especially steam and gas turbines in power generation. Small improvements in the efficiency of these vital parts can have an enormous benefit when spread over a myriad of applications. The ability of turbomachinery to deliver performance improvement plays a vital role in sustainable development. One way to contribute to the sustainability of the environment and its energy resources is in the implementation of industrial steam turbine solutions as alternative energy applications. For that purpose, numerical simulations and numerical predictions are an essential tool for the design and analysis of turbomachinery components. The continuous increase in turbine inlet pressure and temperature, and modification of the turbomachinery parts, definitely require reliable and accurate predictions of the main flow dynamics characteristics and the heat loads imposed on the blades.

The aim of the present research is to contribute to the development of both the numerical method and upgrading mathematical model of a flow in the turbine cascade. The objective is to classify the influenced factors, which affect the efficiency of the work of the turbine stage and defined thermodynamic properties of the flow.

The following is presented in this paper: The Reynolds-averaged Navier-Stokes equations are solved with an implicit time-marching finite volume method around a two-dimensional blade cascade, using the CFD commercial computer code CFX-TASCFlow. The computations were made for two cases. In case one, the flow around the turbine cascade was simulated. In the second part of analysis, the results of computations of the flow in the whole turbine stage with the leaning stator blades are presented. The numerical computations of this study were conducted at the Institute of Turbomachinery, Lodz Technical University in Lodz, Poland.

2. MATHEMATICAL MODEL

The governing equations used to model are instantaneous Navier-Stokes equations time averaged and Standard $k-\varepsilon$ turbulence model. For a single species Newtonian fluid, in a Cartesian coordinate system, the conservation equations for mass, momentum and energy are expressed in tensor form (CFX-TASCFlow, 2000, Theory Documentation) [9] as:

$$\text{Conservation of mass equation: } \frac{\partial \rho}{\partial t} + \frac{\partial}{\partial x_j} (\rho u_j) = 0 \quad (1)$$

$$\text{Conservation of momentum equation: } \frac{\partial}{\partial t} (\rho u_i) + \frac{\partial}{\partial x_j} (\rho u_j u_i) = -\frac{\partial P}{\partial x_i} + \frac{\partial \tau_{ij}}{\partial x_j} + S_{ui} \quad (2)$$

$$\text{Conservation of energy equation: } \frac{\partial}{\partial t}(\rho H) - \frac{\partial P}{\partial t} + \frac{\partial}{\partial x_j}(\rho u_j H) = -\frac{\partial q_j}{\partial x_i} + \frac{\partial}{\partial x_j}(u_i \tau_{ij}) + S_E \quad (3)$$

In the above equations u_i represents the velocities in x_i -coordinate directions, P is the static pressure, H is the total enthalpy, ρ is the density, τ_{ij} is viscous stress tensor, q_j is the molecular energy transport due to conduction, and the S terms are additional source terms.

The total enthalpy is: $H = h + \frac{u_i u_i}{2}$ where h is static enthalpy of the fluid.

The molecular fluxes τ_{ij} and q_j are expressed in terms of velocity, temperature and concentration gradients,

$$\tau_{ij} = +\mu \left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right) + \frac{2}{3} \mu \frac{\partial u_i}{\partial x_i} \delta_{ij} \quad (4)$$

$$q_j = -\lambda \frac{\partial T}{\partial x_j} - \sum_k^n \Gamma_k h_k \frac{\partial Y_k}{\partial x_j} \quad (5)$$

where μ is dynamic viscosity of the fluid, λ its conductivity and Γ_k , h_k , Γ_k , h_k and Y_k are the molecular diffusion coefficient, static enthalpy and mass fraction of species k , respectively. The second term of the right-hand side of eq. (5) represents energy diffusion due to molecular diffusion when the fluid components have different enthalpies.

In turbulent flows, the value of scalar variables fluctuates, and the instantaneous value of any scalar may be expressed as the sum of a mean and fluctuating component. To solve the turbulent flows, the original conservation equations (1) - (3) must be time-averaged. Substituting the time-average quantities into the original, unsteady Navier-Stokes equations results in Reynolds Average Navier-Stokes (RANS) equations and Standard k - ε turbulence model for compressible fluid are given below [9]:

$$\frac{\partial}{\partial x_j}(\rho u_j) = 0 \quad (6)$$

$$\frac{\partial}{\partial t}(\rho u_i) + \frac{\partial}{\partial x_j}(\rho u_j u_i) = -\frac{\partial P}{\partial x_i} + \frac{\partial}{\partial x_j} \left(\tau_{ij} + \rho \overline{u'_j u'_i} \right) + S_{ui} \quad (7)$$

where the convention that any variable without a superscript is a mean flow variable. The term $\rho \overline{u'_j u'_i}$ which appears in the momentum equations is identified as a turbulent Reynolds stress. The turbulence model used in this work really on the Boussinesq's approximation for compressible fluid as:

$$\rho \overline{u'_j u'_i} = \mu_t \left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right) - \frac{2}{3} \left(\mu_t \frac{\partial u_i}{\partial x_i} + \rho k \right) \delta_{ij} \quad (8)$$

The turbulent viscosity is μ_t and k is turbulent kinetic energy, defined by:

$$k = \frac{\overline{u'_j u'_i}}{2} \quad (9)$$

The turbulent viscosity μ_t is modeled as a product of a turbulent velocity scale, V_b , and a turbulent length scale l_t , as a proposed by Prandtl and Kolmogorov. Introducing proportionally constant:

$$\mu_t = \rho c_\mu l_t V_b \quad (10)$$

Both one and two equation models take the velocity scale V_b , to be the square root of the turbulent kinetics energy:

$$V_b = \sqrt{k} \quad (11)$$

The turbulent kinetics energy k is determined from solution of a semi-empirical transport equation. In the standard k - ε , two equation model it is assumed that the length scale is a dissipation length scale, and when the turbulent scales are isotropic, Kolmogorov determined that

$$\varepsilon, \text{ is the turbulent dissipation rate: } \varepsilon = \frac{k^{2/3}}{l_t} \quad (12)$$

In many CFD software packages k - ε turbulence model has been implemented and has a well-established

regime of prediction capability. The standard implementation of the $k-\varepsilon$ turbulence model employs wall functions to model the viscous near-wall layer. The wall functions approach eliminates the necessary of numerical resolving the large gradients in the thin near-wall region, thus conserving variable computer recourses.

3. METHOD

As a solver in this work CFX-TASCFlow is used. The code for solving equations for ideal gas used conservative forms of Navier-Stokes Equations and $k-\varepsilon$ turbulence model. A part of solver strategy used in TASCFlow is multigrid methods. The particular variant used in TASCFlow is based on conservation principles already implicit in the Finite Volume discretization and is called Additive Correction Multigrid. The linearized discrete algebraic equations that arise from most finite volume methods are sufficiently diagonally dominant to permit solution by simple relaxation methods, such as Gauss Seidel.

The Finite Volume method proceeds by integrating these equations over a fixed control volume, which, using Gauss's Theorem, results in [9],

$$\frac{\partial}{\partial t} \left(\int_v \rho dv \right) + \int_s \rho u_j dn_j = 0 \quad (13)$$

$$\frac{\partial}{\partial t} \left(\int_v \rho u_j dv \right) + \int_s \rho u_j u_i dn_j = - \int_s P dn_i + \int_s \mu_{eff} \left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right) dn_j + \int_v S_{u_j} dv \quad (14)$$

$$\frac{\partial}{\partial t} \left(\int_v \rho \phi dv \right) + \int_s \rho u_j \phi dn_j = \int_s \Gamma_{eff} \left(\frac{\partial \phi}{\partial x_j} \right) dn_j + \int_v S_\phi dv \quad (15)$$

where "v" and "s" denote volume and surface integrals respectively, and dn_j are the differential Cartesian components of the outward normal surface vector. The surface integrals are integrations of the fluxes of the conserved quantities, whereas the volume integrals represent source terms or accumulation terms.

The source term in the model k transport equation, can be integrated over a control volume to give:

$$\iiint_{\Delta V} S^k dV \approx \Delta V \left(P_k - \rho \varepsilon + \rho \beta \frac{\mu_t}{Pr_t} \left(g_j \frac{\partial T}{\partial x_j} \right) \right) \quad (16)$$

where $\rho \varepsilon$, P_k and k are respectively, the dissipation rate, production and turbulent kinetics energy for particular control volume.

The compressible turbulent kinetics energy production term is evaluated in TASCFlow 3D in several stages. The first standard production term is calculated as:

$$P_k = \mu_t \left(\frac{\partial \bar{u}_i}{\partial x_j} + \frac{\partial \bar{u}_j}{\partial x_i} \right) \frac{\partial \bar{u}_i}{\partial x_j} = \frac{\tau_{ij}^t{}^2}{2\mu_t} \quad (17)$$

where

$$\tau_{ij}^t = -\mu_t \left(\frac{\partial \bar{u}_i}{\partial x_j} + \frac{\partial \bar{u}_j}{\partial x_i} \right) \quad (18)$$

The velocity divergence squared contribution is subtracted from the standard production term and then the production term is clipped to zero. This contribution is only removed when the high-speed model options have been invoked.

$$P_k = P_k - \frac{2}{3} \left(f_{pk} \mu_t \frac{\partial \bar{u}_i}{\partial x_i} \right) \frac{\partial \bar{u}_k}{\partial x_k} \quad (19)$$

where $f_{pk} = 3.0$, by default for high-speed modelling improvements.

$$P_k = \max(P_k, 0) \quad (20)$$

Then the final contribution is made to production term. In general, this term could be positive or negative depending of the sign of the velocity divergence term, but through a shock this term is negative, resulting in a positive contribution to the generation of turbulent kinetics energy. The one- dimension analysis showed that this term is bounded through a shock. This contribution is clipped as well to ensure that production term is never negative.

$$P_k = P_k - \frac{2}{3} \rho k \frac{\partial \bar{u}_k}{\partial x_k} \quad (21)$$

$$P_k = \max(P_k, 0) \quad (22)$$

The source term in the model ε transport equation, can be integrated over a control volume to give:

$$\iiint_{\Delta V} \dot{S}^\varepsilon dV \approx \Delta V \left(\frac{\varepsilon}{k} \right) (c_{\varepsilon 1} P_k - c_{\varepsilon 2} \rho \varepsilon) \quad (23)$$

The same estimate for the production used in the k equation is used in the ε equation. The only task remaining is to linearize the non-linear source term, such that the k/ε , remains constant and eq.(16) will be linearized as:

$$\iiint_{\Delta V} \dot{S}^\varepsilon dV \approx \Delta V \left(\frac{\varepsilon}{k} \right)^0 (c_{\varepsilon 1} P_k - c_{\varepsilon 2} \rho \varepsilon) \quad (24)$$

Such that coefficient on ε in source term adds to the central coefficient in algebraic representation of the ε transport equation, thereby increasing the diagonal dominance of equation set.

4. RESULTS AND DISCUSSION

The numerical computations were made for two-stage turbine with the leaning stator blades are presented. Number of stator blades are 16, and number of rotor blades are 96. The angle of steam output from the stator blades is 16° .

Boundary conditions: The computations were carried out by means of the CFX-TASCFlow code. The flow was treated as compressible, and steam as an ideal gas. The $k-\varepsilon$ turbulent model was employed. The turbine rotated with standard 50 Hz frequency (3000 rpm). Total pressure over inlet $P_a=107\ 116$ Pa, inlet mass flow 3,4 kg/s; and absolute temperature 315°K .

Outlet: Static pressure constant over outlet 101 657 Pa and adiabatic wall.

From the numerical calculations one can obtain the following results:

- Visualization of the total pressure in characteristic sections, for the frozen rotor.
- Visualization of the speed in characteristic sections

Visualization of the total pressure in characteristic sections.

The total pressure distribution allows one to observe the losses in the stage. The places with lower values of the total pressure show us about the higher losses in those places. In Fig. 3 the distribution of the total pressure in a control section up and downstream, the stator blade row is shown as the rotor blades also. According to the predictions, the higher losses exist only in boundary regions, especially close to the hub in a plane downstream of the stator.

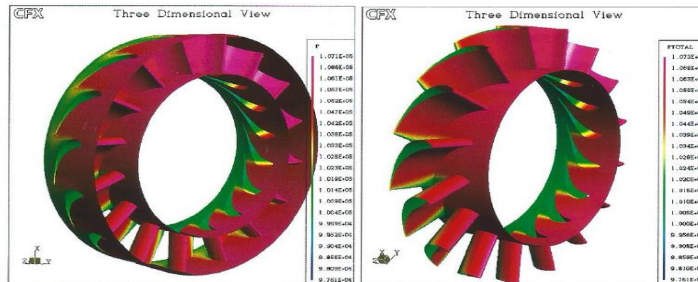


Fig. 1 Total pressure distributions in control planes up and downstream of the cascade.

In Fig.2 the distribution of the total pressure along the meridional direction is shown. It is evident that the majority of the losses are generated at the outlet where the velocities are high and secondary flows developed.

In Fig.3 The distribution of the static pressure around the blade in a 50% span is shown. This diagram points out some possibilities of the profile refining. At the inlet, there are no significant pressure differences between the pressure and suction side of the blade. The suction side of the blade can be changed to get a more significant pressure difference between two sides of blade, however these changes should not cause the separation because they result in a higher loss level.

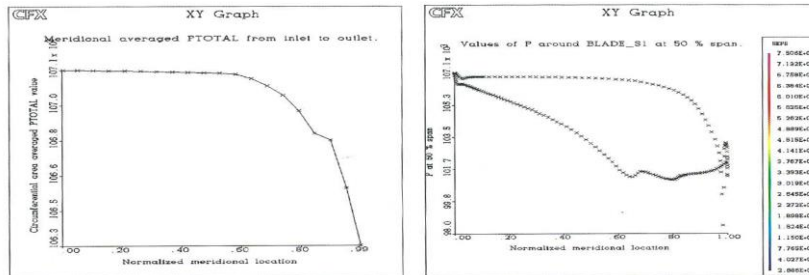


Fig. 2 The distribution of the total pressure along the meridional direction of the cascade.

Fig. 3 Graphical presentation of pressure around the blade in the middle of the blade channel (50% span).

Visualization of the speed in characteristic sections

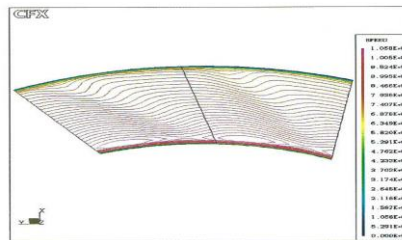


Fig. 4 Graphical presentation of the speed from the inlet to the outlet at section S1 located at stator channel in stage I.

The view of the circumferential area averaged speed along the channel from inlet to outlet is visible that speed is not the uniform, but mainly without any special deviations from the main direction.

In fig. 5 the velocity vectors most significantly at a half of the channel length, which means that is the place where the flow direction is changed.

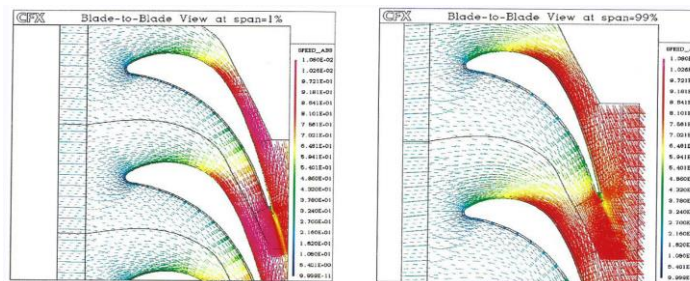


Fig. 5. Graphical presentation of the speed from the inlet to the outlet at section S1 located at a 1% and 99% of the blade height.

The distribution of the axial and radial velocities in the plane downstream of the stator are shown below. The wake tracks are clearly visible here and confirm the fact that the blades are leaned.

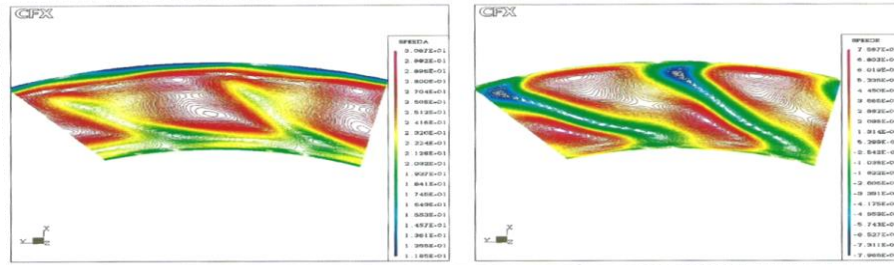


Fig. 6 Axial and radial velocity distribution in the plane downstream of the stator

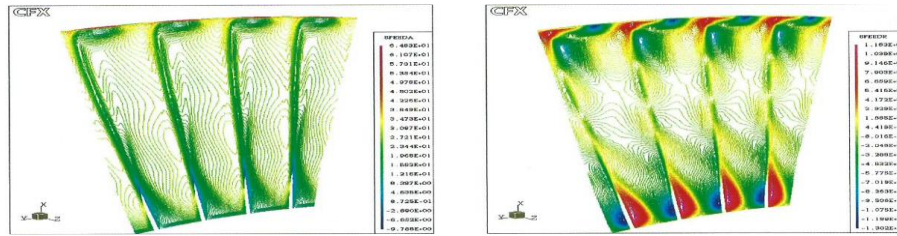


Fig. 7. Axial and radial velocity distribution in the plane downstream the rotor

In Fig 7 the distribution of the axial and radial velocities in the plane downstream of the rotor are presented. There are visible secondary flow effects observed in the regions close to the boundaries

5. CONCLUSIONS

Mathematical and numerical models have been developed in this paper, coupled with the simulation of the prediction of fluid flow parameters in steam turbine, and the classification of the influenced factors, which affect the efficiency of the work of the turbine stage and defined thermodynamics properties of the flow.

The challenge with any steam driven turbine is that the performances need to be defined before the construction phase; therefore, parameters such as pressure and velocity need considering.

From simulations that have been made we have acquired knowledge, numerically and visually about changing pressure valves and velocity. Results can contribute to the development and modification of the turbomachinery parts and definitely require reliable and accurate predictions of the main flow dynamics characteristics and the heat loads imposed on the blades.

Using CFD simulation[9] to deliver increasing efficiencies while improving reliability and reducing the cost of manufacturing. Additionally, optimisation tools that work across the various stages in the design process help to achieve performance improvements [15].

The turbomachinery industry is an ideal example where sophisticated mathematical models and numerical simulations can bring benefits as optimisation tools that work across the various stages in the design process help to achieve performance improvements. One way to contribute to the sustainability of the environment and its energy resources is in the implementation of industrial steam turbine solutions for alternative energy applications. This can be realised in an integrated beginning to end process, thanks to high-level research and development into looking at the problem of a systemic level that has resulted in superior components and performance being available at lower cost to the consumer.

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INTELLIGENT VEHICLES

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ABSTRACT: The history of intelligent vehicles has developed over the last two decades. Although the first ideas were born in the 1960s, the level of maturity of the technology at that time did not allow the pursuit of the original goal of implementing fully autonomous all-terrain, all-weather vehicles. Intelligent road vehicles cover specific aspects of intelligent vehicles such as enabling technologies, human factors and an analysis of social and economic impacts. Today the development of new technologies in transportation, respectively in the vehicles, is closely related to the problems of modern society - an increasing population increase and settling in densely built areas. Using ITS (Intelligent Transport Systems) in traffic brings significant improvement in transportation system performance, including reduced congestion and increased safety and traveler convenience. This paper presents a variety of applications and components of ITS in vehicles. These systems have until recently looked like a distant future, but today they are part of the standard equipment, making all the systems in a vehicle a unique entity which seeks to reduce travel time, traffic accidents, fuel consumption, as well as to increase the capacity of roads and driving comfort. The advantages of intelligent vehicles in the near future in the best way and the proposed model of working with intelligent electronic car materials are also presented.

KEYWORDS: Intelligent transport system, Intelligent vehicles, Traffic flow

1 INTRODUCTION

ITS is the application of sensing, analysis, control and communications technologies to ground transportation in order to improve safety, mobility and efficiency. ITS includes a wide range of applications that process and share information to ease congestion, improve traffic management, minimize environmental impact and increase the benefits of transportation to commercial users and the public in general.

Transportation systems play a critical role in virtually all facets of modern life. However, significant challenges remain in further improving their efficiency and safety and in developing related value-added applications. Opportunities to meet these challenges continuously emerge, largely owing to fast-paced developments in a broad spectrum of related engineering, communications, and information technology fields, including pervasive computing. The current generation of vehicles is already equipped with many different kinds of sensors, CPUs, software systems, and communication capacities. In the next few years, active in and out vehicle environment sensing will become standard, enabling intelligent driver and passenger assistance and increasing driving safety, efficiency, and comfort. Eventually, road infrastructures will also significantly change to provide better sensing solutions (among other benefits), but this will take more time. Fortunately, several technologies already exist that can give vehicles additional information for safer operations and better performance [7].

IT (Information Technology) has transformed many industries, from education to healthcare to government, and is now in the early stages of transforming transportation systems. Whilst many think improving a country's transportation system solely means building new roads or repairing aging infrastructures, the future of transportation lies not only in concrete and steel, but also increasingly in using IT. IT enables elements within the transportation system-vehicles, roads, traffic lights, message signs, etc. to become intelligent by embedding them with microchips and sensors and empowering them to communicate with each other through wireless technologies. In the leading nations in the world, ITS brings significant improvement in transportation system performance, including reduced congestion and increased safety and traveler convenience.

As [Fig. 1](#) illustrates, there are three key facets to the provision of real-time traffic information: collection, processing, and dissemination, with each step entailing a distinct set of technology devices, platforms, and factors, both public and private [1].

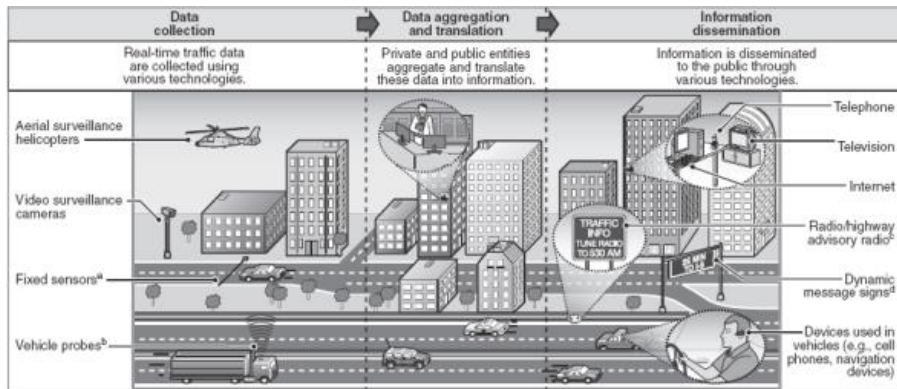


Fig. 1.

Associated with Real-Time Traffic Information Systems

Technologies

Intelligent transportation systems include a wide and growing suite of technologies and applications. ITS applications can be grouped within five summary categories:

1. Advanced Traveler Information Systems provide drivers with real-time information, such as transit routes and schedules; navigation directions; and information about delays due to congestion, accidents, weather conditions, or road repair work.
2. Advanced Transportation Management Systems include traffic control devices, such as traffic signals, ramp meters, variable message signs, and traffic operations centers.
3. ITS-Enabled Transportation Pricing Systems include systems such as electronic toll collection (ETC), congestion pricing, fee-based express (HOT) lanes, and vehicle miles traveled (VMT) usage-based fee systems.
4. Advanced Public Transportation Systems, for example, allow trains and buses to report their position so passengers can be informed of their real-time status (arrival and departure information).
5. Fully integrated intelligent transportation systems, such as vehicle-to-infrastructure (VII) and vehicle-to-vehicle (V2V) integration, enable communication among assets in the transportation system, for example, from vehicles to roadside sensors, traffic lights, and other vehicles.

2 APPLICATIONS IN VEHICLES

2.1 Adaptive Cruise Control - ACC

The limitations of conventional cruise control systems are overcome by Adaptive Cruise Control (ACC). If the vehicle catches up with a preceding vehicle, ACC reduces engine throttle and (if necessary) applies braking force to maintain a safe distance as preset by the driver. Even in dense traffic and with other vehicles crossing or joining their lane at various speeds, the driver is relieved from frequent manual intervention. Above all, Adaptive Cruise Control reduces the strain on the driver. Because ACC maintains a safe distance to the vehicle immediately ahead, the driving is much more relaxed, with reduced symptoms of fatigue. ACC includes a Forward Collision Warning (FCW) function to alert the driver if manual intervention is required. A radar sensor behind the grille detects objects ahead of the vehicle and checks their relative speed and distance. Three radar beams together with an integrated yaw rate sensor enable the system to differentiate between vehicles in the same lane and those in other lanes [3]. The driver sets a desired cruise speed and following distance to a vehicle ahead, shown in [Fig. 2](#).

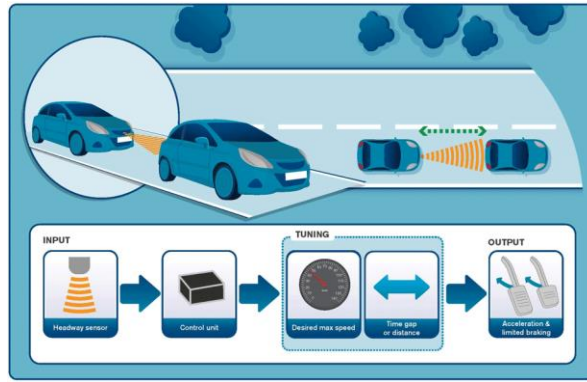


Fig. 2. Adaptive Cruise Control (ACC)

Adaptive Cruise Control (ACC) is one of the most advanced ITS applications with the highest degree of autonomy and is designed to improve safety, driving comfort and traffic flow efficiency. Therefore, an adaptive cruise control is the most important ITS application, with which, in conjunction with other applications, autonomous vehicles will be based on in the future. ACC takes over a part of the driving task of the driver of the car. This means that it influences the behavior of the driver, but also the impact of the car on traffic flows and safety. An increasing number of car models currently on the road is equipped with Adaptive Cruise Control systems.

2.2 Lane Departure Warning System - LDWS

The Lane Departure Warning System (LDWS) is intended to prevent inadvertent lane changes and roadway departure accidents by alerting the driver if a crossing of the lane markings at either side is imminent. LDWS is based on machine vision technology. A camera behind the windscreen is used to track the vehicle's position relative to the lane markings. If the vehicle is about to leave its lane at the right-hand or left-hand side, the radio is muted and a distinctive rumble strip sound is given from a speaker at the corresponding side to alert the driver to steer away from that side. Nuisance warnings are prevented by system logic to recognize intentional lane changes.

To reduce crashes caused by unintentional lane departures, lane departure warning systems (LDWS) monitor the position of a vehicle within a roadway lane and warn a driver if the vehicle deviates or is about to deviate outside the lane, shown in [Fig. 3](#). LDWS can help prevent single vehicle roadway departure, lane change/merge, and rollover crashes involving large trucks. To help avoid single vehicle roadway departures, LDWS issue a warning as the truck crosses the shoulder lane marking. Without the system, the truck might be driven off the shoulder and crash into off-road obstacles (e.g., light poles, signs, guardrails, trees, and stopped vehicles) or roll over [4].

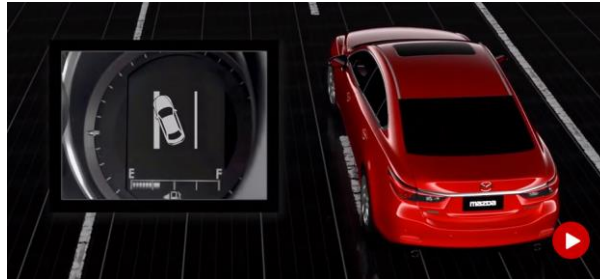


Fig. 3. Lane Departure Warning System (LDWS)

In unintentional lane change/merge situations, LDWS issue a warning as the truck crosses center lane markings.

Other potential benefits from the use of LDWS include:

- Assisting the driver in consistently keeping a vehicle in the lane, thereby reducing lane-departure crashes.
- Encouraging the driver to use turn signals when changing lanes (otherwise, a lane departure warning sounds).
- Reinforcing driver awareness of vehicle position in the lane to maintain a more central lane position and improve the driver's attentiveness to the driving task.

2.3 Traffic Sign Recognition - TSR

Traffic-sign recognition is a technology by which a vehicle is able to recognize the [traffic signs](#) put on the road. Traffic sign recognition (TSR) can be considered part of the bigger problem of autonomous vehicles. An autonomous vehicle system relies on vision-based recognition of the surrounding area in order to make driving decisions. This vision-based recognition system functions as the feedback provider for control of the steering wheel, accelerator, brake, and needs to:

- Recognize road and lane to allow the control system to follow the course of driving.
- Detect obstacles on the road.
- Detect the passing vehicles (e.g. by side or back cameras) to notify the control system about probable hazards.
- Detect and interpret the traffic signs to provide feedback for safe driving.

This system uses a VGA camera for detection of traffic characteristics (speed limit, ban overturns, etc. and can register signaling based on LED technology), and after detection compares it with the database it receives from satellite navigation maps. The system works to a speed of 250 km/h, and can detect signs at a horizontal distance of 10m and vertical distance of 7m.



Fig. 4. Traffic-sign recognition (TSR)

Traffic signs provide important information for drivers about road condition and hazards ([Fig. 4](#)). Their shape and colors make them easily recognizable by humans. The same factors can help development of a vision based TSR system. Beside the application of TSR in autonomous vehicles, it can also serve as an assistant driver (e.g. when combined with speedometer output) to notify the driver about approaching a traffic sign (e.g. even before driver sees it) or his dangerous behavior (like driving above the speed limit).

2.4 Vehicle to Vehicle (V2V)

V2V is a crash avoidance technology, which relies on communication of information between nearby vehicles to potentially warn drivers about dangerous situations that could lead to a crash. V2V could help warn a driver that a vehicle up ahead is braking and they need to slow down, or let a driver know that it's not safe to proceed through an intersection because another car (yet unseen by the driver) is quickly approaching.

V2V communications systems are composed of devices, installed in vehicles that use dedicated short-range radio communication (DSRC) to exchange messages containing vehicle information (e.g., vehicle speed, direction, braking status). V2V devices use this information from other vehicles and determine if a warning to the vehicle's driver is needed, which could prevent a vehicle crash ([Fig. 5](#)).

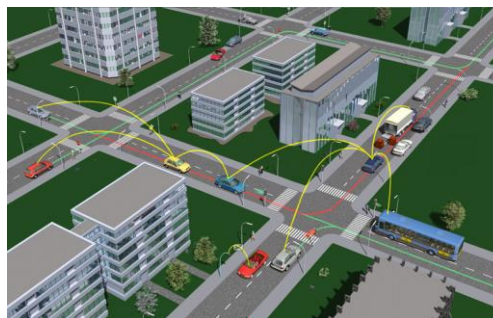


Fig. 5. Vehicle to Vehicle

Vehicle-to-vehicle (V2V) communications are comprised of a wireless network where automobiles send messages to each other with information about what they're doing. This data will include speed, location, direction of travel, braking, and loss of stability. Vehicle-to-vehicle technology uses dedicated short-range communications (DSRC), a standard set forth by bodies like FCC and ISO. Sometimes it's described as being a Wi-Fi network because one of the possible frequencies is 5.9GHz, which is used by Wi-Fi, but it's more accurate to say "Wi-Fi-like." The range is up to 300 meters, 1000 feet, or about 10 seconds at highway speeds. V2V would be a mesh network, meaning every node (car, smart traffic signal, etc.) could send, capture and

retransmit signals [5]. Five to 10 hops on the network would gather traffic conditions a 1600 meters ahead. That's enough time for even the most distracted driver to take his foot off the accelerator. Additionally, V2V technology can also be combined with existing radar and cameras to provide even greater benefits than utilizing them alone. This combined approach could also augment system accuracy, becoming a foundation for realizing automated vehicles on the roadways.

3. MATHEMATICAL MODELS OF AUTOMATIC CONTROL OF INTELLIGENT VEHICLES

The first step in the design of automatic controllers for moving vehicles is to develop the appropriate mathematical models for vehicles' longitudinal and lateral dynamics. The empirical vehicle longitudinal dynamics model, obtained using a system identification technique, was developed by Takasaki and Fenton (1977). For such a model, a digital observer/controller was designed by Hauksdottir and Fenton (1985). Longitudinal dynamics of a platoon of no identical vehicles was considered by Sheikholeslam and Desoer (1992). A control law is designed in the same paper that shows it is possible to keep vehicles within the platoon approximately equally spaced even at high speeds. According to Shladover (1991), technical issues needed to be resolved in the design of automated highway controllers, such as process and measurement noise, sampling and quantization, acceleration and jerk limits. These have been outlined, clarified, and studied.

According to Chien et al (1997) a discrete time model of a traffic flow of computer driven vehicles is developed and a roadway controller that eliminates traffic congestion is proposed. The controller for the obtained nonlinear model is realized using the integrator back-stepping technique such that the actual traffic density converges exponentially to the desired one. The similar problem is solved by Alvarez et al (1999) using vehicle conservation flow models and the Lyapunov stability theory. For the desired vehicular density and velocity profiles stabilizing velocity controllers are obtained. Another version of constant spacing strategies for platooning in automated highway systems has been presented by Swaroop and Hedrick (1999).

A computer-controlled brake system has been studied by Raza et al (1997). A PI controller is used in the feedback loop such that the zero-steady state error and no overshoot are achieved for the step input. The efficiency of the controller is demonstrated on the brake system of a Lincoln town car.

The kinematic model of a moving vehicle is derived by Murray and Sastry (1993) as follows [2]:

$$\begin{aligned} \frac{dx(t)}{dt} &= u_1(t) \cos(\theta(t)) & \frac{dy(t)}{dt} &= u_1(t) \sin(\theta(t)) \\ \frac{d\theta(t)}{dt} &= \frac{1}{d} u_1(t) \tan(\phi(t)) & \frac{d\phi(t)}{dt} &= u_2(t) \end{aligned} \quad (1)$$

where $x(t)$ and $y(t)$ are position coordinates, $u_1(t)$ is the velocity of the rear wheels, $u_2(t)$ is the velocity of the steering wheel, and d is the distance between the front and rear wheels, $\theta(t)$ is the vehicle's angle with respect to $x(t)$ coordinates, and $\phi(t)$ is the angle between the front wheels and the car's direction. In some applications $u_2(t)$ is constant so that the last equation can be eliminated. Using the above kinematic model (with $u_2(t)$ constant) by Sugisaka et al (1998) a fuzzy logic controller is developed such that a moving vehicle is able to search for an object in space and recognize a stimulant traffic signal [2, 8].

The vehicle following control law that includes actuator delays has been proposed by Huang and Ren (1997). The paper derives the upper bound on the time delay that guarantees stability of the individual vehicle. The vehicle position $x_i(t)$ and velocity $v_i(t)$ are modelled by [2]:

$$\frac{dx_i(t)}{dt} = v_i(t) \quad \frac{dv_i(t)}{dt} = k_i [T_{ii}(t - \tau_i) - T_{Li}] \quad (2)$$

where $T_{ii}(t)$ is the throttle input, $T_{Li}(t)$ is the load torque, τ_i is the actuator's time delay, and k_i is a constant that depends on gear ratio, effective tire radius, and effective rotational inertia of the engine. The dynamics of the spacing error $\delta_i(t)$ is modelled by [2]:

$$\frac{d\delta_i(t)}{dt} = x_{i-1}(t) - x_i(t) - H_i \quad (3)$$

According to Zhang et al (1999) a mathematical model of an intelligent cruise control that mimics human driving behavior is developed. An intelligent cruise controller is developed that uses information about distances from both the vehicle in front and the vehicle behind. According to Ioannou and Chien (1993) such a controller is developed

using only information about the distance from the vehicle in front. The controller of Zhang *et al* (1999) guarantees both stability of the individual vehicle and the stability of the platoon of vehicles under the constant spacing policy.

Byrne *et al* (1998) have considered robust lateral control of highway vehicles. The proposed controller guarantees stability over a broad range of parameter changes.

Statistical learning automation theory has been used for the vehicle path following an automated highway system used by Unsal *et al* (1999). An intelligent neural network-based driver warning system for vehicle collision avoidance was presented by An and Harris (1996). Fritz (1996) proposed a neural speed controller that uses throttle and brake inputs. Road tests on an experimental Daimler Benz vehicle showed that such a controller performs well for both low and high speeds. An automatic road following the fuzzy controller of a vehicle's lateral motion has been considered by Blochl and Tsinas (1994) [2, 8]. A computer-controlled camera provides data about the vehicle's position.

Adaptive control is a promising technique that can be used to solve some of the problems that appear in the automatic control of highways and moving vehicles. An adaptive cruise control system was developed by Holzmann *et al* (1997) that adjusts the vehicle's velocity depending on the distance from adjacent vehicles. In the adaptation level, using recursive parameter estimation, all changes in vehicle parameters are obtained on-line. In the automation level, in the lower layer feedforward and feedback linearization together with a PI controller are used. The upper automation layer is based on a fuzzy logic controller. The same paper also describes a technique for supervision of lateral vehicle dynamics. Load-adaptive real time algorithms based on imprecise computations are used for identification of a mathematical model of a convoy of vehicles that is described by a system of fourteen nonlinear differential equations (Pfefferl and Farber, 1998). A corresponding linear discrete-time controller is also proposed.

According to Ishida *et al* (1992) a self-tuning based automatic cruise controller with a time delay was proposed. A model reference adaptive control technique was used by (Bakhtiari-Nejad and Karami-Mohammadi 1998) for the vibration control of vehicles with elastic bodies. A nonlinear PID controller with gain scheduling has been used by (Raza and Ioannou, 1996) for the engine's throttle control. This controller was simultaneously used with the brake controller, designed through a feedback linearization technique, for automated longitudinal vehicle control. The corresponding feedback block diagram and the system dynamics equations are given in the paper. Active noise and vibrations in moving vehicles have been considerably reduced via the use of a generalized predictive controller by (Shoureshi and Knurek 1996) [2, 8]. This is particularly important for lighter vehicles that are susceptible to noise and vibrations.

4 BENEFITS OF INTELLIGENT VEHICLES

Having intelligent vehicles running on our road network would bring a number of social, environmental, and economical benefits. An intelligent vehicle able to assess the driving scenario and react in the event of danger would allow up to 90% of traffic accidents that are caused by human errors to be eliminated, therefore saving human lives. According to the World Health Organization an estimated 1.2 million people worldwide are killed each year, and about forty times this number injured, due to traffic accidents.

At the same time, vehicles able to drive at high speeds and very close to each other would decrease fuel consumption and polluting emissions. Furthermore, they would also increase road network capacity. Vehicles communicating with a ground station could share their routes and be instructed to reroute in order to maintain a smooth traffic flow. Vehicles that can sense and obey speed limits or traffic rules would reduce the possibility of misinterpretation and antisocial driving behavior.

Fully automatic vehicles would also offer a higher degree and quality of mobility to a larger population, including young, old, or infirm individuals, reducing the need even for a driving license. Finally, the availability of vehicles that could drive themselves would increase the quality of mobility for everyone, turning personal vehicles into taxis able to pick up people and take them to their final destination in total safety and comfort, dedicating the driving time to their preferred activities.

However, this full application of intelligent vehicles is far from being complete, since unmanned vehicle technology is still under development for many other applications. The automation of road vehicles is perhaps the most common everyday task that attracts the greatest interest from the industry. However, other domains such as agricultural, mining, construction, search and rescue, and other dangerous industries in general, are looking to autonomous vehicles as a possible solution to the issue of the ever-increasing cost of personnel. If a vehicle could move autonomously on a field to seed, or enter a minefield, or even perform dangerous missions, the number of individuals put at risk would drastically decrease and at the same time the efficiency of the vehicle itself would be increased thanks to a 24/7 operational schedule. The key challenge for intelligent vehicles is safety; accidents must not occur due to automation errors and there is zero tolerance to human injury and death.

5 CONCLUSIONS

The presented applications will have a great impact on improving safety and comfort in driving. Until 10 years ago, they were very rare, whilst today they are many of them that are fitted as standard. That is a good prerequisite for the integration of existing systems i.e. transition to a higher level, and the aim of the manufacturer. These systems are the beginning of autonomous vehicles. Vehicles with varying degrees of autonomy in the future will be able in addition to provide comfort, improve the efficiency of traffic flow by securing the uniform movement of all vehicles. This will allow for a drastic reduction in the clearance distance, i.e. increasing the capacity of the existing infrastructure. Uniform vehicle movement as well as the possibilities for the computer to adjust to the parameters of the movement of other vehicles will also provide significant savings in fuel consumption. It will also reduce harmful effects on the environment, increase safety and improve traffic flow, whilst reducing the mistakes made by drivers which today are a significant cause of traffic accidents.

The intelligent vehicle, as the key technology of intelligent transportation system, is one of the numerous high-tech integrated carriers. It is a general term that refers to a comprehensive vehicle technology to complete one or many driving tasks entirely or partially. The main functions are to drive along the regulated road accurately and maintain the right lane position. To keep a safe distance between the cars and to adjust the speed according to the traffic conditions and road characteristics. To change lanes and overtake automatically to avoid collision and rear-end accidents. To park the car safely on urban roads and to let the driver assistant system find the best route to the destination using an intelligent traffic network environment. Its existence is a necessity of the development of vehicle technology and the people's urgent demand for traffic safety.

The general public will become increasingly accustomed to intelligent systems; sensors and communications on vehicles. The only showstopper in the large-scale deployment of robotics technologies in the automobile field is the ability of the industry to deliver the technologies with total safety, which focus attention on the problems of failsafe systems and their certification.

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Performance analysis of parallel and sequential Sorting Algorithms – Comparative study and implementation on different hardware platforms

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ABSTRACT: Sorting data is common problem in computer science especially when voluminous of data are in expression to be sorted. The sorting techniques and algorithms have evolved within the time to the level that researchers now are focused more in hardware capacity rather than in methodology of sorting. In this paper we have described the comparison aspect of parallel and sequential sorting algorithms. In this research we have employed comparison methodology between sequential and parallel algorithms. Nowadays graphics cards are coming with parallel architecture, this way GPU is providing new opportunities to use parallelism and speed up the execution time. In our case study we have treated Odd-EvenMerge Sort and Parallel Odd-Even MergeSort algorithms with same solving nature implemented in Central Processing Unit (CPU) and Graphical Processing Unit (GPU). The execution time is measured for multiple test cases with random generated numbers. Referring to the results we notice that parallel implementation is more effective in time execution for amount number of elements, rather than this, a sequential algorithm can be more optimal if it is used for small number of elements.

KEYWORDS: Parallel programming, GPU, CPU, Odd Even Merge Sort, CUDA

1 INTRODUCTION

Sorting algorithms have received attention in the past decades for the wide appliance and importance of sorting data. The time issue is a significant reason which pushes the researcher to pay attention on finding other ways and methods of solving the sorting problems. A commonly solution for this is to implement parallelism (parallel computation). This is an attainment to computational methods work in modality of parallel without indicating the results. For this reason nowadays some of sorting algorithms are evolved from sequential to parallel modality. In this paper, a theoretical review and practical implementations are done with aim of comparisons between time complexity and runtime execution of sequential and parallel algorithms with same solving nature. The well-known sorting network algorithm Odd – Even Merge sort it is implemented in a parallel and sequential approach. There are lot of algorithms which can be expressed in sequential and parallel and have the same solving nature. Both sorting algorithms sequential and parallel have the same logical flow and are algorithms based on value comparisons. Either than sequential implementation which implementation is done in one CPU with at least one core, the parallel algorithms need to have appropriate technology and methodology. The parallel approach is dividing the problem into a sub-problems and their execution in a line bring the expected result. In order to implement parallel algorithms it is required to have a multi CPU processing machine or supported specific additional hardware like FPGA or Graphical processing device (GPU).

GPU is massively multi – thread processor which can support huge number of concurrent threads [2]. Current NVIDIA GPUs are many-core chips built around an array of parallel processors [3]. In this paper, the test case experiments are executed in machine with GPU card supporting API programming interface CUDA.

CUDA stand for Compute Unified Device Architecture and is developed from NVIDIA with initiative to bring general-purpose computation to NVIDIA graphics processor.

CUDA is an API that is using device resources for computational purposes. It consists of a compiler for a C-based language and high performance numerical libraries[1]. CUDA creates kernels that can be executed in GPU. The main idea by NVIDIA was to use GPU computation resources not only to refresh the graphical display but to use the resources in making other computational operation like arithmetical and so. CUDA is an API (Application Programming Interface) which communicate end create kernels that can be executed in device.

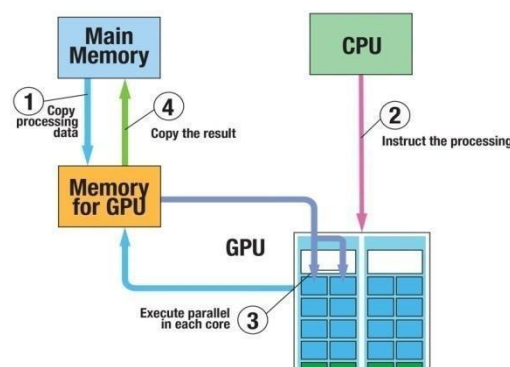


Fig. 1 Processing Flow in CUDA

2 THEORETICAL DEFINITION OF ODD-MERGE SORT

The odd – even merge sort algorithm was developed by K.E. Batcher [6]. Odd-even merge sort is an algorithm that is based on sorting and merging techniques. This algorithm is a kind of networks sorting algorithm that means for sorting n elements, n comparator stages are required [7]. In each stage in altering order i change value in odd and even to go through all elements. The Odd-Even merge sort algorithm consists of sorting larger arrays using the merge operation. The complexity of algorithm is depending on number of operation. The total number of operation $O(\log^2(n))$.

Let A and B be two sorted sequences, $A = [a_0, \dots, a_{n-1}]$ and $B = [b_0, \dots, b_{n-1}]$. Algorithms defines “odd” and “even” phase $E(A) = [a_0, a_2, \dots, a_{n-2}]$ $O(A) = [a_1, a_3, \dots, a_{n-1}]$ and similarity for B sequence. Let A and B be two sorted sequence. To create one sequence from those two sorted sequences need to merge sequence A and B , we call $Merge(A, B)$ and return merged sequence.

Algorithm:

- 1.
- 2.
- 3.

$$ThenMerge(A, B) = [c_0, d_0, c_1, d_1, \dots, c_{n-1}, d_{n-1}]$$

Let be two sorted sequences: $x_0 \leq x_1 \dots \leq x_{m-1}$ and $y_0 \leq y_1 \dots \leq y_{m'-1}$. In the case when m and m' have only one element there is only one compare – exchange operation. In case when m and m' have more than 1 elements then algorithms merge two sequences as follow:

$$x_0, x_2, \dots, x_{\lfloor \frac{m}{2} \rfloor - 2} \text{ and } y_0, y_2, \dots, y_{\lfloor \frac{m'}{2} \rfloor - 2} \text{ in } v_0, v_1, \dots, v_{\lfloor \frac{m}{2} \rfloor + \lfloor \frac{m'}{2} \rfloor - 1}$$

$x_1, x_2, \dots, x_{2^{\lfloor \frac{m}{2} \rfloor - 1}}$ and $y_1, y_2, \dots, y_{2^{\lfloor \frac{m}{2} \rfloor - 1}}$ in $w_0, w_1, \dots, w_{\lfloor \frac{m}{2} \rfloor + \lfloor \frac{m}{2} \rfloor - 1}$

In compare – exchange operation of $w_0: v_1, w_1: v_2, \dots$ we get a sorted sequence $v_0 w_0 v_1 w_1 v_2 w_2$.

Odd –Even merge algorithms sort sequences (m, m) with time complexity:

$$C(m) = 2C\left(\frac{m}{2}\right) + m - 1 = (m - 1) + 2\left(\frac{m}{2} - 1\right) + 4\left(\frac{m}{4} - 1\right) + \dots = m \log_2 m + 1$$

$$D(m) = D\left(\frac{m}{2}\right) + 1 = \log_2 m + 1$$

$$C \times D = \theta(m \log^2 m)$$

3 PARALLEL ODD-EVEN MERGE-SORT

Odd – Even Merge algorithms can be implemented in parallel platforms where number of processors is less than number of elements. Consider p number of processors. The array elements will be distributed in n/p elements for each processor. The comparison and sorting will need $\log p$ stages. The time complexity of merge operation using p processors is $\Theta\left(\frac{m}{p} \log p\right)$ [8].

Let take sequences: $x_1, x_2, \dots, x_{n/p}$, in processor P_1, P_2, \dots, P_p and $y_1, y_2, \dots, y_{n/p}$, in processor P_1, P_2, \dots, P_p

```

procedure Odd_Even_Merge(p);
for all  $0 \leq i < \frac{p}{2}$  parallel do
  compare-exchange ( $P_{2i}, P_{2i+1}$ );
for  $i = \log p - 1$  downto 1 do
  for all  $j, 1 \leq j \leq \frac{p-2^i}{2}$ , parallel do
  compare-exchange ( $P_{2j-1}, P_{2j+2^i-2}$ );

```

Each processor holds more than one element. Sequences are divided through p processors in such way that sequence A will be distributed in even indexed processors and sequence B will be distributed in odd indexed processors.

4 IMPLEMENTATION IN CUDA

Since the algorithm can be expressed in parallel form, this means that this algorithm can be implemented in parallel solution in GPU systems. Implementation of odd even algorithms in Cuda begins by reserving array space in shared memory. The array, it is initialized in host (CPU) and it is fulfilled with random elements. Initialized array is copied from CPU in GPU by using *cudaMemcpy* function (Cuda Memory Copy), and elements references are copied in GPU. Cuda operates with blocks and threads, therefore the number of blocks and threads are determined from number of sequences which are in sorting process. Our hardware device offer 512 thread in one blocks, if consider array length with 1024 elements the only one block it is required where one thread will treat two elements. In experimental case with 256 threads and 1024 elements there are required two blocks with 256 threads to sort the elements. Threads within the block are performing in parallel with 32

threads in group known as *warp*. Algorithm divides the size of array in parallel subsequences with proportional size 2^n for any n . For array length 1024 elements splitting starts with 32 sequences where each sequence contains 32 elements, and continuous up to 1 sequence with 1024 elements.

5 PRACTCAL EXPERIMENTS

For practical experiments this purpose we use NVIDIA Graphic card device 310M supporting CUDA with 512 threads per block for implementation of parallel algorithm and Central processing unit dual core processor for implementation of sequential algorithm.

Methodology of experimentation – Sorting algorithms can be compared with each other based on runtime execution, thereby in our study we have an algorithms adopted in two approaches (Parallel and sequential). That is an opportunity to measure runtime execution of these algorithms. Algorithms are executed in variety array length consisting to variety execution time expressed in milliseconds.

Table 1.Runtime execution of Parallel Odd-Even Merge sort

<i>Array Length</i>	<i>Time (ms)</i>	<i>Array Length</i>	<i>Time(ms)</i>
16	0.006	8192	3.42
32	0.018	16384	7.35
64	0.019	32768	16.31
128	0.02	65536	35.58
256	0.035	131072	78.71
512	0.04	262144	176.31
1024	0.06	524288	396.73
2048	1	1048576	855.12
4096	2.17	-----	-----

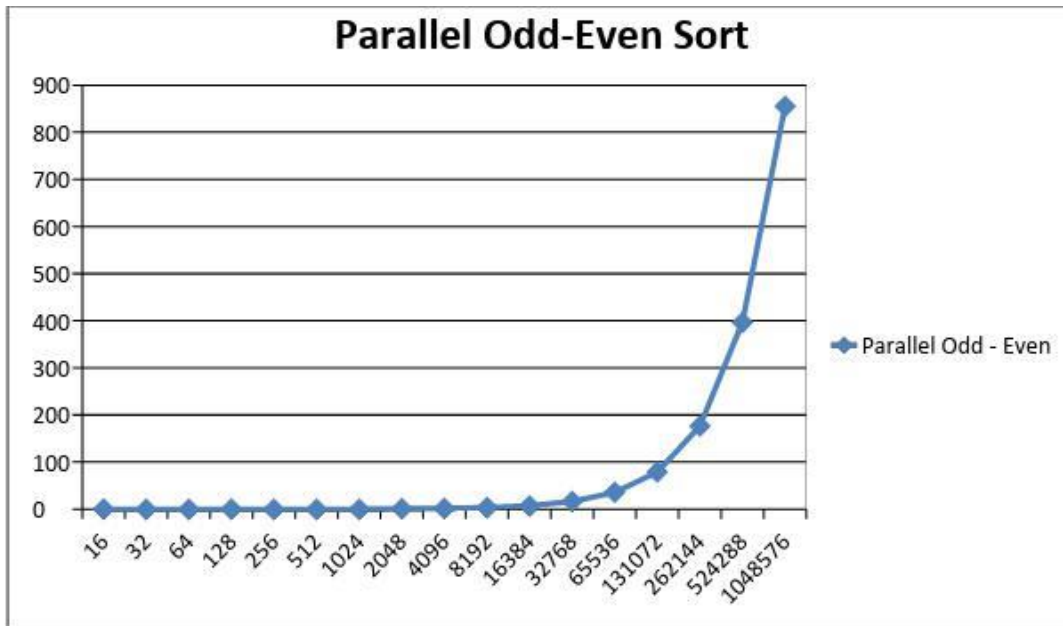


Fig. 2 Odd-Even Merge Sort: Range 16-1048576

Table 2. Runtime execution of sequential Odd-Even Sort

<i>Array Length</i>	<i>Time (ms)</i>	<i>Array Length</i>	<i>Time(ms)</i>
16	0.002	2048	33.608
32	0.008	4096	137.427
64	0.031	8192	535.050
128	0.126	16384	2086.081
256	0.494	32768	5897.414
512	1.980	65536	23836.791
1024	8.256	131072	55033.027

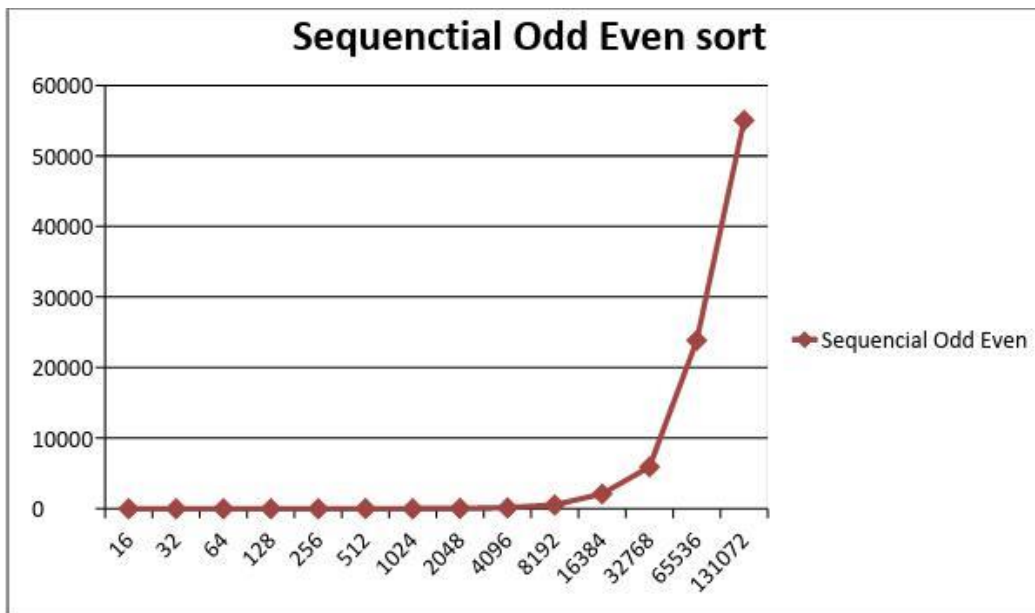


Figure 3. Sequential Odd Even Sort: Range 16-131072

Different fragmentation of runtime execution based on array length.

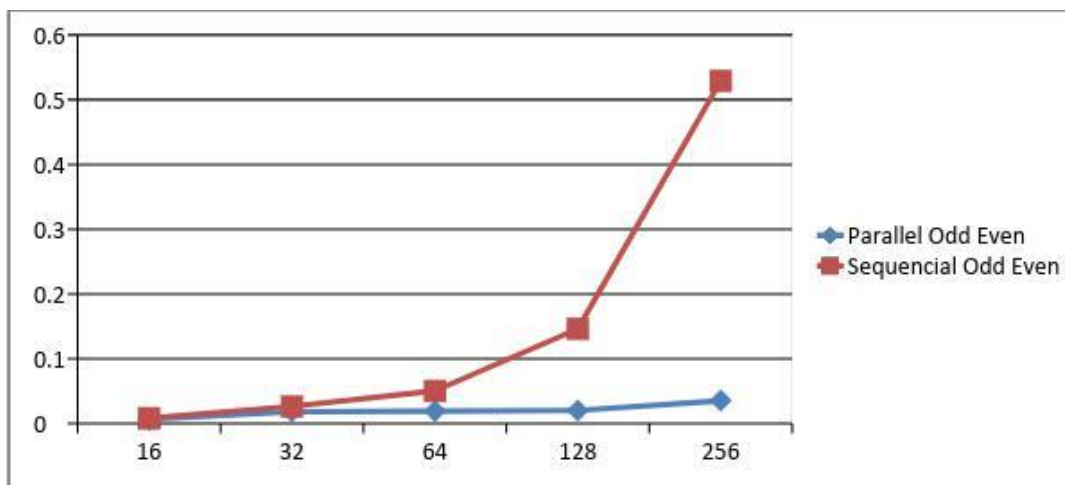


Figure 4. Array length range: 16 - 256

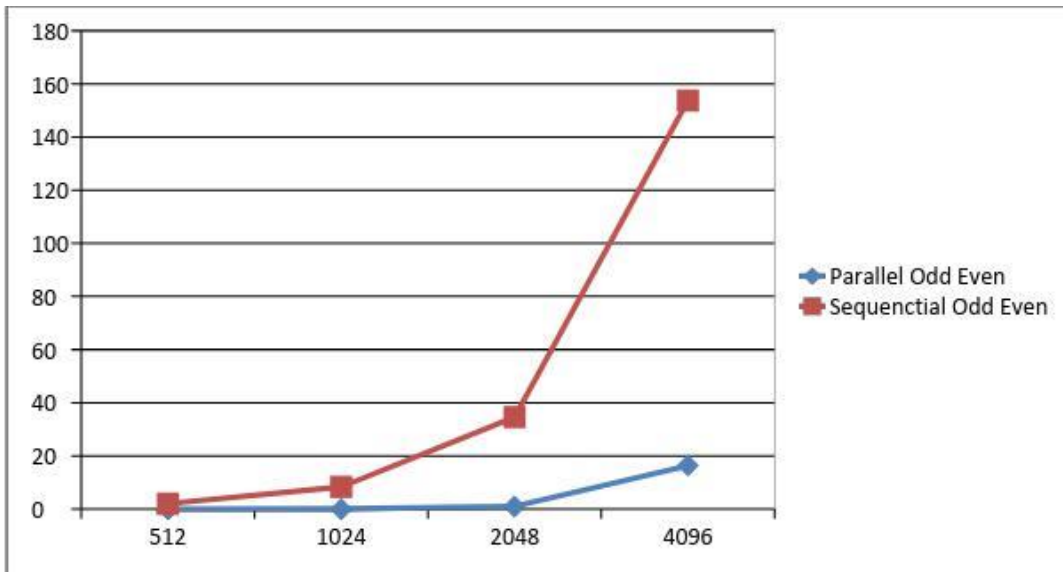


Figure 5. Array length range: 512 - 4096

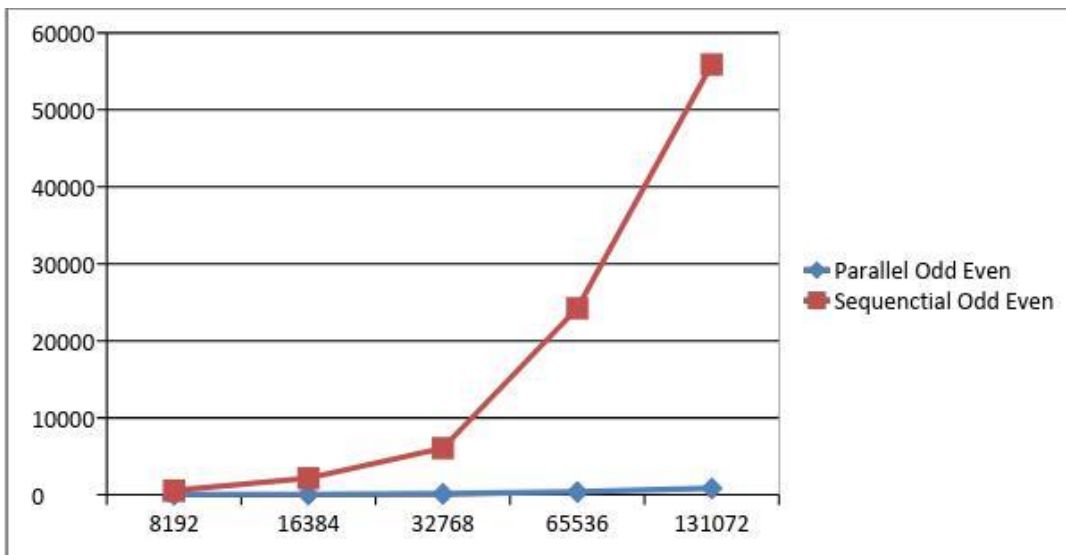


Figure 6 Array length range: 8192 - 131072

6 CONCLUSIONS

In this paper, we experimented with the sorting algorithm known as odd-even merge sort and implemented in sequential and parallel approach. The sorting time it is the crucial point where our measures are oriented. Sequential algorithm is executed on CPU while parallel sort is invoked on CPU and executed in GPU. In this research we used comparative methodology collecting and comparing elapsed time of execution from sequential sort and parallel sort. From results we see that sequential algorithm has some efficient point in measure graph, there is a difference between sequential and parallel algorithm in sorting with small number of elements. Sequential algorithm is faster from parallel algorithm in a range from array length of 16 elements to 32 elements. This cause the fact that processor uses all resources to solve the problem and there is small number of elements that need to be sorted and processor is much effective. In another side in GPU is required

communication and data transportation between host and device this cause a time stumble and it is obviously in comparison between CPU and GPU for small number of elements. However as array length increase also increases the time difference between parallel and sequential mode. This because GPU in parallel mode sort elements and the time communication is not more a variable that can make differences when we have voluminous elements. Parallel mode (sorting in network with Odd-Even algorithm) brings better performance in time for sorting sequence rather than sequential mode.

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METHODS FOR ANALYZING AND SUPPORTING A SUSTAINABLE PRODUCTION SYSTEM

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ABSTRACT: The growing awareness of global warming and the exponential increase of the usage of non-renewable natural resources, as a consequence of the significant growth of population and technological advancement over the past century, have initiated a more focused global approach towards sustainable development. The holistic concept of sustainable development includes three interdependent elements known as the pillars of sustainable development such as economic development, social equity and environmental responsibility. Each of these components consists of different sub elements with distinct degree of relevance. One of the most influential parts of economic development is surely sustainable production especially sustainable production systems.

This paper reviews different methodologies and methods for analyzing and supporting sustainable production systems. This is done through illustrating their key elements: definition, principles, tools, advantages and disadvantages. The elaboration of the methodologies and methods is from a general point of view as a result of the fact that the deployment of the methods may differ a lot in two distinct production systems even on the same line of work. Comparing the various methods that offer different perspective for obtaining and evaluating the sustainability of a production system sheds light upon their common ground as well as their potential complementarity. The initial emphasis is in defining a sustainable production system, as well as its principles and goals which should be in compliance with the goals of a global sustainable development.

KEYWORDS: *Sustainable development, production system, life cycle, key performance indicator, sustainable production*

1 INTRODUCTION

One of the main goals of the global initiative of the United Nations towards sustainable development is achieving sustainable production and consumption. Strategic plans for the future of organization have to include the element of sustainability in their structure more and more as the awareness for the impact of the production systems grows. In order to build sustainable production systems of the future we must evaluate current the level of sustainability. There are various tools and methodologies for analyzing and supporting a sustainable production system including life cycle assessment, eco-design, life cycle costing, environmental development of industrial products which are presented in this paper aiming to compare them in order to identify the potential relationship between them, the possible integration as well as their key benefits and limitations.

2 LIFE CYCLE ASSESSMENT (LCA) METHODOLOGY

LCA methodology is a powerful and internationally accepted tool for analyzing different aspects of the environment as well as the potential impact of a product or service during its life cycle. LCA quantifies the resource use (energy, raw materials) and the wastes of the “product” evaluated, e.g. a building, and thereby can assess the environmental impacts associated with the production, use or disposal stage. [1]

LCA is implemented through four distinctive phases as shown in figure 2.1.

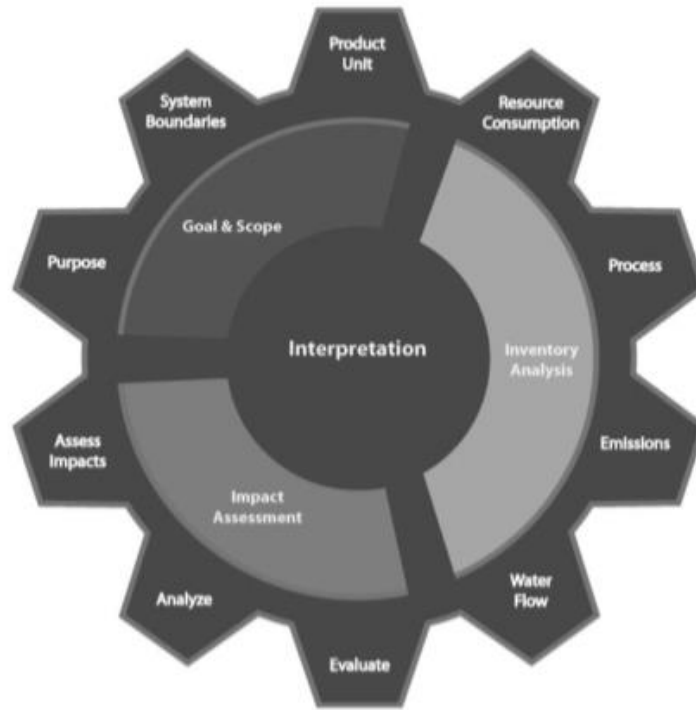


Figure 1 – Phases and elements of LCA [2]

1. Goal and scope definition – defining the product, service or process that is analyzed using LCA framework and tools
2. Inventory analysis – Identifying and quantifying the resources that are used as well as the elements that are released into the environment during the life cycle of the defined product, service or process
3. Impact assessment – Analyzing the defined elements that are released and using different methodologies assessing the potential impact these emissions have on the environment
4. Interpretation – Interpreting the results from the impact assessment and usually concluding in the option with least negative impact

LCA methodology is implemented in companies of different industries, sizes and resources which implies that the scope of the methodology is different especially the amount of data as well as the detail level of the data that has been analyzed.

ISO 14040:2006 describes the principles and framework for life cycle assessment (LCA) including: definition of the goal and scope of the LCA, the life cycle inventory analysis (LCI) phase, the life cycle impact assessment (LCIA) phase, the life cycle interpretation phase, reporting and critical review of the LCA, limitations of the LCA, the relationship between the LCA phases, and conditions for use of value choices and optional elements. [3]

According to ISO 14040 the mandatory elements that LCIA includes are:

- Selection of impact categories, category indicators and characterization models
- Assignment of LCI results (classification)
- Calculation of category indicator results (characterization)

The life cycle assessment in general and inventory analysis and impact assessment phases especially are resource consuming and process a huge amount of data therefore a lot of different softwares have been developed such as Ecoinvent 3.0, GaBi, SimaPro, etc.

The key benefits of LCA can be summarized into [7]:

- Detailed and flexible
- Directly accounts for environmental impacts including scarcity and toxicity
- Wide spreading of the method (ISO Standards)

Limitations of LCA:

- Expensive
- Requires value judgment on environmental priorities
- Requires extensive detailed knowledge to conduct and interpret

3. ECO-DESIGN

Eco-design is an approach for designing new products while using the least possible amount of resources as well considering the impact the products have on the environment during its life cycle. The deployment steps of eco designed are shown in table 1.

ECO-DESIGN PHASE	STAGES OF THE METHODOLOGY
1. Ecodesign Project Organization	1.1. Achievement of Management approval. 1.2. Establishment of a project team. 1.3. Make plans and prepare a budget.
2. Product Selection	2.1. Establishment of selection criteria. 2.2. Decision making. 2.3. Define Design Report.
3. Establishment of eco-design strategy	3.1. Analyze the product's environmental profile. 3.2. Analyze the internal and external pros. 3.3. Generate options for improvement. 3.4. Investigate its feasibility. 3.5. Defining Ecodesign strategy
4. Generation and selection of ideas	4.1. Generate product ideas. 4.2. Organize a workshop on eco-design. 4.3. Select the most promising ideas.
5. Details of the concept	5.1. To turn ecodesign strategies into operations. 5.2. Study the feasibility of the concepts. 5.3. Select the most promising one
6. Communication and product launch	6.1. Internally promote the new design. 6.2. Develop a promotional plan. 6.3. Prepare production
7. Settings of follow-up activities	7.1. Evaluate the resulting product. 7.2. Evaluate the results of the project. 7.3. Develop a program of eco-design.

Table 1 – Phase of eco-design [6]

In order to implement eco-design following the deployment steps of the methodology presented different tools are used depending on many factors such as: resources available, technical knowledge, complexity of the product that is being designed etc. The vast majority of the tools used can be grouped into three categories [8]:

1. Tools based on life cycle assessment analysis

This group of tools analyzes the possible interaction of the product that is being designed, through different stages of the life cycle, with the environment. The possible impacts of the different variations of the product being designed are considered in order to select an option that has the least negative impact on the environment. How LCA is used to define the impact of the designing product and select the best option from an ecological perspective is shown in figure 2.

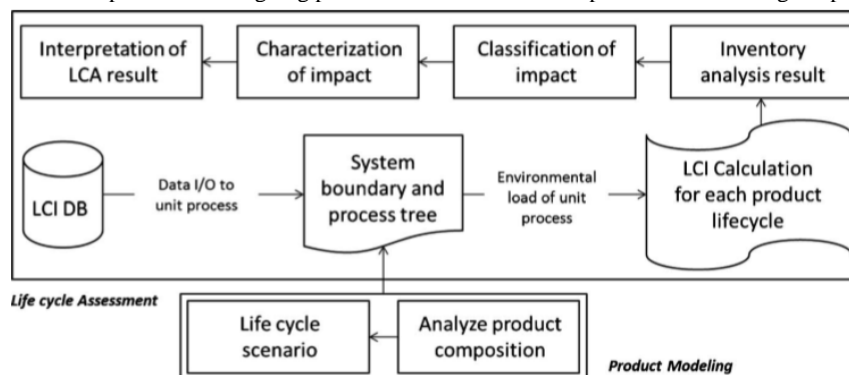


Figure 2 – Steps for identifying environmental impact [5]

2. Tools based on checklists

This group of tools is relatively easy to use, doesn't require a huge amount of time and financial expenses to implement, which makes this tools the most used ones regarding small and medium enterprises. Common element of the tools of this category is the fact they include list of questions the answer to which enables assessing the environmental impact. The key problem with these tools is the subjectivity of the answers as well as the inability to reach a concrete solution through them.

3. Tools based on quality function deployment QFD

The tools of these category such as QFD for the environment, green quality function deployment, House of Ecology have been constructed by adding the environmental aspect to the classic QFD. The steps that these tools are characterized by are:

- o Defining the client requirements as well as the environment requirements
- o The defined requirements are analyzed in correlation with the functions of the product

The tools based on QFD offer a different perspective and they include the client requirements which is a more complete approach to the product designing process. On the other hand the fact that the correlation between the requirements and the functions are solely in the hands of the designer it means that the tool is limited with the knowledge of the designer.

Table 2 presents the key benefits and limitations of the eco – design approach.

Benefits	Limitations
• lower production and labour costs and greater	• consumers' low level of understanding on ecodesign

<p>efficiency</p> <ul style="list-style-type: none"> • reduced material and resource costs • lower waste disposal costs • improved functionality and quality of products • increased market share • improved environmental performance • improved customer and supplier relationships • easier and lower cost of compliance with legislation • easier disassembly and increased potential for recycling • most suitable product design life • a better working environment and business culture for your staff • a useful marketing tool and encouraging innovation and product development 	<ul style="list-style-type: none"> • cost - and whether your clients or customers are prepared to pay that cost • difficulties to clearly demonstrate the benefits to buyers so that they choose your product • risks of trying new materials and approaches • finding alternative ways to make money out of longer-life products • difficulties using ecodesign on mainstream products instead of just high quality and niche products • targeting the right stage in the product's lifecycle or supply chain so you get the greatest environmental paybacks for your investment • integrating principles across business approaches and supply chains where the opportunities can be greater than singling out 'eco-products', which in some cases don't succeed
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Table 2- Benefits and limitations of eco – design [6]

4. ENVIRONMENTAL DEVELOPMENT OF INDUSTRIAL PRODUCTS (EDIP)

The Environmental Development of Industrial Products (EDIP) is a method that was developed by the Institute for Product Development (IPU) at the Technical University of Denmark, which in reality is an extended version of EDIP 1997 (a form of a LCIA methodology) that takes into consideration the environment and integrates them with the product development process.

The deployment framework of EDIP includes the following steps [8]:

1. Goal definition - identifying the specific assessment task to be solved in product development and the potential environmental scenarios related to the decisions taken during that stage of product development
2. Scope definition - identifying the methodological requirements for the assessment task in question and the scope of the systems to be studied
3. Inventory analysis - compiling an inventory of the environmental exchanges from the studied systems
4. Impact assessment - assessing the resource consumption and environmental impacts of the environmental exchanges identified in the inventory
5. Sensitivity analysis - identifying which parameters are essential, their uncertainty and the significance of their variation
6. Decision support - providing support to the different types of decisions to be taken during product development

The benefits of EDIP include the ones of LCA adding the fact that it integrates environmental aspect with the product development process, as consequence it faces the same limitation as LCA as well as the limited practical limitations.

5. LIFE CYCLE COSTING (LCC) ANALYSIS

LCC is an economic method of project evaluation in which all costs arising from owning, operating, maintain and ultimately disposing of a project are considered potentially important to that decision.

The main steps of the deployment of LCC are [10]:

1. Define problem and state objective
2. Identify feasible alternatives
3. Establish common assumptions and parameters
4. Estimate costs and times of occurrence for each alternative
5. Discount future costs to present value
6. Compute and compare LCC for each alternative
7. Compute supplementary measures if required for project prioritization
8. Assess uncertainty of input data
9. Take into account effects for which dollar costs or benefits cannot be estimated
10. Advise on the decision

The main advantages of LCC include [12]:

- Integration of the economic aspect with the life cycle
- Contributes to financial savings
- Encourages a more logical / decision-making process
- Provides support to local / global sustainable development initiatives

On the other hand the drawbacks of the methodology include [18]:

- The LCC methodology is completely dependent on the accuracy of data and assumptions
- Some of the calculations are based on future developments involving a great deal of uncertainty
- Availability of data is not always possible

6. CONCLUSION

The methods analyzed have different approaches to the same goal that is analyzing a sustainable production system. The first correlation that can easily be deduced through their structure and elements is between LCA and LCC, which focus on the life cycle perspective but consider different aspects environmental and financial respectively. These two aspects are being integrated into an approach known as life cycle thinking. Another relationship that can be easily concluded from this paper is the one between life cycle assessment and eco design, which translates to a correlation between life cycle thinking and eco-design. Even though there is an ongoing discussion whether LCT is a sub element of eco-design [17] or they can be viewed from the same level and complement each other [18], synthesizing the presented analyzes we can reach the verdict that LCT can be used as a tool in eco-design which will provide with the input for designing or redesigning of products that have the least negative impact on the environment as well as the economy.

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A Sustainable Urban Transport System in Izmir City - Turkey, with recommendations for the cities in the Republic of North Macedonia

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ABSTRACT: The development of technology, the growing trend for fast and reliable transport of passengers, air pollution, traffic congestion, increased problems with population growth and high costs for using private vehicles, have led to the need of building urban transport systems that will provide economic and environmental sustainability and urban areas will be more efficiently used. A sustainable urban transport system requires strengthening various features of the system including mobility, accessibility, social equity, efficiency, safety, security, low carbon, comfort and people – and environment-friendliness. There are various ways to describe an implementation method for sustainable urban transport in a city. In order to see how this works in a city of millions citizens, this paper presents the system of sustainable urban development of Izmir City – Turkey. It also provides a guidance on how the experiences and concepts applied there can be adapted to our cities in order to have sustainable urban development in the cities of the Republic of Macedonia.

KEYWORDS: Sustainable Urban Transport System, Public transport

1 INTRODUCTION

There are various ways to describe the method of implementing a sustainable urban transport system in cities. In this paperwork is presented the example for the City of Izmir - Turkey, so we will see the way of implementing the system of sustainable urban transport in one city of million inhabitants. Generally, sustainable transport emphasizes the need to use public transport, bicycles and discourages the use of individual motorized modes of transport (cars and motorcycles). It also promotes institutional improvements, urban development plans, appropriate technologies, and the development of promotional schemes that persuade users to use sustainable types of urban transport. In the absence of a built policy for the development of cities, the lack of planning, management and traffic control centers, as well as the weak economic power to invest in the transport infrastructure, gives a situation for our cities to have transport systems with very low efficiency, systems that degrade the quality of living in them. Illegal parking, heavy goods vehicles in the heart of housing zones, traffic jams, low security, high levels of pollution in the environment are just some of the problems common in our cities.

2 IMPLEMENTATION OF A SUSTAINABLE TRANSPORT SYSTEM IN THE CITIES

2.1 Push & Pull approach

One way to view the problem is to analyze it from the standpoint of “where” people should be in transport (where we should “push” them) and from which modes we should “pull” them. This is commonly called the “push and pull” approach. It emphasizes that urban transport measures must persuade users into using public transport and non-motorized transport, while developing strategies to “push them out” of automobiles and similar transport modes. To achieve the “pull” component, one must provide good quality of service in public transport, develop infrastructure for public transport and non motorized transport and in general develop policies that improve conditions for the use of these modes. To arrive at a situation where people are “pushed from cars”, policies must be in place to discourage their use by eliminating fuel subsidies, creating charges to automobile ownership and use, and in general creating policies that increase the cost of using these modes while using the revenue from those charges to enhance sustainable urban transport modes. This approach is generally used by transport economists as it follows a rationale of “price-driven-behavior”.

2.2 Public transport, non-motorized transport, transport demand management, and transit oriented development

A second approach to describing how to implement sustainable urban transport is by applying the four measures listed above.

2.2.1 Public Transport. This measure implies the development of high quality public transport systems, which includes mass transit systems. A specific public transport mode called Bus Rapid Transit (BRT) has been generally favoured in recent years due to its moderate cost of implementation, relatively short implementation time, high quality of service, and capacity to move large numbers of passengers once it is implemented.

2.2.2 Non-Motorized Transport. Also called “Active Transport”, it essentially refers to walking and cycling (and all other modes that have wheels but no engine such as pedicabs and freight tricycles), as well as related infrastructure, policies and education.²¹ These modes have been greatly promoted recently due to their great benefits for reducing transport emissions and for improved human health.

2.2.3 Travel Demand Management. Also termed “Transport Demand Management”, it refers to all measures that try to reduce the demand for travel/transport, and re-evaluate the actual need for providing more road infrastructure to cater for such demand.

2.2.4 Transit Oriented Development. This refers to an approach to urban design where policies promote urban development of higher density along mass transit corridors (Cervero, 1998). The rationale for this approach is that significant energy efficiency and transport efficiency can be realised through urban designs where mass transit provides rapid access to the main nodes of urban activity (home, work, education, recreation, health services).

3 URBAN TRANSPORT SYSTEM IN IZMIR-TURKEY

3.1 Connection with other cities and countries

Izmir is a metropolitan city in the western extremity of Anatolia and the third most populous city in Turkey, after Istanbul and Ankara. Izmir is served by national and international flights through the Adnan Menderes International Airport and there is a modern rapid transit line running from the southwest to the northeast. The Adnan Menderes International Airport is well served with connections to Turkish and international destinations. It is located in the Gaziemir district of Izmir. A recently built large bus terminal, the Otogar has intercity buses to destinations across Turkey. It is quite easy to reach the bus terminal, since bus companies shuttle services pick up customers from each of their branch offices scattered across the city at regular intervals, free of charge. Izmir has two historical rail terminals in the city center (Alsancak Terminal built in 1858 and Basmane Terminal built in 1866).

3.2 Transport within the city

Co-ordinated transport was introduced to Izmir in 1999, the first place in Turkey to apply the lessons of integration. A body known as UKOME gives strategic direction to the Metro, the ESHOT bus division, ferry operations, utilities and road developments. Izmir has an integrated pre-pay ticket, the Kentkart (Citycard)

called Izmirkart. The card is valid on metro (subway), buses, ferries and certain other municipal facilities. The Kentkart allows use of multiple forms of transport within a 90-minute window for the price of a single fare.



Fig. 1. Pre-pay card – Izmirim kart.

3.2.1 *Bus*. All major districts are covered by a dense municipal bus network under the name ESHOT. The acronym stands for "E – *elektrik* - (electricity); S – *suyu* - (water); H – *havagazi* - (gas); O – *otobüs* - (bus) and T – *trolleybüs* -(trolleybus)." Electricity, water and gas are now supplied by separate undertakings, and İzmir's trolleybus system ceased to operate in 1992. However, the bus company has inherited the original name. ESHOT operates about 1,500 buses with a staff of 2,700. It has five garages at Karataş, Gümrük, Basmane, Yeşilyurt and Konak. A privately owned company, İzulaş, operates 400 buses from two garages, running services under contract for ESHOT. These scheduled services are supplemented by the privately owned minibus or dolmuş services. Thanks to the fleet of electric buses, which started transporting passengers from April 2, 2017, 1,747,000 passengers were transported by the end of the year, with 277,000 liters of fuel saved, and 743,000 tons of carbon dioxide emissions were prevented from public transport. According to another estimate, if traditional buses were used, it would need 18,643 trees to clear the air pollution per day.



Fig. 2. The solar power plant, consisting of 3,680 photovoltaic (PV) panels, installed on the roof of ESHOT's workshop

3.2.2 *Urban ferry*. Taken over by İzmir Metropolitan Municipality since 2000 and operated within the structure of a private company (İzdeniz), İzmir's urban ferry services for passengers and vehicles are very much a part of the life of the inhabitants of the city, which is located along the deep end of a large gulf. 24 ferries shuttle between 8 quays. About 50,000 passengers and 2500 vehicles are transported daily.

3.2.3 *Bicycle*. BISIM is a smart bicycle traffic system established in the city of İzmir that operates from January 18, 2014. About 1.3 million trips have been made over a period of 3 years, and the system is still functioning until today.

3.2.4 *Metro*. İzmir has a metro network that is constantly being extended with new stations being put in service. The network, consisting of one line, starts from the Fahrettin Altay station in Balçova in the southern portion of the metropolitan area and runs towards northeast to end in Bornova. The line is 20 km long. The stations are Fahrettin Altay, Poligon, Göztepe, Hatay, İzmirspor, Üçyol, Konak, Çankaya, Basmane, Hilal, Halkapınar, Stadyum, Sanayi, Bölge, Bornova, Ege University, Evka 3. A more ambitious venture named İZBAN has begun involves the construction of a new 80 km line between them Aliğa district in the north, where an oil refinery and its port are and the Menderes district in the south, to reach and serve the Adnan Menderes International Airport. The line comprises 31 stations and the full ride between the two ends takes 86 minutes.

3.3 The impact of the established urban transport system to the city of İzmir

With the help of projects using renewable energy sources, the atmosphere over the City of İzmir is cleared of 94 thousand tons of carbon dioxide, which in normal conditions would have cleared by total of 253,000 trees. İzmir with its environmentally-friendly investments and projects is in the first place in the Republic of Turkey as a city that gives great importance to the use of renewable energy in order to create a city with a healthy and friendly climate. Under the agreement they have signed for the European Union, it is envisaged by 2020 to reduce emissions by 20%.

3.4. Suggestions for Republic of Macedonia

The transport plays a vital role in the development of the Republic of Macedonia. Transportation, whether of passengers or goods, is fundamental to economic prosperity and quality of life. In order to increase competitive power, the Republic of Macedonia must ensure a transport system that is efficient and responsive to new challenges. In order to improve the quality of life, it is also necessary to ensure that the transport system of the Republic of Macedonia is safe, reliable and environmentally responsible. The transport sector has a significant need for new investment and rehabilitation. The government should support the public-private partnership to promote investments in the transport sector that will facilitate the introduction of appropriate technology and infrastructure in line with sustainable development goals based on national priorities. This will include initiatives aimed at urban transport needs, such as public transport and trade and passenger corridors, while remaining insensitive to the needs of rural and remote areas. On the fig.3 we can see an swot analysis made for sustainable development in transport and infrastructure in Republic of Macedonia.

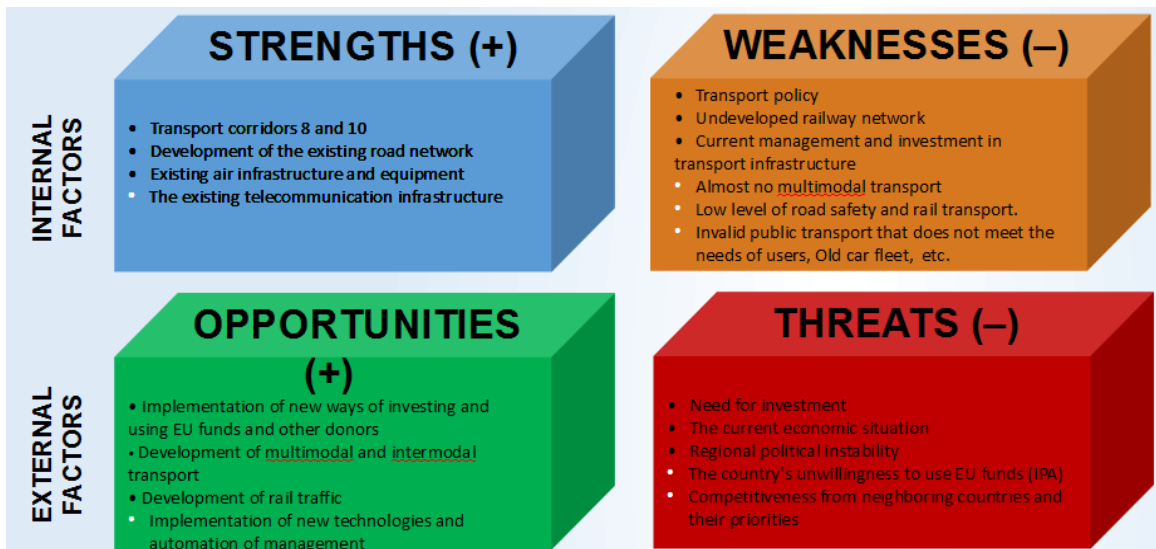


Fig. 3. SWOT analysis for sustainable development in transport and infrastructure in the Republic of Macedonia

4 CONCLUSIONS

In summary, a sustainable urban transport system requires strengthening various features of the system including mobility, accessibility, affordability, social equity, efficiency, safety, security, convenience, low carbon, comfort, and people- and environment-friendliness. In order to achieve all these elements, various challenges need to be addressed in an integrated manner. Thanks to the railway traffic system that has reached a network of 165 km and a capacity of 750-800 thousand passengers per day, Izmir air remains clean. If such investments are not made, in order to carry that number of passengers, about 1,000 buses should be included in the road transport. According to studies conducted by the ESHOT General Directorate, by eliminating buses using fossil fuels and using electric buses and railroads, carbon dioxide emissions have been reduced by 62,000 tonnes / year.

The improvement of the traffic flow is recognized as a basic condition for the successful implementation of a sustainable transport policy. All authorities at different levels should work more closely to improve urban traffic flow and circulation and develop mitigating circumstances and public transport infrastructure that will reduce greenhouse gas emissions. We must ensure that transportation needs are met in a way that avoids or minimizes the formation of pollutants and litter, and that the overall risk to human health and the environment is reduced.

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Flow Analysis of Ungauged Kacandol River

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ABSTRACT: River Kacandol, is an average size of Kosovo rivers, which does not have any gauging station. It is tributary of river Lap, which is subject of year after year floods. Also, according to Kosovo Master Water Resources Plan, there is supposed to be build a dam for multi supply purposes. The aim of article is to calculate minimum, average and maximum flows of this river, with methods that do not use observed data. Minimum flow was estimated by method of regional correlation between minimum average monthly flow of p% probability and minimum

average daily flow of p% probability. The minimum flow is $Q_{MIN} = 0.005 \text{ (m}^3/\text{s)}$. For average flow estimation, has been used “Method of predominant factors”, “Method of Regional Correlation of Precipitation and Runoff”, and “Method of runoff contour map”. The average flow, by each methodology gives $Q_{AVE} = 6.87 \text{ (m}^3/\text{s)}$, $Q_{AVE} = 7.44 \text{ (m}^3/\text{s)}$, and $Q_{AVE} = 7.63 \text{ (m}^3/\text{s)}$, which gives acceptable results, between different methodologies. Maximum value of flow was estimated by use of “Synthetic-unit hydrograph and SCS procedure”. This flow was estimated at $Q_{MAX} = 91.69 \text{ (m}^3/\text{s)}$. As can be seen, extreme flows are estimated only by one methodology per each, and accuracy of results cannot be confirmed. These results are useful, for any water structure design, until a gauging station will be established.

KEYWORDS: flood, flows, region, correlation, precipitation, SCS method

1 INTRODUCTION

River Kaçandol is one of average rivers of Kosovo. It is tributary of river Lap, and it discharges to river Sitnica, then continue to the river Ibar (Ibar), and so on to the Black Sea. It can be useful for water supply, for flood control, for energy generation, requisition. Its problem is, that there isn't ever observed, and there's no any gauging station. For any action to use water of this river, the designing flows are missing. Therefore, main objective of this article will be estimation of average and extreme flows, by ungauged river estimation methods. There are in the region average monthly flows, so the minimal flows will be estimated by regional data correlation. Average flow will be estimated by method of Predominant Factors, method of Regional Correlation of Precipitation and Runoff, by Map contour line of specific runoff. Maximal flow will be estimated by Synthetic-unit hydrograph and SCS procedure. These all, are statistical, physical and empirical methods of Hydrology.

2. METHODS

2.1 MINIMUM FLOWS

As minimum flows, usually is estimated minimum average daily flow and minimum average monthly flow. Estimation of these parameters, of different probability p, at non-observed basins is possible by fitting of theoretical probability curve (cdf curve), with empirical probability curve of minimum flow. Special values of probability p% are obtained by theoretical cdf curve.

At non-observe basins, special values of minimum flow, for average size of basin, can be estimated by map contour lines of these flows or by interpolation between regional gauging stations, while for small size basins, by regional empirical relations, which ones, different features of runoff are correlated with basin area. Such relations, usually are written minimum average monthly flows of probability 80%, as follows:

$$Q_{80\%} = k \cdot (A \pm a_0)^n \quad (2.1)$$

$Q_{80\%}$ = minimum average monthly flow of probability 80 %

A = basin area

a_0 = average area of estimated basin, which doesn't outflow during droughts, average area of underground aquifer which increase river flow, and can happen due to basin hydrogeological conditions (karstic ore artesian springs).

k and n – are parameters that includes impact of regional resources on minimum flows. For given region, there's no such data, so the relation (1) reduces to:

$$Q_{80\%} = k \cdot A^n \quad (2.2)$$

Beyond this, for given basin, should also be defined and relation between minimum flows of p probability, with minimum average monthly flows of 80% probability, by:

$$Q_{P\%} = c_1 \cdot Q_{80\%} \quad (2.3)$$

c_1 coefficient of flows relations of probability 80% with probability p %

Now, except relation (3), to find minimum average daily flow, should be also found their relation with minimum average monthly flow, as follows:

$$Q_{AD,P\%} = c_2 \cdot Q_{A,M,P\%} \quad (2.4)$$

Such relations, are estimated for region composed of Morava Bincit river basin up to gauging station Koncul, Sitnica river basin at Nedakovac, and Nerodime river basin at Kacanik. For estimation of coefficient k and n from relation (2), for all stations are plotted empirical probabilities with theoretical probabilities of type “LPT 3”. On table 1, are given minimum values of $Q_{AM,80\%}$ logarithmic values of responded basins. According to values estimated given on the table 1, in the Fig.1 is plotted regional correlation line, between flows and basin areas, from where, were read coefficient of k and n, of relation (2). for all stations are plotted empirical probabilities with theoretical probabilities of type “LPT 3”. On table 1, are given minimum values of $Q_{AM,80\%}$ logarithmic values of responded basins. According to values estimated given on the table 1, in the Fig.1 is plotted regional correlation line, between flows and basin areas, from where, were read coefficient of k and n, of relation (2).

$$k = 9.39 \cdot 10^{-5} \text{ and } n = 1.17$$

$$Q_{80\%} = 9.39 \cdot 10^{-5} \cdot A^{1.17} \text{ (m}^3\text{/s)} \quad (2.5)$$

Now, we estimate relation of flows of probability 90% and 95% with flows of probability 80 %

$$Q_{90\%} = c_1 \cdot Q_{80\%} \quad c_1 = 0.74 \quad Q_{90\%} = 0.74 \cdot Q_{80\%} \quad (2.6)$$

$$Q_{95\%} = c_1 \cdot Q_{80\%} \quad c_1 = 0.60 \quad Q_{95\%} = 0.60 \cdot Q_{80\%} \quad (2.7)$$

These correlations are given on Fig.2 and Fig.3. Minimum average monthly flows, will be: For river basin area of $A = 95.40 \text{ km}^2$

$$\text{MIN}Q_{AM,80\%} = 19.44 \text{ (l/s)} \quad \text{MIN}Q_{A,M,90\%} = 14.39 \text{ (l/s)} \quad \text{MIN}Q_{A,M,95\%} = 11.66 \text{ (l/s)}$$

Tab. 1 Estimation of regional correlations parameters

N r.	Lumi	Stacioni	A (km ²)	Q _{80%} (m ³ /s)	logA	log Q
1	Prishtina	Prishtinë	53.00	0.012	4	1.72 - 1.92
2	Ballaban	Ballaban	82.20	0.016	5	2.49 - 1.8
3	Batlava	Batllavë	315.44	0.040	9	3.41 - 1.4
4	Sitnica	Nedakovc	0	0.590	3	0.23 -
		Kormijane	1017.0			3.00 -
5	Morav B.	P.	0	0.310	7	0.51 -
			1632.0			3.21 -
6	Morav B.	Konçul	0	0.560	3	0.25 -
						-
7	Nerodime	Kaçanik	214.00	0.092	2.33	1.04

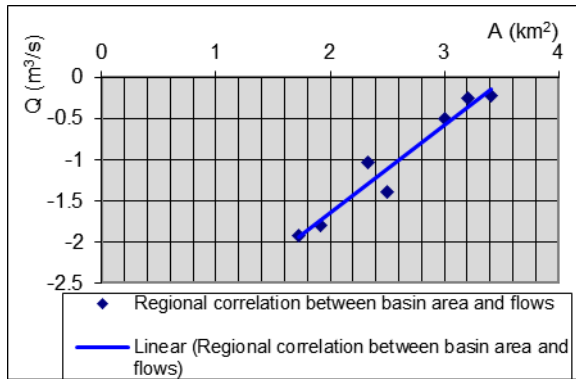


Fig. 1 Correlation Q (A) of regional rivers

Tab. 2 Average monthly and daily low flows for regional gauging stations

r	Rivers	Gauging stations	Q _{AM} (m ³ /s)			Q _{AD} (m ³ /s)		
			80%	90%	95%	80%	90%	95%
			0.01	0.00	0.00			
1	Pristina	Pristina	2	8	6
				0.01	0.00	0.00		
2	Balaban	Balaban	6	1	0
				0.04	0.01	0.00		
3	Batlava	Batlava	0	0	2

			0.59	0.37	0.23	0.27	0.17	0.10
4	Sitnica	Nedakovac	0	0	0	0	0	0
		Kormijane	0.31	0.24	0.20	0.16	0.11	0.10
5	Morav B.	P.	0	0	0	4	8	0
			0.56	0.50	0.47	0.22	0.16	0.13
6	Morav B.	Konçul	0	0	0	0	0	0
			0.09	0.06	0.05	0.03	0.01	0.00
7	Nerodime	Kaçanik	2	4	6	0	2	8

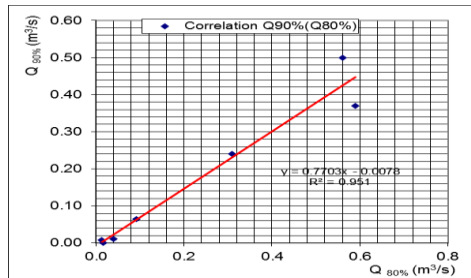


Fig. 2 Linear correlation between low flows $Q_{90\%}$ ($Q_{80\%}$)

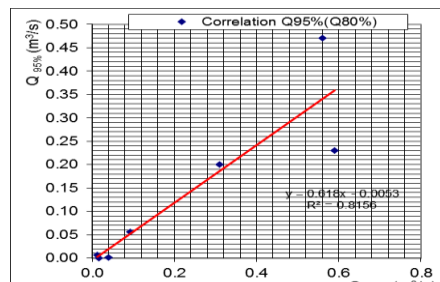


Fig. 3 Linear correlation between low flows $Q_{95\%}$ ($Q_{80\%}$)

The same procedure is repeated for minimum average daily flows.

Since in this case, are missing necessary data, for plotting of theoretical probability curves, the correlation coefficients between flows of different probability, are taken from similar river basin in vicinity, exactly from river Kremenata, which is similar with river Kacandol.

$$\text{MIN}Q_{AD,80\%} = 0.46 \text{ MIN}Q_{AM,80\%} \quad (2.8)$$

$$\text{MIN}Q_{AD,90\%} = 0.44 \text{ MIN}Q_{AM,90\%} \quad (2.9)$$

$$\text{MIN}Q_{AD,95\%} = 0.43 \text{ MIN}Q_{AM,95\%} \quad (2.10)$$

Tab. 3 Minimum Average Monthly and Daily flows of regional rivers

r	Rivers	Gauging stations	Q_{AM} (m ³ /s)			Q_{AD} (m ³ /s)		
			80	90	95	80	90	95
			%	%	%	%	%	%
			0.0	0.	0.	0.	0.	0.
	Pristina	Pristina	12	008	006	006	004	003
	Balaba		0.0	0.	0.	0.	0.	0.
n		Balaban	16	001	000	007	000	000
			0.0	0.	0.	0.	0.	0.
	Batlava	Batlava	40	010	002	018	004	001
		Nedakov	0.5	0.	0.	0.	0.	0.
	Sitnica	ac	90	370	230	270	170	100
	Morav	Kormijan	0.3	0.	0.	0.	0.	0.
B.		e P.	10	240	200	164	118	100
	Morav		0.5	0.	0.	0.	0.	0.
B.		Konçul	60	500	470	220	160	130
	Nerodi							
me		Kaçanik	0.092	0.064	0.056	0.030	0.012	0.008

2.2.AVERAGE FLOWS

2.2.1.Method of Predominating Factors

This method, requires estimation of several river basin hydrological parameters, by which average flow can be estimated. Kacandol river basin features are:

A = 95.40 (km²) – river basin area
H = 700 (mm) - annual precipitation
L = 31640 (m)- river length
L_P = 33940 (m) – river length to the basin border
P_P = 70000 (m) – river basin perimeter
Z_C = 745 (m) – average river basin altitude
Z_{MAX} = 1665 (m) – maximum river basin altitude
Z_{MIN} = 553 (m) – minimum river basin altitude
k_f = 0.24 – forest ground cover coefficient

Tab. 4 Vertical section of river basin

r.	N	Z (m)	l (km)	l _{ave} (km)	Δh(k m)	Δh*l _{ave} (km)	ΣΔh*l _a ve (km)
	1	1665	0				
	2	1600	3.6	1.8	0.065	0.117	0.12
	3	1500	9	6.3	0.1	0.63	0.75
	4	1400	13.8	11.4	0.1	1.14	1.89
	5	1300	18.45	16.125	0.1	1.6125	3.50
	6	1200	21.9	20.175	0.1	2.0175	5.52
	7	1100	22.05	21.975	0.1	2.1975	7.71
	8	1000	20.7	21.375	0.1	2.1375	9.85
	9	900	18.45	19.575	0.1	1.9575	11.81
	10	800	22.8	20.625	0.1	2.0625	13.87
	11	700	21.9	22.35	0.1	2.235	16.11
	12	600	6.3	14.1	0.1	1.41	17.52
	13	553	0	3.15	0.047	0.14805	17.67

Average river slope (J_A) will be:

$$I_A = \frac{Z_{MAX} - Z_{MIN}}{L_P} = \frac{1665 - 553}{33940} = 3.28 \text{ (\%)} \quad (3.1)$$

Flatened slope will be:

$$I_{RR} = \frac{1140 - 553}{33940} = 1.73 \text{ (\%)} \quad (3.2)$$

Basin slope will be:

$$I_P = \frac{\sum \Delta h * l_{ave}}{A} = \frac{17.67}{95.4} = 18.52 \text{ (\%)} \quad (3.3)$$

$$Q = q * A \text{ (m}^3\text{/s)} \quad (3.4)$$

Q – average flow (m³/s) q – specific flow (l/s/km²) A- river basin (km²)

$$q = \frac{H_e}{t} \quad (3.5)$$

H_e = effective precipitation (m) t = annual time (sec) $H_e = c * H$ H = annual precipitation (m)

c = runoff coefficient

$$c = \frac{A_*}{\frac{H}{z}} \arctg \frac{P_h^{0.289}}{0.833} \quad (3.6)$$

Where : A_* = vegetation basin cover indicator

$$A_* = (a_1 p_1 + a_2 p_2 + a_3 p_3 + a_4 p_4) = (0.95 * 0.24 + 1.02 * 0.73 + 1.05 * 0.03) * 1.02 = 1.024 \quad (3.7)$$

Tab. 5 Land cover coefficient [aiError! Not a valid link.](#)

$$P_h = \text{pluvio topographic index} \quad P_h = H * J_p = 0.700 * 0.185 = 0.130 \text{ (m)} \quad C = 0.324 \quad (3.8)$$

$$H_e = 0.324 * 0.700 = 0.227 \text{ (m)} \quad q = \frac{0.227}{0.031536} = 7.2 \left(\frac{1}{\text{km}^2} \right) \quad Q = 7.2 * 95.40 = 686.9 \text{ (l/s)}$$

2.2.2. Method of Regional Correlation of Precipitation and Runoff

Estimation of average flow, by method of regional similarity, consist on estimation of efficient precipitation by average flows of regional river basins, then plotting of correlation line between precipitation and efficient precipitation, from which can be estimated required average flow for actual river basin.

$$H_e = \frac{Q_{mes} * t_{vj.sek}}{A} \text{ (mm)} \quad (3.9)$$

On the Table 6, are estimated efficient precipitations or runoff, while on the Fig. 4 are plotted correlation lines between precipitation and runoff. On this figure, two lines of correlations are good fitted, one for lower hills and one for mountains rivers. Kacandol river basin belongs to the full line of correlation, which represent Sitnica river basin, where it discharges.

On the Fig.4 (full line), for $H_{Kac} = 700$ (mm) can be read $H_e = 245$ (mm) $q = \frac{H_e}{t} = \frac{0.246}{0.031536} = 7.8 \text{ (l/s/km}^2\text{)}$

Average flow is $Q_{mes} = q * A = 7.8 * 95.40 = 744.12 \text{ (l/s)}$

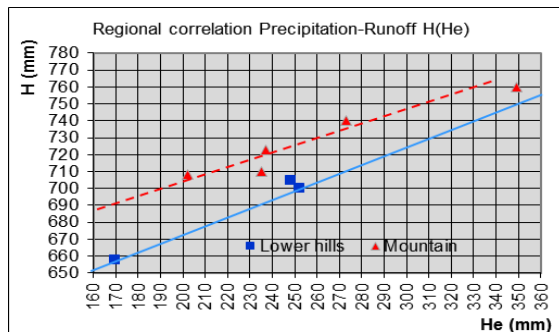


Fig. 4 Regional correlation between precipitation and runoff H(He)

2.2.3. Method of Map Contour Line of Specific Flow

Another method that rely on regional correlation, between runoff and river basin area, observed on several gauging stations. On the map of runoff, issued from Kosovo Master Plan, the Kacandol river basin, is laying between contour lines 4, 6, 8 and 10 of (l/s/ha). Estimation by method of weights gives a specific runoff of:

$$q = 8 \text{ (l/s/km}^2\text{)}$$

Estimated average flow is:

$$Q = q * A = 8 * 95.40 = 763.20 \text{ (l/s)}$$

2.3. MAXIMUM FLOWS

For ungauged river basins, most known methodology, for estimation of maximum flows, is by “Synthetic-unit hydrograph and SCS procedure”.

2.3.1. Unit Hydrograph

For estimation of maximum flows, is required the maximum value of unit hydrograph (q_m), which is defined by parameters t_p , T_K , T_r and river basin area A . For synthetic unit hydrograph of three-angle shape, is given this relation:

$$q_m = 0.56 \frac{A}{t_p + \frac{T_K}{2} + T_r} \text{ (m}^3\text{/s/mm)} \quad (4.1)$$

where:

A – river basin area (km²)

t_p – lag time of maximum flow (hour)

T_K – efficient precipitation time duration (hour)

T_r – hydrograph recession time duration (hour)

If $t_p + \frac{T_K}{2} = T_L$ is hydrograph rising limb, then by replacing of ratio: $k = \frac{T_P}{T_L}$ is obtained:

$$q_m = 1.12 \frac{A}{(1+k)(2t_p + T_K)} \text{ (m}^3\text{/s/mm)} \quad (4.2)$$

$$k = T_P/T_L = f(\text{Attach. Fig.14}) = f(A) = 1.58$$

Hydrograph lagging time t_p , is determined by geometric features of river basin. Most known formula is Linsley-Kohler:

$$t_p = C_t \left(\frac{L * L_c}{\sqrt{J_{rr}}} \right) = f(\text{Attach. Fig 13}) \quad (4.3)$$

Where

L – is river length, from the top of basin, to the discharge 33,940.0 (m)

L_c – is river length, from center of river to the discharge 18,300.0 (m)

J_{rr} – is flattened slop of river

C_t – is a parameter that depends from basin size and features.

$$\frac{L * L_c}{\sqrt{J_{rr}}} = \frac{33.94 * 18.3}{\sqrt{1.73}} = 472.2 \quad c = \frac{t_p}{\left(\frac{L * L_c}{\sqrt{J_{rr}}} \right)^{0.38}} = \frac{4.7}{10.38} = 0.45$$

$$t_p = 4.7 \text{ (hour)}$$

Now, the relation (2) can be written as:

$$q_M = \frac{1.12 * A}{(1+k)(T_K + 2t_p)} = \frac{106.85}{24.25 + 2.58T_K} \quad (4.4)$$

Precipitation duration is determined by trial-and-error, starting by approximately precipitation duration, according to Sokolov:

$$T_k = T_c * (T_c + 1)^{-0.20} \quad (4.5)$$

By selecting duration time larger or shorter than obtained duration time, after relation (5), are obtained coordinate maximum values of hydrograph, and hydrograph is plotted.

$$Q_M = f(T_K) \text{ therefore: } T_c = 0.000325 \left(\frac{L}{J_{RR}} \right)^{0.77} \quad (4.6)$$

$$T_c = 0.000325 \left(\frac{33940}{0.0173} \right)^{0.77} = 22.76 \text{ (hour)} \quad T_k = 22.76 * (22.76 + 1)^{-0.2} = 12.08 \text{ (hour)}$$

2.3.2. Run-off estimation by SCS procedure

Efficient precipitations, are estimated after SCS procedure. CN curve number, is determined according to data on land cover vegetation, ground features, and for recent humidity conditions of type III. The C type of ground was assumed (shallow ground with much clay and colloids, after saturation, infiltration is smaller than average).

Tab. 5 Determination of curve number CN

Table 6 Area	Hydrological group	CN	ΔA(%)	CN* ΔA
Forest	C	70	24	1680
Meadow	C	60	60	3600
Planted fields	C	85	13	1105
Wastelands	C	31	3	273
		Σ=	100	6638

$$CN' = (6638)/100 = 66.38 \quad \text{For recent humidity condition of type III, } CN \approx 85$$

$$H_e = \frac{(H - 0.2d)^2}{H + 0.8d} = \text{ (mm)} \quad (4.7)$$

Where are:

H – annual precipitation
H_e – efficient precipitation
d – precipitation deficit

$$d = \left(\frac{1000}{CN} - 10 \right) * 25.4 = \left(\frac{1000}{85} - 10 \right) * 25.4 = 44.82 \text{ mm}$$

$$H_e = \frac{(H - 0.2 * 44.82)^2}{H + 0.8 * 44.82} = \frac{(H - 8.96)^2}{H + 35.86} \text{ (mm)} \quad (4.8)$$

2.3.3. Maximum Flows

Estimation is done for different precipitation duration $T_K = 0.5; 1; 2; 3; 4; 6; 10; 20$ and 24 hours. For given precipitation duration, from figure of Attach. Fig. 15, can be read annual precipitation H, given on table 8. Afterward are estimated efficient precipitation by SCS procedure. At the end are estimated maximum flows from unit hydrograph, and given on table 10. These flows are plotted in the chart, where can be seen, that maximum flows are achieved for precipitation duration of $T_K = 2$ (hours), and it is: $Q_{max} = 3.63 \text{ (m}^3/\text{s/mm)}$, while maximum specific flow is $q_{max} = 38.05 \text{ (l/s/km}^2/\text{mm)}$ or $Q_{MAX,1\%} = 91.69 \text{ (m}^3/\text{s)}$.

Tab. 7 Annual precipitations of different time duration and different probability for Kacandol river basin

Probab.	TK (hour)								
	0.5	1	2	3	4	6	10	20	24
1	42.5	53	57.5	59	60.5	63	66.5	74	76
2	37.5	46	51.5	54	55	57	60.5	68	71
10	28	33.5	36.5	38	39	41	45.5	53.5	56
20	23	27.5	31	31.8	33	35	39.5	47.8	50
50	16.25	19.5	22.5	23.5	24.5	26.7	30	37	38.5

Tab. 8 Efficient precipitations of different time duration and different probability of Kacandol river basin

Probability P %	TK (hour)								
	0.5	1	2	3	4	6	10	20	24
1	14.36	21.8	25.2	26.4	27.6	29.5	32.4	38.5	40.2
2	11.1	16.8	20.7	22.6	23.3	24.9	27.6	33.6	36
10	5.68	8.68	10.5	11.4	12.1	13.4	16.4	22.2	24.1
20	3.35	5.43	7.27	7.71	8.39	9.57	12.4	18	19.6
50	1.02	2.01	3.14	3.56	4	5.03	6.72	10.8	11.7

Tab. 9. Maximum flows of different precipitation time duration and different probability of Kacandol river basin

Probability P %	TK (hour)								
	0.5	1	2	3	4	6	10	20	24
1	60.06	86.9	91.7	88.2	85.2	79.4	69.1	54.2	49.8
2	46.45	66.8	75.3	75.4	72.1	66.8	58.9	47.3	44.7
10	23.75	34.6	38.1	38.1	37.3	35.9	35	31.3	29.9
20	14.01	21.6	26.4	25.8	25.9	25.7	26.4	25.4	24.3
50	4.27	7.99	11.4	11.9	12.4	13.5	14.4	15.2	14.6

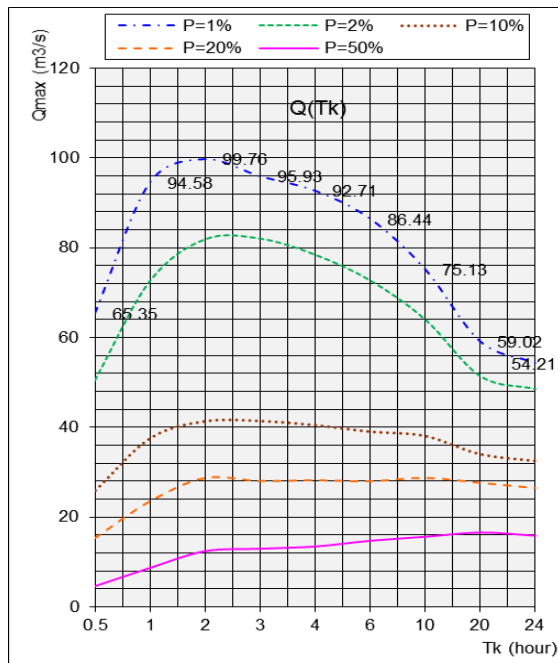


Figure 5. Maximum flows of different precipitation time duration and different probability of Kacandol river basin

3. RESULTS AND DISCUSSION

The Minimum flow of $Q_{MIN} = 0.005 \text{ (m}^3/\text{s)}$, was estimated by Regional Correlation method. This result is so low, due to mountain regime of Kacandol river, which mean that fluctuations are very heavy, and during summer months it already goes dry.

The Average flow, was estimated by three methods:

$Q_{AVE} = 6.87 \text{ (m}^3/\text{s)}$ by method of Predominant factors

$Q_{AVE} = 7.44 \text{ (m}^3/\text{s)}$ by method of method of Regional Correlation of Precipitation and Runoff, and

$Q_{AVE} = 7.63 \text{ (m}^3/\text{s)}$ by method of method of Runoff contour map.

The Maximum flow, was estimated as $Q_{MAX} = 91.69 \text{ (m}^3/\text{s)}$, by method of Synthetic-unit hydrograph and SCS procedure.

As can be seen, from results, average methods are giving good results, being that they can be compared between, while the extreme flows have no alternatives, since they are obtained by one method, each one. Very heavy fluctuation, between minimum and maximum flow, comes due to (mountain) snow-rainfall regime, around 18,300 time. These results, are not of excellent level comparing with well-observed river flows, but if we consider that the Kacandol river was never observed, these results are very useful for any hydrological preliminary analysis, and design.

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ANNEXES

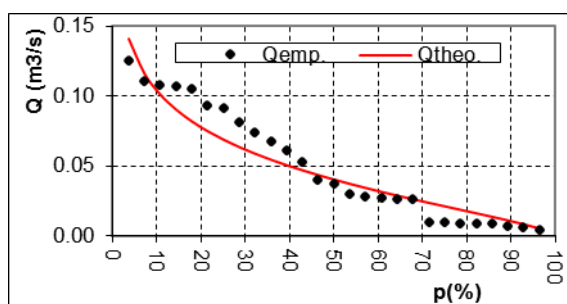


Fig. 6. Low flows probability of river Balaban

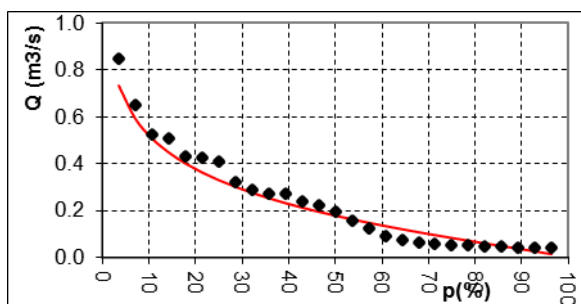


Fig. 7. Low flows probability of river Batlava

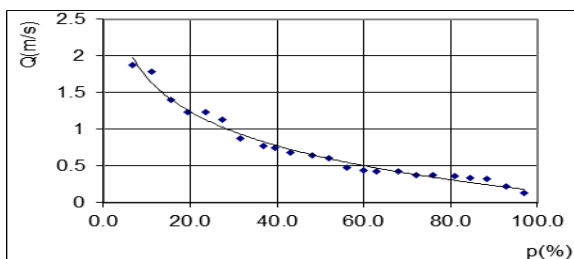


Fig. 8. Low flows probability of river Morava - Kormijane

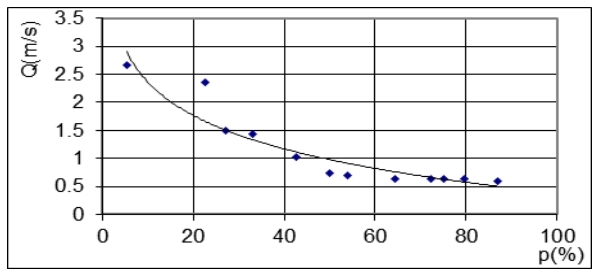


Fig. 10. Low flows probability of river Nerodime - Kacanik

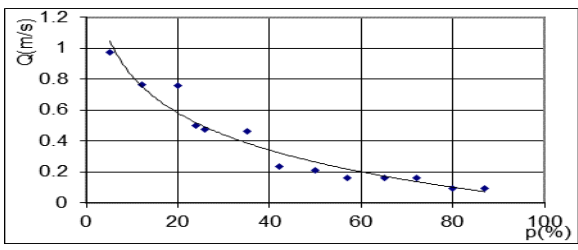
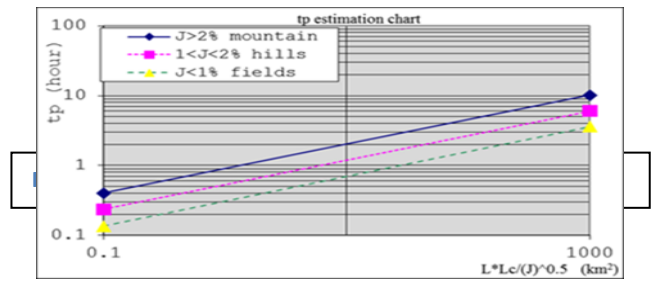
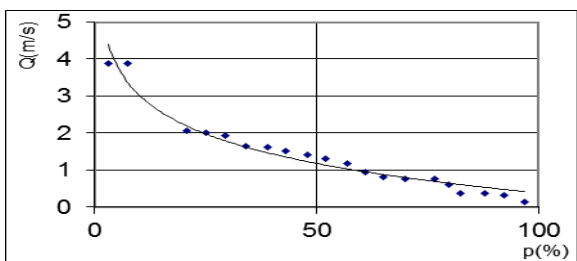
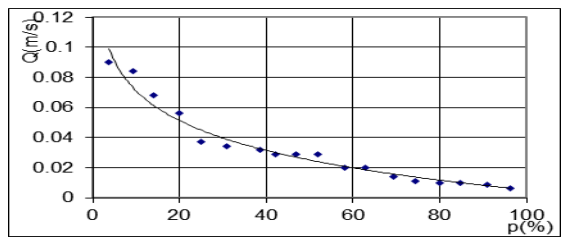


Fig. 11. Low flows probability of river Pristina - Pristina



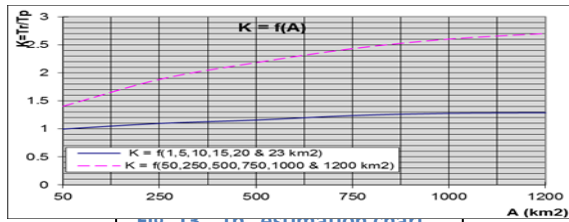


Fig. 13. t_p estimation chart

Fig. 14. Coefficient K in function of basin area A

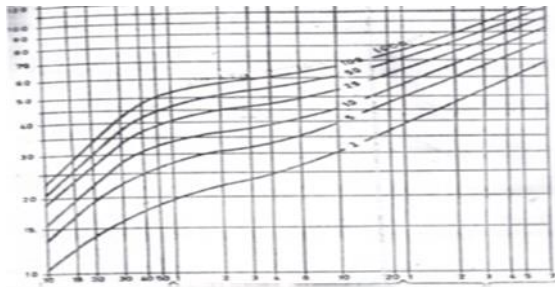


Fig. 15. Precipitation of Pristina after t_k (hour) and p (%)

HEATING, VENTILATING, AIR CONDITIONING SYSTEMS AND ERGONOMIC WORKPLACE SEAT IN THE FUNCTION OF A SAFETY AND PRODUCTIVE WORKING ENVIRONMENT

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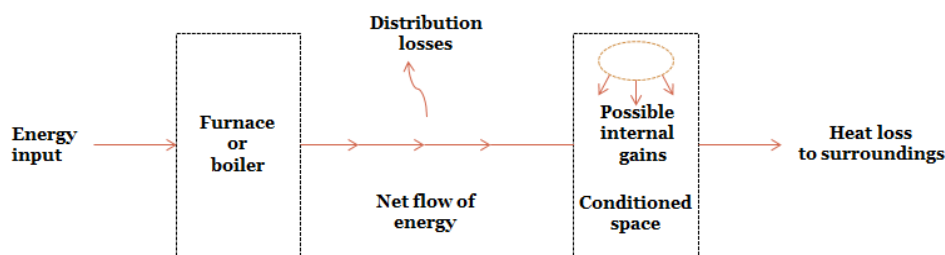
ABSTRACT: Indoor working conditions of the 21st century require heating, cooling, humidity control, and ventilation. Air conditioning is one of the main factors that has made our working conditions healthier, safer and more productive. Air-conditioning devices, as well as refrigeration and heating devices, come in many sizes and shapes and do the job well for a period of time. However, in order to have a comfortable working environment, an internal control of this working environment nowadays is ‘a must’. Such devices require periodic inspections, repairs, and replacement in order to achieve appropriate effects on the sustainability of the working environment in terms of protection and human health. The main purpose of this paper is the discussion of the air conditioning that refers to the temperature control, moisture content, cleanliness, air quality, as well as air circulation, as required by the European standards for the working environment. The results achieved through these processes aim to better environment conditions, which include keeping indoor environments safer and more productive, while protecting and preserving the outdoors for the new generations. Since most 21st century’s jobs require people to sit whilst working, safety and health at work are very important features; ensuring that seating in the workplace is safe and suitable. The paper takes into account concrete examples of how a workplace seat should look like. Accordingly, to be as comfortable as possible and enable untiring work without consequences on worker’s health, or hazardous environment, and what is more: increased productivity.

KEYWORDS: working environment, heating, ventilating, air conditioning systems, ergonomic workplace seat.

1. INTRODUCTION

The need for closely controlled environments such as laboratories, hospitals, and industrial facilities has continued to grow. Developments in electronics and computers have furnished different tools, allowing sciences of Heating, Ventilating, and Air Conditioning (HVAC) to become a high-technology industry [1]. Many offices and commercial facilities nowadays would not be comfortable without year-round control of the indoor environment. This rapid development of technology has improved human living (and working) conditions, by producing better, faster, and more economical goods, in a properly controlled environment. Nowadays, these goods would not be produced if the temperature, humidity, and air quality were not controlled within the limits. As mentioned above, the development and industrialization require the use of year-round control of the indoor climate. As such, the space conditioning system that provides heating is performed in two ways: either to bring a space up to a higher temperature than existed previously, or to replace the energy being lost to colder surroundings so that a desired temperature range may be maintained.

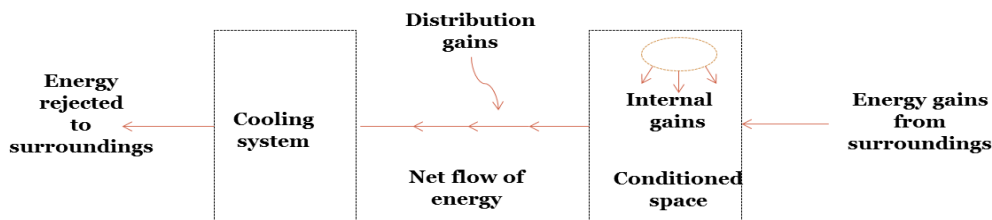
This process may occur in different ways, a). by direct radiation and/or b). free convection of the space. The direct heating of forced circulated air is mixed with cooler air in the space, or by the transfer of electricity or heated water to devices in the space for direct or forced circulated air heating, Fig. 1.1 [1].



Source: Heating, Ventilating, and Air Conditioning, Analysis and Design, © 2005 John Wiley & Sons

Figure 1.1 The flow of energy in space heating

Nowadays, most modern buildings need the application of the cooling system. This system provides more comfortable environment, especially in warm seasons. Some areas are cooled to provide a suitable environment for sensitive manufacturing or process control. In summary, cooling is the transfer of energy from a space or from air supplied to a space, in order to make up the energy which is being gained by that space. Fig. 1.2 [1].



Source: Heating, Ventilating, and Air Conditioning, Analysis and Design, © 2005 John Wiley & Sons

Figure 1.2 The flow of energy in space cooling

All-air systems are also used for lots of special applications where close control of temperature and humidity are needed. They are included in clean rooms, computer rooms, hospital operating rooms, and factories.

Equipment normally found in a central mechanical room include [1]:

- ✓ Fans or air handlers for moving air with associated dampers and filters
- ✓ Pumps for moving heated or chilled water and appropriate control valves
- ✓ Heat exchangers for transferring energy from one fluid stream to another
- ✓ Flow measuring and control devices.

All control systems, even the simplest ones, have three necessary elements:

- ✓ sensor,
- ✓ controller, and
- ✓ controlled device.

The complete air-conditioning system may involve two or more processes considered above. For example, in the air conditioning of space during summer, the supplied air supplied have sufficiently low temperature and moisture content to absorb the total cooling load of the space.

2. HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS (HVAC)

The commonly used acronym for Heating, Ventilation and Air Conditioning is HVAC. The conditions depend on the type of activity for which the space is used. For instance, if it is an indoor space, the most pertinent conditions are the temperature, the humidity level, and the cleanliness of the air [2]. The indoor conditions for health facilities or industrial ones are similar, but they have to be controlled within more rigorous limits compared to those of an ordinary home. The indoor conditions of each facility have to satisfy those processes mandated by the industrial guidelines.

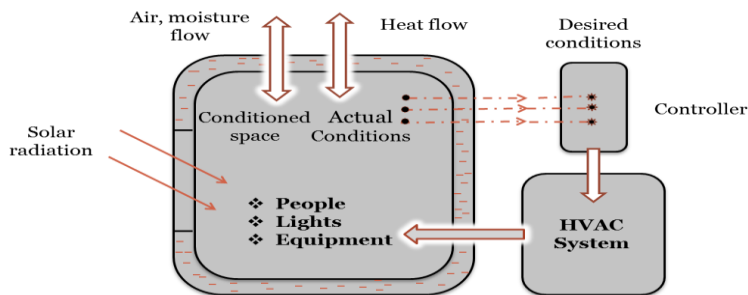
The temperature difference between the indoor air and the outdoor air causes heat to flow across the building envelope. During winter time, when the temperature outside is lower than the indoor temperature, heat is lost more. As such, the inside air is colder, and therefore uncomfortable for people/workers. The HVAC system needs to balance this heat loss by supplying the necessary heat input, using an external energy source.

In summer, the outdoor air is usually warmer and more humid than the typically required indoor comfort conditions. In this case the heat flow across the building envelope occurs in the opposite direction. Moreover, the indoor air is heated indirectly by the solar radiation entering through the glass surfaces of the building envelope, such as, windows, glass doors, and skylights. The transmitted solar radiation is first absorbed by interior surfaces of the building like walls, the floor, and other items, such as furniture. This absorbed energy is later released to the indoor air when the latter surfaces get warmer. The amount of energy that needs to be removed by HVAC system per unit time is called **the cooling load** of the building. It is significant to note that in winter, the energy inputs like absorbed solar radiation, energy from radiated from people, lights and equipment, tend to heat the indoor air; thereby they reduce the heating load of the building.

For the purpose of industrial and transportation applications, some of optional designs of HVAC systems could also be modified. The requirements may be somewhat different [2]:

- ✓ HVAC system using air as the energy transport medium,
- ✓ HVAC system using water as the energy transport medium,
- ✓ HVAC system using water and air as energy transport media,
- ✓ Packaged and unitary systems, and
- ✓ Reversible heat pumps for heating and cooling.

Figure 2.1 below shows an optional designs of HVAC systems including some of the used equipment [2].

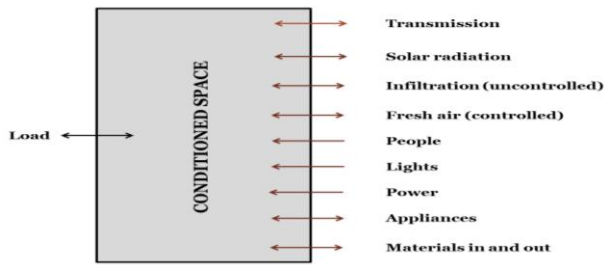


Source: Nihal E Wijesundera, Principles Of Heating, Ventilation And Air Conditioning, with Worked Examples, 2016 Singapore

Fig. 2.1 Conceptual diagram of HVAC system

As shown in Fig. 2.1, the energy released by people depends on the type of activities they are engaged in. The controller compares the actual conditions of the space with the desired conditions supplied to it by the designers of the HVAC system or its operators. Careful control of the inside conditions at the desired values contributes both: to the comfort of the people in such places, and to the overall energy efficiency of the system.

Basic Components of Heating and Cooling Loads: The basic components of the heating and cooling loads are shown in Fig. 2.2 [3].



Source: HVAC: Handbook of Heating, Ventilation and Air Conditioning for Design and Implementation, 2007 INDUSTRIAL PRESS INC. NEW YORK.

Fig 2.2 Components of heating and cooling loads

The working fluids in HVAC systems are mainly water, steam, refrigerants, natural gas and oil. Pipes and pipe networks are used to appropriately distribute the working fluids throughout the system. Pipes must be correctly sized to ensure that pressures and flow rates are balanced and that the flow rates are maintained at design values.

2.1 Air conditioning systems

All-air systems are also used for any special applications if there is a need for close control of temperature and humidity, including clean rooms, computer rooms, hospital operating rooms, and factories.

Normally mechanical rooms are outside the conditioned area, in basements, on the roofs, or in service areas at the core of the buildings. Mechanical rooms reduce noise, spills, and mechanical maintenance that might otherwise occur in the occupied spaces. Therefore, air conditioning is necessary for the following reasons.

When discussing about heat, it is gained from the sunlight, electric lighting and machinery. In particular, it may cause unpleasantly high temperatures in rooms, unless windows are opened. If windows are opened, then even moderate wind speeds cause excessive draughts, becoming worse on the upper floors of tall buildings. Further, if windows are opened, noise and dirt enter and are objectionable, becoming worse, particularly in urban districts and industrial areas.

In general, those standards which have been used by the Chartered Institution of Building Services Engineers in their Guide to Current Practice, are used here. The more important values are [5]:

Density of Air	1.293 kg m ⁻³ for dry air at 101 325 Pa and 0°C.
Density of Water	1000 kg m ⁻³ at 4°C and 998.23 kg m ⁻³ at 20°C.
Barometric Pressure	101 325 Pa (1013.25 mbar).

Full air conditioning implies the automatic control of an atmospheric environment either for the comfort of human beings, or for the proper performance of some industrial or scientific processes. Air conditioning is always associated with refrigeration and it accounts comparatively high cost of air conditioning. Full control over relative humidity is not always exercised; Hence, a good deal of partial air conditioning is carded out. It is still referred to as air conditioning because it does contain refrigeration plant, and is therefore capable of cooling and dehumidifying [5].

On the other side, atmospheric contaminants are: solid, liquid, gaseous and organic. When discussing about small particles of atmospheric contaminants, the micrometer- is used as a unit of measurement, ranging from 30 to 200 μm [5]:

Types of filter can be:

- ✓ Washers
- ✓ Dry filters
- ✓ Viscous filters
- ✓ Electrostatic precipitators
- ✓ Absolute.

There are two requirements for the evaporation of liquid water to occur [5].

1. Thermal energy must be supplied to the water.
2. The vapour pressure of the liquid must be greater than that of the steam in the environment.

Types of system include:

- ✓ Cooling only (comfort cooling).
- ✓ Cooling or heating.
- ✓ Cooling or heating with control of humidity (full air conditioning)

In all systems, the heat is removed from the conditioned space and dispersed outside the building.

Compressors can be different: reciprocal, centrifugal, screw, rotary, and scroll [4].

Pollutants in occupied rooms come from six sources [5]:

1. The people who emit carbon dioxide, water vapor, solid particles, odors and biological aerosols.
2. Smoking, which produces carbon monoxide, carbon dioxide, gases and vapors, solid particles, liquid droplets, and odours.
3. Building materials, furnishings and their emissions.
4. The activities of people and the equipment they use give off gaseous and solid emissions and produce odours.
5. The outside air which is used for ventilation may be contaminated, or
6. The air handled by the plant and supplied to the occupied space through the ducting may be contaminated.

As the air flows through the space, it is heated and humidified. Some outdoor air is usually mixed with the returned air and sent to the conditioning equipment, where it is cooled and dehumidified.

The air temperature and the humidity are regulated to predetermined set points by means of the *full air conditioner* known as *ventilation system*. The ventilation, or air conditioning system with a heat recovery system should be able to operate with minimal necessary energy for the supply air treatment. The one for a given time required transmission capacity of the heat recovery system is determined by the following variables [7]:

- ✓ Temperature and relative humidity of the outside air, exhaust air and supply air
- ✓ Type of humidification system (steam humidification or evaporation humidification).

2.2 Methods to control contaminants and ventilation system

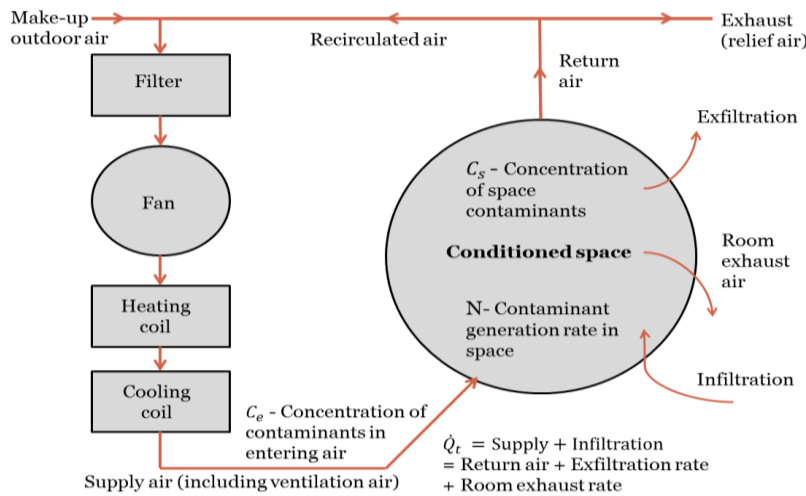
In order to maintain good Indoor Air Quality (IAQ), four basic methods of control of gaseous or particulate contaminants are used [1]:

1. Source elimination or modification
2. Use of outdoor air
3. Space air distribution
4. Air cleaning

Source elimination or modification very often is the most effective method for reducing some contaminants. This is because it directly operates on the source. In order to make the indoor environment more acceptable, removal or containment of these materials is necessary in some case.

If a mechanical ventilation system is used, it should be maintained on a regular basis. The control system should register any defect-as a necessary feature for the health of the employees. If a cooling system or mechanical ventilation systems are used, then they should function in that way that employees are not exposed to a draft which may cause discomfort.

Fig. 2.3. Various terms involved in the air flow of a typical HVAC system [1].



Source: Heating, Ventilating, and Air Conditioning, Analysis and Design, © 2005 John Wiley & Sons

Figure 2.3 A typical HVAC ventilation system

Outdoor air is used to dilute contaminants within a space. The supply air is the air delivered to the conditioned space and used for ventilation, heating, cooling, humidification, or dehumidification. Ventilation is a portion of the supplied air, and the recirculated air that has been treated for the purpose of maintaining acceptable IAQ.

The basic equation of contaminant concentration in an indoor environment is shown in figure 2.3. While the balance of the concentrations entering and leaving the conditioned space assuming complete mixing in equation 2.1. It also describes the uniform rate of generation of the contaminant, and uniform concentration of the contaminant within the space and in the entering air. (Equation 2.1). [1].

$$\dot{Q}_t C_e + \dot{N} = \dot{Q}_t C_s \quad (2.1)$$

Where: \dot{Q}_t - rate at which air enters or leaves the space

C_s - average concentration of a contaminant within the space

\dot{N} - rate of contaminant generation within the space

C_e - concentration of the contaminant of interest in the entering air.

This fundamental equation may be used as the basis for obtaining more complex equations of more realistic cases.

According to Health and Safety in Employment Regulations (1995), employers have a responsibility to take all practicable steps to provide the following facilities (amongst others) in every place of work: [6]:

- ✓ Ventilation providing either fresh or purified air,
- ✓ Means for controlling humidity that arises from any work process or activity,
- ✓ Means for controlling atmospheric conditions, including air velocity, radiant heat, and temperature.

When discussing about temperature control based on ventilation technology facilities, it is important to keep a room with a constant temperature. As such, there are cases that the internal heat sources must be cooled away with high energy consumption. Or, internal heat sources can be used as a heating energy. From controlling points of views, three heat sources can be effective [7]:

- ✓ Heat emission from radiators (base load heating)
- ✓ Heat supply of the ventilation system, and
- ✓ Internal heat sources (people, appliances, lighting, solar radiation, etc.)

Taking into account the working methods used, and the physical characteristics of the employees' workplaces, one of the most important factor is fresh air supply.

Factors influencing the thermal comfort of a person are [7]:

- ✓ Room (Surface temperature of the surrounding areas);
- ✓ Human (Activity, clothing);
- ✓ Building technology (Room air temperature, air movement, room air velocity, Indoor Air Quality-IAQ, indoor humidity).

The ventilation system installation does cost a lot. However, an increased use of natural ventilation is an option worthy of consideration. For example, in hot climates, fully natural ventilation usage is practical, as it carries away hot air and polluting substances. Of course, natural ventilation can be combined with the use of ventilation equipment.

Risks and symptoms of bad ventilation are [8]: (a) thermal discomfort, (b) heat stress and (c) excessive fatigue.

The efficiency of a ventilation system depends not only on its overall capacity, but also on how the air flow is created, and how the polluted air (or the heated one) is accumulated. Simple changes of ventilator locations, electric fans and hoods, or rearrangement of the location of work areas can often bring about remarkable benefits.

The polluted inhaled air is a problem. The air flow greatly helps to reduce this problem amongst the worker and the polluting sources (and to the outside). The direction of ventilation must be taken into account. Since the hot air rises, the use of ceiling fans and windows in higher positions can improve ventilation well. We should take into consideration chimneys: although they have no power source they can efficiently ventilate smoke, as well.

It is known that air conditioning increases productivity, helps reduce accidents and absenteeism, as well as, improves human relations. The effects on reducing musculoskeletal disorders may also be observed. It is noticed that the effect of the cool air flow gives unnecessary chill effects, as well as work disorders. However, careful adjustment of the air conditioning facility reduces workers' discomfort, i.e. this adjustment is needed in order to increase the comfort of people in their workplaces. It is also based on workplace operations and workers' preferences. The change of the air flow directions can avoid overcooling of particular groups of workers [8].

In closed-circuit liquid circulation systems, the air is considered to be the source of problems; therefore, measures must be taken to eliminate it (Air Elimination) [1]. Steam heating systems differ from the liquid circulating systems in water. Vapor (steam) is distributed to the various terminal units in which it is condensed, by giving up latent heat and the condensed is returned to the boiler.

2.3 Temperature as a complex issue in workplaces

Based on the subjective assessment of the individual, the issue of finding a suitable temperature value that would be acceptable to each individual separately remains a complex question. Although it is possible to create workplace conditions that will make the majority of people comfortable, it is still almost impossible to satisfy everyone. One person can be described as "thermally comfortable" if not aware that it is too hot or too cold.

There are several factors that influence temperature in workplaces [6]:

1. Air temperature is based on the hot or cold surrounding air.
2. Humidity is the moisture content of the air. In hot situations, high humidity makes people feel hotter than low humidity one.
3. Radiant heat is emitted from anything that is hot, such as sunlight, a furnace or a heater.
4. Wind speed or air speed will in most situations cool a person. This will provide relief to people in a hot situation, but extra chill to people in a cold situation.
5. Our bodies generate heat while doing physical activities; as our level of physical activity increases, so does our heat production.
6. Clothing protects us from our environment to a greater or lesser degree. It can protect us from radiant heat, prevent heat loss, prevent sweating, or help heat transfer.
7. Other factors, such as age, state of health, body build and weight, use of prescribed medicines, use of substances such as alcohol, use of illegal substances such as cannabis etc.

The temperature in the work rooms should be appropriate, always considering the working methods that are used and the physical requirements of the employees.

The temperature in the rest rooms, staff rooms, sanitary facilities, restaurants and first-aid rooms should be adequate, and especially according to the purpose of such premises.

A “thermally comfortable” environment is the ideal thermal environment for people to work in. Not only people perform their work more efficiently, but they are less likely to make mistakes that could result in an accident. The following tables show thermal comfort in different occupations. Table 1: Thermal comfort for people in sedentary occupations and Table 2: Thermal comfort for people in active occupations.

Table 1 Thermal comfort for people in sedentary occupations

Condition	Value	
	Summer	Winter
Air temperature	19 – 24 °C	18 – 22 °C
Relative humidity	40 – 70 %	
Air speed	0.1 – 0.2 m/s, without creating a draught	
Radiant heat	No direct exposure to a radiant heat source	
Clothing	Light clothing	Winter clothing

Source: An Introduction To Temperature At Work, ISSUED BY THE OCCUPATIONAL SAFETY AND HEALTH SERVICE, DEPARTMENT OF LABOUR, WELLINGTON, NEW ZEALAND, December 1997

Most people will be thermally comfortable in the following conditions, as shown in Tables 1 and 2.

Table 2 Thermal comfort for people in active occupations

Condition	Value	
	Summer	Winter

Air temperature	16 – 21 °C	16 – 19 °C
Relative humidity	40 – 70 %	
Air speed	0.2 m/s	

Source: An Introduction To Temperature At Work, ISSUED BY THE OCCUPATIONAL SAFETY AND HEALTH SERVICE, DEPARTMENT OF LABOUR, WELLINGTON, NEW ZEALAND, December 1997

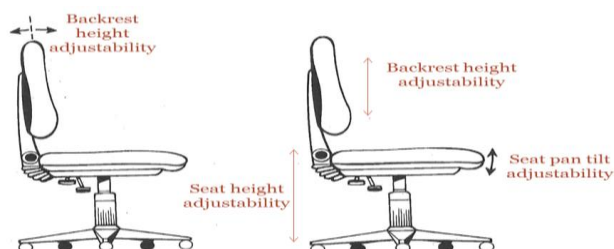
Because of the additional physical activity, it becomes less possible to predict a comfort environment. An increase in air speed up to 0.5 m/s will create a more comfortable environment for people with active work.

3 ERGONOMIC WORKPLACE SEAT

3.1 Seating at work and workstation design

Seating at work seems comfortable compared with other forms of work. However, sitting for long hours is also tiring. Good chairs reduce fatigue, improve work efficiency and increase job satisfaction. Most jobs nowadays require people to sit whilst working. This is partly due to the rapid increase in information technology and mechanisation within business and industry. Unsuitable seating can cause people to adopt awkward postures which can lead to discomfort, back pain and upper limb disorders. This seating problem could bring costly drawbacks for the employers as: staff absences, potential civil claims and lost production.

People find it more comfortable to sit rather than stand whilst working, unless the type of work requires constant stretching or twisting to reach or lift objects. Therefore, employers need to ensure that work is organized in such ways that allows people to be seated wherever possible. In circumstances where sitting is not possible, for instance where work has to be done over a large area or where constant handling of heavy objects cannot be avoided, standing may be preferable [9]. Adjustable office chairs need to be used for proper seating. Office chairs should have the following characteristics (see Figure 3.1) [10]:



Source: Ergonomic guide to computer based workstations, August 2012 Columbia

Figure 3.1 Features of an adjustable office chair.

3.2 Acceptable and proper sitting position when working on a computer

The way of sitting at a computer is shown in Figure 3.2. This is a suitable seating position for the workplace, which offers well-supported positions that can be changed in a convenient range throughout the day [10].

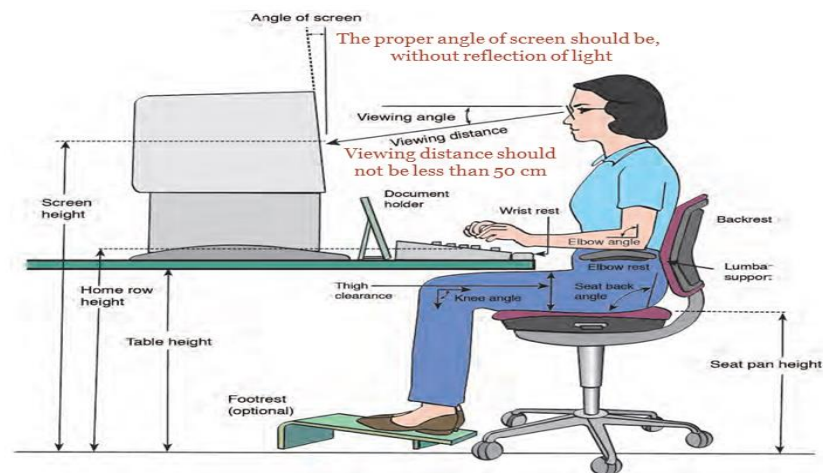


Figure 3.2 Acceptable sitting position at computer workplace.

The provision of ergonomic adjustable chairs i.e. with correct seat heights and good backrests are necessary for every worker. Moreover, these chairs should provide good mobility (Figure 3.2).

When a worker is seated at the workplace with his/her hands on the keyboard, he/she should have his/her shoulders relaxed and symmetrical, head in mid line, head not arched backwards or chin not extended forwards. He/she should also put elbows close to side of the body, wrists in a straight line and not lifted too high, hips slightly higher than or level with knees, thighs not making contact with under-surface of desk, or/and feet flat on the floor or footrest.

Proper sitting position when working on a computer is shown in Figure 3.3 [8].



Source: Ergonomic checkpoints, Practical and easy-to-implement solutions for improving safety, health and working conditions, 2010 International Labour Office • Geneva

Figure 3.3 Proper sitting position when working on a computer

When working on a computer the following proper postures should be achieved [11]:

- ✓ The distance between the screen and the worker's eyes should not be less than 50 cm.
- ✓ The workplace should be stable and should provide a comfortable position and free movement, i.e. displacement.
- ✓ The workplace should allow adjustment of the height of the seating surface, as well as its rotation.
- ✓ The surface of the backrest should be adjustable by slope and height, and should allow elastic support of the spine during its movement.
- ✓ A footpad (45 cm x 35 cm) should be provided for every worker who wants one
- ✓ The workplace should be shaped so that the worker does not work in a non-physiological position.

Prevention is always better than cure. Employers need to be able to spot the signs that suggest that seating is uncomfortable. It is better for employers to take the initiative in providing suitable seating, and not wait until complaints are received, or until workers take time off with back pain. Employers are responsible for health and safety at work. Therefore, appropriate preventive measures if seating is unsuitable or unsafe should be taken.

4 CONCLUSIONS

Practically every developed commercial, industrial, and institutional building in industrial countries in the world have year-round controlled environment. The need for closely controlled environments in residential, commercial, laboratories and industrial facilities has become necessary and it has grown fast. There has also been an increasing awareness of the importance of working comfort and the indoor air quality, considering workers' health and their performance.

Chairs can be critical factors in preventing back fatigue, as well as improving employee performance, efficiency, and safety. People who sit for long periods run high risk of low-back injuries. The risk of back injuries occurs not only to those who lift heavy weights, but also because of inadequate chairs, or from the inappropriate sitting position.

The aim of this presentation was to advise that prevention is better than cure. Based on the above mentioned, the general conclusion is that Heating, Ventilating, Air Conditioning Systems (HVAC) and ergonomic workplace seats are crucial factors that determine the increased productivity at work. They have been designed and simulated in such ways aiming healthy working environments, that is, workers' non-threatening environments resulting in qualitative and quantitative working outcomes.

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The rate of pesticides presence in the grape cultivated in Kosovo

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Abstract

Treating grape with pesticides continues to be a common practice of the farmer to protect the product from various infections. The use of pesticides is as good as harmful for both the product and the human body. The positive side of using pesticides is to protect the product from

infections caused by various injurious. While, the negative side of using pesticides is when farmer use a higher dose than prescribed, these excess doses in grape cause an irregular fermentation process, while in human body, with slow deposition, cause a large number of diseases. By curiosity that does farmer use the foreseen dose of pesticides for treatment, I was inspired to do this research about the rate of pesticides presence in the grape cultivated in Kosovo, respectively in Rahovec. During this research we have assigned two monitoring points at two parcels with minimum and maximum sea level. Two samples were taken for each parcel. The samples were taken in three phases, starting from berry formation, beginning of the aging of the berry and ending with the full technological aging of the grape berry. The method used to measure the presence of pesticides in grape is called QuEChERS (Quick Easy Cheap Effective Rugged Safe) and this method is implemented in the liquid chromatography (LC) device. The objective of this research was to identify the used pesticides doses by the farmer and the absorption of them from grape through the waiting period (karenca) and up to full technological aging of grape, and the results of this research have given us a positive conclusion and expectation that the grape consumer and wine producer are using a safe and free agricultural product from pesticides residues.

KEYWORDS: grape, pesticides, protection, waiting period (karenca), product.

1 INTRODUCTION

Pesticides are substances that are intended to control pests or weeds. The term pesticide includes all of these: herbicides, insecticides, nematocides, termiticides, molluscicides, avicides, rodenticides, bactericides, fungicides, etc. The most common of these are herbicides that account for about 80% of all pesticides use. Generally, a pesticide is a chemical or biological agent (such as a virus, bacterium, antimicrobial or disinfectant) that inhibits, destroys, kills or otherwise discourages pests.

Although pesticides are used to protect many fruits and vegetables, research has been done especially for grape. The question is: Why vine grape should be protected with pesticides? Since the grape vine is a culture of particular interest in Kosovo, it is required to pay special attention to disease and pests. In our climatic conditions, in several years of rainfall, the smut of the vine is a disease that greatly damages this culture, reduces the yield and quality of grapes. In the absence of protective measures, grape production is reduced by 50-80%, where in some vineyards the damage may be much greater.

Signs of smut disease appear in all green parts of the vines, such as: leaves, flowers, branches etc. The first spraying of the vine takes place in the third week of May, while other treatments continue intensifying until the second part of July. The incubation period starts from the infection until the conidiophorm formation in conidia and lasts 5 to 18 days. The duration of the incubation depends on the temperature, humidity and sensitivity of the varieties of the vine. So, based on these informations, the curiosity of the study for the rate of pesticides presence in the grape has been raised, respectively the dose use for the treatment of grape.

2. MATERIAL

2.1. Definition and classification of pesticides

The Food and Agriculture Organization (FAO) has defined pesticides as: any substance or mixture of substances intended for the prevention, destruction or control of any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing damage during or intervening in the production, processing, storage, transport or marketing of food stuffs and agricultural products. The term includes substances intended for use as a regulator for plant growth, defoliant, desiccant or preventing premature fall of the fruit. They are also used as substances applied to harvest, before or after harvest to protect the product from deterioration during storage and transport. A classification of pesticides is also: contact pesticides, non-selective, selective, systematic and biopesticides. Pesticides are often referred by the type of pests

(pesticides associated with the pest type are shown in Table 2.1) that they control. Pesticides can also be considered as biodegradable pesticides, which will be separated from germs and other living beings in harmless compounds or persistent pesticides, which may take months or years before they are separated: was the persistence of DDT which led to its accumulation in the food chain and the killing of birds at the top of the food chain. Another way to think about pesticides is to consider those chemical pesticides derived from a common source or production method.

Table 2.1. Pesticides related to pest type

Pesticides	Action
Algicides	Control algae in lakes, pools, water tanks, and so on
Antimicrobials	Kill organisms that attach to underwater surfaces, such as the bottoms of the ship
Biopesticides	Are certain types of pesticides derived from natural materials as animals, plants, bacteria and some minerals
Biocides	Kill Microorganisms
Fungicides	Kill the fungus
Herbicides	Kill weeds and other plants growing where it is not required
Insecticides	Kill insects
Mithicides	Kill mites that feed on plants and animals
Molluscicides	Kill the snails
Nematicides	Kill a nematode
Rodenticides	Control rats and other rodents
Ovicides	Kill the insect eggs
Microbial pesticides	Microorganisms that kill, inhibit or release from pests, including insects or other microorganisms

2.2. Dangers of using pesticides by direct impact on people and the environment

If pesticide credits include increased economic potential in terms of increasing food and fiber production, and improving disease, then their debts have resulted in serious health implications for human and environment.

Applying pesticides is and will always be destruction. Although growers largely claim that small pesticide dosages are not harmful, scientists put these claims down because even small doses can endanger the health if they consume food with pesticide content for a longer period of time. Scientists have discovered that pesticides can cause a range of health problems and various illnesses such as: diabetes, cancer, autism, obesity, sterility etc.

Pesticide residues refer to pesticides that may remain in food as they are applied in food products. Exposure of the general population to these residues most often occurs through the consumption of treated food sources or by being in close contact with areas treated with pesticides, such as farms or lawns. Continuous chemicals can be exaggerated through the food chain and are found in products ranging from meat, poultry and fish, vegetable oils, nuts and various fruits and vegetables.

Worldwide deaths and chronic diseases due to pesticide poisoning are around 1 million a year. High risk groups exposed to pesticides include production workers, formulators, sprayers, chargers and farm workers. During production and formulation, the likelihood of risks may be higher. In industrial environments, workers are at high risk, as they deal with various toxic chemicals including pesticides, raw materials and toxic solvents.

Pesticides can contaminate soil, water and other vegetation. In addition to killing insects or weeds, pesticides may be toxic to a host of other organisms, including birds, fish, useful insects and unplanned plants. But herbicides may pose risks to non-target organisms.

Pesticides can reach surface water through treated plants and lands. Water pollution from pesticides is widespread. Pollution of groundwater due to pesticides is a worldwide problem. At least 143 different pesticides and 21 transformation products have been found in groundwater, including pesticides from any major chemical class.

3. METHODS

3.1. Place of sampling

The samples were taken in the Rahovec vineyards (the map of the vineyard extension at the altitude in the Rahovec vineyard area is shown in Figure 4.1) stretching between the longitude from east 20°31'4.84'' to west 20°43'52.68'' and from the latitude in south 42°18'53.96'' to the north 42°30'42.19'' while the altitude lies between H = 328m to H=654m. The area of vineyards stretched to these altitudes is S ≈ 2350ha or over 70% of the entire vineyard area on the territory of the Republic of Kosovo. Most of the area around 76% extends in the altitude from 400m up to 500 m, respectively 44.7% at altitude from 400m up to 450m and 31.28% from 450m up to 500m.

Sampling points are:

1. Vineyard with maximum altitude - 654m
 Geographic Longitude 20°36'05.8''
 Geographic Latitude 42°28'03.82''
2. Vineyard with minimum altitude - 328m
 Geographic Longitude 20°35'10.22''
 Geographic Latitude 42°21'39.11''

In the figure below we will also show the vineyards map with the altitude of the locations.

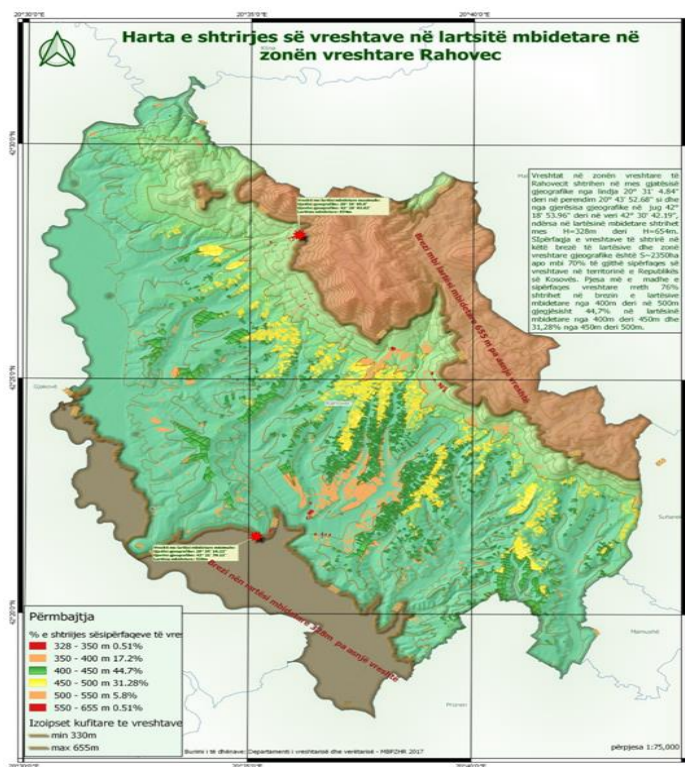


Figure 4.1. Map of vineyard extension at altitude in the Rahovec vineyard area

3.2. Time of grape treatment and dosing of pesticides

When it spoken about the treatment of grapes with pesticides and its protection against various diseases, the treatment time should be known (time of grape vine treatment in 2017 is shown in Table 3.1), the type of preparation as well as the dose used or concentration of the preparation used.

If the concentration of the preparation or dosage used will be above the permitted values, it can affect the human body by causing various diseases, it may also affect the fermentation process, causing an irregular fermentation process.

The table below will show the time, the type of preparation, and the concentration used during the grape treatment.

Table 4.2. Treatments against diseases in grape vines – 2017

Number of treatments	Date of treatments	Preparation	Concentration g/100 L water
1	14.05.2017	Primat	250
		Falcon	40
2	02.06.2017	Neoram	300
		Tilt	25
3	20.06.2017	Aviator	200
		Falcon	40
4	03.07.2017	Neoram	300
		Falcon	40
		Microthiol	300
5	18.07.2017	Antracol	250
		Orius	50
6	30.07.2017	Primat	250
		Orius	50

3.3. Procedure of sampling and transport

Taking a sample is a very important step which affects both positively and negatively in the procedure of their analysis and the final results. In our case we have to do with the grape sample and determine the degree of pesticide residues in it. It is preferred that samples be taken in early morning and in polyethylene bags. If there is no possibility of sampling for sample analysis in the morning when the sample is taken then the sample should be kept in a refrigerator at 4°C.

In our case, the sampling procedure has been respected and is made based on the permissible conditions for grape sampling. To have the best results, the samples were taken at different points of vineyard.

Sampling is done in three phases (shown in Figure 4.2):

1. At the stage of grape grain formation and in the first day of pesticide treatment
2. At the beginning of the baking of grapes
3. At the final stage of technological grape grain baking

The reason why samples are taken in three phases is because we wanted to study the absorption of pesticides from the time of grape grain formation and pesticide treatment to its technological baking and to determine if the farmer refrained from dosing with pesticide.



a)

b)

c)

Figure 4.2. Sampling in: a) first stage, b) second stage and c) third stage

3.4. Analytical techniques and methods for determination of pesticides

The analytical technique that is used is LC-Liquid Chromatography. Chromatography is generally used to separate proteins, nucleic acids or small molecules in complex mixtures. Liquid chromatography (LC apparatus is shown in Figure 4.3) divides the molecules into a liquid mobile phase using a stable stationary phase.

In the liquid chromatography, four types of chromatography are used in which the mobile phase is a liquid: distribution chromatography, adsorption chromatography, ion exchange chromatography and gel chromatography.

The method used to define pesticides is called QuEChERS-Quick Easy Cheap Effective Rugged Safe (the scheme of this method is shown in Figure 4.4).

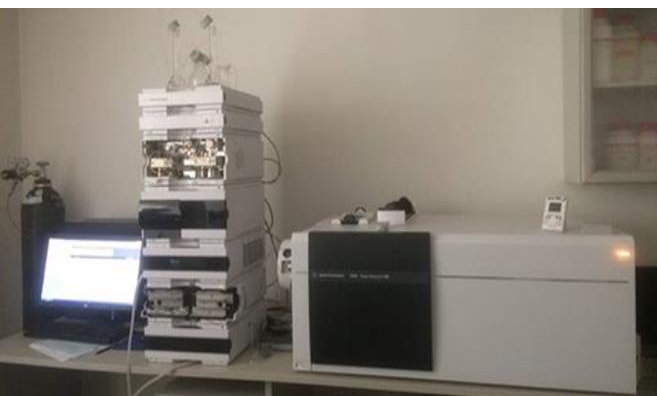


Figure 4.3. LC (Liquid Chromatography)

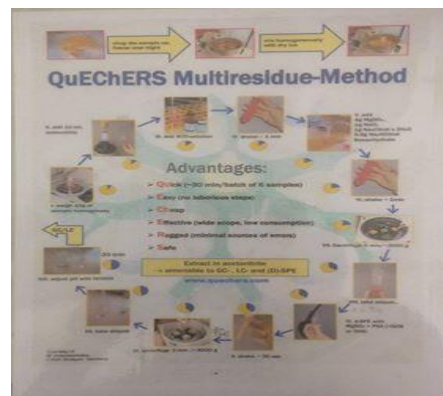


Figure 4.4. QuEChERS Method

4. RESULTS AND DISCUSSION

After the implementation of the experimental part, the results of the presence of pesticides are examined in tabular form, as follows.

Table 4.3. Results of the analysis for the degree of pesticides presence

Variety	Phase	Sample	Pesticides type	Concentration mg/kg	Limits mg/kg
Vanac	I	1	Fludioxonil	0.0001	5.0
			Linuron	0.0001	0.05
		2	Diflubenzuron	0.0001	1.0
			Fludioxonil	0.0001	5.0
			Triadimenol	0.0001	2.0
	II	1	Linuron	0.0001	0.05
		2	Fludioxonil	0.0001	5.0
	III	1	-	0	-
		2	-	0	-

The result of the sample analysis by LC (Liquid Chromatography) shows that the first sample in the first stage results in a concentration of 0.0001 in Fludioxonil and 0.0001 in Linuron. The second sample, in the first stage, results in a concentration of 0.0001 in Diflubenzuron, 0.0001 in Fludioxonil and 0.0001 in Triadimenol. The first sample, in the second stage, results in a concentration of 0.0001 in Linuron and the second sample in the second stage results in a concentration of 0.0001 in Fludioxonil. While, the two samples of the third stage do not present any pesticide residue at all.

Such a fact demonstrates that the dosage of the preparations used has not been exceeded, because it has passed and that these samples will not present a problem during the fermentation process.

Based on the Pesticide Limits Regulation EU-MRLs Regulation (EC) No 396/2005, and by comparing the results obtained with the limits of the regulation, we see that we have not exceeded the limits, which means that all results are within the specified limits.

5. CONCLUSIONS

At the end of the analysis, we have come to the conclusion that in the parcels investigated, we have not encountered, luckily, the presence of pesticide residues, although in some samples we have a very small concentration that results in standard values. This makes us realize that the farmer has respected the rules of use of the preparations and their dosage. If, at the end of the analysis, we would result in a concentration of pesticide residues beyond the limits, then this suggests that the farmer applied an uncontrolled dose of the preparations and continued treatment without adhering to the condition of the preparation.

So if we had results with concentration beyond the reference values of pesticides in table grapes, this would negatively affect the human body, but, if we have results with concentration beyond the reference values of pesticides in wine grapes, this will affect an irregular process of fermentation, causing in some cases the stagnation of it.

The results obtained from the analysis, also, not only enjoy us but also encourage us that the products obtained from our vineyards are of a high quality and thus, the grape products of Kosovo, without hesitation, can be competitive in the European Union (EU) market.

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TAX SYSTEM AND RATES IN THE REPUBLIC OF KOSOVO AND THEIR COMPARACION WITH THE BALLKAN COUNTRIES

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ABSTRACT:

In order to understand the functioning of the tax system and tax rates, we have elaborated the issue and the importance of the state budget revenues creation. During the research, we have noticed that changes in tax rates, expansion of the taxable base, and creation of conditions for economic development which have been constantly changing in Kosovo and Balkan countries. Although the tax system in Kosovo is new, it is competitive not only in the region but even beyond it. In the new fiscal package of 2015, tax rates had changed. Personal Income Taxes have reduced some of the revenues, corporate taxation up to 10%, insurance companies 7% to 5%, VAT is applied with two tax rates 18% and 8%. Balkan states have significant differences in tax rates, but not in tax systems. In some taxes, high rates have already been set, while in some countries there are lower rates. It is characteristic and interesting that the tax systems of these countries have been constantly reformed, reducing tax rates and redefining the tax base.

Key words: Taxes, tax rates, tax system, reforms and comparison

1. INTRODUCTION

In this paper we present the functioning of the tax system in the Republic of Kosovo and comparison of tax rates with Balkan countries. The paper continues dealing with the tax system and norm, where many economists and financiers from different countries have taken up this issue. In the continuation of the work, the focus of addressing this problem will be related to

the process of building and developing the tax system in Kosovo starting with customs, excise, presumptive tax, value added tax, income tax, corporation tax, property tax and contributions. In the continuation of the paper we will analyze the development and functioning of the tax system in the Balkan countries to debate the tax rates, the effects of this system on the development of certain sectors and the economy in general.

2. PURPOSE OF TAX SYSTEM

Existence and functioning of tax types in different countries regardless of the level of economic development, form the tax system where certain goals are achieved. Through the tax system, the collection of financial means on setting up budget revenues, the financing of economic and functional categories, development of the economy, improvement of its structure, alleviation of social effect and other problems. For the purposes of taxation, many authors from different countries have been taken into consideration, depending on economic and financial developments, especially those who pay great attention to taxation. The tax system represents all taxes levied in a co-existent country with which the fiscal policy goal can be applied. Taxes are one of the forms through which the state earns revenue. Hence, it follows that the purpose of the tax is to collect the financial means for the benefit of the state that is needed to finance their functions.¹

Taxes are one of the forms through which the state earns revenue. Hence, it follows that the purpose of the tax is to collect the financial means for the state that are necessary for the financing of their functions².

With other taxation policies, other objectives can be achieved in the economy by making allowances or discounts, benefits for certain products and certain sectors of the economy. With the tax system, the government can achieve other goals by protecting the economy from external competition. This is reflected in some economic branches, both industrial and agricultural. The place and role of any of the taxes is not the same and depends on many factors that governments decide to build the country's tax system. In this context, the author emphasizes two purposes of taxation and they are fiscal and non-fiscal purposes³.

The study of tax purposes is closely related to the study of the role of the state. With the expansion of the state's role, money needs also increased. Apart from the financing of increased state expenditures, taxes are increasingly being utilized for the realization of other purposes that can be taken as fiscal purposes of taxation⁴.

To better understand the characteristics and essence of taxation, we are examining the tax system issues and the tax rates that determine the tax policies in Kosovo by comparing with the Balkan countries.

3. TAX LEGISLACION AND TAXASION POLICY IN KOSOVO

Since the end of the war in 1999, a new era has begun in the Republic of Kosovo in the political, economic and budgetary terms. Through system laws, the types of taxes that make up the tax system function. Tax instruments operate on the basis of the policies in which they are applied, which are harmonized with the regulations, guidelines and laws approved⁵.

¹ Limani, M. (1994). Politika ekonomike, faqe 128, Prishtinë, 1994.

² Komoni, S(2008). Financat Publike, faqe 47, Prishtinë.

³ Brajshori, B. (2014). Financat Publike, faqe 105, Prishtinë.

⁴ Jelçiq, B.(1985) Shkenca mbi financat dhe drejta financiare, faqe 204, Prishtinë

In Kosovo, the tax system is administered by the Tax Administration of Kosovo, established in January 2000, under the administration of UNMIK, and from February 2003 the powers are transferred to the Ministry of Finance. From July 2001, VAT is applied, part of the tax burden goes to customers. Since 2002, the Wage and Income Tax applies. From January 2005 Pre-tax, Income Tax and Income Tax is replaced with Personal Income Tax (PIT), which includes natural persons and corporate income tax (CIT), legal entities.

3.1 CUSTOMS AND EXCISE

Customs are fiscal instruments that through state procedures collect funds at the moment of importation and exportation when goods are transferred from another country. Customs is a government agency that collects duties and controls the goods from the customs territory. In Kosovo, customs operate since 1999. UNMIK Regulation no. 1999/3 and the Administrative Direction. Taxes and procedures are defined in the Customs Law. All goods of any kind intended for Kosovo and not subject to any import ban shall be subject to a customs duty of 10% with the exception of goods for which the customs duty is equal to 0%⁶.

Excises are a special type of tax for certain types of products. With the calculation of excise duty, the taxable value of the goods shall consist of the total customs value plus customs duties, the value accruing from the retail price, including customs duties and excises⁷.

Excise duties are charged special products, specific is that although the rise in the price of the product does not significantly affect the decline in consumption. In the framework of reforming the tax system, 2009, changes were made in customs and excise, the Customs and Excise Code was approved.

3.2 VALUE ADDED TAX (VAT)

VAT is a special type of turnover tax set at each stage of the production and distribution process. In the cleanest form, VAT is a tax on all final expenditures for goods and services that is delivered to the final customer. Applies to products that go through production and distribution stages, from raw material to final products and to sales. In practice, VAT has substantial deviations because there are different degrees, exceptions for certain goods and services. With the Law on VAT, the tax rate was 15%, since 2009 was 16%⁸, is applicable from January 1, 2009, and is applicable from 1 January 2010⁹.

The most recent reforms were implemented from 01 September 2015 through the new Fiscal Package including VAT, PIT and CIT, where VAT rates are 8% and 18% depending on the supply of goods or services¹⁰.

3.3 PERSONAL INCOME TAX (PIT)

The application of personal income tax in practice is a direct tax. TAP applies resident and non-resident persons, enterprises, partnerships and companies that generate gross income.

Personal Income Taxes are charged by these levels and sources of income¹¹:

1) For taxable income 960,00 € or less, zero%, taxable income 960,00 € up to 3,000.00 €, including the amount of 3,000.00 €, 4% of the amount over 960,00 €, for taxable income of over € 3,000 to € 5,400.00, including the amount of € 5,400.00, € 81.6, plus 8% of the amount over € 3,000.00 and for taxable income over € 5,400, 00 €, 273.6 € plus 10% of the amount over € 5,400.00.

⁵Tax Legislation of Kosovo, Publication I, 2016, TAK, Pristina.

⁶ Customs and Excise Code, November 11, 2008

⁷Regulation on excise tax.2000 / 2, dt, 22.01.2000.

⁸Law no. 03/ L-144 on value added tax

⁹Law no. 03 / L-146 on value added tax.

¹⁰Law no. 05 / L-037 on Value Added Tax

¹¹Law no. 03 / L-161, Law on Personal Income Tax

2) Gross income from business activities with gross annual income over 50,000.00 €, who choose to keep books and businesses less than 50,000.00 €, who do not choose to keep books, 3) Gross income from rents, 4) gross income from intangible property, 5) gross income from interest, and 6) other income, gifts from any source. With the recent reform of the personal income tax, taxes on interest, rent taxes, gambling, capital gains, sale of intangible property etc. have also decreased¹².

3.4 CORPORATE INCOME TAX (CIT)

In the course of the construction of the tax system there is also profit tax¹³.

Profit tax is a corporation tax rate applied to the rate of 10 percent, for all economic activities and 5 percent for insurance and reinsurance companies¹⁴.

Profit tax is payable by corporations that realize turnover in excess of 100,000.00 € and those that possess assets in the amount of 50,000 €. Previously it was applied only to large corporation tax profits¹⁵.

With the new reforms, Corporate Income Tax, in the calendar quarter are obliged to pay these taxpayers:

1. Taxpayers with annual gross income up to € 50,000.00 or less, who are not required to submit their annual declaration:

2. Criminal taxpayers exceeding the amount of € 50,000.00 and taxpayers who have to compile financial statements:

- a quarter (¼) of the tax liability for the following tax period based on the estimated and reduced taxable income, whichever is severely withheld during the quarter or for the second period, the following tax periods for which the taxpayer makes the payment, at least one quarter (¼) of 110% of the tax liability reduced by any amount held at source during the quarter. TAP includes all small corporations that are themselves subject to real-estate tax, applied only to gross corporate sales¹⁶.

3.5 CONTRIBUTIONS

Contributions are non-fiscal instruments, ie the obligatory take-over of a portion of the profit realized by certain individuals. Contributions are paid in special funds, in a certain social program, eg. health insurance, pensions or social security and unemployment. In the countries of the region, two pension systems, investment systems and transfers are applied:

1) PAYG Transfers System or Scheme, applied by some states, known as the Pay As You Go system. This system is based on the transfer of pension funds, (the Balkan countries applying the pension scheme are: Bulgaria applies since 2000, Croatia 2002 and Macedonia since 2005).

2) Investment system or investment-based pension scheme (The Transfer Scheme of Transfers applies to these countries in the region, such as: (Albania, Montenegro, Bosnia and Herzegovina and Serbia).

Collective contributions are made by the employer and the employee by 5% of the salary. Voluntarily can contribute, up to 10% of the annual salary, to a total of 15% of the salary.

4. TAX RATES IN KOSOVO

¹² Law no 05/L-028 on Personal Income Tax.

¹³ Regulation no. 2002/3 on Profit Tax in Kosovo.

¹⁴ Law no. 05 / L-029 On Corporate Income Tax.

¹⁵ Regulation no. 2004/51

¹⁶ Law no. 03 / L-162 Corporate Income Tax.

Based on the established tax policies, the various contemporary countries, in their tax systems, set the tax rates. Tax rates are set by percentage, which represents the ratio between the tax and the tax base, which serves to set the tax rate. In Kosovo, along with the development of the tax system, we have dynamics of tax rate changes.

Change of tax rates, period 2005 to 2018

Table 1

No	Taxes	2005	2009	2015 - 2018
1	Personal Income Tax (PIT)	0 - 960€ - 0%, 960 - 3000€ - 5% 3000€ - 5400€ - 10% mbi 5400€ - 20%	0 - 960€ - 0%, 960 - 3000€ - 4% 3000€ - 5400€ - 8% mbi 5400€ - 10%	0 - 960€ - 0%, 960 - 3000€ - 4% 3000€ - 5400€ - 8% mbi 5400€ - 10%
2	Corporate Income Tax (CIT)	20%	10%	10%
			7% Assurance compensation	5% Insurance company
3	Value added tax VAT	15 %	16%	8% dhe 18%

Source: Processed data based on tax legislation in force.

In Table 1 we see that Kosovo has made some progress in reforming and functioning of the tax system. Setting new tax rates to some extent has also impacted on budget growth and economic growth in the country¹⁷.

In order to reflect the effects of taxes on economic development, reforms are made both in the system and in tax rates. The changes have influenced the growth of National Revenues, economic growth, and increased budget revenues¹⁸. In this regard, the changes in tax rates in all modern countries create ideal conditions for foreign investors that affect economic development in general¹⁹.

5. CHARACTERISTICS OF THE TAX SYSTEM IN BALKAN STATES, DIFFERENCE AND COMPARISON BETWEEN THESE COUNTRIES

Major political and economic changes occurring in the 1990s in Europe and beyond have been accomplished with many objectives that have been reflected in the countries of the region in many aspects and directions, especially in the political, economic and financial aspects. Politically, the reforms have influenced the development of democracy, economic freedom is spreading and in fiscal policy the fiscal system has been developed and reformed, with the developed European countries. While in the Balkan countries, there are approximately the same tax systems, while with their policies there are significant differences in the establishment of norms. Total tax rates are counted as tax, tax, and contribution charges, to be calculated and paid by businesses and individuals. This burden shows the weight that a country's fiscal policy puts on residents and non-residents. Withholding tax (such as salary tax) or tax and tax collected with tax agent (VAT, sales tax) are excluded²⁰.

In the Balkan countries, there are three main types of taxes: Personal Income Tax (PIT), Corporate Income Tax (CIT) and Value Added Tax (VAT) as well as Social Security Contributions (SSC) and Health Insurance Contributions (HIC). Personal Income Tax (PIT), Albania, Bosnia and Herzegovina, Macedonia and Montenegro apply the flat tax. In Albania it has been applied since 2007, replacing the progressive tax by up to 30%. At the same time, Macedonia has passed a flat tax since 2007. Montenegro also applies the flat tax 9%, from 2009 to 12%. Croatia and Serbia, apply the progressive tax. In Croatia, PIT is escalating from 15% to 45%. In Serbia the basic rate is 10%, but the self-employed pay 12%²¹.

¹⁷Kryeziu, R. (2011). *Ekonomia Kombëtare. Përspektivat e zhvillimit ekonomik të Republikës së Kosovës*, Prishtinë.

¹⁸Kryeziu, (2014). *Financat Publike*, faqe 154, Prishtinë

¹⁹ Kryeziu, R. (2009) Foreign direkt investmens in the Republic of Kosova and their impact in economic development. Iternacional Conference, Management Challenges during Tranzition, 28-29 prill, pp. 323, Faculty of Economy, Universty of Tirana.

²⁰ Gjokutaj, E. (2016) Barra tatimore dhe lira fiskale ne Ballkan, Shqiperi dhe Kosove, 2016 Qendra Altax Studime Fiskale Shqiptare Edicioni 5^{të}, Prill, Shqipëri.

²¹Pere E. Hashorva, A. (2011). Tax Systems in West Balkans Countries- Between Simplicity and Efficiency. *Romanian Economic and Business Review* 6 (2), 80.

Corporate Income Tax (CIT) rates differ in Balkan countries. In Albania there is 15%, Macedonia 10%, Montenegro 9%, Serbia 15%, Kosovo and Bosnia with 10%²².

Tax rates in Balkan countries for 2016

Table.2on %

No	States	VAT	TAP	PIT	Social and health insurances		
					Total	Employer	Employee
1	MACEDONIA	5,18	10	10	27	0	27
2	KOSOVO	8,18	10	10	10	5	5
3	CROATIA	5,13,25	20	47,2	37,2	17,2	20
4	MONTE NE	19	9	9	32,8	9,3	23,5
5	BOS-HERC	17	10	10	41,5	10,5	31
6	BULLGARI	9,20	10	10	31,4	18,5	12,9
7	ALBANIA	20	5,15	13,23	27,9	16,7	11,2
8	SERBIA	20	15	15	37,8	17,9	19,9
9	ROMANIA	2,9,20	16	16	54,5	38,45	16,05
10	GREECE	6,13,23	29	46	40,06	24,56	15,5

Source: TAX BAR AND FISCAL FREEDOM IN BALKANS, ALBANIA AND KOSOVO, 2016.

In table 2. We note that in the Balkan countries, in 2016, we have differences in tax rates. Above average, VAT has Croatia and Greece, below Kosovo 18% and 8%, Bosnia and Herzegovina and Montenegro. Albania 20%, Macedonia 18% and 5%, Montenegro has 19%, Serbia 20%, Bosnia 17%. For tax on profit, the tax rates in the Balkan countries over the average are Greece with 29%, Croatia with 20% and Romania with 16%, below average have Montenegro, Kosovo, Macedonia and Bosnia. Albania operates with a tax rate for profit, between the highest and the lowest. For personal income tax (including tax at source) Greece, Croatia have the highest tax rate, Romania is close to 16%. The lowest level is Kosovo, Albania, Macedonia, and Bosnia. For social and health insurance contributions, Romania, Greece, Serbia, Bosnia, Croatia and Montenegro have the highest rates. Social and health insurance contributions in Romania are 54.5%, employers with 38.45% and employees with 16.05%. In Albania, social security contributions paid by the employer are 15% and the employee 11.20%. Macedonia has all the burden transferred to the employee with the level of 27%, Montenegro 5.50% and 24%. In Serbia, the employer pays 17.9%, while the employee is 19.60%. In Kosovo, the employer pays 5% and the employee 5%, in Bosnia the employer pays 10.50%, while the employee is 31%.

6. CONCLUSION

One of the objectives of the tax policy and system in Kosovo and the Balkan states is to adapt to the position of national economies and the functioning of their tax systems in a continuous manner, they should improve and design their tax policies, which we consider it a good way and way for state governments to advance their tax systems and thus to develop public finances in order to be competitive with the economies of the region, the European Union and beyond. As noted in the paper, we conclude that the governments of some Balkan countries need to reform their tax systems for the sake of consolidating their system and to improve the quality of taxation compared to those currently in force.

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Technological Change and Unemployment in Developing Countries – the Case of the Republic of North Macedonia

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ABSTRACT: Technological advancements and inventions are considered as key factors of

economic growth and development. There is a huge difference between the levels of technologies used across countries. Because of their increased access to education and opportunities, developed countries are more likely to use modern technology. Those countries can easily adjust their labor market and entire economy to the changes. Additionally, developed countries are significantly more competitive because of their high-tech sectors, which increase productivity and efficiency. On the other hand, developing countries find some difficulties in the process of implementing modern technologies. Moreover, developing countries have problems related to the labor market and its adaption to the technological changes, especially because developing countries have high unemployment rates. High unemployment causes additional social and economic problems like social gaps between social groups, limited access to high-level education and poverty. This paper offers an analysis of possible approaches to reducing the unemployment by an increased use of high technologies in developing countries, with particular reference to the Republic of North Macedonia. The main reforms required are related to education, self-employment in technology-oriented businesses and financial support. These reforms should reduce unemployment and solve labor market failures by using the opportunities offered by high technology.

Keywords: Technological Advancements, Education, Economic Growth, Labor Market, Developing Countries

Over the past decade, huge attention was devoted to technological change because of its implications on the economic growth. Many economists provide empirical evidence that technological change boosts the economic growth and reduces the unemployment rate because of the increased productivity and efficiency. However, some economists argue that technological change has an insignificant impact on the unemployment rate or even increases it.

In the 1960s, the relationship between unemployment and output growth was documented by the economist Arthur Okun, who suggested a negative relationship which became known as Okun's law [7]. According to Regaldo (2012), the implementation of high technology allows access to affordable and powerful tools that cause massive increases in productivity. Since massive productivity increases the output, based on the Okun's law, the unemployment rate will decrease.

However, there are contradictory analyses which suggest that the introduction of high technology can have a negative effect on the unemployment rate. In other words, the introduction of high technologies and digitalization of manufacturing processes may cause "destruction of jobs", e.g. according to Massa (2015), the technological change allows producing the same amount of goods with a lower quantity of inputs, namely labor and capital. Feldmann (2013), stated that faster technological change is likely to increase unemployment substantially. The adverse effect on unemployment appears to persist for three years and to disappear later on, so the effect is transitory, not permanent. Due to the skill gaps between labor supply and demand, labor supply cannot adjust to the technological change. Once the reallocation of labor is complete, the unemployment may even fall below that level, because the firms will take a full advantage of their improved international competitiveness. According to Keynes (1930), that is "only a temporary phase of maladjustment", or a "technological unemployment".

As countries differ by their economic growth, they also differ by the technology level they implement in their work processes, their unemployment rates and educational systems. Advanced economies implement high technology in their work processes and constantly adjust to the changes, which is mostly due to their better educational systems. Moreover, developed countries have low unemployment rates.

On the other hand, developing countries have high unemployment rates and low level of technology use in their work processes. Additionally, the lack of education or low quality education affect their technology implementation and unemployment rates. Because of lack of education, young people cannot be employed in jobs where knowledge about modern technologies is required. The lack of any employment opportunity for young people may cause tremendous disenchantment and frustration, which could lead to social disruption [21]. However, if countries are facing population ageing, the use of modern technologies may cause problems for older employees because of their learning abilities.

Based on previous studies and analyses, this research applies a panel data approach to find if there is any significant relation between technology change and unemployment rates. The second objective is to explain some possible approaches to implementing technology without unbalancing the labor market in developing countries, with particular reference to the Republic of North Macedonia.

2 LITERATURE REVIEW

The literature review can offer a useful theoretical context of previous researches on technological changes and their impact on the labor market. The role of this research is to consider an empirical model, so the theoretical part is limited to the most important research related to technological change and labor market.

In the early 1800s, David Ricardo agreed with a short excerpt he read from Adam Smith's "The Wealth of Nations", which held that machinery helped provide for the division of labor and bolstered economic growth by lowering the cost of goods [13]. However, according to Pressman (2014), (as cited in Barry and Aho, 2016), Ricardo later came across a pamphlet written by John Barton in 1817 which caused him to change his mind, and see a gloomier future, because capitalists would make higher profits by hiring fewer workers and investing more in machines.

Keynes (1930) defined the technological unemployment or unemployment due to our discovery of means as economizing the use of labor which outruns the pace at which we can find new uses of labor.

Based on their theories, empirical evidence for correlation between the technological change and unemployment rates was found by many economists. For instance, Feldman (2013) examined if there was a correlation between the ratio of triadic patent families to population as a measurement of technological change and employment. As it was explained before, he found a negative correlation in the short term, but he also explained that there was no long-term effect.

Bogliacino F. and Vivarelli M. (2010) found a relation between technological change (proxied by R&D expenditures) and employment. They find that R&D expenditures (which are good predictors of product innovation) may have a job-creating effect in the European manufacturing and service sectors.

Morrison Paul and Siegel (2001) found that technological innovation increases the relative demand for skilled workers, i.e. that there is a positive correlation between IT investment and labor demand.

Goux and Maurin (2000) examined the correlation between new technology and change in labor demand and they found an insignificant impact of 15% of the new technology on the change in labor demand. Bogliacino, Piva and Vivarelli (2011) found a statistically significant relation between the R&D investments and labor demand, meaning R&D expenditures are beneficial not only to the European productivity and competitiveness, but also to the European job creation capacity.

Cang Y. (2017) does not find a significant relationship between technological innovations and unemployment on an aggregate level. This research proves that some states are affected by technological changes more than others. More specifically, states that are less tech-savvy are suffering more by the job displacement effect.

Piva & Vivarelli (2018) found a significant labor-friendly impact of R&D expenditures, which are particularly related to product innovation. According to their research, the positive employment effect appears to be entirely due to the medium-and high-tech sectors, while no effect could be detected in the low-tech industries.

Boone (2000) presents that technology innovations raise the wages, so firms overinvest in innovations, thus cutting their labor costs, and as a result, higher technology increases the unemployment and lowers the welfare below the social optimum.

3 DATA AND METHODOLOGY

In this study, an unbalanced panel with 30 European countries is used and the data is based on annual frequency for 2000–2017. The data was extracted from the World Bank database. The panel consists of Luxembourg, Ireland, the Netherlands, Austria, Denmark, Sweden, Germany, Belgium, Finland, the United Kingdom, France, Italy, Spain, Cyprus, Malta, Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Macedonia, Moldova, Montenegro, Poland, Romania and Serbia.

The dependent variable is the unemployment rate, (as a percentage of the total labor force). As independent variables, the following are considered: the Government expenditure on education, total (as a percentage of GDP), Foreign direct investment, net outflows (as a percentage of GDP), Foreign direct investment, net inflows (as a percentage of GDP), GDP per capita, PPP (current international dollar), High technology exports (as a percentage of manufactured exports), Researchers in R&D (per million people), Research and development expenditure (as a percentage of GDP).

In this research, a basic regression equation for two groups of countries, developed and developing, classified by their annual GDP is used. The regression model is defined as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i + u \quad (1)$$

where Y is the dependent variable, and the values of the β coefficients represent the proportional changes in the dependent variables, which are due to the changes in independent variables. The value of u represents the error, that is, the residual in the model.

For the second econometric model, a panel model for the entire sample is used. According to Hsiao (2007), the panel data involve at least two dimensions, a cross-sectional dimension and a time series dimension. Panel data contain information on both the intertemporal dynamics, while the individuality of entities may allow one to control the effects of missing or unobserved variables.

The panel dataset analyzed has a short time dimension ($T = 17$) and a larger country dimension ($N = 30$), and has time-invariant country characteristics (fixed effects). According to Mileva (2007), the fixed effects are contained in the error term in equation, which consists of the unobserved country-specific effects and the observation specific errors. As Roodman (2006) claimed that the Arellano – Bond difference GMM estimator can be used when the N is larger than the T, the best solution in this research is to use the GMM model at first differences. The basic equation of the Panel Generalized Method of Moments model is:

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \Delta x'_{it} \beta + \Delta u_{it} \quad (2)$$

Before the GMM estimation, a unit root test was used so that we can assure that the variables are stationary. In this research, the ADF-GLS test is used, which is another modification of the Augmented Dickey-Fuller test and also known as the ERS test [13]. This test was used to utilize the detrending transformation [3].

Moreover, a Granger Causality test was estimated as a most suitable econometric model for linear prediction. Granger causality is not causality in a deep sense of the word. It just talks about linear prediction, and it only has “teeth” if one thing happens before another

[31]. In this research, a multivariate Granger-causality test including more than two variables is used.

Before analyzing the results of the model, it should be noticed that the model has its own limitations:

1. Because of the data unavailability for all countries, as a single indicator for education the Government expenditure on education is used;
2. Because of the insufficient data, the GMM estimator was pooled on the entire sample and a comparison between the developed and developing countries was not estimated.

4. RESULTS AND DISCUSSION

4.1 Result discussion for the Multiple linear regression model

According to the results, the coefficient of determination for the developing countries is higher than the coefficient for the developed countries. That means that 46% of variations of the unemployment rate of the developing countries and 37% of variations of the unemployment rate of the developed countries are explained by the variations of the indicators used.

Table 10 Results from the Multiple linear regression models

Variable	Developing countries	Developed countries
HTE	-0.280666** (0.0144)	-0.229299*** (0.0000)
LR_D	4.062374 (0.3575)	7.954095*** (0.0000)
RDE	9.930427* (0.0910)	-5.244618*** (0.0000)
LGDP	-12.34459*** (0.0012)	-7.469240* (0.0139)
GEE	-3.601205*** (0.0001)	-0.377818 (0.3507)
FDO	0.465713 (0.2576)	-0.008609 (0.6604)
FDI	-0.454249 (0.2765)	0.013901 (0.6371)

1. Based on the regression equation for the developing countries, a 1% increase in the GDP and GEE will cause 12% and 4% decrease in the unemployment rate, respectively. However, a 1% increase in the RDE as an indicator of technology change will lead to 10% increase in the unemployment rate.

This shows the important relation between education, economic growth and unemployment rate in the developing countries. On the other hand, it also shows a possibility of a higher unemployment rate caused by the increase of RDE.

2. Based on the regression equation for the developed countries, it can be noticed that a 1% increase in the RDE and GDP will lead to a 5% and 7% decrease in the unemployment rate, respectively. On the other hand, a 1% increase in the R&D will cause a higher unemployment rate by 8 percent.

Unlike the developing countries, the GEE variable does not show significant results for the developed countries.

4.2 Panel Generalized Method of Moments at First Differences for the entire sample

The results from the Panel unit root tests indicate a failure to reject the null hypothesis by the majority of variables. However, at the first difference, all of the variables rejected the null hypothesis of a unit root.

Table 11 Unit root results

Test determinants	ADF - Fisher Chi square	
	Stationarity Level	Stationarity 1st difference
UNEM	0.1817	0.0017
FDI	0.0000	0.0000
FDO	0.0000	0.0000
GEE	0.2412	0.0000
HTE	0.0839	0.0000
LGDP	0.6242	0.0001
R_D	0.8345	0.0024
RDE	0.0470	0.0000

According to the multivariate Granger Causality Tests showed in Table 2, we fail to reject the Null hypothesis for almost all tests. The only statistically significant relation was detected between the RDE and Unemployment rate. That means that a change in the Research and development expenditure as a percent of GDP had a significant impact on the Unemployment rate.

Table 12 Pairwise Granger Causality Tests

Granger Hypothesis	Result
DRDE does not cause DUNEM	3.61239 (0.0157)
DLR_D does not cause DUNEM	1.26477 (0.2909)
DHTE does not cause DUNEM	0.43068 (0.7313)
DLGDP does not cause DUNEM	1.24396 (0.2952)
DGEE does not cause DUNEM	0.51965 (0.6705)
DFDO does not cause DUNEM	0.00749 (0.9991)
DFDI does not cause DUNEM	0.31758 (0.8127)

The estimation results in which we employ the GMM first differences model are showed in Table 3. The interaction terms between the Gross domestic product and Unemployment rate measures have a negative and significant coefficient. The estimated coefficients imply that an increase in the RDE leads to an increase in the Unemployment rate. This estimation is significant at level $p < 0.1$.

Table 13 Results from the PGMM model

Variable	Coefficients and P values
HTE	0.080384 (0.1725)
LR_D	-1.834982 (0.1292)
RDE	3.485947* (0.0803)
LGDP	-12.83990*** (0.0057)
GEE	0.136939 (0.2089)
FDO	-0.005570 (0.7323)
FDI	0.008997 (0.7322)

The Arellano – Bond test for autocorrelation that is estimated in this analysis has a null hypothesis that assumes no autocorrelation and it is applied to the differenced residuals. According to Mileva (2007), the test for AR (1) process in first differences usually rejects the null hypothesis. However, the test for AR (2) in first differences is more important, because it will detect an autocorrelation in the levels. The absence of a second-order serial

correlation provides additional evidence that the use of lags is valid [12]. In our case, at the AR(2) in first differences, the probability is 0.4027, which indicates that there is no correlation and that the use of lags is valid.

4.3 The case of the Republic of North Macedonia

Macedonia is a developing country that has a technological lag in all the components except for the usage of mobile phones and personal computers. In addition, according to the Growth Competitiveness Index, Macedonia is found at the bottom of the region [19]. The unemployment rate is high and in 2017, it amounted to 22.4% (State Statistical Office of the Republic of North Macedonia). This rate is higher than the South Europe's average rate of 15.9% and EU 28 average rate of 7.6% (International Labor Organization). Moreover, the population is ageing and the introduction of modern technology may cause problems for elderly workers.

According to the empirical evidence in this paper, the policy recommendations are toward a better educational system that could help the process of adjusting between the labor supply and the labor demand which encompasses knowledge in technology.

As the labor supply in the developing countries has financial difficulties to afford supplementary training, the access to higher education should be promoted and supported by the policy makers. Increasing the access of high-level education can be provided by financial assistance, training grants or career development loans. The main objective of the labor market training is to enhance the productivity and employability of participants and to enhance human capital by increasing skills [18]. Furthermore, as online courses can be very useful and affordable, they should be promoted among young people in order to educate them about the advantages of using modern technologies. Technologies are radically changing the access to information, and E-Learning has been spotted as the solution to the growing needs of education [33]. According to Arkorful & Abaidoo, (2014), the adoption of e-learning in education has given its several advantages and benefits, and it is considered among the best methods of education. E-learning is cost effective in the sense that there is no need for students or learners to travel. It is also cost effective in the sense that it offers learning opportunities for a maximum number of learners.

The second policy recommendation is to encourage young people to self-employ. Small businesses can become very successful if young entrepreneurs take advantage of all

the opportunities that modern technologies can offer. Young people should be more innovative and focus on businesses related to the IT sector. For example, they can invest in a business related to Video Production, Web Design, IT support, Online Consulting, Online Marketing, App Development Service, E-Library, and Ecommerce Platforms etc. This business can be very challenging and attractive to young people because of the global access, cost savings, outsourcing services, flexibility, faster service and most importantly high productivity [20].

5. CONCLUSIONS

Introducing high technology in the developing countries can be crucial for their productivity and international competitiveness. However, according to the previous literature review and empirical evidence, increasing high technology in work processes can have negative implications on the unemployment rate in the short term.

Consistent with what was obtained by the previous theoretical and empirical literature, it is found that the R&D and RDE as indicators for technological change may increase the unemployment rate. However, higher GDP and GEE can decrease the unemployment rates.

Hence, a cautious approach through better education and self-employment in IT sectors would adjust the labor market to the technological changes, and it would mitigate the negative effect on the unemployment rate as a consequence of rapid technological change.

As a developing country, Macedonia should increase the use of high technology in order to increase its productivity and international competitiveness. However, in order to support sustainable development and reduce the unemployment rate, policy makers should consider the measures suggested for adapting the labor market to technological changes.

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ROLE OF MARKETING IN THE PRODUCTION AND SALE OF KOSOVO WINE

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ABSTRACT: From the marketing context the wine is a specific product of the agricultural branch in Kosovo, while from the standpoint of consumption is relatively low, whereas applying the marketing concept wines represent a relatively representation most important export of Kosovo. At the same time, the presence of vineyard and vinery areas in Kosovo present a very important resource in southern part of the economic region of Kosovo, with particular emphasis on Rahovec, Suhareka, Prizren, Gjakova, and Malisheva. These cities represent the importance for this production and the greatest absorption of workforce in the branch of agriculture, as the segment that generates of the economic development of the region and of Kosovo in general.

The aim of this paper, on one hand is to research, see and scientifically verify the importance and application of the marketing concepts with contemporary methods. This will improve growth sales and consumption of wines and on the other hand, to recommend what's necessary to make important improvements concerning the quality of wines, promotion of sales channels, the export flow of wine and the deficiencies observed in promoting wines in foreign markets. Wine production in Kosovo has a thousand-year-old of inheritance, as a traditional branch of agriculture, with a steady export performance with a tendency of growth, which should continue to contribute in the development of the southern economic region of Kosovo, but also in the overall economy of the country. Therefore, one of our most important goals is improving marketing activities thus far and especially transforming weaknesses into strengths in order to have quality wine producing, as well as placing it in the domestic and global market.

KEYWORDS: marketing, promotion, wine, production, selling, agriculture, economic development.

1 INTRODUCTION

The end of the second millennium presents the years of great expectations and at the same time the anxieties and big challenges. In this context, in front of us are found great opportunities in identifying and implementing the marketing concept. The end of the cold war enables in many countries the unblocking of the tools for infrastructure construction and material goods that are more than necessary.

Many Western European countries are fleeing with quick steps toward their goals, to become the largest common European market with over 500 million consumers. The Kosovo's economy (wine sector) should implement its development strategy; represent the expansion of their domestic markets, regional and penetration in order to take part in the global (international) market.

Entrance in the third millennium presents fast technical-technological developments that promise more and more, the most precise mediums, miraculous medications, super-transmission, genetic engineering and other scientific achievements.

On the other side, there are great problems, the vast majority of the world's population still faces hunger, diseases, lack of education and environment deterioration is happening because of increasing environmental pollution. Many countries are facing with corrupt leadership, huge loads from internal and external debts and the expansion of the gap between poor and rich countries.

For the underdeveloped countries the greatest irony is that are most basic needs such as food, clothing, the issue of housing and, other basic and material goods, but unfortunately there is no purchasing power. While the rest of the developed world possesses giant industrial capacities, to meet these needs but instead they only sell these to the ones who have the purchasing power.

Research Methodology to this work has been done through the form of survey, using the "Google Forms" platform. The survey form have largely based in formulating related basic questions with the marketing application in their companies and what role marketing plays in their business.

2 MATERIALS AND METHODS

2.1. THE NOTION AND ROLE OF MARKETING IN PRODUCTION AND THE SALE OF WINES IN KOSOVO

Marketing is a whole set of activities, with which production is optimized in meeting the needs and demands of consumers, because the market with its mechanisms suggests the way of production, assortment, distribution, price, orders and consumer behavior (natural, legal persons and society in general)[1].

The term "Marketing" descends Anglo-Saxon consisting of two words: "Market" and "Ing".

The word "market" means market, while the suffix "ing" has a different meaning as process, action, meeting to win etc. Translation in Albanian language is not as adequate, therefore used as in others: marketing.

Marketing has a broader meaning than sales and advertising, publicity, promotion, etc..

The marketing function is to help the company to recognize well the consumer needs, to develop products or services that will be liked by the consumers.

So, the main marketing objectives are:

- Finding needs and desires, discover and replenish them,
- Produce what you can sell,
- Love the buyer.

Marketing is science more practical-applicative and as such it has a reputation, it reduces the risk to the enterprise and boosts its image in the markets. In this context, we have some definitions that some foreign scientists use in this area, for example:

According to Philip Kotler "Marketing is leading and social process through in which, the creation of bids and exchange of valuable products with others, individuals and groups satisfy their needs and desires [2].

According to Fedor Rocco: "Contemporary Marketing implies the acceptance of business activity which connects the producer to the customer to meet the maximum needs of society, which appears on the market as a demand"[3].

According to Peter Drucker "Marketing is understood to be all-inclusive as a special function we are dealing with the general business, watched through the prism of its last result"[4].

Therefore, many scientists from both sides of the Atlantic try to uncover the marketing secrets and its performance. From what we said above we can conclude that the role of marketing is the definition of the market, image improvement, respecting deadlines for delivery, improving the quality of products (wines) which is not enough now.

Therefore, companies through marketing should implement customer requirements in particular, what satisfies them, in order to be motivated to grow continuous quality products (wines).

2.2. THE CONSTITUENT STRUCTURE, AND THE MEANING OF WINE AS A PRODUCT

Based on various literature and even from the ancient philosophers we can conclude that there are three noble trees: the Grapes, the Olive and fig tree.

Wine as a grape product is the oldest drink and as the oldest it was produced and it was consumed, where the civilizations existed.

How is wine produced as a product?

Wine is produced with the suppression of grapes, grape juice is obtained, where, apart from other ingredients, also contains glucose - the sugar of the grape, which with the help of microorganisms is converted in alcohol and carbon dioxide.

Red wine is a product of the best varieties of black grapes and together with stiff portions of grapes is fermented in order to extract the ingredients.

Also, white wine is a product of white grapes and what's characteristic is the case of the gain of white grape juice is separated from stiff grape parts(husk, turnip, grape and grape seed), and as such fermented.

According to Greek philosopher PLUTRAH: "Wine as a product, from all the drink is has the highest interest, is the most delicious of it all the medications and the saltiest of all life articles"[5].

The constituent structure of wine is: a liter of wine, contains on average 850 gr. water, glucose, 60 to 100 grams of ethyl alcohol, glycerin, acid, tannins (in red wine), vitamins polyphenols and flavonoids, etc. therefore it is divided into three categories:

- VITAMINS: In this structure of vitamins attend these vitamins: B1, B2, B6, B12 and Vit. C.
- POLYPHENOLS: In this structure of polyphenols, the parts are: Resveratrol, Quercetin, Epikatehin and Katehin.
- MINERAL: In this mineral structure, take part: Iron, Iodine, Potassium, Calcium, Copper, Magnesium and the Sodium.

Wine as a product, by the governments of many states is valued as food-agricultural product, because the wine in it has substance nutritional value with energy values certain, as nutrients.

Nutrient matter in wines is present:

- Energy value (kcal.),
- Albumins,
- Carbohydrates,
- Monosaccharides.
- Disaccharide,
- Water, etc.[6].

2.3. WINE AS A THREE-DIMENSIONAL PRODUCTS

Herodotus, Strabo, and many ancient philosophers, tell that the Illyrians were not only talented wine producers, but also regular consumers. The Illyrians have known the wine and wine culture, long before the other peoples of the region. This is evidenced by the archaeological discoveries made in the settlements of the Eneolithic (2350-1950 BC).

Kosovar wines, starting from their great geographic origin, with good climatic conditions, pedological and ecological, and sun radiation more than in other regions, characterized by taste, quality as premium and noble drinks. Analyzing and considering wine as a multi-dimensional product we classify it in three aspects of 3D:

- The preventive and healing aspect on human organism,
- Nutritional aspect (possesses nutrient matter),
- The aspect of creating pleasure and feeling [7].

2.3.1. The preventive aspect of wine in health

In ancient times, doctors have used wine to heal people just like medications are used today, injections and scalpels. In the year 400 b. k. c, Hippocrates (father of medicine), has used wine as a tool to strengthen the body that has alleviated the rheumatic pain, healed the wounds and intestinal diseases. In ancient times, doctors have healed with summer like medications today, injections and scalpels. In the year 400 b. k. c, Hippocrates (father of medicine), has used wine as a tool to strengthen the body that has alleviated the rheumatic pain, healed the wounds and intestinal diseases.

Therefore, the wines prevent or heal these diseases in the human body:

- Leads carbohydrate metabolism,
- Helps eliminate toxic compounds from the liver,
- Participates in the metabolism of fat,
- Stimulates the creation of blood and antibodies,
- Stabilizes the amount of hormone that helps in not clotting blood,
- Prevents arterial inflammation,
- It treats blood and improves its ability to circulate,
- Protects against cancer and regulates glandular function,
- Strengthens bones and teeth,
- Needed for regeneration pigments for strengthening the immune system and the activity of the nervous system,
- Prevents the barriers of the neuro-system and regulates the amount of water and reflects the balance of the quantity of acids and toxic elements in the organism[8].

2.3.2. The nourishing aspect of wine

Wine in the human body has the role as a food item because in its constituent structure the product has calories, albumin, carbohydrates, monosaccharide, disaccharide, water, etc., according to this from many states wine is classified as a food product. According to the law of wine in Kosovo, wine not only is a food product, but it accompanies food. We can simply say that they are an inseparable married couple. In order for this relationship to be the more harmonious, we should notice some rules:

Combining wine with food can be a happy relationship, but sometimes a juxtaposition of nonsense ... In order to prevent this from happening, there are a set of rules, which have their roots all over the world. Precisely this is the profession of somelierit, whose task is to answer the question: which wine goes with which specialty ? This special profession requires experience and rules, because the bottle, when selected from the wine shelves, to then be combined with a set menu, is often closed so you cannot taste it. Somelier should also have a taste, because this wine can be of different types, or as Americans say: "What for one is tea, for the other is coffee!"[9].

2.3.3. The aspect of creating pleasure and feeling of disposable

Candle light, easy music, wine in the glass can well more beautifully create the trigger for a dinner with your partner. HIPOKRATI has said that wine is a AFRODIZIAK, its a drug that adds pleasure and changes mood making us feel free and happier. Any consumption in normal quantities of the wine stimulates the hormonal system, increases blood circulation and loses fear. Wine and love are described in thousands of poems. There are practical recommendations, "Wine must be old, and the girl should be young." What love lovers value in wine is erotic action. A sip of wine rapidly increase blood circulation, stiffness and tension disappear. Courage grows[10].



Fig.1 The aspect of creating pleasure and feeling of disposable

2.4. THE WAY THE MARKETING FUNCTION IN THE WINERY

In general, it is inconceivable doing an activity without applying marketing science, especially in the wine production business. The wine sector in Kosovo is facing with unfavorable trading conditions and the placement of their products, given the strong competition, from both the countries of the region as well as from the states of Europe, as well as the countries of Africa, Australia etc.

Manufacturing enterprises in Kosovo that deal with the production of wine, implement the marketing system mainly with classical methods, because we lack professional capacity and lack of budget. Companies in Kosovo, mainly focus their methods and marketing system, strategies on the export of wine.

The concept of export to foreign markets is applied because the primary market have local market who uses all the concepts and philosophy of marketing, but this enterprise officials say are not even so satisfied with the local market, because of the processing and production capacities are very large that it does not cover the expense of these companies. Necessarily they have to penetrate foreign markets. Enterprises that deal with wine production have a good chance to make placement through export, because there is huge production surplus. The national market is so small that no absorption opportunities are given considering the marketing environment.

They use marketing to promote their (Kosovar) products, which are considered as very natural and ecological products. In the post-war period, Kosovo wine has also served as Kosovo's ambassador. In the basements of Kosovo, many important figures of political life, business, diplomatic, military, artistic they have degusted. Now, Kosovo started to collect revenues from exports or even for the future these enterprises, namely Kosovo's winery has bright prospects. Wines will be served at tables of European families and elsewhere. This achievement is due to the application of methods and marketing system, adapting to circumstances and the internal and external environment, of wine producers in Kosovo.

In this context orientation of these enterprises, moreover they have the character of the sale and less of the character marketing and counting on staff. Skills, moreover stimulate commercial activities. In the marketing research process, depending on the activity and the enterprise approach in terms of penetration into foreign markets, enterprises apply the selected methods, based on which they try to ensure primary and secondary information.

By providing information(Collection, storage, data processing) we can relate to the customer and his demand on the market, where we should attach importance to assumptions, the real description of the size and the structure of certain buyers their features and specifications.

In the context of the way of marketing functionality in winery, enterprises apply in methodological and scientific terms, directed in two directions:

- Office search method(near the desk, cabinet ,etc.) and
- Field research method [11].

As we mentioned, the company itself determines which form the use to apply it in their marketing.

To what extent production companies of wines apply marketing to their companies, we have developed an exploration through information technology through office search method (near desk, cabinet, etc.), through the form of survey, using the “Google Forms” platform. The survey form is largely based in formulating related basic questions with the marketing application in their companies and what role marketing plays in their business.

In the survey were participated 21 companies, respondents, producers of wines licensed by MAFRD, Department for Wine and Viticulture.

3. RESULTS AND DISCUSSION

3.1.The questionare and survey results[12].

1. What do you understand with Marketing?

- An advert (2 respondent or 9.5%)
- A publicity (0 respondent)
- A message (0 respondent)
- A promotion (7 respondents or 33.40%)
- A broader concept (12 respondents or 51.10%)
- Other. (0 respondent).

2. Have you established a marketing department at the enterprise?

- Yes (7 respondents or 33.30%)
- No (14 respondents or 66.70%) .

3. Which staff consists of the marketing department?

- Department director (3 respondents or 23.8%)
- Division chief (2 respondents or 9.5%)
- Marketer (3 respondents or 14.3%)
- Promoter / sales promoter (8 respondents or 38.10%)
- No, not at all (11 respondents or 52.40%)

4. What marketing activities do you develop in your enterprise?

- Promotion through: brochures, flyers, flyers, billboards (16 resp.ose 76.2%)
- Written media (4 respondents or 19%)
- Electronic media (9 respondents or 42.9%)
- Promotions / open testing / personal sales (17 respondents or 81%)
- Participation in international fairs (13 respondents or 61.9%)

5. Which social networks are the most used for promotional purposes?

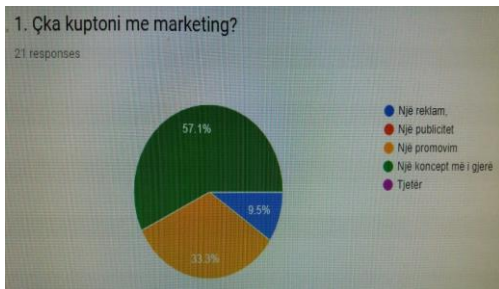
- FB (20 respondents or 95.2%)
- Instagram (9 respondents or 42.9%)
- Twiter (2 respondents or 9.5%)
- Snapchat (1 respondent or 4.8%)
- Whats app (3 respondents or 14.30%)

6. Do you plan marketing activities in advance?

- Po (14 respondents or 66.7%),
- No (7 respondents or 33.3%)

7. Do you develop strategies to achieve the objectives of the enterprise?
 - Yes (18 respondents or 85.7%)
 - No (3 respondents or 14.3%)
8. Do you do research of competition and market?
 - Yes (13 respondents or 61.9%)
 - No (8 respondents or 38.1%)
9. Have you heard about the 4P's of Marketing ?
 - Yes (13 respondents or 61.9%)
 - No (8 respondents or 38.1%)
10. How to divide the budget into marketing your business?
 - 0 - 1000 Eur. (8 respondents or 38.1%),
 - 1001 - 5000 Eur. (8 respondents or 38.1%)
 - 5001 - 10000 Eur. (2 respondents or 9.5%),
 - 1001 - 15000 Eur. (0 respondent or 0.0%)
 - Over 15000 Eur. (3 respondents or 14.3%)
 - Not at all budget (0 respondent or 0.0%)

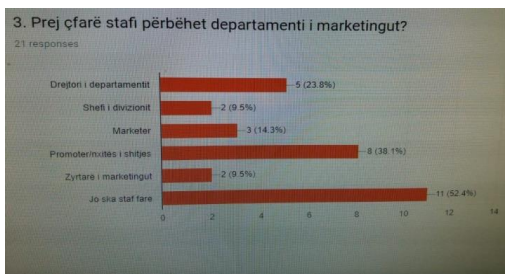
3.2. Research result – graphs



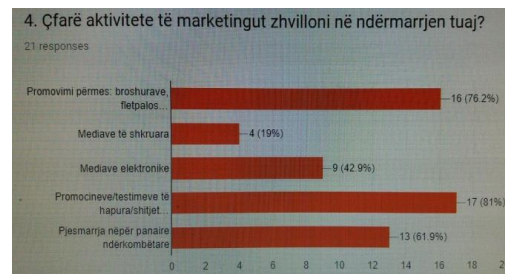
Graph 1. What do you understand with Marketing?



Graf 2. Have you established a marketing department at the enterprise?

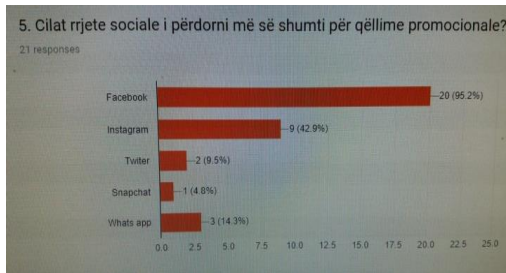


Graph 3. Which staff consists of the marketing



Graph 4. What marketing activities do you

department?

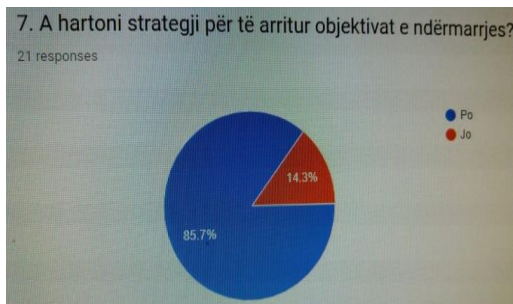


Graph 5. Which social networks are the most used for promotional purposes?

develop in your enterprise?



Graph 6. Do you plan marketing activities in advance ?



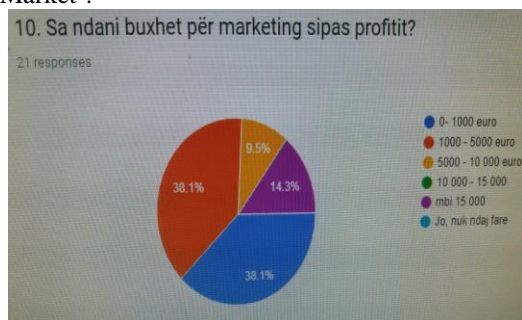
Graph 7. Do you develop strategies to achieve the objectives of the enterprise?



Graph 8. Do you do research of competition and Market ?



Graph 9. Have you heard about the 4P's of Marketing ?



Graph 10. How to divide the budget into marketing your business?

Remark: Graphs 1-10 have asked questions of respondents in Albanian language, while actually under they are marked as in English language.

4. CONCLUSIONS

As noted previously, we conclude that marketing is a pillar and the main carrier of the business activities of the enterprise among others, also of wine producers through which identifies the requirements, needs and desires of consumers, their behavior and target market, through the application of mix marketing tools, "4P", also taking care of the post-purchase process.

From the results and analysis extracted from this research can be see that companies are less agile or do not know the importance of marketing, as well as, establishment of the marketing department, strategy development and marketing plan, allocation of financial means (budget), and their implementation through marketing activities.

Based on the that, the following recommendations can be proposed:

- To increase marketing capacities,
- To apply marketing concepts,
- To develop staff, training and human resources,
- To plan and allocate budgets for marketing activities.

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THE IMPORTANCE OF PROFIT PLANNING AND CONTROL PROCESS, A LITERATURE REVIEW

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ABSTRACT:

The profit is one of the main goals of the organization to look into profit condition of survival; it is the goal on how we look into the future cost and profit in order to have the business managed well. A company always considers the resources, capabilities and the goals on how the foundation of the income statement of the organization is made up to. The profit is up to planning in how the estimation is made to evaluate the best results. Every organization has a goal to set, to put on how well they go into profit planning and controlling the budget system. It takes an entire concept building on management functions in terms of planning and controlling in the management to come across the major needs of the organization and functions of it. The planning always comes to connect with the production and the operating systems which come to show various concepts on the techniques which are used in focused on operating the cost system and the system that is standard operating on the costing planning system. The budgeting always connects with the systems which are used independently on how they are not interfering the depended. The word of the budget usually comes to show the interest of the money that we are spending for various things, costs, and how we are limiting that budget to look at the highest needs of the organization which does connect to the concept of how the budget is the major tool for connecting the limitation for the control system and avoiding the extra cost that we are spending on things in the organization which are leading to cost. A manager's task is to evaluate how well a business can be demonstrated and launched with functions and looking forward with future spending to enhance the best estimated as the quantitative statements are used for purpose of periods and policy made for organizations objectives. This research paper, through a literature review, is going to evaluate various concepts of the business to show the importance of planning in profit control and budget control and maximizing profit while minimizing the cost for a better performance in the organization.

KEYWORDS: profit, planning, control, process, budget, cost

In the recent years, businesses have been rising to multiple stages where management activities need to be planned well before operations are flagged off. Most of the business work towards better decision-making platform, production of quality products and ultimately improved performance control and profit maximization (Bucklew and Smith, 1986). The business should be prepared for effects arising from the controllable factors, such as problems with adequately skilled workforce, production capacity or needed equipment, and the uncontrollable ones that include government policies and regulations, competition and customer specifications. Managerial accounting in the form of proper budgeting is one way to approach these situations. Budgeting is a planning and control system that elaborates an organization's expectations to its members on its future (Mee, 1989).

2 OBJECTIVE OF THE STUDY

The research aims to understand if proper profit planning and control process are essential to the survival of the business. The literature indicating the organization's ability to make profits and recover from downfall is worth investigating.

3 IMPORTANCE OF THE STUDY

The study on the profit planning and control process should be a must for any business targeting reasonable profits. One comes to light on the many benefits that are associated with the planning and control and the risks associated with lack of planning and control process in the organization (Dechow & Mouritsen, 2005). The options surrounding planning, advice on budgetary procedures is outlined, creating a better understanding of the role of budgeting in planning and control processes.

Upon the reading of this paper, one will get profound knowledge on how planning help improves performance, ensure consistency in management, help adaptation to change, ensure more efficient allocation and use of resources, and better control and communication channels.

4. LITERATURE REVIEW ON PROFIT PLANNING AND CONTROL PROCESS

Profit planning is the determination of the actions and activities necessary for the actualization of a company's objectives and goals. Evidence shows that upon the institution of an individual profit target, the workers will work towards that specific goal hence attaining it within a short period, even shorter than the scheduled timeframe, and ensure success in the long term (Bunnoon & Ussahawanitchakit, 2012). It is needed so that the company can operate its departments and make decisions successfully within the outlined guidelines. It focuses on what should be done, how it should be done when it should be done, and by whom. There is also the determination of objectives, evaluation of alternative courses of action, and authorization to select programs. A profit plan is an outline that a company believes if followed well, a profit goal is attained. However, managers should be discouraged from spending their entire budget just because it was approved and some reward should be given for those who save some of the budgeted amounts but get all work done (Hynes, 2009). Budget planning meetings and follow-ups should be conducted on a routine basis for discussion on topics such as the number of employees required, objectives, resources available and time schedules. Planning leads to informed actions such that outcomes are better than when no planning took place.

Control is basically a feedback concept where regular and comprehensive analysis of the firm's performance and changes in environmental factors are incorporated in decision-making process. The external and internal environment might influence the plans in the expected or against the expected manner (Lucey, 2015). This is reported to the organization in the form of budgeting and comparisons on the budgeted performance and the actual performance. The business should allow flexibility in making changes brought out by the factors. Both qualitative and quantitative monetary information is essential in the comparison process (Evans, 2005). Control focuses majorly on the actual implementation of the planning decision and the evaluation of the performance of that same decision. The control process is well established in any organization, but they lack well-established goals. The presence of well-defined goals and strategies and control system are essential for the long-term well-being of the business.

Budgetary control follows the classical control cycle whereby each period, usually monthly, the actual costs and the difference or variances are highlighted (Lucey, 2015). They should also be limited to short time periods depending on the nature of the business.

5 CONCLUSION

Concluding this paper, it is important for an organization to set its goals towards the profit planning and control, it is basically the way the organization has set its goals towards considering the profit and the things which are costly. Followed up with the details, the process of the companies always goes down with the output that is used in planning process and price levels on maximizing the profit which again assures costs, sales, and the reaching of the profit.

Responsibility managerial accounting always results to maximized profits. While managers should be held responsible for the factors they can control to a significant extent, they should not be blamed for the external factors.

Businesses are set up to make a profit, revenue adjusted all for costs involved. Profit is a condition of survival, the cost of the future and of staying in business. It should, therefore, be planned and appropriately controlled in any business under considerations of the business capabilities and level of resources. Profit planning and control are essential and linked aspects of financial management. Profit planning enables the management to make predictions on revenue, costs and hence level of profit after a thorough analysis of the market conditions. The main purpose of this paper was to explore the role profit planning and control process in an organization's survival and the specific impact paid by budgeting. The effect of the non-existence of a proper planning process on the business performance was ascertained.

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Challenges through the Process of Transformation to Teaching Health Care Institutions

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ABSTRACT: Since the foundation of the University of Gjakova with medical faculty included, the regional hospital in Gjakova as a general hospital and other health care institutions in this city have the mission of teaching and research in addition to patient care. They share the responsibility to host and provide clinical practice for students of nursing and midwifery. In line with models of transforming teaching hospitals, we aim to present a unique model that could be an accepted way of immediately dealing with the existing situation and, in the meantime, serve as a bridge toward transforming the process without encroaching the processes of healthcare, patient satisfaction, and their outcomes. As a part of ERASMUS +, our staff have actively participated in projects and presented future plans toward new practices. Based on the teaching curricula, there is a need for remodelling the existing health services. Relying on the European perspective toward establishing new health care strategies for elderly and palliative care, too, this will ensure the consistency of the studies, incorporate all necessary professionals with the modern and updated studies and result in a better outcome not only for in-patients but also family medicine as an incorporated part of this process.

KEY WORDS: Health Care Institutions;Nursing;Midwifery

1 INTRODUCTION

The University of Gjakova is a newly founded public institution including three faculties within education, language and medical faculty. The latter, so far, has two departments (nursing and midwifery).[1]These two departments are the only public university departments in the Dukagjini valley and cover approximately half of the territory of our republic,as well as neighbouring countries. Health care institutions in Gjakova such as general hospitals, primary care/family medicine, institutes of occupational medicine, regional public health institutes, and mental health centres are now offering their capacities for practical (clinical) work of our students. [1, 2]In addition to patient care,the health care institutions have the mission of teaching and research too, sharing the responsibility to host and provide clinical practice for students of nursing and midwifery.[3]On the other hand,elderly people and palliative care are two fields of particular needs and interests not only identified at home but also among others abroad.[4]The importance and actualization might be related to some characteristics of current living. In the globalization era, we are increasingly dealing with issues such as:living longer, low birth rate, migration, sophisticated technology / detection of diseases, lifestyle changes (living, eating, working, etc.), and increased incidence and prevalence of malignant disease[5-8]. Therefore, the process continuously moves toward identifying new life challenges in terms of life expectancy and dealing with the elderly,in particular,palliative care for this category of the population.[9-11]Teaching hospitals are dedicated to: providing quality health care to patients, supporting research in medicine, involving experience and knowledge, and educating the health care professionals. International experiences and approaches show us examples of models attempting to optimize teaching hospitals. International health care institutions are taking actions towardresearch-oriented teaching hospitals, searching how a new model could become the best model by spreading their activities not only in teaching hospitals but also as university-based lab schools, and confronting an altogether new teaching and learning methodology, technology, business and the community.[3, 12]Therefore, they are reshaping the academic institutions in terms of new concepts, along with rapid changes, new challenges and expectations.[13] Some authors deal with different forms of transformations of the health care institutions according to the needs, field of interest and development,[14]while incorporating several beneficiaries to transform the idea toward enforcement of research and funding.[15]

2 AIM AND METHODS

In line with all these challenges, we aim to present a unique model that could be an accepted way of immediately dealing with the existing situation, and in the meantime, serve as a bridge toward transforming processes without encroaching the processes of healthcare, patient satisfaction, and their outcomes. The work is based on searching the actual projects in which our university has been currently involved and initiatives for new projects with authentic ideas related to the issue. Activities were in line with Code of Ethics of University of Gjakova signed by the President of the Board, and approved by the Management.

3 RESULTS AND DISCUSSION

The University of Gjakovais continuously involved in several projects and is working as a strong partner with other public universities and institutions of higher education, home and abroad. The medical faculty of the University of Gjakova, in the context of the particular issue that was elaborated above, is involved as a partner in two Erasmus + projects. The first project, "Entrepreneurial Universities for Industry Alliances", started in 2015 and has already been completed this year. Our faculty took part in all of the activities and expressed the process of transformation of health and education through the case study. [16]The second project, "Social Rehabilitation through Education", [17]started a year later, in 2016, and is approaching completion in 2019. We were focused on incorporating social rehabilitation, also of elderly people, through the teaching process. "Short Courses on Focused (Applicative) Professional Studies" [18]is another project, which is for now pending, searching for Austrian partners, and originated as an idea from workshops of higher education, research and applied science. The project tended to organize short term courses of the 5th level certifying the competencies of particular fields that would be applicable for the work place and incorporate not only the teaching staff but also the valuable experienced professionals from the health care institutions. In line with the process of accreditation in which we applied with the Master of Science program on palliative care and family medicine, we are preparing the next Erasmus + project for submission on building capacities. (Table 1 and Figure 1)

Table 1. Projects involved with partner universities

ERASMUS +	ERASMUS +	HERAS	ERASMUS +	MSc
EUFORIA	SOCRE	SCFaPS	EQUMSci	PCFM
Entrepreneurial Universities for Industry Alliances	Social Rehabilitation through Education	Short Courses on Focused (Applicative) Professional Studies	Enhancing the Quality of the Master Studies through building capacities in Family Medicine and Palliative Care	Palliative Care and Family Medicine
Completed	Approaching Completion	Pending	In Preparation	Submitted for Accreditation

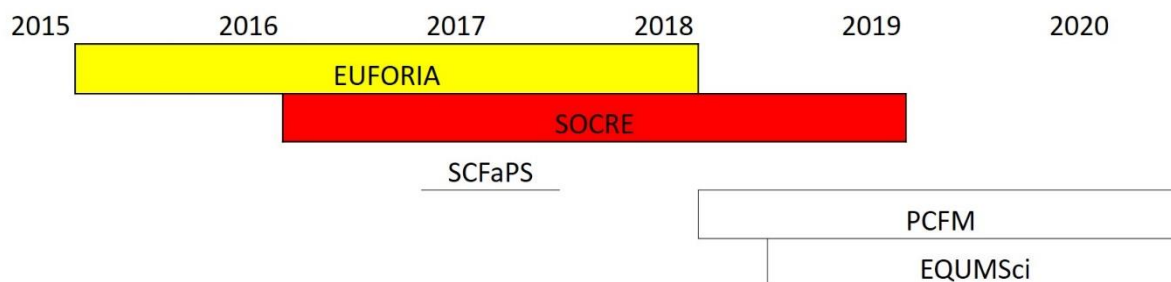


Figure 1. Timeline of the projects

Table 2. Activities and benefits of the projects

<p><i>Curriculum Development</i></p> <p><i>Teaching & Learning Tools</i></p> <p><i>Issue</i></p> <p>Entrepreneurial</p> <p>Geriatric</p> <p>Palliative Care</p> <p>Professional</p> <p><i>Science</i></p>	<p><i>Partner Universities</i></p> <p>Kosova Public Universities</p> <p>Kosova Higher Education Institutions</p> <p>United Kingdom</p> <p>Finland</p> <p>Belgium</p> <p>Portugal</p> <p>Holland</p> <p>Russia</p> <p>Czheck Republic</p> <p>Austria</p>
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Table 2 shows us the overall activities and benefits for the projects. We were involved in curriculum development; exploring and facing teaching and learning tools involving entrepreneurial, geriatric, palliative, care and professional issues; and incorporating science dealing with the important matter of further development of our faculty. The related concerns were elaborated and objectives achieved with the partnerships in Kosova and abroad. Involvement and partnerships in these projects have advantages toward unification of the different systems from different partners. In particular, there is a need to achieve standards in teaching and learning in line with the Bologna process. The projects are also a good source for mobility of staff and students. Another characteristic was the good amount of staff involved (the inclusion of entire English-speaking staff), taking care also in gender equalities. This led to interdisciplinary collaboration and development and implementation of new teaching/ learning techniques. With expert involvement, we tend to bring the university and the market closer, among academics also taking advantage of professional points of view and building capacities toward proficiency. The impact is foreseen to be contributing further in several levels of education (non-degree, bachelor, and master programmes). During these activities, we proposed overall steps to be taken at the Gjakova hospital toward establishing the Excellency Centre and rearranging of a part of the internal disease department and paediatric department at the general hospital of Gjakova into an in-patient palliative care

room. Furthermore, we proposed continuing with the revitalization of continuing professional education centres by health care institutions. On the other hand, primary health care would be used to launch palliative day care, e.g., at the main family medicine centre in Gjakova. For the practical clinical enrolment of the students, it is crucial to engage clinical practice assistants - experienced nurses/ midwives as clinical mentors and experienced health care (specialized) professionals, too, for specific work in particular departments (e.g., microbiology, laboratory, radiology). Finally, in line with collaboration with international partners, we intend to build up a scientific hierarchy that will not only impact the teaching and scientific work but also serve as an abroad board of ethics that will contribute to the maintenance of studies, and master's studies in particular. Different collaborations including funding for health promotion and disease prevention, training and education [19] are found in the literature. There are continuously attempts on finding the best ways to change primary health institutions relaying needs and trying to improve the service delivery, making institutions more attractive and reliable to their mission and toward scientific contribution. [20, 21] They are also pioneering in finding true and successful models for connections among palliative care providers and the community. [22] In this way, establishing or reinforcing existing communities' leads toward new ways of dealing with education and efforts on changing and improving the conditions. [23] Some authors are working on finding strategies used to make rural health care institutions capable and attractive for health education [24] and establishing the framework for enabling and supporting the educational mission of primary health care institutions. [25] They are prone also to building alliances to support each partner in the society. Not forgetting the most important part, palliative child care with partners in the appropriate settings are serving in the good mean of the health education and the cooperation, which are based on faith, trust, understanding, support, team work, sharing, etc. [26] The academic transformation and reshaping of primary care focusing on continuous and sustainable improvements takes on [27] initiatives to find ways to improve health care. Particularly in nursing care, through identifying gaps and needs and directly confronting the perceptions of the health care providers about their working environments [28, 29] might be good examples for future initiatives.

4 CONCLUSION

We expect that these could contribute to increasing the quality of new generations (nursing and midwifery) in networking/

connection between faculty and health care institutions. The measures will help toward fulfilment of accreditation recommendations accrediting new university programs in accordance with labour market needs. This, indeed, will encourage the health care professionals to progress and engage as academic staff, enhancing the scientific research and publishing, which leads to novel models of professional, scientific work and service delivery. Relying on the European perspective toward establishing new health care strategies for elderly and palliative care, too, this will ensure the consistency of the studies, incorporate all necessary professionals with the modern and updated studies and result in a better outcome not only for in-patients but also family medicine as an incorporated part of this process.

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Students Behavior Analysis to Improve the Learning Process Using Moodle Data

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Abstract: The main purpose of this research is to analyze student behavior using Moodle Data from the e-learning system at the GoceDelcev University in Stip. Using the tables from the database, we created temporary tables that contain the number of activities for each user, on specific modules of the system. By determining the role of the users, we made a filtering of results and we got the number of activities for each student. To make the analysis, we used tools for Big Data analysis. After that, we performed clustering of students in several clusters. For this purpose, we used k-means clustering technique and Elbow method to find the optimal number of clusters. At the end, we performed visualization of the clusters using the Scikit-learn Python library. With the knowledge gained from the analysis, in the future we can improve the learning process.

Keywords: *Analysis, Students Behavior, Learning Process, Moodle*

INTRODUCTION

The term “Big Data” refers to datasets that increase so much that it is difficult to analyze using traditional database management systems [1]. By using traditional techniques this process becomes quite complex. Therefore, special tools are used for analysis that are used to process and analyze big data. Data is generated from different sources and this is the reason for increasing big data. Recent years big data. In recent years, big data has appeared in many domains such as: health care, public administration, retail, biochemistry, education and so on [2]. In all these domains, big data are generated and it is virtually impossible to analyze them in terms of time for processing, method of analysis and presenting of results. If we analyze this data with traditional techniques, then we would take much more time. Some of the methods used in small data processing (for example the statistical method) are inadequate to handle big data. The way of presenting the analyzed results in small data is quite simple. This process becomes complex when we need to present the results of big data analysis. Prior to 2008, there was no determination whether the data were “small” or “big” data [3]. Then all data were called by the term known to us as small data. The term for big data was introduced because the number of data has steadily

increased and the process of analysis, processing and storage has become complex. The term big data is defined by the four V's: Volume, Velocity, Veracity and Variety [4]. Volume refers to the size of the data. Streaming of the data at much faster rates represents the velocity property. The veracity feature refers to the quality of the data available. Presenting data of different types is characteristic of the variety property. Big data can be analyzed to find associations, patterns, trends and to get knowledge. Particularly interesting area is the big data in education. We can use this data to get knowledge. Knowledge discovery is an interdisciplinary area focusing mainly on methods for extracting meaningful and useful patterns from big data [5]. We can use the process known as Learning Analytics (LA) to improve the learning and teaching [6]. It refers to the measurement, collection, analysis and presenting the data in order to optimize the learning. The main goal of Learning Analytics is the detection of patterns in learning data. Using the patterns, we can build hypotheses, confirm them, making conclusions and presenting the results from the analysis [7]. The other term devoted to analyzing data is Educational Data Mining (EDM). This term represents the process of developing and adapting statistical, machine learning and data-mining methods to study data generated by students and instructors [8]. The both processes (LA and EDM) are quite similar. The main difference is that the EDM focuses on the application of data mining techniques while LA includes other methods such as statistical and visualization tools or social network analysis techniques [9]. The basic idea in this research is by using LA and EDM techniques to gain knowledge about student behavior, which in the future can help us to improve the learning process. We present a workflow for analyzing Big Data from Moodle system. By creating temporary tables, we facilitate the process of Big Data analysis. The same tables in the future can be used for other research.

In Section 2 of this paper, it is presented the used technology and the dataset that we used in our research. The analysis of student behavior is presented in Section 3. The results of our research you can see in Section 4. The last section is conclusion of our work.

USED TECHNOLOGY AND DATA (material)

For the purposes of our research, we used the database of Moodle E-Learning Platform at the GoceDelcev University. At the beginning, we selected the tables from which we could extract some knowledge. The size of the database was 6.9 GB, and it contains data for a period of six years (2012-2018). Using the tables from the database, especially the table with logged user activities (`mdl_logstore_standard_log`), we created temporary tables that contained the data for individual users for a certain activity. We investigated the student activity for various Moodle modules such as: Forums, Lessons, Glossary, Assignments, Survey, Quizzes, Choices, Chats, and so on. These tables are presented in Section 3 of our research. We created temporary tables using big data processing tools. We created two versions of tables for each module. The first version contains all user actions for the given modules. The second version contains all the actions except the action presented as "view" with which students only see something. For this, we used the Cloudera Hadoop distribution, and tools that are part of Cloudera such as Hive, Impala [10]. The key elements of this distribution are HDFS (Hadoop Distributed File System) and Map-Reduce. HDFS can store a huge amount of data. Map-Reduce as

a second core element of Hadoop is used for processing the data. It divides the work into a set of independent tasks for processing the data in parallel manner. For the clustering part, we have used Python distribution – Anaconda and Scikit-learn [11] which is a set of Python modules for machine learning and data mining. Also, we have used some libraries and modules from Scikit-learn, for the visualization part of the results that we got after we finished the clustering.

ANALYSIS OF STUDENTS BEHAVIOR (Activities) (methods)

As we said before, in this research we have focused on analyzing the activities of the students in Moodle e-learning system. More precisely, our biggest challenge was to extract useful information from carefully chosen data from Moodle database which contains the information regarding every action of the students in the Moodle platform. In other words our main idea was to make a descriptive analysis of the student activities. In order to achieve this goal, we have decided to cluster the data about the student actions. First, we build dataset using tools and technologies mentioned in Section 2 of this paper. After we have completed the final version of the dataset, we proceed to the next phase of this research - clustering. For this purpose, we have used K-means algorithm and we tried to divide students in a few clusters, each with separate characteristics, based on the activities presented in Moodle modules which were subject of analysis. In the table below, are presented the selected modules from Moodle platform, which were the main basis for this work.

Activity	Description
assign, assignNV	Number of activities in module Assign, number of activities in module Assign that are different than only viewing the content of the module
book, bookNV	Number of activities in module Book, number of activities in module Book that are different than only viewing of the content of the module
chat, chatNV	Number of activities in module Chat, number of activities in module Chat that are different than only viewing the content of the module
choice, choiceNV	Number of activities in module Choice, number of activities in module Choice that are different than only viewing the content of the module
forum, forumNV	Number of activities in module Forum, number of activities in module Forum that are different than only viewing the content of the module
glossary, glossaryNV	Number of activities in module Glossary, number of activities in module Glossary that are different than only viewing the content of the module
quiz, quizNV	Number of activities in module Quiz, number of activities in module Quiz that are different than only viewing the content of the module
survey, surveyNV	Number of activities in module Survey, number of activities in module Survey that are different than only viewing the content of the module

Table 14. Modules chosen for analysis

Before moving to the clustering part, we have done a research for finding the optimal number of clusters, and for this purpose we have used the Elbow method on our prepared dataset.

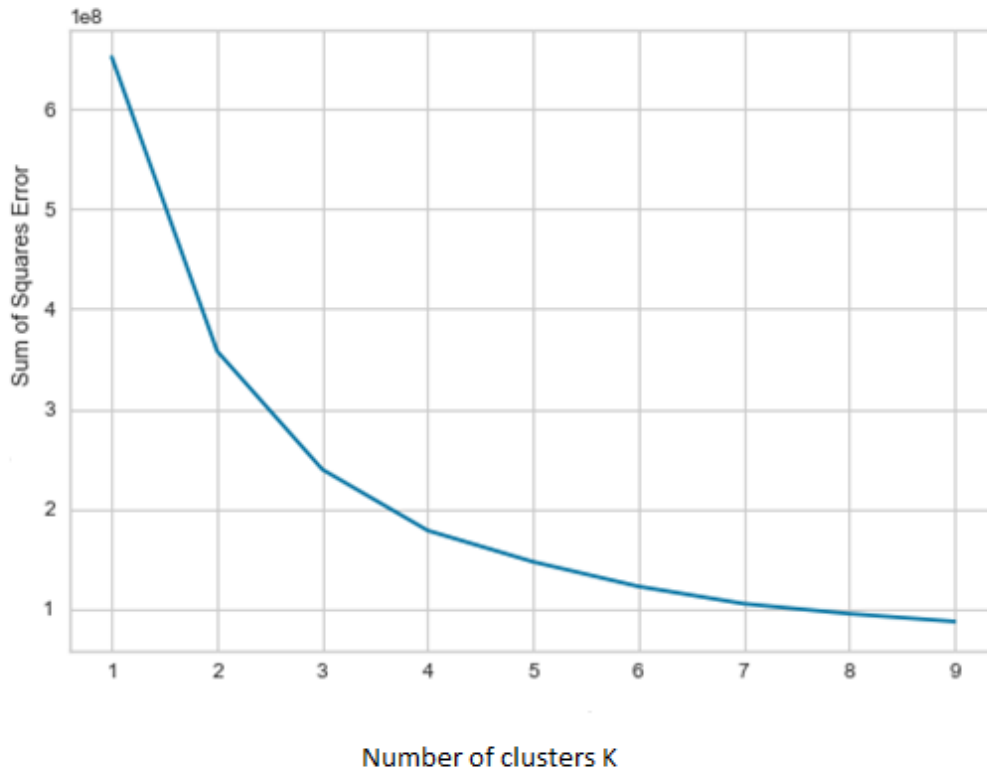


Figure 3. Elbow method – choosing the optimal number of K

Elbow method is a way to find the optimal value of K, while using K-means for clustering. This method calculates the variance (sum of squares) inside each of the clusters, and this is done for different values for number of clusters (Figure 1).

By implementing the Elbow method on our dataset, we make a decision to cluster the students in three clusters (K=3).

In order to get better preview of how our data looks like, and what are the relationships between attributes in the dataset, we build a matrix of correlation of the attributes in the dataset (Figure 2). This is a statistical measure of the relation between two variables. So in our case, the matrix that we get is a review of the connection between the attributes in the dataset which is presented as a value in range from -1 to 1.

If the value of the correlation between two attributes is 0, that means that there is no correlation between the attributes. In other case, negative correlation means that if the value of the first attribute is increased, then the value of the second attribute is decreased and vice versa. Positive correlation means that the values of the two attributes are moving in the same direction.

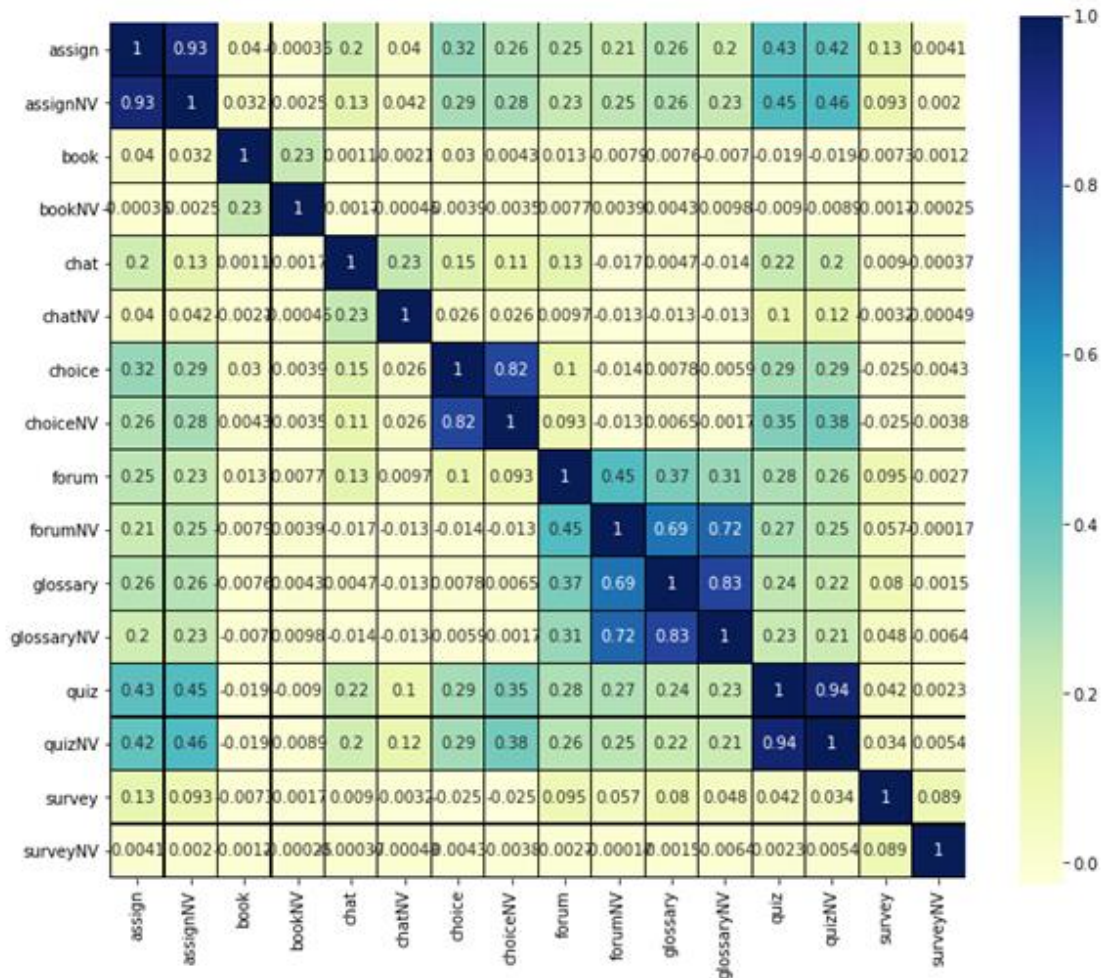


Figure 4. Matrix of correlation for the attributes in the dataset

RESULTS and discussion

Finding the best way of presenting the results of the clustering, was the other challenge in our research. We have tried a few methods of visualizing the clustering results that we get. Speaking of this, we have used some functions from Scikit-learn Python library, which offers a plenty of options for visualizing the results while using different techniques of machine learning. Using the PCA(Principal component analysis) technique, the results that we get are shown in the Figure 3:

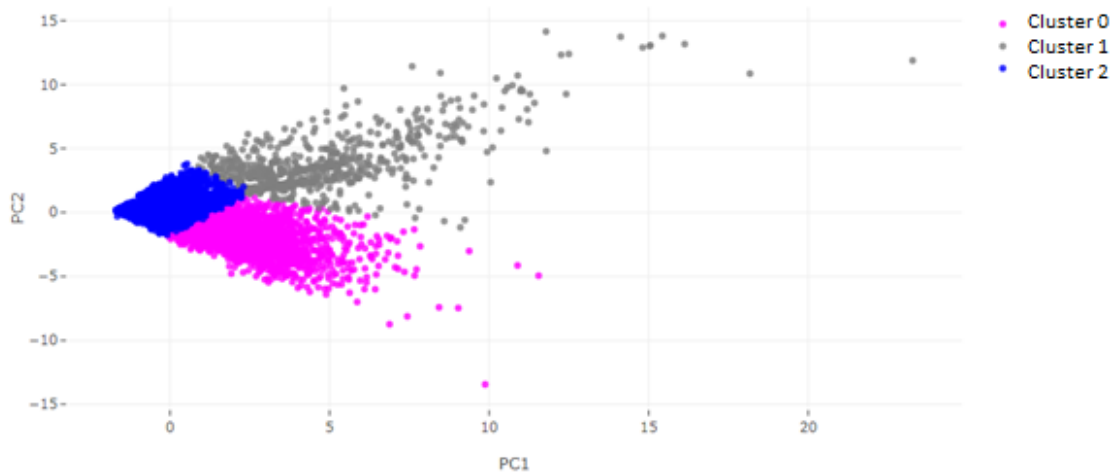


Figure 5.2D visualization of the clusters

In Figure 4 is shown the number of students in each cluster:

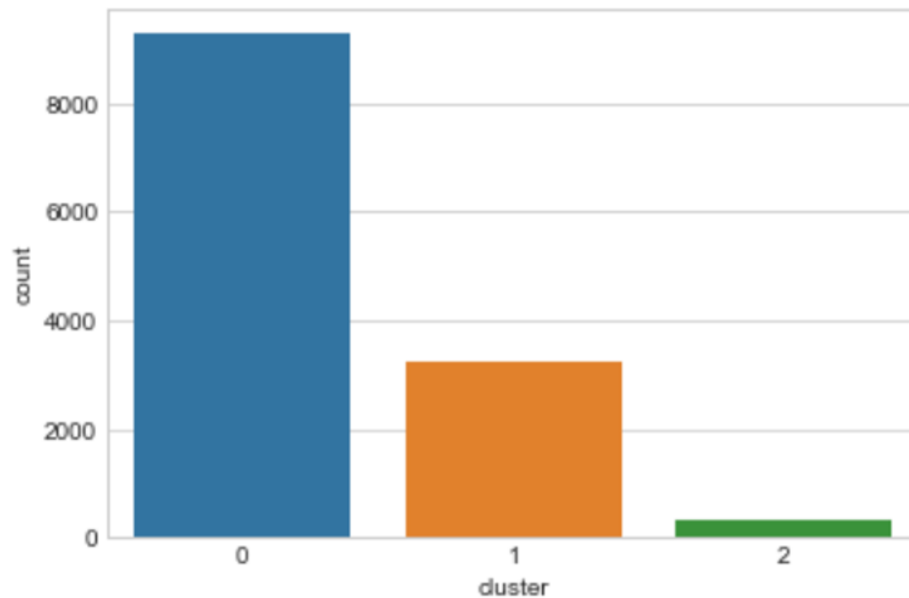


Figure 6.Number of students in each cluster

In the Figure 5,you can see the results that we got, for the activities of the students separated in three clusters. By showing the parallel diagram of all the activities in every module, and all that for every cluster, we can have better picture of how each one of the modules (student’s actions) is represented in each cluster.

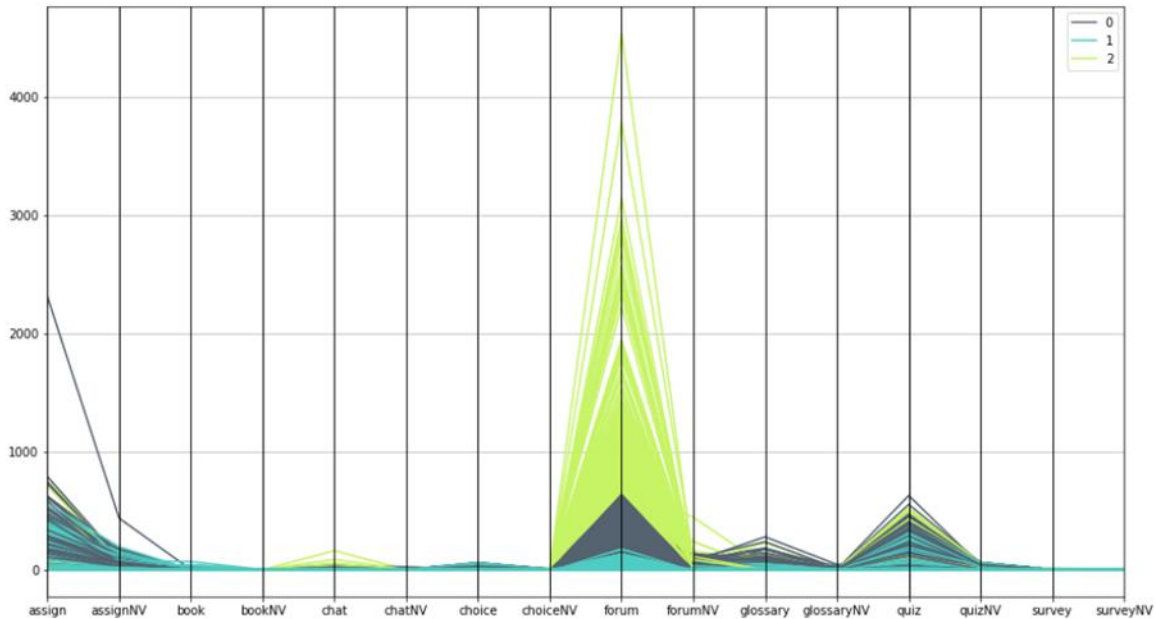


Figure 7. All clusters and modules shown together

Based on the results, from the graph, we can see that the module forum is the most visited and used module from the students, and this is true for each one of the clusters. The modules for which the students shown the smallest interest are book, survey and choice and this is the case for the students belonging in each one of the defined clusters.

Combining the results shown in the previous graphs, we can say that the smallest cluster (cluster 2), contains the students which were pretty active in the explored modules in Moodle platform. In opposite, in the most numerous cluster (cluster 0), there are the students which based on their activities and actions in e-learning platform, are positioned somewhere in between students from cluster 2 and cluster 1. In other words, we can say that the largest part of the analyzed students, according to our research, are classified in a cluster which have characteristics of moderate usage of the Moodle e-learning system. In cluster 1, there are the students, which have shown minimal activities in the modules that were subject of our research. Finally, as we mentioned earlier, the most active students are classified in cluster 2, which in the same time is the cluster with the least number of students.

conclusion

We used Moodle data to get the number of student activities on Moodle site. We created a dataset using big data analytics tools and then we extracted useful information from it. After we created the dataset, we made clustering. For that, we have used the K-means algorithm and we divide the students into few clusters using the number of activities on Moodle modules. Using the results, we can conclude that the cluster with most active student is also the cluster with the least number of students. In the future, we must provide techniques to increase the number of students in this cluster and their activities on Moodle. From all that been said we can say that from this research we got more information related on how Moodle modules

were used in the years that were subject of analysis and based on the collected information we have better picture of students activities. Beside the fact that we can utilize this information for deciding the future steps and plans for the teaching processes, the results also could be used as a base for some further research and analysis.

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EMIGRATION FROM SOUTHEAST EUROPE AND ITS ECONOMIC IMPACT ON SENDING COUNTRIES

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ABSTRACT: The past quarter-century has seen a persistent and large wave of mostly economic migration from Central, Eastern, and South-eastern Europe, mainly to Western Europe. Amongst diverse migration trends in Europe, the emergence of new immigration countries seems particularly important. The transition of migratory status followed economic development induced by the participation in the common European market and political stability. The socio-economic conditions of the change as well as policy responses to the new situation varied considerably between the countries of North-Western, Southern and Eastern Europe and led to various structures of immigration and impacts on labour markets. These differences provide interesting research basis, which could shed light on the immigration mechanisms in Europe. Close to 20 million, mostly young and skilled Eastern Europeans left their countries over the past 25 years to seek better opportunities abroad. In addition, even as they have contributed to the riches of the receiving countries and the European Union as a whole, their departure has slowed growth and convergence of their home countries to the living standards of advanced Europe.

KEYWORDS: *migration, economic development, labour markets, European Union.*

INTRODUCTION

Emigration is the act of leaving one's resident country with the intent to settle permanently in another country. According to certain sources, we can define emigration as well as relocation of people from one country to reside in another. In other words, emigration indicates leaving a country permanently and going to live in another country.

Models of emigration have been shaped by numerous economic, social and political reasons throughout the world in the last few decades. Anyway, emigration affects the economies of the countries that are involved in both positive and negative ways depending on the current state of the countries' economic situation.

South-eastern Europe is a geographical region of Europe, consisting primarily of the coterminous Balkan Peninsula. There are many overlapping and conflicting definitions as to where exactly South-eastern Europe begins or ends or how it relates to other regions of the continent. Sovereign states that are most frequently included in this region are Romania, Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Kosovo, Albania, Macedonia, Bulgaria and Greece.

The opening up of Eastern Europe to the rest of the world in the early 1990s brought about tremendous benefits. The inflow of capital and innovation has led to better institutions, better economic management, and higher efficiency. On the flip side, it has also led to sizable and persistent outflow of people. (Ilahi, N. et al., 2016: 1).

Emigration from Central, Eastern, and Southeastern Europe (CESEE) has been unusually large, persistent, and dominated by educated and young people. After the fall of the Iron Curtain in the early 1990s, the next quarter century featured large and persistent east-west migration flows. The Southeastern European (SEE) economies typically saw appreciably larger labor outflows than the Baltic and Central European countries. Many emigrants were well educated and young; their exodus has sharply accentuated already adverse demographic trends in CESEE. Moreover, emigration appears to be permanent, with indications of only limited return migration so far. Against that backdrop, this paper examines the effects of emigration on private sector activity, competitiveness, public finances, and ultimately, growth in CESEE economies as well as the pace of their income convergence to Western Europe. (Atoyán, R. et al., 2016: 5).

IMPACT OF MIGRATION ON RECEIVING COUNTRIES

If the state was once left out of the social science in the field of international migration, analyzes of the last few years partially have brought it in. Scholars from around the world increasingly attend to the role of receiving country governments in shaping migration flows. This is of great importance because of the need to create appropriate policies. This means that when creating these policies, the state must also hear the voice of science.

Some studies that take a global viewpoint to the long-run positive welfare effects for both recipient countries – through greater product variety – and sending countries – through remittances (di Giovanni, Levchenko, and Ortega, 2015). León-Ledesma and Piracha (2004) find positive productivity effects from return migration in CEE countries and highlight how remittances can help boost investment in the home country. However, other papers point to losses for sending countries. Dustmann, Fadlon, and Weiss (2011) employ a theoretical model with learning and find output losses in the sending country, but note that the corresponding output gain in the receiving country may be larger. Barrell and others (2007) show overall output losses from emigration in many new EU member states, associated with the 2004 EU enlargement. But they also highlight positive effects in terms of GDP per capita, including in recipient countries over the long run. In a recent study on a sample of 18 Organisation for Economic Co-operation and Development (OECD) countries, Jaumotte and others (forthcoming) find that recipient advanced economies benefit from immigration in terms of GDP per capita and labor productivity in the long run (a 1 percentage point increase in the share of migrants in adult population raises GDP per capita by up to 2 percent). A Meta study of the empirical literature on the effects of migration on income growth and convergence (Ozgen, Nijkamp, and Poot 2009) finds that the overall effect of net inward migration on growth in real per capita income tends to be positive. This also means that labor outflows tend to reduce the sending countries' GDP per capita, with the size of the impact depending on the persistence of emigration, as well as on the age and skill composition of migrants. (Atoyán, R. et al., 2016: 6-7).

IMPACT OF MIGRATION ON SENDING COUNTRIES

In the last few years, the need for research of the impact of migration has developed from a perspective of examination of the policies that sending country governments have. The role of sending countries has been

studied in the contexts of highly skilled and refugee emigration. However, insufficient attention has been paid to sending countries' broader stances towards labor emigration.

Economic migration is driven by personal choices. For Eastern Europeans, the motivation to leave is mainly better jobs and higher pay. Many of these economic migrants are highly skilled (e.g., doctors, architects, engineers) and younger than the average person at home. The less effective the government and the weaker the institutions (guarding the rule of law, upholding accountability and fighting corruption) in their home countries, the more likely the young and educated are to seek better opportunities abroad. While emigrants themselves tend to be better off and their families back home often benefit from remittances, their departure weakens the economic potential of their home countries. (Ilahi, N. et al., 2016: 1).

This has left Eastern European countries worse off. Large and persistent emigration appears to have slowed both overall and per capita output growth rates. In the absence of emigration between 1995 and 2012, real GDP growth would have been altogether 7 percentage points higher on the average in the region, according to analytical work by IMF staff. Some skills are in short supply, lowering productivity growth in the East. And while the large inflow of remittances has supported investment and consumption, it also led to exchange rate appreciation, making economies less competitive. Moreover, the money sent back to relatives pushed up starting wages and reduced incentives to work. As a result, wages have risen faster than productivity, eroding returns on investment and weakening incentives to invest in home countries. (Ibid., 2).

Most experts have concluded the effects are positive for the sending country because unemployment generally decreases and the workers who leave may send funds back to their home country, which can increase the standard of living for the family members who remain.

BRAIN DRAIN IN THE CONTEXT OF EMIGRATION

The term "brain drain" is defined as the migration of health personnel or skilled human resources in search of the better standard of living and quality of life, higher salaries, access to advanced technology, education and more stable political conditions in different places worldwide.

Moreover, the term "brain drain" refers to the international transfer of resources in the form of human capital. This term usually entails the migration of highly educated labor force from developing countries to developed countries. Brain drain is taking place at a very fast rate in developing countries.

However, better standards of living and quality of life, higher salaries, access to advanced technology and more stable political conditions in the developed countries attract talent from less developed areas. The majority of migration is from developing to developed countries. This is of growing concern worldwide because of its impact on the health systems in developing countries. These countries have invested in the education and training of young health professionals. This translates into a loss of considerable resources when these people migrate, with the direct benefit accruing to the recipient states who have not forked out the cost of educating them. The intellectuals of any country are some of the most expensive resources because of their training in terms of material cost and time, and most importantly, because of lost opportunity. (Dodani, S. and E LaPorte, R., 2005).

Two concepts prevail in the discussion on the impact of highly skilled migration on economic development. The first refers to the notion of brain drain as a phenomenon having negative impact on the human capital accumulation and on the fiscal revenue of the sending country (Bhagwati & Hamada, 1974).

The second concept focuses on the existence of a highly skilled diaspora acting as a powerful force in promoting economic development through a variety of instruments, such as remittances, trade, *foreign direct investment* and knowledge transfer.

In the book "Debating Brain Drain: May Governments Restrict Emigration?" the author Michael Blake makes an important and innovative argument for the view that humans have a right to leave their country and that this right severely limits the restrictions that governments may place on emigration. Blake's defense of a right to emigrate is based, in large part, on freedom of association. He holds that "all humans have a basic right to leave any country, including their own" and that this right "makes any attempt by a state to forcibly prevent people from leaving ... fundamentally unjust, and a violation of the most basic norms of human rights". (Brock, G. and Blake, M. 2015).

Defining emigration as a right, it introduces a completely different view of this issue.

The dissolution of the former communist regimes, weak economic structure, low level of production, low performance of the educational system, high level of debts, high level of unemployment, low recognition of the private sector and SMEs' contribution to innovation and lack of motivation, commitment and trust have had enormous impact on the human capital in the SEE countries. (OECD, 2007).

Two concurrent processes have been taking place, one associated with "external" brain drain, in the form of experts leaving the country for better professional fulfillment abroad, and the other associated with "internal" brain drain, in the form of specialists leaving their professions for better-paid jobs in the private and/or informal sector of the economy.

The reasons for migration from the Republic of Macedonia have a long historical tradition. The first significant emigration from Macedonia were of an economic nature, when migrant workers went abroad overseas to earn money. Other significant migrations occurred during the Ottoman rule with Macedonia, during the Balkan Wars, as well as during the First and Second World War when its neighbors occupied the territory of Macedonia.

Macedonia is a good example of a country where brain drain is significant, where there is little awareness that a problem exists, and where almost no research has been carried out in order to examine what impact political instability has on highly skilled labour migration out of the country. There are at present no policies which could reverse the adverse effects of this exodus, and according to the available data, there are no signs of any measures planned for the future. (Horvat V., 2004: 84).

Causes of highly skilled emigration are also rooted in the socioeconomic situation, and include the lack of any sense that the situation will improve. After a deep economic and social crisis hit the Yugoslav Republic of Macedonia after 1981 and resulted in a decrease of production and the standard of living, the situation worsened after the country gained independence in 1991 and what followed was greater socio-economic turbulence and a further drastic decrease of investment and economic activity (together with an increase in unemployment). In addition to that, problems inherent to the transition process, as well as the political instability in the region, the reduction of human rights, military conflict in the spring of 2001, and two refugee crises negatively influenced the country's movement toward a better and more secure living standard. (Horvat V., 2004: 85).

The Republic of Macedonia stands out with the highest emigration rate of the tertiary educated persons in the group of the candidate countries for membership in the European Union.

What can the Republic of Macedonia do to reduce the "brain-drain" process?

One of the crucial challenges for countries experiencing continuous brain drain in order to sustain their economic growth is to mitigate the negative effects of the flow of the highly skilled. However, this is a rather complicated task. In general, countries try to improve living and working conditions in order to match the offer of better faring economies. The final goal is to instigate a process of return migration or even to stimulate an inflow of highly skilled foreigners to the country and effectively achieve the effect of "brain gain." (CRPM: 7).

The motivation of this "brain-drain" process is not solely due to the weaknesses of the education system. Therefore, it cannot be concluded that the motives for educational migration are always completely of an educational nature. In this sense, the respondents in the YAS's research recognize the high emigration rate, but they do not see the motivation for it to be personal reasons only (which would also include seeking a better education), but the majority of them blame it on the undesirable economic situation in the country (83.5% declared that the reasons for migration are of an economic nature). This leads to questions as to the motivations of those who claim to emigrate from Macedonia for educational purposes. That aside, the desire to seek a better education abroad should in no way be ignored. (Taleski D. et al. 2006: 37).

In this paper, I would offer the following options to reduce the "brain-drain" process:

- **providing better job opportunities;**
- **providing attractive salaries to highly qualified people on the basis of their qualifications and experience;**
- **improving the quality of universities and bring them at par with universities in Europe;**
- **providing adequate research facilities for young scientists and researchers;**
- **providing attractive working conditions etc.**

Stopping brain drain should be paramount priority in any government to intend to improve their own country.

6. CONCLUSION

Emigration of highly skilled people from developing to developed countries has significantly increased over the past decades. The biggest loss for the country and the economy is the emigration of educated citizens. This brain drain trend requires a careful policy approach.

One of the most important factors for emigration from the Republic of Macedonia is the high and long-term unemployment of educated people. Also, in our country, people with higher education frequently work below their skill level and the possibility of professional development is very limited. Due to the prolonged process of transformation and the country's political instability, the economic development is progressing too slowly. This certainly affects the motivation of young and highly educated people to decide to leave our country.

According to the data of the State Statistical Office, in 2017, the labour force in the Republic of Macedonia numbered 954.212 persons, of which 740.648 were employed, while 213.564 were unemployed persons. In the absence of any prospects for a quick improvement of the situation and due to the high level of unemployment, the outflow of educated people seems natural. Low economic growth and insufficient investments in the Republic of Macedonia do not generate optimism on the labour market either.

For years, the governments in the Republic of Macedonia have paid more attention to stabilizing the political life in the country than to building realistic strategies and programs for keeping the young and highly educated people in this country.

Having in mind all of the above, the return of the educated and the professionally active Macedonians from abroad seems to be an impossible mission.

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ABSTRACT: The more the world becomes connected and interdependent, partnerships outside the city and beyond the state can often help the community to renew themselves by taking new experiences, looking beyond their traditional boundaries, and why not, to stay as long as possible close and help the Diaspora and the emigrant or the community that for different reasons lives outside its borders. In this paper, we have focused on the impact that civil society has in building a twinning city from local government that will be useful to both cities and secondly we have focused on the activities that derive from this twinning cities to help and integrate immigrants and saving them from assimilation. There are two basic concepts that will be elaborated in this paper: Sister cities as a model of globalization, namely, at the benefits of international activities for the local community; and second, the impact of the civil sector of finding an inter-municipal partnership.

KEYWORDS: Twining cities; Diaspora; Intercity projects, Democratization of Society

[12]

1 INTRODUCTION

Twinning cities are a modern political concept that implies the union of the two cities from geographically and politically different areas, but having an element that unites them, such as human contact, cultural ties, Diaspora projects for countries of origin, etc., as such, we will analyze the twin cities of the Debar Municipality of Republic of North Macedonia and we will find that one of the most right twinning for this city is exactly that initiated by the Diaspora, concretely by a non-governmental organization of Debar immigrants who work in the United States and who cares for the rights and progress of the Debar community living in the United States and so we will end that with the most dedication and with cultural projects that take place in both cities it positively affects the process of democratization of our society.

The main hypothesis of this paper is: "The civil society and local government's involvement in building partnerships is beneficial for the two sister cities; with the two auxiliary hypotheses which are: activities that derive from the twinning cities help immigrants in the Diaspora for their rapid suitability without assimilation and their experiences that positively effects in the process of democratization of their countries of origin.

2 THE TERM AND HISTORY OF TWINNING CITIES

City partnership or twinning cities is a political concept derive from globalization that implies the unify of cities from geographically and politically diverse areas, with the aim of promoting human contact and mutual cultural development and understanding, encouraging and coordinating visits between related cities, enlarging recreational, educational and commercial activities of twin cities, etc. For city connections, are used different terms, such as twin cities, partnership cities, sister cities, friendship cities or even brotherly cities, such as Germany uses the term "partner cities" (Partnerstadt), France uses the term "twin cities" (Ville Jumelée), in the Netherlands is used the term "Stedenband", in North America, South America, Asia, and Australia they generally use the term "sister cities", wherein the cities of former countries of The Soviet bloc, was used this connection as "fraternity of the cities". The earliest form of cities connection in Europe was between the German city of Paderborn and the French city of Le Mans in 836. But the first registered modern partnership is between Keighley and Poix-du-Nord cities, North of France in 1920 after the end of The First World War. The partnership between cities of similar character as today came to light as a result of The Second World War, due to the European initiative that was born out of the conviction that friendship among Europe's citizens was the first necessary step for the reconstruction of a stable and peaceful Europe. The partnership later spread gradually including all European countries. In 1991, over 8500 partnerships were counted in 14 countries around the world. For the next fifteen years, the number of partnerships rose considerably. This impressive growth can be explained in the context of the opening up of former communist states, which helped to create many partnerships, especially in Poland, the Czech Republic, Hungary and Romania, and the creation of a special European Union program in the year 1989 to support partnerships between local authorities. Financial support that facilitated the travel of citizens to their twin cities, as well as the organization of related events, greatly stimulated the partnership movement in Europe (CCRE-CEMR, 2007, p. 3). The practice has continued after The Second World War as a way to bring Europe's people closer to one another in mutual understanding and to foster cross-border projects of mutual benefit. For example, Coventry partnered with Stalingrad (now Volgograd) and later with Dresden as an

act of peace and reconciliation, cities heavily bombed during wartime. In Europe, a partnership between the cities is supported by the European Union itself. The support scheme was established in 1989 and in 2003 an annual budget of about 12 million euros was allocated to about 1300 projects. The Council of European Municipalities and Regions also works closely with the Education and Culture Commission with the European Union to promote high-quality partnership initiatives and exchanges involving all sections of the community (CCRE-CEMR, 2007, p. 2). The United States City Partnership Program was initiated in 1956 by President Dwight Eisenhower. It was initially administered as part of the National League of Cities, but since 1967 it has become a special organization titled "Sister Cities International" (SCI), a network of non-profit civil diplomacy that creates and strengthens the partnership between the United States and international communities to promote cultural understanding and stimulate private businesses and economic development. The first city in North America that created a partnership was Toledo, Ohio, with Toledo in Spain in 1931. Tashkent, an Uzbek city, then part of the Soviet Union, partnered with Seattle in Washington in 1973 and became the first Soviet city to become a friend to a United States city. From these examples, we understand that many partnerships that come from countries that have common borders or between neighbors, have cultural and historical ties or have once been in conflict and this is a good opportunity for affirmation and friendship.

However, since the opening of former communist states, and because of the ease of transport, cities are increasingly inclined to create partnerships at distances. So far as the purpose and final goals of creation and connection of twinning cities are these: promoting and fostering friendship; The development of mutual cultural understanding; Expanding activities; Participation in projects; Gaining new experiences, such as in tourism, culture, etc., but that does not mean that there aren't other goals and purpose as well, such as the economic benefits of twinning, which has not been researched so far in this paper, but we hope to be a stimulus for other researchers in the future.

3 RESULTS - THE CASE STUDY OF DEBAR MUNICIPALITY AND ITS TWINNING NETWORK

The local economic development and cross-border cooperation and partnerships in the Debar Municipality in the Republic of North Macedonia with a modest engagement has managed to reach contacts with municipalities both inside and outside of North Macedonia which are: with Gjakova Municipality in the Republic of Kosovo (Official Journal, 2007), with Llom City of Bulgaria (Fida, 2009, p. 53), with If City of France (Official Journal, 2003), with Staten Island of New York State of USA and lately with Kapakli and Adapazar Municipality of Republic of Turkey (Official communiqué of the municipality, 2016). We will mention first, in particular, the twinning between Debar of Republic of North Macedonia and the two cities that are part of the EU: If City of France and Llom City of Bulgaria, which, also to exchange of experiences and culture, aims at benefiting from various European funds, since twinning with cities that are in the EU are posing as a serious aid to attracting various European funds (Torte, 2009). According to author Kazepov, "we sometimes find partnerships in which the main players are social partners, third sector volunteer agencies, and State agencies. They increasingly negotiate with local authorities in drafting active public policies" (Kazepov, 2005, p. 30). According to Grindle, under the best conditions, organizations that mediate between the government and each citizen at the local level can be relatively effective in identifying common interests, selecting effective leadership for organizational tasks and advocacy, obtaining information, strategies for influencing local officials and disciplining those who do not carry out their duties. They have the opportunity to create alliances with other organizations to increase their impact on local public affairs (Merilee, 2007, p. 124). The same opinion has the even British researchers who say that "organizations involved in co-operation must be very motivated and convinced that these partnerships will be useful. Collaboration should focus on clear goals and organizations should be committed to achieving them (Vernis, Iglesias, Sanz, & Saz-Carranza, 1988, p. 83). Most of these organizations should work together on a more or less regular and formal basis and many of them involve in partnership actors and organizations in the private sector (Danson, Halkier, & Cameron, 2000). The scientific ideas presented so far have a common point, and it is as much as possible to use the influence of civil society organizations and associations to start partnerships both at government and local level.

If we do an analysis of the twin cities of the Debar Municipality with the two cities of the European Union and especially with city If of France, from the viewpoint of the above mentioned authors we can close that these partnerships, although they do not have many things together with the city of Debar again can help the process of democratization and this benefit is mostly due to Debar that is part of a society that main ambitions of the countries have the economic development and Euro-Atlantic integration, but we think that the main link that keeps these twin alive are European funds. With regard to this issue, in the framework of our work we have conducted an interview with the Chairman of Debar Municipality Council, Bashkim Mashkulli who is in this position is in the second term of five years (Mashkulli, 2018). According to him "from twin cities, Municipality

of Debar only have cooperation with the city If of France. With them, we had cultural activities, they were visiting us and we were there”.

As far as the Staten Island is concerned, the issue is different, although in this case, it is not about absorption of any fund, despite the fact that the opportunity existed through the Sister Cities International organization which divides many such funds. This partnership is of greater benefit to the Debar Municipality than to the Staten Island, which normally as a big city has many other twins, because besides the opportunity to benefit from the great experience of one of the most important municipalities of New York City, it is also a city that lives half of the Debar Diaspora in America. The twinning of Debar with Staten Island Municipality would be impossible as if there were no populations of Debar migrants who, according to the numbers obtained from a study by the Debar community in US "Votra Dibrane", reach 50% of the total Debar Diaspora. The above-mentioned association initiated this twinning by proposing to the Major of the Municipality of Debar Imer Ollogu, while he was an official visit to the Staten Island. This also concludes Chairman of Municipality council (Mashkulli, 2018): “with the Municipality of Staten Island, the Municipality of Debar was twinned at the time of DPA party when the Mayor was Mr. Imer Ollogu, while I am in the position of chairman of the Municipal Council, we have had no kind of cooperation with this city”.

Another issue that will further examine with the last twinning are with the two municipalities in Turkey, our research resulted in the fact that in these cities, especially in the municipality of Ada Pazar has a considerable number of the Albanian community. Perhaps this is also the main purpose of this partnership of the Municipal Council of Debar, but from the interview that we had with the Municipal Council Chairman who has its own jurisdiction guaranteed by law for cooperation between the cities it turned out that he was not familiar with this kind of cooperation, although the same is written in the Official communiqué of the Municipality. He said: „For twinning of the Municipality of Debar with the two Turkish municipalities, the Municipal Council has not made any decision, nor is it known for this phenomenon in the last 5 years that I am the Chairman of the Municipal Council. While the municipal council has not made any decision, in this case, will not be undertaken any cultural, sports, educational activities”. According to him, the Mayor of the Municipality of Debar encourages this cooperation and we should ask him for the reasons for such cooperation“. However, the main issue remains the question of how this cooperation between the cities can be written in the Official communiqué of the Municipality when the Chairman has no information about this match. This lack of coordination gives us the impression that there is a big gap between the Mayor and the Chairman of the Municipal Council of Debar. In general, the partnership is not something that can be invented, but it needs to be carefully prepared, so we're going to present some conditions to account for a successful functional and long-term cities partnership and then through our case studies we will assess whether the Municipality of Debar fulfilled these criteria.

Defining common goals: The first question when establishing a partnership is what we want from this partnership. The two partners must together define clear goals and types of activities. If this is not done, the partnership may fail due to wrong misunderstandings or perceptions;

Vision or reasoning to decide: Before entering a partnership, both sides must have a clear idea of why they are doing this. This reasoning, or vision, should also apply to existing and long-term partnerships. The partnership link should enable the rest of the authority to understand the importance of the activity. The Partnership can be related to specific subjects. A partnership will yield results if the field of excellence or experience is first identified (Handley, 2006, p. 9).

Providing political support: It is important that partnership activities are supported by as many circles as possible. In this case, we have legal support for the partnership of the cities of North Macedonia through the official gazette of the Republic of Macedonia, Article 14 (Official Gazette of the Republic of Macedonia, 2002). Political support is also important; local authorities are chosen to serve the community and have an important role in guiding and supporting the partnership activity. Many of them have experience in international activity and can add a great deal of ability to overseas activities. Additionally, to increase political legitimacy to work, the support of elected members is also important at a practical level for partnership implementation (Handley, 2006). If political support is also attainable, local networks may be a powerful reason that increases or decreases the economic potential of different parts of the country (Danson, Halkier, & Cameron, 2000, p. 18).

Finding a partner city: Cities need to consider many elements before they get involved in a partnership. At the top of the list is the choice of a proper partner city. Finding a suitable partner and developing a successful relationship requires time and patience. Authorities need to have regard to what they want to achieve from partnerships, if they want to work with a local authority or community similar to them, or if they can earn by working with a partner of different characteristics. Each partnership is unique, but in most cases, the right partner city is better to be similar to your city. These similarities can be a number of inhabitants, geographic position, economic activities, historical links with other communities, major social or environmental issues, etc. As we noted above, the Debar Municipality has a great closeness to the city of Gjakova as they link tradition, culture etc.;

The Inclusion of citizens and the community: There can be no twinning cities without the active participation of citizens. Representatives and civil servants can often be the driving force behind the projects but they should not be the only people involved. Schools, sports clubs, leisure groups, senior citizens' organizations, and all other local community associations should be involved;

Preliminary visit: Potential partners should contact each other to control whether they have areas of common interest. Observation visits are a useful way to discuss each goal and aim for partnership and to make sure consensus on the way forward. Before the visit, both sides should create a list of important questions to undertake some basic research on each other's culture. It is important to decide whether partners can work together on detailed projects. Visits detect common points, make photographs and video recordings of the area, both sides decide whether they can work together or not (Handley, 2006, p. 9).

The strategic agreement document: This strategic document should offer clear limits and tell everyone about what partners want to achieve and how they will achieve it. Both partners must draft the strategic plan together. Good partners should always work by discussion and agreement, as well as in about different perspectives. The plan should be accompanied by a timeline for the activities, to get space and to target it, as well as a list of the resources available. The strategy should be considered as a working plan to guide the daily work program and must stay flexible and inevitably be able to respond to any unpredictable challenges. In addition, to make one project more effective, the strategic plan can give to fundraising efforts for the activities that partners want to make. Almost all institutional donors need clear evidence of strategic planning and that, in the form of a flat logic framework. This framework should bring together everything about the project clearly and concisely. The main thing is not the activity but its impact. Ultimately, the strategic plan helps to tell others about a partnership, ensuring that its activities are transparent and providing propitious publicity for new participants (Handley, 2006, p. 10). According to Chairman of Municipal Council (Mashkulli, 2018): In the Municipal council about the twinning, we have no strategy or action plan for the future, but we have a primary strategy for the cooperation of the Albanian municipalities of North Macedonia at the level of cooperation associations at the political, cultural and artistic level as Albanian settlements”.

Partnership formalization: According to author Marr, relationships are divided into two categories, those that are formalized through contractual obligations with clients and big partners and those that are informal (Marr, 2008, p. 49). So the partnership must become official through status or relevant agreement.

Plan for Sustainable Relationships: The friendships between residents of different cities need to be strengthened. Only if you keep healthy connections, one city can count on another city, such as: in case of disasters;

Developing a budget and financial care: Every transnational partnership is obliged to spend money. Partnership events should be carefully planned and organized. It is useful for local authorities to divide annual budgets for twinning activities, even in very small amounts.

Creating a supporting structure: Over time, energy after the partnership can be weakened. A small but active team in the partner cities can help to keep up relations, develop partnerships with new projects, seek and find financial resources, and so on.

Working with schools and youth: There are many ways to involve young people in partnership. Students and student exchanges are often one of the crucial partnership points. In this regard, it may be encouraged to learn the language of the partner city. These actions tend to involve a large number of citizens: parents, teachers and school staff, student associations, etc.;

According to the analyzes so far based also on the statements of the Municipal Council Chairman that the Municipality has not had any strategy or action plan for action, we conclude that despite the great will, the least conditions have not been fulfilled to have solid cooperation with the twin cities. Starting from the selection of cities that have been made not on the basis of any study, but each city is selected on the grip of the mayors of the Municipality of Debar, and after this everything is left in the harness, starting from the twinning of Gjakova, then with city Llom of Bulgaria, and to close with the Staten Island and the two Turkish cities that so far have not reflected, with the exception of the city If of France, which works a bit better as a result of the involvement of Association ” Center for Sustainable Community Development” of Debar which not only has initiated but also contributes in continuity to its survival.

In the following, we will show the data and comment on them and we will outline our conclusions that emerge from the focus group interview on the topic "Twinning of the Municipality of Debar" (Focus-group, 2018):

How much information do you have about twinning cities?

The group generally has enough information about twinning cities. In addition to the official authorities that make the decision to twin cities, others have no correct source of twinning information beyond what they get from local authorities. It is worth mentioning that although in the focus group structure was a diversity of people, none of them responded that there is a lack of information;

With how many cities your city have twinned?

During the free focus group discussion, most of them mentioned only the first two twinning, namely with the Staten Island Municipality and Gjakova Municipality, which obviously attracted more attention from the public due to a large number of Debar citizens who lived in America and due to the approximate mentality of Debar with the Gjakova. The last two twinning did not have many repercussions for the citizens: the main reason was the insufficient promotion of these twinning by local authorities;

Did the Debar Municipality make proper twinning?

Most of the group thinks that "some twinning are good, and some others are not". This fact we believe has a great connection with the preliminary question. Many felt that Debar had only two twinning, and when it became clear that the city had a total of six twinning (even with the Llom City of Bulgaria, If City of France and two Turkish cities: Adapazar and Kapakli) they were surprised and tried to find connectivity with these cities, concluding that the last twinning was not suitable;

Who, according to you, mostly affects the establishment of a partnership: central government, local government, civil society or citizens?

Most of interviewers responded that local partnerships have a greater impact on the development of a partnership, while a minority of them felt that the civil sector was more affected, which is a reality with our key studying because, in addition to the first twinning of Debar with the Staten Island which was motivated by an organization of civil society, three others were implemented with the initiative of local government;

Who is actively involved in the twinning of your city?

As we came to the conclusion that twinning should include schools, sports clubs, leisure groups, elderly citizens' organizations and all other associations of the local community, on the other side in the Debar Municipality is another reality, because in twinning process are involved only elected representatives and civil servants, a fact that is consistent with the focus group's conviction;

With which city would you wish your city to create twin?

Most focus group interviews think that the next twin city of Debar Municipality should be Tirana, the capital city of Albania. This is probably related to the involuntary emigration of the Debar citizen to Tirana during the years 1912-1913 due to Serbian pressure, whereupon the city of Debar was empty. Today in Tirana there are over 55,000 people with origins from Debar. In Tirana, there is also a street that is named "Debar Street". The focus group resulted that one of the most right twinning for Debar is exactly that initiated by diaspora, concretely by a non-governmental organization of Debar emigrants who work in the US and who cares for the rights and progress of the the Debar community living in the United States, because they engaged in more projects for Debar community as humanitarian, sports, infrastructure, etc. as their city of origin. In this case the opinion of the chairman of the Municipal Council does not differ much from the concept of the focus group, but what is different is the name of the city to twin, which according to him should be the city of Peshkopia (Mashkulli, 2018): "In the future, we have a twinning and cooperation plan with the city of Peshkopia in the Republic of Albania, in which we are connected with blood, tradition, customs and so on".

4 CONCLUSIONS

By having, cooperation demonstrates the ability to learn from the best practices of others. Local communities can gain a lot of partnerships and links within and outside the country, especially if different parties - such as schools and community groups - are involved. Inter-municipal cooperation creates good opportunities for attracting various donations and government grants; Partnerships unites people from different countries and cultures, increase understanding, expand horizons, fight isolates. They promote tolerance and respect for others, fight racism and xenophobia. The good partnership should include a lot of community members, citizens of all ages and backgrounds, and in both partner cities; Although young people may in most cases be the main focus (target group) of the partnership, however, all members of the population can benefit. Representatives and civil servants should be the driving force of the projects, but they should not be the only ones involved; For some people, the concept of city partnership is either unknown or misunderstood. In order to increase interest, it is necessary to explain exactly what the partnership relationship means. Promoting actively will help in this regard; Organizers should use every opportunity explanation, that the community members, various groups, schools, colleges, religious institutions, and business groups to understand the relevance of partnership and the truth that anyone can be involved in it; Good communication with the media, with the partners and with the local community are important to making a successful international partnership. By learning from our counterparts in other countries, sharing good ideas and practices, together with the common work to build a better environment for everyone, we urge more international activities, such as twinning cities, not only with the European Union traditional partners but also wider than this, throughout the developing world. We recommend local authorities "to produce" a bulletin, newspaper or website for creating the right image of partnership. It is very important to have continuous

marketing to stimulate citizens to engage and to be constantly involved in various activities within the partnership. Signs can be at the entrance of the city, as well as courses and newspapers. From this research, we come to an end that twinning cities help immigrants in the diaspora for their rapid suitability without assimilation and their experiences have positive effects in the process of democratization of their countries of origin. But if our basic hypothesis is that the twinning cities helps the Diaspora and our result from key studying shows the opposite, namely, if the twinning of the Municipality of Debar and the Municipality of Staten Island is in existence, then we find that the main source of this negligence falls on the municipality of Debar which does not use this powerful weapon to help Diaspora with various activities to protect it from continuing assimilation. We appreciate that this role that the Municipality of Debar should have had, has taken over by the Debar Community which operates on Staten Island and has various cultural, sports and artistic activities not only for the Debar Diaspora operating on Staten Island but also for the city and citizens of Debar. During all the activities that have taken place between Debar Municipality and the Staten Island Municipality, the initiator of these projects has always been a non-governmental organization operating on Staten Island (The Dibra Community Organization) and the most of these projects have been developed only in Debar Municipality with the support of local government, but we noticed that besides the formalizing of this cooperation document between the two cities, the Staten Island Municipality is totally passive and all initiatives and commitments for joint projects are implemented by Albanian non-governmental organization operating in the United States. What we recommend through this paper is that the Debar Municipality with the help and influence of Albanian associations operating in the US needs to find more flexible methods for restoring contacts with the Staten Island Municipality and jointly to organize cultural projects not only in Debar, but also in Staten Island where live tens of thousands citizens with origins from Debar, because all this is in the benefit of its citizens living in America.

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The contribute of the Diaspora in the overall social welfare - the case of Debar

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ABSTRACT: Globalization and technological advancement have led the phenomenon of immigration to take a different approach, especially in the century in which we live. Throughout the history of humanity, but also over the past century, immigration outside the borders was seen as a phenomenon that has negative consequences for the country from which people leave, but if we take it in the long-term, we will see that Diaspora's role is important for the country's democratization. The process of democratization is influenced by many factors such as urbanization, social welfare, education, promotion of private businesses, international co-operation, democratic protests, and so on. Through this research paper, we aim to highlight the role of the Diaspora in the overall social welfare, focusing on case of Debar. Population of Debar that has migrated to the United States marks nearly five decades of displacement from their homeland and their number in this country is tens of thousands. Through interviews and other collected information, we will highlight the contribution that Diaspora of Debar has given in the raising of the standard of living and promoting other factors of the democratization process. Diaspora's contribution is not only in terms of family members and groups, but also wider. Establishment of Diaspora Associations has led them to be more organized and better to manage the support to their homeland.

KEYWORDS: immigration, Diaspora, welfare, Debar, democratization

1 INTRODUCTION

Human history is a history of people movements from one place to another to find better living conditions. If we refer to the divine books, such as the Qur'an and the Bible, we will meet many stories about the immigration of people because of oppression or injustice: such as the story of the prophet Moses and the children of Israel, who disagreed with the cruel rule of the Pharaoh and left their homeland; or the immigration of the Prophet Muhammad from Mecca to Medina, known in Islamic literature as the Hijrah, who together with a group of

followers, as a result of persecution by the first people of Mecca, were forced to leave their native land and settle in the city of Medina where they founded the new state. Even in the last century, as a result of regional and world wars, or as a cause of mass genocide committed against the population, people or communities, were forced to leave their homeland to live a life of peace and security. Such a case is the immigration of Jews during World War II as a result of the violence and the Nazi massacres exercised against them. But wars and bad ruling regimes have not been the only reason that has contributed to what is called migration of population. People have also emigrated as a result of diseases, epidemics and natural disasters that have included their hometowns. After the Second World War, with the rapid development of technology and living in a global world, people began to emigrate for other reasons, whether economic, for a better life, or even a want to live in developed countries. Despite the factors, recent immigration is seen as a trend and not a problematic, although large flows of refugees and migrants from less developed countries to developed and westernized countries pose a potential threat to national and international security.

In the short-term, immigration has negative consequences for the country of origin and represents a challenge for the host country. But if we look at it in the long-term, we will notice that the role of organized emigrants, also known as Diaspora, is present in their home country. The Diaspora of Western European and US countries has a great influence on democratization processes and the growth of social welfare in the country of origin. The Albanian Diaspora from the USA has played a special role in the independence of the state of Kosovo, with the influence it has had on US senators and congressmen, which later resulted with the intervention of NATO and US forces in Kosovo. Diaspora's contribution was also present after the war, until today, not only in Kosovobut in all Albanian-inhabited areas in Macedonia, Serbia, and Montenegro.

2 KEY RESEARCH TERMS: IMMIGRATION, DIASPORA, DEMOCRATIZATION, AND SOCIAL WELFARE

Immigration is a very old phenomenon that has accompanied humanity from ancient times to modern ones. According to Segal, Elliott, and Mayadas (2010: 3), the phenomenon of migration has been part of human experience since ancient times, along with the economy, politics, and religion, as well as a longing for exploration or adventure. The history of human migration has been perpetuated in such scriptures as the Bible, referring to the migration of Prophet Moses and his followers to the "promised land" and Homer's *Odyssey*, depicting the story of Odysseus wandering around the world. (Segal, Elliott & Mayadas, 2010: 17). To emigrate means moving from one place or state to another, changing your place and settling in another country, either for a temporary or permanent period. Immigration factors can be. push factors (wars, armed conflicts, hunger, drought, spread of diseases, poverty, religious and national intolerance, earthquakes, floods) and pull factors (high salaries in the foreign country, lower taxes, climate conditions, better access to employment, social welfare, better opportunities for education and medicine, better political system, basic rights and freedoms, etc.).

Diaspora is a term that is related to the phenomenon of immigration. According to most scholars, the Diaspora concept is related to the removal of Jews from their homeland, their later migrations, and their preservation and identity in various parts of the world (Graham & Poku, 2005:

According to the online dictionary Merriam-Webster, the Diaspora refers to the group of people who have left their ancestors' birthplace and are stationed in another country (Merriam-Webster, 2018), it involves moving, migrating or distributing a population far away from their homeland.

Democratization represents the process through which democracy is distributed, within a country or across the world. Democratization is not a story of the political changes that have touched the West, but this process has become a landmark for understanding modern political change around the world (Harrison, 2018). Democratization is influenced by various factors: economic development, urbanization, social welfare, education, promotion of private businesses, international co-operation, democratic protests, and wealth and social equity.

Social welfare implies the well-being of society. Social welfare is not the same as the standard of living, but rather refers to the quality of life that includes several factors: the quality of the environment (air, soil, water), the level of criminality, the extent of drug abuse, the availability of essentially social services as well as other aspects of spiritual and religious life (businessdictionary.com, 2018). Social welfare has to do with all the good things and services that can be used privately and publicly by the people of a place.

3 IMMIGRATION OF THE CITIZENS OF DEBAR: THE PERIODS, CAUSES AND CONSEQUENCES OF IMMIGRATION

The dissolution of the Soviet Union, Yugoslavia, and Czechoslovakia, as far as democratization is concerned, raises a series of new issues, because in these countries this process encouraged the movements for national independence, so we can say it is a synonym of national self-determination and destruction of the multinational state that governed by an authoritarian rule (Przeworski, 1995: 10). Though Yugoslavia broke up, multinational states remained alive, such as Serbia before the separation of Kosovo, Bosnia and Herzegovina, Montenegro, and Macedonia, so democratization in these countries was rated as more difficult than in countries where people see themselves as members of a community. Democratization seeks to strike a balance in the competitive forces of different categories of interest: labor, owners, women, consumers, institutions, governance, freedom of expression and choice - composed of a large number of scattered and subordinated actors who have been oppressed by authoritarian rule.

The centralized socialist systems of governance in the countries of the former Yugoslavia did not have the same treatment and appreciation for all communities that lived within the territorial boundaries of this multinational state, especially the Albanian population in Kosovo, Montenegro, Sandzak, Serbia, and Macedonia. The

controlled and improper political regime, through various violent and unusual methods, and by restricting the freedom of speech and national and religious rights, has influenced that a large part of Albanians who lived in the former Yugoslavia, to emigrate to Western European countries and the United States. Like all Albanian-inhabited places in Macedonia, also the city of Debar has been influenced by emigration at different periods of time. Emigrations during the Ottoman rule resulted in a migration of population of Debar to Istanbul and other cities of Turkey, while the emigration of 1912-1913 as a result of Serbian violence affected a large population outflow from the city of Debar. During this period, the citizens of Debar emigrated to Albania, where they first went to the city of Elbasan, and then settled in Tirana. According to Ruzhdi Lata (2010), this wave of emigration in the former Yugoslavia was almost entirely sponsored by the central state security system of Yugoslavia, through modified and organized pressures, political conditionality and the conviction that the life in the city of Debar was a waste of time. In the 1970s, using the economic reason as an excuse, and as a result of an agreement between the former Yugoslavia and West Germany, a considerable number of workers of Debar went to work and operate there. According to Osman Mashkulli (2018), the number of citizens of Debar who left their homeland in the 60s, 69 and 70's of the last century has reached some 530 workers, most of whom have been employed in Debar but was the wish of them to be employed in the Western world because of the better life conditions. According to Sakip Veliu (2018), the emigration of citizens to the United States of America started in the 1970s, and after the 1990s, the number of those leaving the city began to increase even more.

According to the data and conversations with different citizens, we received this data from Nasuf Strikçani (2018), who is working on Master's Thesis on Immigration, the first citizen from Debar who has migrated to the United States was Nazmi Varvarica, from Varvarica village. According to the same source, in 1923, in the United States are registered to leave three other citizens from Dibra: Azis Veliu, Gafur Langu, and Shaban Langu (Strikçani: 2018). Today, according to the first data of The Dibra Community Organization, which has taken over the registration of citizens living and operating in the United States, the number of citizens from Debar in the United States is more than 15,000 inhabitants, distributed in the states of New York, New Jersey, Philadelphia, Worcester, Chicago, Hartford, Waterbury, Connecticut, Pennsylvania, Florida, Arizona and Alaska (www.dibra.org, 2017).

In general, the causes of the emigration of citizens from Debar in different periods of time are political, economic, social and psychological; and according to a survey conducted in 2010, the reasons can be summarized as follows:

- the Unjust Political System: The intellectuals and those who wanted to express their national and religious rights and freedoms disagreed with rules and centralized system and controlled extremely by state security;
- unemployment: Today, the employment of young people who had finished faculties has become very difficult, as, in places like Macedonia, the private sector has not yet started to act properly, while workplaces in public and state institutions are limited;

- poor financial condition and low living conditions: Although some members of the household have jobs, high prices and low salaries make the financial situation worse. Considering these conditions, a part of the youth have been forced to borrow and use illegal ways to leave their homeland. Some others, considering the technological developments and the advantages given in the Western European countries and the US, are not satisfied with the standard of living and social welfare in our country;

- family reunion: In the 1990s many people left leaving their families. Those who managed to be provided with regular US documentation and economically were good, decided to take their families;

- desire for a better life and to live somewhere outside the home country: There are even those who have good living conditions, when they are given the opportunity to be provided with documentation, immigrant visa or working visa, have decided to leave their hometown to create a better life, a higher standard of living and better social welfare.

Even though we live in a globalized world where immigration effects are not as pronounced as before, the phenomenon of immigration has the consequences and its effects, both positive and negative. The negative aspects of immigration in the city of Debar are the empty of the city and the danger that the autochthonous population will be replaced with another community; "brain drain"; lack of workforce; decrease in the number of students in primary and secondary schools; exploitation of illegal roads to leave home; the risk of assimilating culture, language and religion to those who leave the country of origin; deviating young people from the traditions and customs of their ancestors; as well as the sadness and love of those who are far away from their relatives. Regarding the positive aspects of emigration, they are the contributions of the citizens to their families and issues of public interest; organizing the citizens in the US through the organizations and strengthening their place, which is good for the city of Debar; to make sure a better life, especially those who have not had the opportunity to do so in their city; socialization and acquisition of positive values of Western culture; as well as Diaspora's contribution to the democratization process of the country, the increase of living standards and overall social welfare.

4 THE CONTRIBUTE OF THE DIASPORA IN THE OVERALL SOCIAL WELFARE

The contribute of the Diaspora in overall social welfare in the city of Debar has a historical and continuous flow that it can be divided into two levels:

- Privately or internally; and

- In public terms.

The greatest contribution of the citizens who have emigrated to the United States, obviously remains assistance to their family and relatives, being maintained and assisted in all respects, both for economic and financial issues, for education and training, for construction or reconstruction, for healing, and so on. Thanks to the remittances and other financial resources that come from the population living in the US, their fellow citizens and their families living in Debar may live a bit modern and trendy. The Diaspora not only meets the basic needs of families in need but is interested in helping even more.

Diaspora gives a great contribution to the public aspect. The Diaspora has provided a great help in building the infrastructure of the city of Debar. According to the mayor of Debar, Ruzhdi Lata (2018), Diaspora's contribution was initially in the construction and maintenance of religious buildings, the construction and reconstruction of mosques, the construction of minarets and clock tower, and then with donations and irreversible investments in asphaltting the city streets. According to Lata (2018), it is the Diaspora contribution, the asphaltting of the roads of Debar, the asphaltting of the Ibe Palikuqa road, a considerable contribution for the construction of the city boulevard, where the contribution amounts are between 25,000 and 30,000 US dollars, sums that can be repeated several times within a year.

Undoubtedly, the greatest contribution of the Diaspora to the overall social welfare is through organizations and associations operating in the US and in the city of Debar. The largest organization in the USA, is the Dibra Community Center which was founded in 1996. This organization has made a significant contribution, both for the citizens from Debar who live and work in the US, but also for their fellow citizens living in the city of Debar. Through the former Albanian congressman, Josef Diogardi, has lobbied in the government and the US Congress on the Albanian issue in general, but also to regulate the status of citizens in the US. According to the data obtained from the official website of this organization, members of it have provided modest help to the issue of education in elementary schools in Debar by bringing tables and chairs with a container, as well as financially supporting the football club "Korabi" ,as well as donating a sport's equipment repair facility (www.dibra.org, 2017). The organization participated in the construction of mosques and their restoration when needed, assisted in the restoration of educational institutions, while in the years 1998-1999 the association contributed to the construction of Skanderbeg's bust in the center of the city (Strikçani, 2018). This organization has also contributed to the opening of the University of Tetovo, regular aid for the Eid Holidays and the month of Ramadan, help for the reception, accommodation, and housing of Kosovars in 1999, and so on. As for the promotion of democracy and protesting voice, together with other Albanian associations, has organized protests against the project "Field of Lukova", a project that foresaw the construction of a hydropower plant by diverting the water of the Radika river.

The other association established in the United States, operating and contributing to social welfare, is the Humanitarian Association "Drita", founded in 1999 to help refugees coming from Kosovo. According to data from the president of this association, Nertil Osmani (2018), in 2017 this organization has donated a contingent of medical materials and appliances with some 434,468 different products distributed to the Health House in Debar, the Municipal Hospital in Debar and the Municipal Hospital of Tetovo. Also, with the support of

international associations such as "ICNA RELIEF" and "Helping Hand", donated bags and teaching aids in elementary schools.

Another organization of the Diaspora, is the one of the groups of immigrants named "Dibra" foundation, which was activated in 2013. According to the coordinator of this Diaspora project, Skender Kërçishta (2018), this foundation in 2014 has bought and repaired a house for a family, while in 2015 they built a house for another family. This foundation has done similar activities in 2017.

The other association initiated and supported by the Diaspora, which has aimed to contribute to the overall social welfare, is also One Dollar for Dibra. This association has been active with the gathering and distribution of humanitarian aid during various holidays, as well as with the encouragement and support of protests against the Radika River diversion.

In public terms, the Diaspora has also led to investments from the US to come to Debar, citizens living in the US that have invested their capital in their birthplace, in order to employ the young people and their country's population of origin. Some emigrants' investments in Debar can be classified as follows:

- "Korabi Ready Mix" company, with owner Ibrahim Kolari, who started work in 2003, deals with the production of concrete for construction and has 12 employees;
- Call Center established in 2006, which today is known as Fix-Respond with owner Atli Dobrova, who has 23 employees. The same investor in 2008 has opened a company that deals with the production of pellet stoves, known as Diecotec, with some 30 employees;
- the Slice company, founded in 2010, which initially operated under the name My Pizza, is today known as Slice brand, with owner Ilir Sela. Today, this company employs over 300 workers in Macedonia and operates with four offices in New York, Belfast, Ohrid, and Debar.

5 CONCLUSIONS

Diaspora of the city of Debar gives a special, considerable and continuous contribution in several aspects: political, economic and social. From all that has been elaborated above, we can say that the contribution of the Diaspora to the overall social welfare is solid, thus making a sufficient contribution to the process of democratization of the city. Internally, Diaspora contributes through remittances, which positively affect the household and domestic economy. Although the financial aid they send to their family members is personal, the organization of the citizens of Debar in the US have a direct or indirect impact that this support continues uninterruptedly. Thanks to these financial aids, the citizens living in Debar increase their family well-being, which affects the overall social welfare.

Different aides from the Diaspora living in the USA and Europe are targeted at schools and hospitals, which generally positively impact social welfare. Diaspora have also contributed to the organization of protests against the Radika River diversion, protests to preserve the ecosystem and biodiversity in Debar and its surroundings. Through American governors, the Diaspora has positively influenced the political events in the Albanian countries, and from this lobbying won Albanians and the immigrants from Debar in the US and beyond. It is also an undeniable contribution of the Diaspora to the increase of direct investments, which has affected the reduction of the unemployment rate.

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Submission Template for ACM Papers*

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ABSTRACT

This submission template allows authors to submit their papers for review to an ACM Conference or Journal without any output design specifications incorporated at this point in the process. The ACM “Submission Template” is a single column MS-Word document that allows authors to type their content into the pre-existing set of paragraph formatting styles applied to the sample placeholder text here, or copy- and-paste their text and then apply the respective paragraph styles (**Windows**: you can open the Styles task pane from the **Home** tab [it can also be opened with the keyboard shortcut Alt+Ctrl+Shift+S]; **MAC16**: you can access the Styles pane at the right of the **Home** toolbar.) Highlight a section that you want to designate with a certain style, and then select the appropriate style from the list. To view which style is being used in any part of this document, place your cursor on your text and look at the “Current style” field in the Styles pane. It is beneficial to create your document in draft mode with the style panel open in the left-side panel. If the panel is not immediately visible when the Submission Template is opened, you will need to open the panel manually—for Windows: click on the following from the main ribbon above: File > Options > Advanced > Display > Style area pane width in Draft and Outline views. Set the style area width (1–1.5" is a good starting value.); for MAC: go to the “**View**” menu and select “**Draft**”; then go to the “**Word**” menu and select “**Preferences**” and then “**View,**” under the “**Window**” section insert “1.5” inches under the style area width. *If a paper is accepted for publication*, authors will be instructed on the next steps: to submit a revised document file after applying the Word version of the ACM Master Article Template to their paper. Building on the work authors have already completed using this “Submission Template,” the ACM Master Article Template will contain macros, functionalities, and validations that need to be applied before a paper can be submitted for publication. Authors must then follow the submission instructions found on their respective publication’s web page. Once your submission is received, your paper will be processed to produce the formatted Word, PDF, and HTML5 output formats, which will be provided to you for review, revision/resubmission (if applicable), and approval.

CCS CONCEPT insertion: The new template enables you to import required indexing concepts for your article from the [ACM Computing Classification System \(CCS\)](#) using an [indexing support tool](#) found in the ACM Digital Library (DL). The tool generates formatted text after you have selected your terms. To insert your CCS terms into your document, copy and paste the formatted text from the CCS tool using the “<https://dl.acm.org/ccs/ccs.cfm>” link into the “CCS CONCEPTS” section.

An additional step is necessary to ensure that the proper CCS terms are added to the Digital Library citation page: from the “view CCS TeX Code” listing, click on “Show the XML Only.” Highlight and copy the XML code from the window. You must insert the XML code into your Word

document's properties: from your Word document, click on "**File**", then click on the "**Info**" tab on the left-hand side panel, then click "**Properties**" and select "**Show All Properties.**" Click within the "Comments" metadata field and paste the XML data .

CCS CONCEPTS

- Insert your first CCS term here • Insert your second CCS term here • Insert your third CCS term here

KEYWORDS

Insert comma delimited author-supplied keyword list, Keyword number 2, Keyword number 3, Keyword number 4

1 Introduction: About this Template

All style elements are specified in this template to facilitate the production of your paper and to have the styles consistent throughout. The paragraph styles are built-in and examples of the styles are provided throughout this document. *Save as you go and backup your work regularly!*

More about the submission template

This submission version of your paper should not have headers or footers, Baldassare (2000). It should remain in a one-column format—please do not alter any of the styles or margins.¹

How to apply Display Math.

There are two types of math equations: the numbered display math equation and the un-numbered display math equation. Below are examples of both.²

$$\sqrt{b^2 - 4ac} \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (1)$$

The **DisplayFormula** style (above) is applied in the numbered math equation. A numbered display equation always has an equation number (label) on the right.

$$\sqrt{b^2 - 4ac} \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The **DisplayFormulaUnnum** style (above) is applied only in unnumbered equations. An unnumbered display equation never contains an equation number Bertot and Grimes (2012) on the right—this element distinguishes it from the numbered equation. Please note: the subsequent text after the **DisplayFormula** (numbered equation) or **DisplayFormulaUnnum (unnumbered equation)** must have the paragraph style **ParaContinue** applied.

Figures and Tables.

Figure(s) and table(s) are “float elements” which should be inserted after their first text reference, and have specific styles for identification. Insert a figure and apply the “**Image**” paragraph style to it. For the figure caption, apply the style “**FigureCaption**.” Below is an example of a figure and caption with the styles applied.

¹ Instructions for inserting the footnotes in **Windows and Mac16 platform**: Place the cursor in text where the footnote mark should be located, go to “References” tab, select “Insert Footnote” and enter the footnote text. Return to your place in the document by double-clicking on the footnote marker at the beginning of the note.

² Instructions for inserting the footnotes in **Mac11 platform**: Click at the end of the word where you want to insert the footnote. Click on the Insert menu. Now click on Footnotes. Microsoft Word shifts the document to the footnote area. Insert the footnote text in the provided pane.

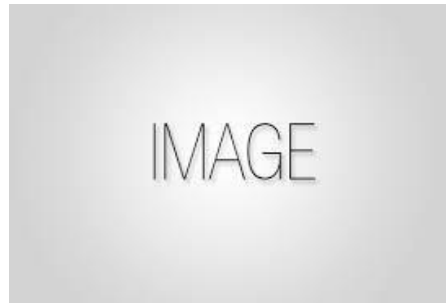


Figure 1: Figure caption and image above the caption [in draft mode the image will not appear on the screen.]

Authors can also insert a (Abdelghaffar, Kamel, and Duquenoy 2010) multi-part figure above a single caption. Every inserted figure must have the “Image” style applied. Below are instructions regarding how to insert a multi-part figure in your paper.

- (i) If the author wants to insert two multi-part images, they must draw a one row and one column table and insert the images one-by-one in the cells.
- (ii) If the author wants to insert three multi-part images, they must draw a one-row and three-column table and insert the images one by one in all three cells.
- (iii) If the author wants to insert four multi-part images, they must draw a two-row and two-column table and insert the images one-by-one in all four cells. (see the following example):

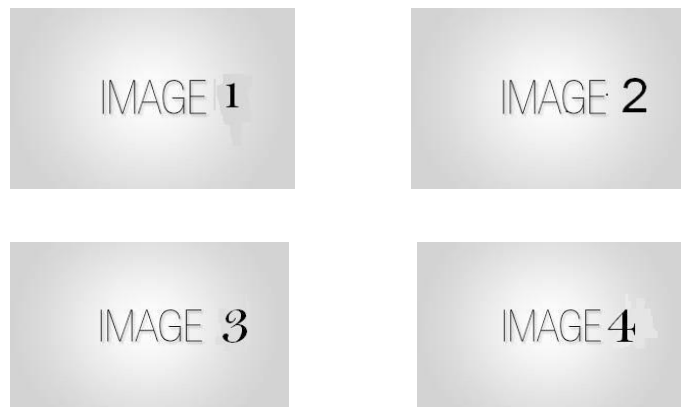


Figure 2: The layout of multipart images should be as per the above example within the table. All images must have the “Image” style applied.

The instruction list below describes the required steps authors need to follow in order to insert descriptive text for figures (alt-txt value) in **MS Word 2013 and 2016**:

1. Insert a picture in the document.
2. Right click on the inserted picture and select the **Format Picture** option.
3. In the settings at the right side of the window, click on the “Layout & Properties” icon (3rd option).
4. Expand **Alt Txt** option.
5. In the “Title” and “Description” text boxes, type the text you want to represent the picture, and then click “Close.”

NOTE: For additional information regarding how best to write alt text descriptions and why doing this is so important, please see: <https://www.acm.org/publications/taps/word-template-workflow>.

Below are steps to insert the alt-txt value in **MS Word 2010/2011 for Windows***:

1. Insert a picture in the document.
2. Right click on the inserted picture and select the **Format Picture** option.
3. Select the **Alt Txt** option from the left-side panel options.
4. In the “Title” and “Description” text boxes, type the text you want to represent the picture, and then click “Close.”
 - * The Mac 2011 version 14.0.0 and later allows the option for inserting “alt-text.” In the MAC version of Word 2016, right-click on the image and select “Edit Alt Text” from the pop-up menu and then enter the description for the alt text.

Authors can also insert (please see Table 1) tables by using the MS Word option (INSERT ->Table) as Abdelsalam, Reddick, Gamal, and Al-shaar (2013) per the required row and column size. Every table must have a caption (title) and it must have the “**TableCaption**” style applied. Please note that tables **should not** be supplied as image files, but if they are images they must have the “Image” style applied. After a paper is accepted for publication, apply the “table head” style by highlighting the respective row and apply the “**TableHead**” style found in the “Body Element” section of the ACM Master Article Template.

Tables can be very difficult for screen reader users to understand unless they include markup that explicitly defines the relationships between all the parts (i.e.: headers and data cells). *A key to making data tables accessible to screen reader users is to clearly identify column and row headers.* For simple tables, the only step necessary for accessibility is to identify which row contains the column headers. Below are a few steps to help make tables accessible:

1. Select that table’s row, then right-click the row and select “Table Properties”;
2. In the *Table Properties* window, click the *Row* tab and select the box that says “Repeat as header row at the top of each page.”
3. If every row contains the column header, then select “Table Properties” and follow the same process.

Table 1: This is an example of the table caption.

Table Head	Table Head	Table Head
Row 1 Column 1	Row 1 Column 2	Row 1 Column 3
Row 1 Column 1	Row 2 Column 2	Row 2 Column 3 ^a

^a This is example of table footnote.

How to Set a Figure (Image, Table, etc.) to Span Two Columns

After your paper has been accepted, if there is a need for a figure to span both columns in the PDF/print output, please follow the steps below in your document to apply the “Large Float” style to the figure (which will be listed under the “Body Elements” menu after the ACM Master Article Template has been attached to your submission document):

- 1) Apply both the “Image” and “FigureCaption” styles to the respective figure.
- 2) After applying both styles, **select both elements** and apply the “Large Float” option found under Body Elements -> Large Float as shown in the following screenshot:

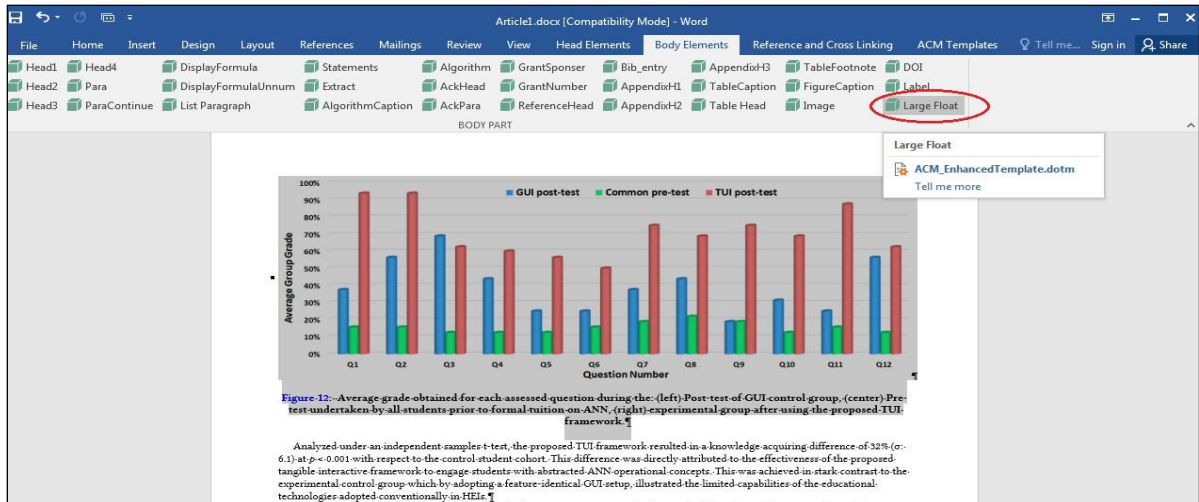


Figure 3: Example of the “Large Float” feature.

After completing these steps, the final layout generated by the production system’s conversion process will be rendered in the PDF/print output version as seen in the screenshot below. ACM recommends that you review the PDF proof of your text to ensure that your figure is properly formatted.

IUI'18, 2018-03-07, 2018, Tokyo

Clifford De Raffaele et al.

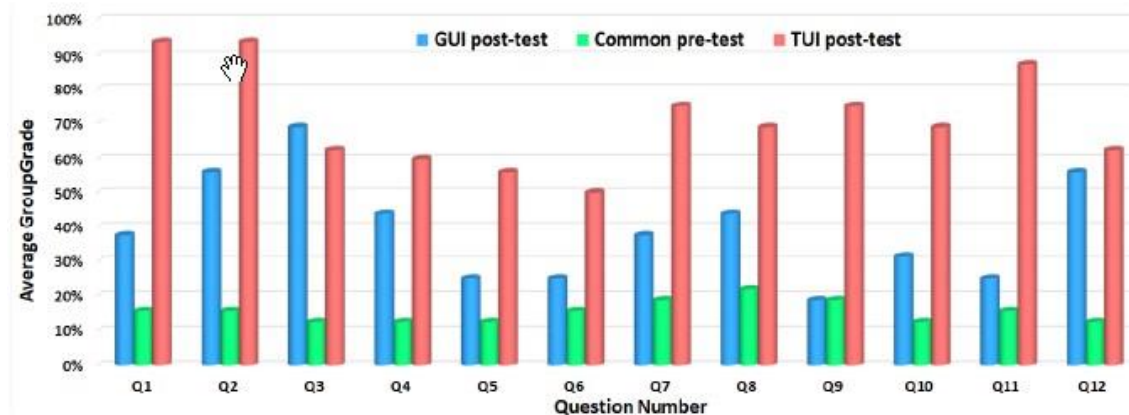


Figure 12: Average grade obtained for each assessed question during the: (left) Post-test of GUI control group, (center) Pre-test undertaken by all students prior to formal tuition on ANN, (right) experimental group after using the proposed TUI framework.

Analyzed under an independent samples t-test, the proposed TUI framework resulted in a knowledge acquiring difference of 32% ($\sigma: 6.1$) at $p < 0.001$ with respect to the control student cohort. This difference was

The aggregated results in Figure 13 show that both technologies performed with equitable effectiveness on ‘detail oriented’ aspects of knowledge with Q3 in Figure 12 showing a marginal increased ability by GUI software to

Figure 4: Large figure spanning in both the columns in final version.

1.2.1 Formatting math statements and extracts.

Theorem/Proof/Lemma. Math statements should have the “Statement” style applied. This paragraph is an example of the “Statement” style.

“A clip, snippet, passage or extract from a larger work such as a news article, a film, a literary composition or other media is called the extract. An extract is a short passage taken from a text, film, or piece of music.”

.... This is an example of a short Extract which is usually 1-2 lines of text. Please notice the placement of the ellipses and either end of the short extract...

ALGORITHM 1: Iterative Algorithm

```
current_position center
current_direction      up
current_position is inside
circle
while current_position is inside circle, do
    neighborhood all grid hexes within two hexes from
    current_position for each hex in neighborhood, do
        for each neuron in hex do
            convert neuron_orientation to
            vector scale vector by
            neuron_excitation
            vector_sum vector_sum + vector
        end
    end
end
normalize vector_sum
end
```

ACKNOWLEDGMENTS

Acknowledgments are placed before the references. Add information about grants, awards, or other types of funding that you have received to support your research. Author can capture the **grant sponsor information**, by select the grant sponsor text and apply style ‘GrantSponser’. After this, select grant no and apply ‘GrantNumber’ from style panel. Example of Grant sponsor: [Competitive Research Programme](#) and example of Grant no: [CRP 10-2012-03](#).

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 - [2] F.N.M Surname, Article Title, <https://www.acm.org/publications/proceedings-template>.
 - [3] F.N.M Surname and F.N.M Surname, 2018 Article Title, The title of book two (2nd. ed.). Publisher Name, City, State, Country.
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A APPENDICES

In the appendix section, three levels of Appendix headings are available.

General Guidelines

1. Save as you go and backup your file regularly.
2. Do not work on files that are saved in a cloud directory. To avoid problems such as MS Word crashing, please only work on files that are saved locally on your machine.
3. Equations should be created with the built-in Microsoft® Equation Editor included with your version of Word. (Please check the compatibility at <http://tinyurl.com/lzny753> for using MathType.)
4. Please save all files in DOCX format, as the DOC format is only supported for the Mac 2011 version.
5. Tables should be created with Word's "Insert Table" tool and placed within your document. (Tables created with spaces or tabs will have problems being properly typeset. To ensure your table is published correctly, Word's table tool must be used.)
6. Do not copy-and-paste elements into the submission document from Excel such as charts and tables.
7. Footnotes should be inserted using Word's "Insert Footnote" feature.
8. Do not use Word's "Insert Shape" function to create diagrams, etc.
9. Do not have references appear in a table/cells format as it will produce an error during the layout generation process.
10. MS Word does not consistently allow the original formatting to be modified in the text. In these cases, it is best to copy all the document's text from the specific file and paste into a new MS Word document and then save it.
11. At times there are font problems such as "odd" stuff/junk characters that appear in the text, usually in the references. This can be caused by a variety of reasons such as copying-and-pasting from another file, file transfers, etc. Please review your text prior to submission to make sure it reads correctly.

Preparing Graphics

- Accepted image file formats: TIFF (.tif), JPEG (.jpg).
- Application files (e.g., Corel Draw, MS Word, MS Excel, PPT, etc.) are NOT recommended.
- Images created in Microsoft Word using text-box, shapes, clip-art are NOT recommended.
- Scalable vector formats (i.e., SVG, EPS and PS) are greatly preferred.
- IMPORTANT: All fonts must be embedded in your figure files.
- Set the correct orientation for each graphics file.

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