

GOCE DELCEV UNIVERSITY - STIP
FACULTY OF COMPUTER SCIENCE

ISSN 2545-479X print
ISSN 2545-4803 on line

**BALKAN JOURNAL
OF APPLIED MATHEMATICS
AND INFORMATICS
(BJAMI)**



YEAR 2018

VOLUME I, Number 1

GOCE DELCEV UNIVERSITY - STIP, REPUBLIC OF MACEDONIA
FACULTY OF COMPUTER SCIENCE

ISSN 2545-479X print
ISSN 2545-4803 on line

BALKAN JOURNAL OF APPLIED MATHEMATICS AND INFORMATICS



BALKAN JOURNAL
OF APPLIED MATHEMATICS AND INFORMATICS

(BJAMI)

AIMS AND SCOPE:

BJAMI publishes original research articles in the areas of applied mathematics and informatics.

Topics:

1. Computer science;
2. Computer and software engineering;
3. Information technology;
4. Computer security;
5. Electrical engineering;
6. Telecommunication;
7. Mathematics and its applications;
8. Articles of interdisciplinary of computer and information sciences with education, economics, environmental, health, and engineering.

Managing editor

Biljana Zlatanovska Ph.D.

Editor in chief

Zoran Zdravev Ph.D.

Technical editor

Slave Dimitrov

Address of the editorial office

Goce Delcev University – Štip
Faculty of philology
Krstev Misirkov 10-A
PO box 201, 2000 Štip,
R. of Macedonia

**BALKAN JOURNAL
OF APPLIED MATHEMATICS AND INFORMATICS (BJAMI), Vol 1**

**ISSN 2545-479X print
ISSN 2545-4803 on line
Vol. 1, No. 1, Year 2018**

EDITORIAL BOARD

- Adelina Plamenova Aleksieva-Petrova**, Technical University – Sofia,
Faculty of Computer Systems and Control, Sofia, Bulgaria
- Lyudmila Stoyanova**, Technical University - Sofia , Faculty of computer systems and control,
Department – Programming and computer technologies, Bulgaria
- Zlatko Georgiev Varbanov**, Department of Mathematics and Informatics,
Veliko Tarnovo University, Bulgaria
- Snezana Scepanovic**, Faculty for Information Technology,
University “Mediterranean”, Podgorica, Montenegro
- Daniela Veleva Minkovska**, Faculty of Computer Systems and Technologies,
Technical University, Sofia, Bulgaria
- Stefka Hristova Bouyuklieva**, Department of Algebra and Geometry,
Faculty of Mathematics and Informatics, Veliko Tarnovo University, Bulgaria
- Vesselin Velichkov**, University of Luxembourg, Faculty of Sciences,
Technology and Communication (FSTC), Luxembourg
- Isabel Maria Baltazar Simões de Carvalho**, Instituto Superior Técnico,
Technical University of Lisbon, Portugal
- Predrag S. Stanimirović**, University of Niš, Faculty of Sciences and Mathematics,
Department of Mathematics and Informatics, Niš, Serbia
- Shcherbacov Victor**, Institute of Mathematics and Computer Science,
Academy of Sciences of Moldova, Moldova
- Pedro Ricardo Morais Inácio**, Department of Computer Science,
Universidade da Beira Interior, Portugal
- Sanja Panovska**, GFZ German Research Centre for Geosciences, Germany
- Georgi Tuparov**, Technical University of Sofia Bulgaria
- Dijana Karuovic**, Tehnical Faculty “Mihajlo Pupin”, Zrenjanin, Serbia
- Ivanka Georgieva**, South-West University, Blagoevgrad, Bulgaria
- Georgi Stojanov**, Computer Science, Mathematics, and Environmental Science Department
The American University of Paris, France
- Iliya Guerguiev Bouyukliev**, Institute of Mathematics and Informatics,
Bulgarian Academy of Sciences, Bulgaria
- Riste Škrekovski**, FAMNIT, University of Primorska, Koper, Slovenia
- Stela Zhelezova**, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Bulgaria
- Katerina Taskova**, Computational Biology and Data Mining Group,
Faculty of Biology, Johannes Gutenberg-Universität Mainz (JGU), Mainz, Germany.
- Dragana Glušac**, Tehnical Faculty “Mihajlo Pupin”, Zrenjanin, Serbia
- Cveta Martinovska-Bande**, Faculty of Computer Science, UGD, Macedonia
- Blagoj Delipetrov**, Faculty of Computer Science, UGD, Macedonia
- Zoran Zdravev**, Faculty of Computer Science, UGD, Macedonia
- Aleksandra Mileva**, Faculty of Computer Science, UGD, Macedonia
- Igor Stojanovik**, Faculty of Computer Science, UGD, Macedonia
- Saso Koceski**, Faculty of Computer Science, UGD, Macedonia
- Natasa Koceska**, Faculty of Computer Science, UGD, Macedonia
- Aleksandar Krstev**, Faculty of Computer Science, UGD, Macedonia
- Biljana Zlatanovska**, Faculty of Computer Science, UGD, Macedonia
- Natasa Stojkovik**, Faculty of Computer Science, UGD, Macedonia
- Done Stojanov**, Faculty of Computer Science, UGD, Macedonia
- Limonka Koceva Lazarova**, Faculty of Computer Science, UGD, Macedonia
- Tatjana Atanasova Pacemska**, Faculty of Electrical Engineering, UGD, Macedonia



CONTENT

Aleksandar, Velinov, Vlado, Gicev PRACTICAL APPLICATION OF SIMPLEX METHOD FOR SOLVING LINEAR PROGRAMMING PROBLEMS	7
Biserka Petrovska , Igor Stojanovic , Tatjana Atanasova Pachemska CLASSIFICATION OF SMALL DATA SETS OF IMAGES WITH TRANSFER LEARNING IN CONVOLUTIONAL NEURAL NETWORKS	17
Done Stojanov WEB SERVICE BASED GENOMIC DATA RETRIEVAL	25
Aleksandra Mileva, Vesna Dimitrova SOME GENERALIZATIONS OF RECURSIVE DERIVATES OF k-ary OPERATIONS	31
Diana Kirilova Nedelcheva SOME FIXED POINT RESULTS FOR CONTRACTION SET - VALUED MAPPINGS IN CONE METRIC SPACES	39
Aleksandar Krstev, Dejan Krstev, Boris Krstev, Sladzana Velinovska DATA ANALYSIS AND STRUCTURAL EQUATION MODELLING FOR DIRECT FOREIGN INVESTMENT FROM LOCAL POPULATION	49
Maja Srebrenova Miteva, Limonka Koceva Lazarova NOTION FOR CONNECTEDNESS AND PATH CONNECTEDNESS IN SOME TYPE OF TOPOLOGICAL SPACES	55
The Appendix	
Aleksandra Stojanova , Mirjana Kocaleva , Natasha Stojkovicj , Dusan Bikov , Marija Ljubenovska , Savetka Zdravevska , Biljana Zlatanovska , Marija Miteva , Limonka Koceva Lazarova OPTIMIZATION MODELS FOR SHEDULING IN KINDERGARTEN AND HEALTHCARE CENTES	65
Maja Kukuseva Paneva, Biljana Citkuseva Dimitrovska, Jasmina Veta Buralieva, Elena Karamazova, Tatjana Atanasova Pacemska PROPOSED QUEUING MODEL M/M/3 WITH INFINITE WAITING LINE IN A SUPERMARKET	73
Maja Mijajlovikj1, Sara Srebrenkoska, Marija Chekerovska, Svetlana Risteska, Vineta Srebrenkoska APPLICATION OF TAGUCHI METHOD IN PRODUCTION OF SAMPLES PREDICTING PROPERTIES OF POLYMER COMPOSITES	79
Sara Srebrenkoska, Silvana Zhezhova, Sanja Risteski, Marija Chekerovska Vineta Srebrenkoska Svetlana Risteska APPLICATION OF FACTORIAL EXPERIMENTAL DESIGN IN PREDICTING PROPERTIES OF POLYMER COMPOSITES	85
Igor Dimovski, Ice Gjumandeloski, Filip Kochoski, Mahendra Paipuri, Milena Veneva , Aleksandra Risteska COMPUTER AIDED (FILAMENT WINDING) TAPE PLACEMENT FOR ELBOWS. PRACTICALLY ORIENTATED ALGORITHM	89

DATA ANALYSIS AND STRUCTURAL EQUATION MODELLING FOR DIRECT FOREIGN INVESTMENT FROM LOCAL POPULATION

Aleksandar Krstev¹, Dejan Krstev, Boris Krstev³, Sladzana Velinovska

¹Faculty of Computer Science, Goce Delcev University, Stip, Macedonia

aleksandar.krstev@ugd.edu.mk

²Faculty of Natural and Technical Sciences, Goce Delcev University, Stip, Macedonia

boris.krstev@ugd.edu.mk

Abstract: There is great interest around the world, and lately in our country and facilities associated with industrial heritage to promote direct foreign investment as an attraction for possibly development. It's very attractive possibility for full affirmation of its valuable heritage. The direct foreign investment (DFI) as a specific development segment mainly standardized diversify the economic offer of offering domestic possibilities a different experience aesthetics of the economy. The direct foreign investment has the potential to improve the social, economic and environmental elements of the local community, as well as to expand the development of state economy growth. Work study examines community support for that development in the context of sustainable development. This topic is interesting for processing because it deals with specific and so far in Macedonia untreated problems and aspects arising from the relationship between the local community and the state efforts for better conditions for development and higher standard.

Key words: investment, heritage, potential, sustainable development

1. Introduction

A unique feature of direct foreign investment (DFI) as an activity or moving element that shaped the local community and set of functions that are specific to many areas across the globe (Ballard and Banks, 2003). The most important characteristics of the economy and industry areas are geographic, economic and social isolation, modification of the natural environment, the presence of large facilities and infrastructure that affect the design of landscapes and a strong labor movement.

Direct foreign investment (DFI) or financial funds are constantly faced with the discontinuance of resource exploitation, which eventually leads to comprehensive social change and economic crisis. The possibility of providing development by means of foreign capitals for facilities and industrial plants become ruins leading to the decisive rejection in symbolic and material terms, but the area and its population look for other symbols and alternative economic activities. Therefore, it is necessary to provide viable alternatives that could be compared to the benefits generated faster development and better standard.

The industry heritage in the broader context of studying the development of dealing activities, buildings and landscapes that come from earlier periods of intensive industrialization. The local economy is part of a broader category, which deals with the history of settlements (Edwards and Llurdes 1996; Nuryanti 1996). The sense of pride and wonder of the engineering achievements of the industrial revolution, creates a special feeling with economics which is especially important in educational terms. Sustainable development in the context of the development of economy and new technologies as an activity does not call into question the long-term economic feasibility of extraction of resources, but focuses on the protection of the negative social and environmental consequences.

The aim of this paper is to examine the extent to which the local population agrees with the sentence and determine whether their perception of various aspects of sustainability affects support overall sustainability of the economy and industrial development. [1,2,3,4,5,6,7]

2. Social, environmental and economic sustainability

In the social context of economy is associated with an uncompromising exploitation of workers and the hard life of their families according to the post communism period. For the development of the industry and economy, it is important to provide support and political factors, which should feel like a part of the project and to ensure the political and economic certainty of its further development. In this process, it is essential that local people participate in the decision-making process with the ability to selflessly share their experience, skills and knowledge. Many companies have interests that are accountable to local people and become aware of the need to reduce conflict with key stakeholders (Black, 2006; Kapelus, 2002). Limited regeneration of the natural environment is achieved publicity about the wider social engagement, promoting space that is radically changed as a result of human activities, and today again contains a visually attractive landscape that are completely contrast.

Economy with direct foreign investment, different industry and different advanced technologies provided higher employment, providing an alternative to living on welfare. The development of industry leads to the creation of a new image of local towns, villages, but the places in which it can achieve a higher quality of life, higher employment and active protection of natural and cultural values in service all kinds of development.

Since the development of communities must be based on diversification of the economy based on the development of economy projects to promote domestic industry. Local community planning and use tourism as an alternative means of stimulating economic development needs to develop sustainable tourism which can meet the needs and demands of its citizens.

3. Methodology and research results

3.1. Data collection and sample

The research was conducted in order to identify key aspects of sustainability of the direct foreign investment is perceived by locals. The questionnaire/survey includes statements that measure aspects of sustainability of the direct foreign investment: social, economic and environmental sustainability. The research model (Figure 1) that was used for the realization of empirical research includes four variables: social sustainability, economic viability and environmental sustainability and support for sustainable direct foreign investment and development of the economy and industry heritage. The independent variables are social, economic and environmental sustainability, and the dependent variable is to support sustainable development. [8,9]

The research was conducted on a sample of 600 respondents who makes the local population of the direct foreign investments (DFI) of Bitola, Shtip and Kavadarci, The Republic of Macedonia. When formulating a sampling strategy, was taken into account that the sample covers approximately equal number of men and women in the mentioned towns, with different education and different occupations, and that includes individuals of different age groups ranging from 18 to 60 years.

The structure of the sample makes 45.0% of male respondents and 55.0% of female respondents. The largest proportion of respondents in the age group of 21-25 years (35.0%), and respondents between 36-45 years (25.0%) and respondents between 26-35 (25%). The least numerous are those in the age group 46-50 years (7.0%), and less 20 years (4.0%) and over 60 (4.0%). If we analyze the level of education, 40.0% of respondents had completed high school, 30.0% have a college degree, and 30.0% of examinees had education at the primary level. When it comes to employment, the sample includes 55% of employees and 45% of the unemployed. Regarding marital status, 55.0% were married / married, and 45.0% were unmarried / unmarried. The sample mainly consists of respondents in various ways involved in direct foreign investments (DFI) as an activity (15%), while respondents who were not involved in direct foreign investments (DFI) accounted for 85%.

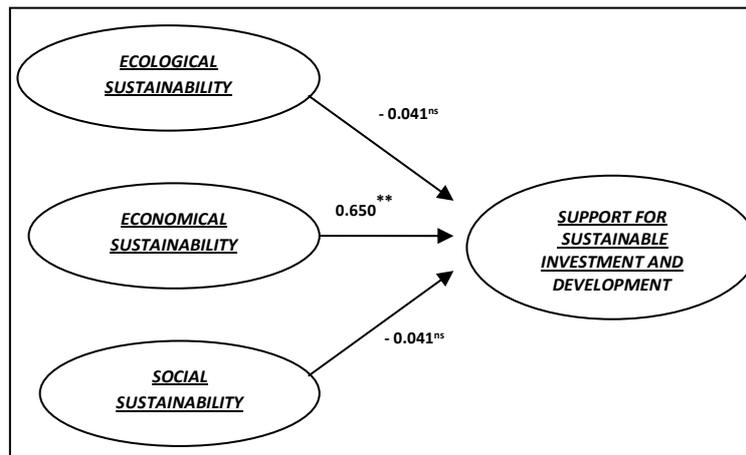


Figure 1. Research model

Notes for model: $p < 0.05$ (**), ns – not significant

Table 1. Demographic structure of the sample (n = 600)

	Number of sample (%)
Male	270 (45,0%)
Female	330 (55,0%)
Age	
<20	24 (4,0%)
21-25	210 (35,0%)
26-35	150 (25,0%)
36-45	150 (25,0%)
46-60	42 (7,0%)
>60	15 (4,0%)
Education	
Elementary school	120 (20,0%)
High school	240 (40,0%)
College	60 (10,0%)
Faculty	180 (30,0%)
Marital status	
Married/Married	330(55,0%)
Not married/Unmarried	270 (45,0%)
Employment	
Employed	330 (55,0%)
Unemployed	270 (45,0%)
Involment in DFI	
On	80 (15,0%)
Off	520 (85,0%)

To create a clear and concise questionnaire, organized focus groups (Bitola, Shtip and Kavadarci - each one with 200 respondents). For ease of use of the questionnaire/survey consisted of a printed page. After making questions, the survey pre-tested on a small sample of 20 randomly selected respondents. The results of this pilot survey we found that the allegations in the questionnaire clear and easy to understand and there was no need for any additional changes. Respondents who agreed to participate in the study provided sufficient time to consider their responses. It was agreed that interviewers contact respondents and collect questionnaires after three days. Of the 650 respondents, 600 of them returned the completed questionnaire interviewers. Subsequently, questionnaires were tested, and 10 of them were excluded from further analysis due to the fact that they are not adequately filled. [10,11]

3.2. Measures

Claims are chosen reviewing relevant literature. Social sustainability is measured by six statements which were selected based on the study of Chen and Chen (2010), Dyer et. al., (2007), Kuvan and Akan (2005), Vargas-Sánchez, et. al., (2009), Oviedo-Garcia et. al, (2008) and Choi and Sirakaya (2005). Economic viability is measured by two statements which were selected on the basis of studies, Chen and Chen (2010), Vargas-Sánchez, et. al., (2009), Kuvan and Akan (2005), Dyer et. al., (2007), Oviedo-Garcia et. al, (2008) and Choi and Sirakaya (2005). Four arguments are used for ecological sustainability and designed on the basis of allegations that use Kuvan and Akan (2005) and Choi and Sirakaya (2005). Support sustainable DFI of the economy heritage which is measured via two assertions on studies Lee (2013) and Dyer et. al., (2007). All claims are additionally adjusted for the purposes of this study. The research model is shown in Figure 1. All statements were measured by Likert scale of five points (1-I fully agree, 5-I completely agree).

3.3. Data analysis

Data analysis was performed through the **Statistical Package for Social Sciences** (version 12.0) and the **AMOS** (version 18.0). The following statistical analyzes: **correlation analysis, confirmative factor (CFA) and structural equation modeling (SEM)**.

3.4. Results

In the first step, based on the value of the coefficient Cronbach's alpha was estimated reliability and internal consistency of the statements through which the measured latent variable models (Table 1). All variables have an adequate level of reliability, as the coefficient of Cronbach's alpha over the required threshold is 0.6. The results show that the highest degree of reliability is reflected in variables Environmental sustainability (Cronbach's alpha = 0.896), whereas in the case of variable support sustainable DFI present a slightly lower level of internal consistency of the statements which have been used for its measurement (Cronbach's alpha = 0.615). The condition of convergent validity was met by the fact that the AVE of all constructions was greater than the minimal threshold of 0.5. Through comparison of AVE and squared correlations between constructs, discriminant validity was also analyzed. Given that the value of AVE for each individual construct is greater than the squared correlations between the given construct and other constructs, discriminatory validity was assured for model variables. Composite reliabilities (CR) of all variables were 40.8 suggested that composite reliability should be great than 0.6.

Table 2: Construct inter-correlation matrix, AVE, CR and Cronbach's alpha

	Economical sustainability	Environmental sustainability	Social sustainability	Support for DFI sustainability development
Economical sustainability	1.00			
Environmental sustainability	0.50***	1.00		
Social sustainability	0.75***	0.65***	1.00	
Support for DFI sustainability development	0.60***	0.25***	0.40**	1.00
AVE	0.75	0.70	0.50	0.50
CR	0.85	0.90	0.85	0.70
Cronbach's alpha	0.85	0.90	0.85	0.60

Table 3: Fit indices

Fit indices	X ² /df	CFI	TLI	IFI	RMSEA
Recommended values	< 3	> 0.90	> 0.90	> 0.90	< 0.1
Model values	1.75	0.95	0.95	0.95	0.08

In order to test the influence of the independent variable on the dependent model, we used SEM (**structural equation modeling**). We looked at the impacts of social, environmental and economic sustainability in support of sustainable development. In this case, the only variable is the economic viability showed a statistically significant effect on the support that the local population has when it comes to sustainable **DFI** development of the **DFI** heritage ($\beta = 0.647, p > 0.05$). The other two variables do not show a statistically significant effect on the local population support the sustainable development of **DFI**. The above research findings clearly indicate that the local population believes that the economic benefits of **DFI** development provide their full support for the sustainable development of the **DFI** heritage, especially if **took** into account that the municipalities (**above mentioned towns**) one of underdeveloped in **Macedonia**.

Table 4: Results of SEM analysis

Parameter	B	p
Social sustainability → Support for tourism sustainability development	-0.041 ^{ns}	0.85
Environmental sustainability → Support for tourism sustainability development	-0.041 ^{ns}	0.75
Economical sustainability → Support for tourism sustainability development	0.650 ^{**}	0.01

** Correlation is significant at the 0.05 level

5. Conclusion

By encouraging a lifestyle that is characteristic of the **industrial and economical** community will keep a written record of their existence and attributes that otherwise may have disappeared. One of the ways that **industrial and economical** communities benefit from their **DFI** heritage, and also by the protection and the development of **economy**. Achieving sustainability is possible if the local **industrial and economical** community is involved in the formation of the image of **the local places**, because only in this way can ensure the authenticity of the **DFI** heritage. Given the specific and unique challenges of development of the **DFI** heritage, it is recommended to cooperation at national and international level in order to identify good practices and utilize their experience to achieve sustainability.

The research provides a significant contribution to the existing literature by highlighting the links between various aspects of sustainability and support the sustainable development of **DFI** heritage in the specific environment of the local **industrial and economical** community. Similar studies were implemented in a very small number of studies in the field of **industry and economy**, so in that sense, the proposed research model has a certain amount of innovation, primarily because of its specific composition. The resulting research findings confirm that there is a significant correlation between perceptions of economic sustainability and support the sustainable development, primarily as a result of the high expectations of the potential benefits when it comes to the future economic development of local communities that could potentially arise from the development of the **industry and economy**. This result arises because of the negative impact of the global economic crisis, primarily due to the fact that the study was escorted to the **industry and economy** community that is largely dependent on the development of this one, which recently was faced with serious problems.

REFERENCES

- [1] Streiner, (2003), "Starting at the Beginning: An Introduction to Coefficient Alpha and Internal Consistency" (J. of Personality Assessment v. 80 no. 1 p. 99-103)
- [2] Alfrey, J, and Putnam, T. (1992) *The Industrial Heritage: Managing Resources and Uses*, London.
- [3] Black, L. D. (2006). Corporate social responsibility as capability: the case of BHP Billiton. *The Journal of Corporate Citizenship*, 23, 25–38.
- [4] Dicks, B. (2000). *Heritage, place and community*. Cardiff: University of Wales Press.
- [5] Dicks, B. (2003) Heritage, governance and marketization: A case-study from Wales. *Museum and Society* 1 (1), 30-44
- [6] European Route of Industrial Heritage (2001a) *European Route of Industrial Heritage: The masterplan*.
- [7] European Route of Industrial Heritage (2001b) *Our common heritage. Executive Summary*.
- [8] Leary, T.E. and Sholes, E.C. (2000) Authenticity of place and voice: Examples of industrial heritage preservation and Interpretation in the US and Europe. *Public Historian* 22 (3), 49-66.
- [9] Kuder & Richardson, (1937), "Theory of the Estimation of Test Reliability" (*Psychometrika* v.2 no. 3)
- [10] Cronbach, (1951), "Coefficient Alpha and the Internal Structure of Tests" (*Psychometrika* v. 16 no. 3)
- [11] Cortina, (1993), "What is coefficient alpha? An examination of theory and applications" (*J. of Applied Psych.* v. 78 no. 1 p. 98-104)