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EVALUATION OF THE TAX BURDEN ACCORDING TO ITS ADMINISTRATIVE AND FULFILLMENT COMPONENTS

Abstract

This study emphasizes the importance of defining the tax burden in terms of its compulsory, administrative, and fulfillment components in contrast to the general assessment method, which tends to focus only on the compulsory component. Although a compulsory burden is the main component of the economy's tax burden, an evaluation of the other two components is also essential. Assessment of the compulsory burden using a new approach (according to aggregate investment expenditures) is the initial part of our tax burden research. In this study, a methodology for tax assessment based on the administrative and fulfillment burdens is developed. The qualitative indicators utilized in this research are proposed for calculation using the Mamdani fuzzy inference method. These qualitative indicators are considered in the estimation of the tax burden. The administrative and fulfillment burdens are assessed using the weighted sum model, which investigates this as a multi-criteria decision-making problem. This methodology is applied to assess the Azerbaijani tax system and the results obtained are compared with the Doing Business report 2019 (World Bank Group 2019). The results of this assessment can help inform the implementation of tax policy and thus improve the international ranking of the Azerbaijani government.

Keywords: tax burden; tax administration; tax liability fulfillment; fuzzy inference system; multi-criteria decision-making problem.

Introduction

Tax policy refers to a superstructure category within a specific field of human activity. There is a close relationship between the economic basis of society and its tax policy. On the one hand, the tax policy is based on economic relations, whereby society considers the economy to be the basis for the formation and implementation of tax policy. On the other hand, tax policy is independent of economic relations, in that, as an aspect of financial policy, it has its own specific law and development logic. Accordingly, it also dictates economic relations, affecting the economy and the country's financial position. Efforts are regularly undertaken to improve the effectiveness of tax policy, which is a major regulatory instrument for stimulating economic activity. These efforts can be categorized into three aspects of tax legislation:

- the number and rate of taxes (i.e., the compulsory burden)
- tax administration (i.e., the administrative burden)
- tax liability fulfillment (i.e., the fulfillment burden).

In the modern economic literature, the special importance of the economy's tax burden as a category of economic development is economically justified and investigated (Abuselidze 2012; Mayburov 2011). Although the tax burden of the economy has been continuously studied by economic scholars, its calculation cannot be considered as complete from the methodological point of view. This is mainly because the tax system, which consists of several taxes in different tax bases, has to generate financial resources for the state and

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stimulate the economic activity of economic entities. Thus, so long as the economy continues to change, so too must the tax system.

The literature defines the tax burden as a percentage expression of total tax revenues divided by the tax base, established by the corresponding legislation (e.g., Giriūnienė 2012). Different approaches to defining the taxable base exist. The “compulsory” tax burden (the burden created by taxes and tax rates) is determined as a legislative tax burden levied regardless of the will of the economic entity. However, two other components of tax legislation, the administrative and fulfillment components, should also be calculated, as taxpayers spend financial resources, time, and labor to meet the requirements of the compulsory tax burden. The economic literature investigating the tax burden fails to consider these components. Only the Doing Business report (World Bank Group 2019) assesses the time and money spent on “starting a business” and “paying taxes,” thereby reflecting all three components mentioned above and the reality of the business environment. This study examines the economic justification for a separate assessment of the three components of the tax burden, including the compulsory, administrative, and fulfillment burdens. At the same time, the Doing Business assessment is compared with other similar investigations and exemplified in a practical application based on the tax system in Azerbaijan.

1. The compulsory tax burden

Compulsory tax liabilities, that is, the taxes citizens or organizations owe based on their income, profit, or consumption of commodities and services, are defined by law. This legislated burden is the main component defining a tax policy. The tax burden is incurred via tax procedures. These procedures define to what extent and how the different forms of tax are paid depending on the income or consumption of a person or organization. Tax rates are the most important variable for defining these procedures. There are several different approaches to defining the tax burden, which differ depending on the level of economic development and the dynamics of macroeconomic indicators.

Giriūnienė (2012) distinguished, described, and characterized the most commonly encountered tax burden assessment methods. After analyzing their advantages and disadvantages, a model was created to allow for an objective assessment of the tax burden for Lithuania and other foreign countries with different tax systems. Wang et al. (2016) investigated the evaluation method of tax burdens in traditional industries to identify problems and misunderstandings about problems and thus improve the methodology of assessing the tax burden in China’s logistics industry. Further, a new method of tax burden assessment, which differs from the profit analysis method, was proposed (Wang et al. 2016). This method applies the theory of social average profit rate, a concept from Marxist political economics, and based on this new approach, it was found that the tax burden of the logistics industry is higher than its profit margin (Wang et al. 2016). Mayburov (2011) examined the differences among three types of tax burdens: marginal, final, and economic (effective) tax burdens. Kbiladze (2015) determined the optimal tax burden of the Georgian economy, using numerous research methods, including qualitative, quantitative, and correlation/regression analysis.

The tax burden affects not only the state budget but also demand, supply, investment, and economic factors. It is important to determine its relationship with the potential for

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economic activity and production. This relationship was studied in two different ways by Abuselidze (2012). Another academic study on the interaction of the tax burden with macroeconomic indicators was conducted by Musayev, Davudova, and Musayeva (2018). This article analyzed the relationship between the average tax burden and other macroeconomic indicators in a balanced open economy using interval analysis. These relationships define how the average tax burden change depends on macroeconomic indicators. Sinevičienė (2016) investigated the relationships between the tax burden and economic development, using indirect tax rates for measuring the tax burden. Finally, an overview of the broad spectrum of approaches to understanding the tax burden was given by Yashin (2015).

2. The administrative tax burden

The tax legislation of countries also determines the procedures for tax administration, which are just as important as the compulsory taxes levied. This is because a lower tax burden, as defined by tax legislation, loses its significance when administration is complex and high costs are incurred. The procedures for starting a business, which are part of tax administration, are evaluated by the Doing Business report (World Bank Group 2019). However, many other procedures for the joint control and coordination of tax administration in countries' tax legislation should also be considered in these evaluations.

Alink and Kommer (2016) provided a complete, systematic overview of modern tax administration by reviewing the following issues: taxation, the main business of tax administration, risk management, the initial process of tax administration, personnel and support processes, planning and control, and so on. All these constituents should be considered to realistically estimate the total tax burden. The effects of changes and additions in tax administration and legislation on the potential tax burden were assessed by Musayev, Madatova, and Rustamov (2016a, 2016b, 2018) using Mamdani and Sugeno fuzzy inference methods. These studies found that changes and additions to tax administration and legislation affect the potential tax burden markedly. This result could help policymakers reduce the tax burden. Krasnitsky (2010) considered tax administration as a taxation management system and developed a new approach to taxation based on the state of productive forces. Krasnitsky (2010) also predicted tax revenue based on forecasted revenues in the medium term and developed new taxation concepts to prepare for implementing a protectionist policy with respect to foreign economic activity. Vorobjit (2015), who investigated the fundamental functions of tax administration, mentioned that each of these functions has its own means of application that solve specific problems. The purpose of the tax authority is to provide information for governmental budgets in terms of planned tax revenues and the optimal combination of taxation and tax control methods.

Tax administration is a complex and polygonal category. It can be assessed from numerous points of view (legal, financial, and management). Tax administration is also characterized as a tax relations management system that coordinates the work of tax authorities. The state tries to increase tax revenues in various ways, and taxpayers try to minimize tax payments using the means and facilities available to them. Therefore, improving tax administration and increasing its effectiveness is one of the main goals of governmental tax policy (Glenn, Chun-Yan, and Gangadhar 2000).

3. Tax liability fulfillment burden

In tax legislation (the tax code), the procedures of tax liability fulfillment (the number of tax returns, sequence of submission, current and full payment time of estimated taxes, and so on) are exactly defined. Obviously, each step that is necessary for the fulfillment of this obligation requires a certain amount of time, financial expenditure, and labor from the taxpayer. The Doing Business report (World Bank Group 2019) assesses the time it takes and the total tax burden (the percentage of revenue) imposed on business entities to accomplish their tax payment obligations. Every country has different tax laws, so the resulting figures are quite different. The Doing Business report evaluates the business environment of the countries according to these figures and defines the usefulness degree of states with respect to business. The Doing Business report generated awareness among tax policy authorities regarding establishing payment procedures that were less time consuming and cheaper. Estimates in the latest report suggest that these costs are being reduced over time (World Bank Group 2019).

4. Methodology

Assessments of the administrative and fulfillment burdens relating to tax liabilities in terms of the money, time and labor taxpayers spend, were conducted using the weighted sum model (Triantaphyllou 2000) and the Mamdani fuzzy inference system (Mamdani and Assilian 1975). Obtaining the information and the initial evaluation of it were carried out using the Delphi method (Twin 2019). The research in this study applies the following steps:

Step 1: A survey is conducted using the Delphi method among taxpayers to define their financial, time and labor costs. This study defines the linguistic evaluations and uses some indicators such as tax inspections, dispute resolution, tax registration for starting a business, opening bank accounts, and the administration's validity to characterize the costs of starting a business, tax administration, and fulfilling tax obligations. In this case, the j^{th} answer of the i^{th} expert y_{ij} is as follows:

$$y_i = (y_{i1}, y_{i2}, \dots, y_{ij}, \dots, y_{in}), i = \overline{1, m} (i \neq j) \quad (1)$$

Step 2: The level of tax system organization, tax morality, and other indicators also affect the tax burden. Hence, they are reflected in the questionnaire and the responses obtained are accounted for in the research. The results of the survey are expressed quantitatively for the measures of financial ($d = 1$), time ($d = 2$), and labor ($d = 3$) expenditures and qualitatively for linguistic inputs from the survey ($d = 4$). In this context, equation (1) is written as follows for $d = 1, 2, 3$, and 4:

$$y_i^d = (y_{i1}^d, y_{i2}^d, \dots, y_{ij}^d, \dots, y_{in}^d), i = \overline{1, m} (i \neq j), d = \overline{1, 4} \quad (2)$$

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Step 3: In this step, the effect of the relevant quantitative (financial, time, and labor expenditure) expressions of the qualitative indicators ($d = 4$ directions) on the tax burden is assessed using the Mamdani method, which is one of the most common and important methods of fuzzy inference.

First, the qualitative indicators are distinguished from the quantitative indicators as per equation (2), and the process is executed based on the following steps for each of the i^{th} expert responses included in the system as input variables for each quality indicator:

- (1) Fuzzification of the input variables
- (2) Applying fuzzy operators (“and” or “or”)
- (3) Implication
- (4) Aggregation of the rule outputs
- (5) Defuzzification.

For fuzzification of input variables, the affiliation functions are defined by typing them in the form of linguistic variables. Then, the set of “IF-THEN” rules that characterize this influence by considering feasible options are created as follows:

If Input 1 is y_{i1}^4 and Input 2 is y_{i2}^4 and and input j is y_{in}^4 , then Output is $\hat{y}_j^d$,

$$\hat{d} = 1, 2, 3 \ (\hat{d} = 1(\text{finance}), \hat{d} = 2(\text{time}), \hat{d} = 3(\text{labor})) \quad (3)$$

If there is more than one variable in the set of rules based on knowledge and experience, then “and” and “or” fuzzy operators are applied. This means that the “min” operators are applied to each rule and the result is obtained according to the rules. All the results obtained are aggregated by the “max” operator and the final result is expressed with quantities by defuzzification. It should be mentioned that every $\hat{y}_j^d$ that characterizes each qualitative indicator $\hat{y}_{ij}^d$ derived from the Mamdani method is the cost according to the financial, time, and labor expenditures corresponding to each i^{th} expert. In this case, equation (2) is modified as follows:

$$\hat{y}_i^d = \hat{y}_{i1}^d, \hat{y}_{i2}^d, \dots, \hat{y}_{ij}^d, \dots, \hat{y}_{in}^d, \ i = \overline{1, m}, \ (i \neq j), \ \hat{d} = \overline{1, 3} \quad (4)$$

Step 4: To increase the accuracy of the results, a totally independent expert group is selected from taxpayers and this group is asked to evaluate the validity of the above assessment on the scale of $[0, 1]$. This step is applied to equation (4). The results can be expressed as follows.

$$\hat{p}_i^d = p_{i1}^d, p_{i2}^d, \dots, p_{ij}^d, \dots, p_{in}^d, \ i = \overline{1, m}, \ (i \neq j), \ \hat{d} = \overline{1, 3} \quad (5)$$

Step 5: The evaluation of the tax burden in terms of administrative and fulfillment burdens is the main objective of this research. The information on the effectiveness of these

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indicators that characterize the administrative and fulfillment burdens is also a result of the inquiry. Therefore, equations (4) and (5) are grouped according to the indicators and experts' assessment and are written as follows:

$$\dot{y}_i^{dt} = (\dot{y}_{ij}^{dt}) \quad (6)$$

$$\dot{p}_i^{dt} = (\dot{p}_{ij}^{dt}) \quad (7)$$

where, $i = \overline{1, m}$ stands for experts; $j = \overline{1, n}$ denote the indicators ($i \neq j$); $d' = \overline{1, 3}$; and $t = a, f$ are the directions of assessment (a-administrative burden, f-fulfillment burden).

Step 6: The assessment of the administrative and fulfillment burdens on the taxpayer according to $\dot{d} = 1, 2, 3$, which represents financial, time, and labor expenditures, is conducted by applying the weighted sum model, which is one of the methods of solving multi-criteria decision-making problems.

The final formulation for evaluating burdens in accordance with $\dot{d} = 1, 2, 3$ is as follows:

$$\dot{y}_i^{dt} = \sum_{j=1}^n \dot{y}_{ij}^{dt} \dot{p}_{ij}^{dt} w_j^{dt}, i = \overline{1, m}, j = \overline{1, n}, t = a, f, (i \neq j) \quad (8)$$

w_j^{dt} expresses the weights of the indicators calculated using equation (9). The weights depend on the significance of indicators (Roszkowska 2013):

$$w_j^{dt} = \frac{2(n+1-r_j)}{n(n+1)}, j = \overline{1, n} \quad (9)$$

r_j -rank (order of importance), $\sum_{j=1}^n w_j^{dt} = 1, w_j^{dt} \geq 0$

The weights are equal when the importance rates of the indicators are the same.

Finally, the administrative and fulfillment tax burdens are calculated by the average value of $\dot{y}_i^{dt}$ obtained separately for financial, time, and labor expenditures using equation (8).

5. Application of the methodology

The proposed approach has been applied to the tax system of the Azerbaijan Republic, and the tax burden has been calculated according to the above methodology.

In the first step, an inquiry was held among 39 taxpayers using the Delphi method. The survey questions were prepared to allow for the calculation of different types of tax burdens, as well as other indicators that influence the tax burden. The survey was repeated six times to obtain robust results. The information obtained is expressed quantitatively for financial, time, and labor expenditures and qualitatively for other indicators that influence the tax burden. Some of the indicators are presented in the four parts of Table 1.

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Table 1 (part 1).

Obtained information from survey

№ (Experts)	Type of activity	Period of activity	Form of activity	Qualitative indicators		
				Organization level of tax administration	Business interference	Tax morality
1	Finance	10 years	Legal	Satisfactory	By law	High
2	Finance	10 years	Legal	Satisfactory	By law	Satisfactory
3	Agriculture	5 years	Physical	High	Never	Response is difficult
4	Service	5 years	Legal	Response is difficult	Never	Low
5	Agriculture	10 years	Legal	Response is difficult	By law	Low
6	Finance	10 years	Physical	Low	By law	Low
7	Service	10 years	Physical	Response is difficult	By law	Low
8	Agriculture	10 years	Legal	High	By law	Satisfactory
9	Service	5 years	Physical	Response is difficult	By law	Low
10	Service	10 years	Physical	Response is difficult	Never	Low
11	Agriculture	10 years	Legal	High	By law	Response is difficult
12	Agriculture	10 years	Legal	Response is difficult	Never	Response is difficult
13	Finance	5 years	Legal	Satisfactory	By law	Satisfactory
14	Finance	10 years	Legal	Satisfactory	By law	Satisfactory
15	Finance	10 years	Legal	High	Never	Response is difficult
16	Service	10 years	Legal	Response is difficult	Never	Response is difficult
17	Agriculture	10 years	Physical	Response is difficult	By law	Response is difficult
18	Service	1 year	Physical	Response is difficult	Regular	Low
19	Service	5 years	Physical	Response is difficult	Never	Response is difficult
20	Agriculture	10 years	Physical	Response is difficult	Regular	Response is difficult
21	Agriculture	10 years	Physical	High	Regular	Response is difficult
22	Agriculture	10 years	Physical	Satisfactory	Regular	Low
23	Service	1 year	Physical	Satisfactory	Never	Low
24	Service	10 years	Physical	Satisfactory	Never	Satisfactory
25	Service	1 years	Physical	Satisfactory	Never	Satisfactory
26	Service	5 years	Physical	Response is difficult	By law	Low
27	Agriculture	10 years	Physical	Response is difficult	Regular	Response is difficult
28	Agriculture	10 years	Legal	Response is difficult	Never	Low
29	Agriculture	10 years	Legal	Response is difficult	Never	Low
30	Finance	10 years	Legal	Satisfactory	Regular	Satisfactory
31	Finance	10 years	Legal	Satisfactory	By law	Satisfactory

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№ (Experts)	Type of activity	Period of activity	Form of activity	Qualitative indicators		
				Organization level of tax administration	Business interference	Tax morality
32	Finance	10 years	Legal	Satisfactory	Never	Satisfactory
33	Agriculture	10 years	Legal	High	By law	Response is difficult
34	Service	10 years	Physical	Response is difficult	By law	Low
35	Agriculture	10 years	Physical	High	By law	Response is difficult
36	Service	10 years	Physical	Satisfactory	Regular	Low
37	Service	10 years	Physical	Satisfactory	Never	Satisfactory
38	Finance	10 years	Physical	Low	By law	Response is difficult
39	Service	10 years	Physical	High	Never	Response is difficult

Table 1 (part 2).

Obtained information from survey

№	Time spent (hours)										
	On-site inspection	Off-site inspection	Chronometer	Concerns	Agreement	Tax registration	Opening bank account	Starting activity	Setting cash machine	Tax return preparation	Agreement of tax return
1	1	720	1	1	1	1	1	36	1	216	1
2	5	24	240	720	720	5	1	10	2	192	2
3	240	24	24	840	1080	5	5	15	1	120	3
4	720	24	1	792	864	1	5	24	24	48	1
5	720	720	1	720	720	24	24	10	1	24	1
6	24	24	24	48	120	1	1	24	24	72	24
7	24	720	5	720	720	24	1	5	5	168	5
8	24	720	1	720	720	24	1	11	1	144	1
9	720	24	1	720	720	1	1	24	24	240	1
10	24	24	24	24	720	24	5	24	1	264	7
11	120	720	144	5	5	1	5	40	24	168	24
12	5	720	192	24	1	24	5	24	4	192	1
13	1	5	1	720	720	1	1	1	1	144	5
14	5	24	5	24	720	1	1	1	1	72	8
15	24	24	5	720	720	1	5	1	1	120	1
16	5	720	216	48	240	5	5	24	3	144	5
17	168	720	24	720	720	5	5	48	5	192	48
18	24	24	24	720	720	1	1	24	24	96	24
19	192	5	5	720	720	24	24	5	5	192	12
20	24	24	24	720	720	5	5	24	24	120	24
21	216	24	120	720	720	7	5	30	0,5	72	24

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№	Time spent (hours)										
	On-site inspection	Off-site inspection	Chronometer	Concerns	Agreement	Tax registration	Opening bank account	Starting activity	Setting cash machine	Tax return preparation	Agreement of tax return
22	720	720	24	24	720	6	12	35	5	96	24
23	24	24	1	1	5	8	10	10	6	120	1
24	5	720	168	24	5	12	15	5	4	168	1
25	5	24	1	24	5	18	2	12	3	216	1
26	24	24	5	720	720	24	5	15	7	240	1
27	24	720	5	720	720	5	9	17	1	264	24
28	1	5	5	24	5	1	4	20	1	360	1
29	5	24	1	1	5	1,5	3	24	2	240	1
30	24	720	1	24	5	3	4	48	1,5	120	24
31	24	720	1	24	720	5	7	40	1	48	24
32	24	24	1	720	720	10	5	4	2	240	24
33	24	720	24	720	840	15	3	5	24	192	24
34	24	720	240	720	120	24	15	15	1	120	24
35	24	720	1	720	720	48	24	17	1	96	5
36	24	24	1	720	5	10	12	20	1,5	216	5
37	5	24	5	5	5	1	2	5	2	168	5
38	360	720	24	720	720	5	1	5	2	120	24
39	24	720	720	720	720	4	1,5	10	1	192	24

Table 1 (part 3).

Obtained information from survey

№	Financial expenditures AZN										
	On-site inspection	Off-site inspection	Chronometer	Concerns	Agreement	Tax registration	Opening bank account	Starting activity	Setting cash machine	Tax return preparation	Agreement of tax return
1	20	1000	50	50	40	10	10	40	250	600	10
2	30	50	50	800	800	20	20	25	300	550	15
3	30	40	100	700	900	15	15	20	200	350	20
4	30	50	100	700	800	10	10	25	350	150	10
5	60	40	100	800	800	30	30	20	200	120	10
6	30	40	50	900	1000	10	10	30	350	250	40
7	30	500	100	600	700	30	30	20	280	500	20
8	30	800	100	600	800	30	24	30	200	450	10
9	50	40	50	600	700	10	10	30	400	650	10
10	30	40	50	50	600	30	30	30	200	700	25
11	20	50	100	70	80	10	10	40	390	400	40
12	20	1000	100	70	70	30	30	30	250	550	10
13	20	50	100	900	1100	10	10	10	200	250	20

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№	Financial expenditures AZN										
	On-site inspection	Off-site inspection	Chronometer	Concerns	Agreement	Tax registration	Opening bank account	Starting activity	Setting cash machine	Tax return preparation	Agreement of tax return
14	30	50	100	200	1000	10	10	10	200	200	30
15	30	50	100	900	1200	10	20	10	200	300	10
16	30	50	100	900	1100	20	20	30	300	350	20
17	30	700	100	800	900	20	20	40	350	550	40
18	30	40	50	700	800	10	10	30	400	300	30
19	30	40	50	700	700	30	30	20	350	550	25
20	30	40	100	800	900	20	20	30	400	450	30
21	50	40	100	800	1000	20	20	35	150	250	35
22	50	700	100	800	900	20	20	40	280	350	35
23	30	40	50	50	100	25	25	20	350	450	10
24	30	800	50	70	100	25	25	10	300	500	10
25	30	40	50	70	80	30	30	20	300	600	10
26	30	40	50	700	800	30	30	20	450	700	10
27	30	700	100	800	900	20	20	25	200	800	40
28	20	50	100	100	80	10	10	30	200	950	10
29	20	50	100	70	90	10	10	35	250	700	10
30	30	1000	100	80	100	15	15	40	250	350	40
31	40	40	100	90	1100	20	20	40	200	150	40
32	40	50	100	900	1200	25	25	15	250	700	30
33	40	1000	100	900	1300	30	30	15	400	550	30
34	30	700	50	900	900	30	30	25	200	450	30
35	30	700	100	900	1000	40	30	30	200	350	15
36	30	40	50	900	50	20	20	30	250	600	15
37	30	40	50	80	60	10	10	20	250	500	15
38	50	800	100	800	1200	20	10	15	300	450	30
39	30	700	500	800	900	15	10	15	200	550	35

Table 1 (part 4).

Obtained information from survey

№	Labor expenditures (number of laborers involved)										
	On-site inspection	Off-site inspection	Chronometer	Concerns	Agreement	Tax registration	Opening bank account	Starting activity	Setting cash machine	Tax return preparation	Agreement of tax return
1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	2	2	2	1	1	1	1	1	1
3	1	1	2	2	2	0	1	1	1	1	1
4	1	1	2	2	2	1	1	1	1	1	1
5	1	1	2	2	2	1	1	1	1	1	1

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№	Labor expenditures (number of laborers involved)										
	On-site inspection	Off-site inspection	Chronometer	Concerns	Agreement	Tax registration	Opening bank account	Starting activity	Setting cash machine	Tax return preparation	Agreement of tax return
6	1	1	1	2	2	2	1	1	1	1	1
7	1	1	2	2	2	1	1	1	1	1	1
8	1	1	2	2	2	1	1	1	1	1	1
9	1	1	1	2	2	1	1	1	1	1	1
10	1	1	1	1	2	1	1	1	1	1	1
11	1	1	2	1	1	2	1	1	1	1	1
12	1	1	2	1	1	1	1	1	1	1	1
13	1	1	2	2	2	1	1	1	1	1	1
14	1	1	2	2	2	1	1	1	1	1	1
15	1	1	2	2	2	1	1	1	1	1	1
16	1	1	2	2	2	1	1	1	1	1	1
17	1	1	2	2	2	1	1	1	1	1	1
18	1	1	1	2	2	0	1	1	1	1	1
19	1	1	1	2	2	2	1	1	1	1	1
20	1	1	2	2	2	1	1	1	1	1	1
21	1	1	2	2	2	1	1	1	1	1	1
22	1	1	2	2	2	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	2	2	1	1	1	1	1	1
27	1	1	2	2	2	1	1	1	1	1	1
28	1	1	2	2	1	1	1	1	1	1	1
29	1	1	2	1	1	1	1	1	1	1	1
30	1	1	2	2	1	1	1	1	1	1	1
31	1	1	2	2	2	1	1	1	1	1	1
32	1	1	2	2	2	1	1	1	1	1	1
33	1	1	2	2	2	1	1	1	1	1	1
34	1	1	2	2	2	1	1	1	1	1	1
35	1	1	2	2	2	1	1	1	1	1	1
36	1	1	1	2	1	1	1	1	1	1	1
37	1	1	1	1	2	1	1	1	1	1	1
38	1	1	2	2	2	1	1	1	1	1	1
39	1	1	2	2	2	1	1	1	1	1	1

In the second step, all the information obtained has been grouped based on equation (2) according to $\alpha = 1,4$, and in the next step, the quantitative expression of qualitative indicators (financial, time, labor costs) ($d = 4$ direction) are resolved. The Mamdani fuzzy inference method is employed for this estimation. The process has been conducted individually for each expert on three qualitative indicators, including “organization level of tax administration,” “business interference,” and “tax morality.” Consequently, the quantitative expression of the

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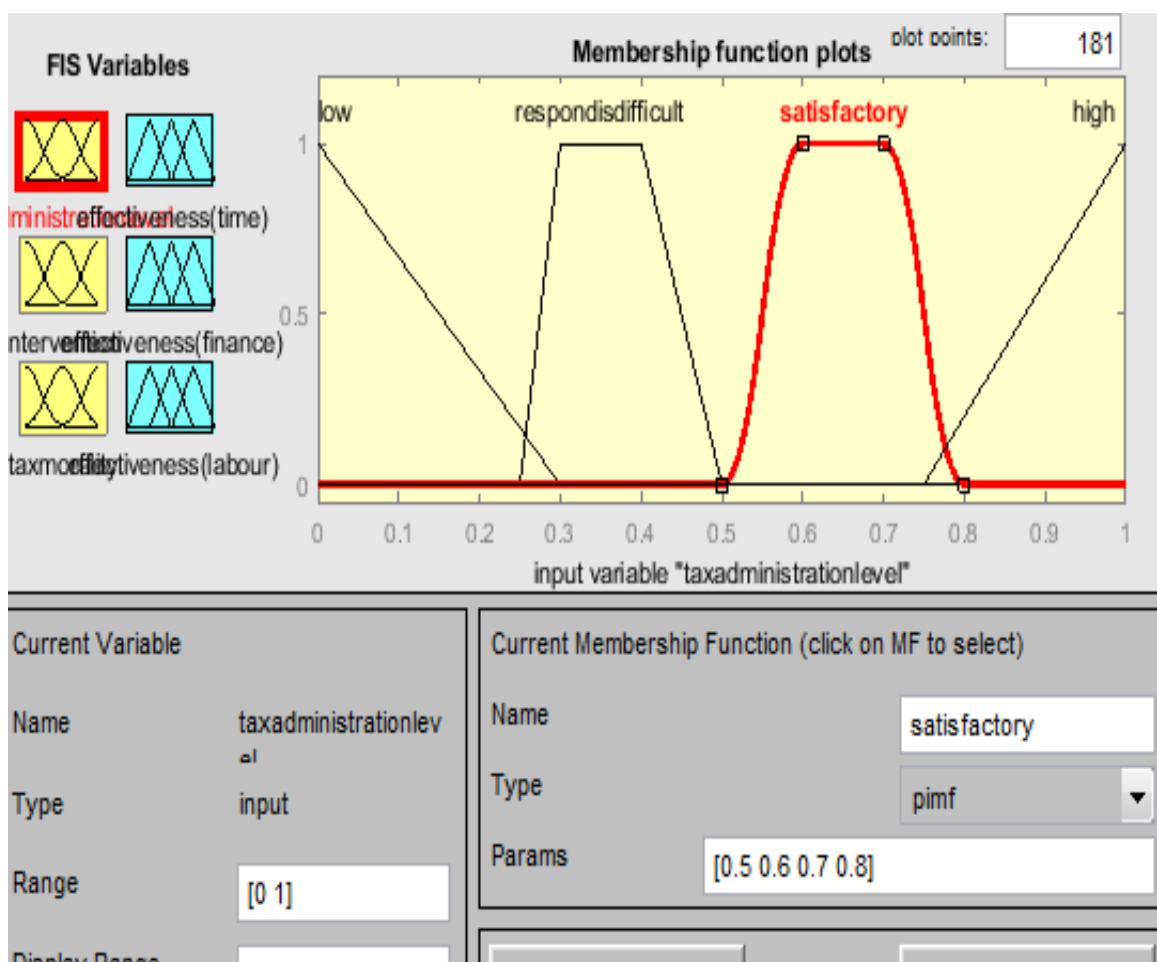
qualitative indicators with the new term “effectiveness” for each of the financial, time, and labor expenditures was obtained.

For instance, the process has been evaluated as follows for one expert’s indicators:

The above three qualitative indicators were entered into the system as input variables. “The organization level of tax administration” is defined by the input options “high,” “satisfactory,” “response is difficult,” and “low,” and the membership function of each term was established (Figure 1).

Figure 1.

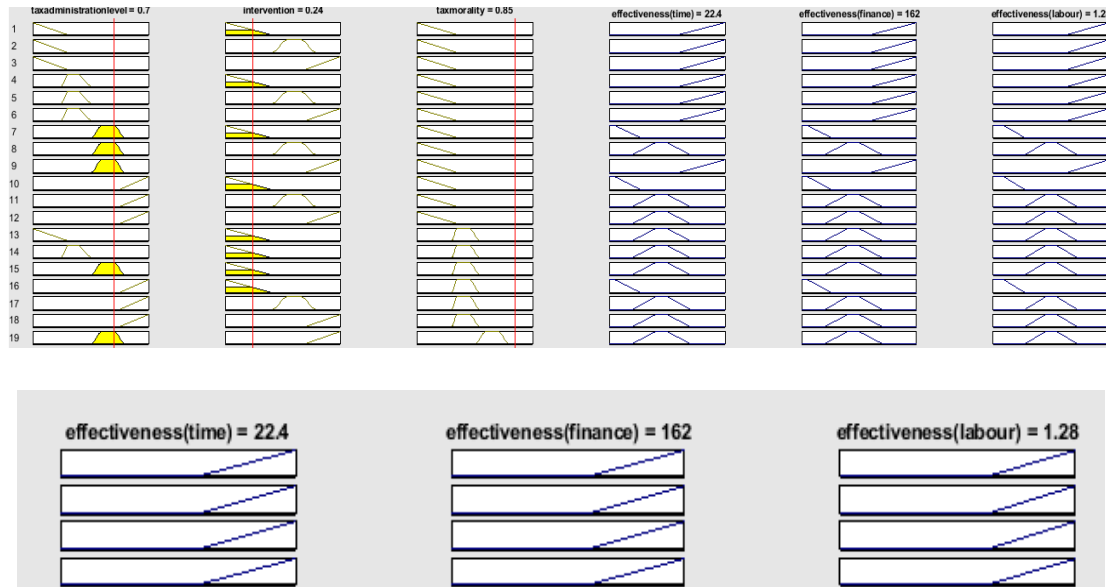
Membership functions of the “organization level of tax administration” input variable.



The input options for the “business interference” measure were “regular,” “by law,” and “never,” and for “tax morality,” they were “high,” “satisfactory,” “response is difficult,” and “low.” The membership functions for each term were established. Three output variables were included in the system to express the result for the quantitative indicators of financial, time, and labor expenditures. After the fuzzification of the input variables, the set of rules defined by equation (3) were created. The final result according to the first expert’s responses on the qualitative indicators is shown in Figure 2.

Figure 2.

Final results for one expert's responses



This process was replicated for the remaining 38 experts' responses, and the values are listed according to $\hat{d} = 1,2,3$ in Table 2.

Table 2.
Quantitative expressions of the qualitative indicators in terms of time, financial and labor expenditures using the Mamdani method

№ (Experts)	Quantitative expression of qualitative indicators		
	Time spent (hours)	Financial expenditure (AZN)	Labor expenditure (number of laborers involved)
1	22,4	162	1
2	25,8	186	1
3	26	187	1
4	90	675	5
5	100	750	5
6	167	1000	9
7	163	995	8
8	24,8	179	1
9	100	750	5
10	80	600	4
11	19,7	143	1
12	23	161	1
13	24	170	1
14	24	174	1
15	18	130	1
16	85	650	4
17	110	800	6
18	100	750	6

(Continuation)

№ (Experts)	Quantitative expression of qualitative indicators		
	Time spent (hours)	Financial expenditure (AZN)	Labor expenditure (number of laborers involved)
19	24	170	1
20	85	600	5
21	21	148	1
22	119	919	7
23	90	675	5
24	25	181	1
25	26	186	1
26	100	700	5
27	85	600	5
28	165	1100	9
29	23,6	170	1
30	25,8	186	1
31	20,8	151	1
32	23,3	168	1
33	19,2	135	1
34	100	750	5
35	18,7	135	1
36	70	500	4
37	23,3	168	1
38	100	750	5
39	15	120	1

The calculations were carried out using the fuzzy toolbox of the MathWorks, MATLAB Software R2018b (Matlab 2018). The new row of indicators determined by equation (4) includes the quantitative expression of the qualitative indicators in terms of finance, time, and labor expenditures. In the fourth step, another expert group evaluated the reliability of these data on a scale of [0, 1]. Then, the information obtained was grouped using equations (6) and (7) so that the administrative and fulfillment tax burdens could be estimated.

In the last step, the administrative and fulfillment burdens were investigated as a multi-criteria decision-making problem in terms of financial, time, and labor expenditures by using the weighted sum model. That is, the sub-indicators that characterize the administrative burden were distinguished and calculated using equation (8) according to financial, time, and labor expenditures. This process resulted in six indicators, namely, on-sight inspection, off-sight inspection, chronometer inspection, effectiveness (quantitative expression of qualitative indicators), concerns, and agreement. The indicators are weighted differently according to their degree of importance; appropriate weights are calculated with equation (9): $w_1^a = 0.23$, $w_2^a = 0.27$, $w_3^a = 0.18$, $w_4^a = 0.14$, $w_5^a = 0.09$, $w_6^a = 0.09$. In the same way, indicators that characterize the fulfillment burden have been selected and evaluated. This process resulted in six indicators, namely, tax registration, opening bank account, setting cash machine, tax return preparation, starting activity, and agreement of tax return. Because the degree of importance of the indicators is the same, they are weighted equally: $w_1^f = w_2^f = w_3^f = w_4^f = w_5^f = w_6^f = 0.166$. The result of all calculations is shown in Table 3.

Table 3.

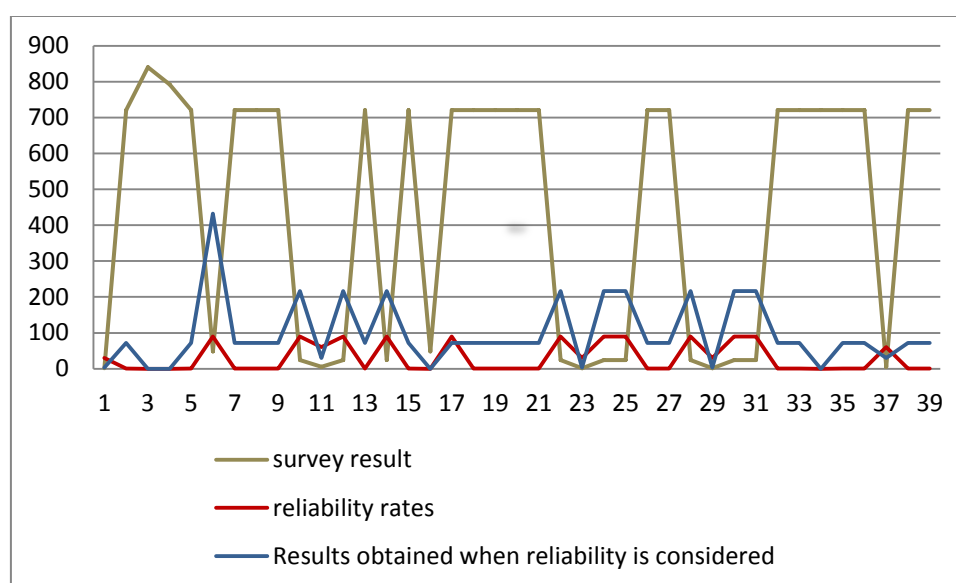
The results of the proposed methodology according to only the time spent and comparison with the World Bank's Doing Business report

Time spent (hours)	
Doing Business report	Proposed methodology
	Administrative burden =107
	Fulfillment burden =21
159	Total =128

These calculations were executed with Microsoft Excel (Excel 2010). Figure 3 presents the survey's data and respective reliability levels. As the figure shows, discrepancies in taxpayers' responses were adjusted because of their reliability ratings.

Figure 3.

Comparative analysis of initial and final information for one indicator (time spent on disputes)



Notably, the tax burden of the economy can be estimated according to the aggregate investment expenditures, as Musayev and Musayeva (2018) proposed in their study that informed our research in a general sense. Their study provides the first basis of the present study on the tax burden. This evaluation model enables the total compulsory (integral) tax burden to be determined according to the proportional increase in capital expenditure in a particular fiscal (tax) year. The results of this study were compared with the Doing Business report (World Bank Group 2019). Table 4 presents the research outcomes in terms of the estimated tax burden of the economy for the relevant years based on the two approaches.

Table 4.

Comparative analysis of the measures of the total tax burden

Years	Doing business	Musayev and Musayeva's (2018) study
2011	0.4	0.38
2012	0.4	0.37
2013	0.4	0.39
2014	0.398	0.35
2015	0.398	0.33

Conclusion

This study develops three important innovations. First, it justifies the importance of defining the tax burden as a sum of the compulsory, administrative, and fulfillment components. In the past, the tax burden was narrowly defined as the ratio of tax receipts to the taxation base. Second, a methodology is developed for the assessment of the total tax burden (in accordance with the classification). Third, the modified weighted sum model is proposed, which reflects the reliability rates for diminishing uncertainty of model inputs. The proposed methodology is applied to the tax system of the Azerbaijan Republic, and the results obtained are compared with the Doing Business report of 2019. Based on our methodology, the total tax burden is less than the Doing Business evaluation. This is an important insight since it shows that Azerbaijan's international ranking may in fact be higher than the 25th place determined by the Doing Business report.

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IMPROVING EDUCATIONAL AND TRAINING PROGRAMMES THROUGH LEARNING ANALYTICS AND VISUALISATION OF EDUCATIONAL DATA

Abstract

This paper provides a step-by-step approach on how institutions can use their information for improving educational provision and subsequently becoming more competitive in the higher education sector. The paper focuses on three scenarios in explaining how the visualisation of data that are available in higher education institutions can become a key element for gaining competitive advantage.

Introduction

This position paper provides an overview of how data analytics and in particular the analysis of educational information can be used from institutions as the means for improving their competitiveness. The report first discusses different views on how learning analytics and their visualisation can be used for a number of areas to improve institutional effectiveness. The paper continues with a discussion on a number of scenarios where learning analytics could be used, with detailed guidelines on how data visualisations can assist decision-making. It is important to note that learning analytics can be used in two main ways in order to improve educational and training programmes. On one hand analytics can be used as predictive tools focusing on forecasting what will happen next based on patterns of what has happened before. For example how applications may increase following trends of the past few years. On the other hand analytics can be used as prescriptive tools focusing on determining recommendations for decisions and actions based on the institution's assumptions on what is

believed that it will happen. For example identifying the necessary resources to support the delivery of a programme based on the assumption of a set number of applicants to be registered for the programme in the coming year.

The Role of Analytics in Higher Education

The emerging field of analytics in higher education has been widely discussed over the past few years. Emphasis is given on understanding the role of analytics in higher education, as well as determining the impact of analytics on academic programmes. In this section we will briefly discuss the main concerns associated with the use of analytics in higher education. According to an article published by McKinsey & Company [3] there are a few challenges associated with the effective use of analytics in higher education including (i) being overly focused on external compliance (meaning that emphasis is given more on meeting benchmarks and standards for producing reports and visualisations rather than focusing on understanding the institution's own data), (ii) isolating the analytics program in an existing department (meaning that analytics are commissioned by specific units, failing to offer an institution-wide resource based on the integration of various analytics reports and merging of different data sources), (iii) failing to establish a culture of data sharing and hygiene (meaning the reluctance for integrating institutional data and allowing information sharing between different organisational units) and (iv) lacking the appropriate talent (meaning the ability of universities to employ skilled individuals who can properly analyse data sets and offer meaningful visualisations). The report concludes to five actions steps for academic institutions [3] as follows:

- Articulating an analytics mandate that goes beyond compliance – in other words universities must integrate analytics in their core strategy, making sure that they gain insights from their own data.
- Establishing a central analytics team with direct reporting lines to executive leaders – universities must ensure that sufficient human resource are available with specific line management and reporting responsibilities to the institution's board of governors.
- Winning analytics buy-in from the front line and create a culture of data-driven decision making – it is suggested that in order to gain true benefits from analytics universities must ensure there is strong support and commitment from senior management, as well as a transformation of the corporate culture towards effective use of institutional data.
- Strengthening in-house analytical capabilities – it is important for institutional analytics to be operated by full time staff members, able to understand the true value of the data being analysed.
- Not letting great be the enemy of good – university executives must understand that analytics do not always produce amazing results and that it is necessary to gradually immerse into the seamless use of analytics as part of the institution's self-assessment and decision-making processes.

The Center for Digital Education identifies a number of ways smart universities use data and analytics [2]. First, institutions can use analytics to improve recruitment, y attracting students with better chances for retention and progression based on careful profiling of

applicants. The admissions process can be also enhanced and lead to improved Return on Investment (ROI) after analysing several criteria such as demographics, academic prospects and historical data. Student progression can be also improved with strategic use of analytics, based on maintaining individual profiles with academics performance, personal tutorial information and student profiling. A very straightforward way to benefit from analytics is through evaluation of motivation, which can be done with the use of attendance monitoring. Emerging patterns can help institutions identify whether there is an issue for specific programmes and perhaps determine the reasons for increased absenteeism. Analytics have been historically used for curriculum evaluation, usually in the form of student surveys or other means for gaining feedback and student views. Analytics can be also used for designing lean, efficient operations. Cost and time gains can be the result of analytics for the way certain academic operations perform. There are quite a few benefits from the use of analytics in higher education including [1]:

- Optimising academic programmes in such a way that they are more aligned to learners' needs.
- Improving programme delivery through scheduling according to room availability, student preferences and available resources.
- Assessing profitability and ROI of academic programmes against a number of factors including enrolment forecasts, budgets, computing resources, parking, and more.
- Determining issues relating to retention and progression and assessing individual learners according to certain benchmarks that flag cases in need for attention.

According to Deloitte [5] the types of data generated in academic institutions that can be used for effective analytics include the following: (I) timetables, (II) administrative data, (III) application and admissions data, (IV) research data, (V) financial data, (VI) planned work, (VII) maps, estates and facilities data, (VIII) student and performance data, (IX) staff data, (X) course data, (XI) environmental data and (XII) alumni and historical data. In the UK, there are certain data collection institutions that serve the education sector as follows [5]:

- HESA – collecting and holding information on the composition of the student body, degree results, and destinations of leavers after graduation.
- UCAS – holding data on the prior qualifications of successful and unsuccessful university applicants.
- SLC – holding data about applicants for student support, the rate at which they repay their student loans after graduation, and the accumulation of debt and the total loan outlay.
- UKVI – holding data on international students, including attendance data.

Recommendations for using Learning Analytics

We could identify a number of motivating factors for deploying analytics in a Higher Education Institution (HEI). These can be as follows:

- Improving the institution's student retention results.
- Providing better feedback to students based on their performance.
- Assessing attendance patterns across cohorts and programmes.
- Enhancing the learning experience of students.
- Evaluating teaching and assessment practices.

According to the report of a ten-month inquiry co-chaired by Lord Norton and Sarah Porter for the UK Higher Education Commission, a set of recommendations were produced –

that emphasise the importance of a strategy for data and analytics that needs to be put in place, and kept up-to-date, by each university [5]. We will attempt to adapt these recommendations into the following table, to provide suggested actions that can be implemented by institutions that wish to consider the deployment of learning analytics.

Table 1.

Recommended actions for the deployment of learning analytics in higher education institutions

Recommendation	Description
Recommendation 1.	Having in place a sector-wide strategy for excellent and innovative data management.
Recommendation 2.	Rationalising the data collection process across the sector.
Recommendation 3.	Introducing an appropriate learning analytics system to improve student support / performance at each institution.
Recommendation 4.	Putting in place clear ethical policies and codes of practices that govern the use of student data in analytics and other digital systems I each institution.
Recommendation 5.	Seeking fully informed consent from students to the use of their personal and learning data in analytics before introducing learning analytics to na institution.
Recommendation 6.	Driving learning analytics by improvement of learning and teaching processes and student engagement.
Recommendation 7.	Reviewing institutions' internal data management approaches and put in place action to ensure that institutional data is fit for purpose.
Recommendation 8.	Ensuring that digital literacy, capability and good data management strategies are an integral part of each institution's strategic plans.
Recommendation 9.	Ensuring that the digital agenda is being led at an appropriate level within each institution.
Recommendation 10.	Providing teaching and administrative staff with appropriate training and support to improve their digital capability and data management skills.
Recommendation 11.	Ensuring that institutions are not exempt from the Freedom of Information Act.
Recommendation 12.	Encouraging institutions to use the information from learning analytics systems to identify and foster excellent teaching.

However, it is important to ensure that institutions use learning analytics, with the understanding that one size does not fits all. According to research studies [7] it is imperative for learning analytics research to account for the diverse ways technology is adopted and applied in course-specific contexts. We mentioned earlier the role of analytics as predictive tools for universities. Alternatives to predictive models can be provided in the form of (i) social network analysis aiming to increase the effectiveness of student engagement in real-time and (ii) personalisation of learning, and guiding the student along a learning pathway that meets their specific needs, are other uses for learning analytics.

Another important aspect relates to institutional responsibility when using analytics. According to JISC's Code of Practice for Learning Analytics [8] universities should allocate specific responsibility for a number of areas including:

- The collection of data to be used for learning analytics.
- The anonymisation of the data where appropriate.

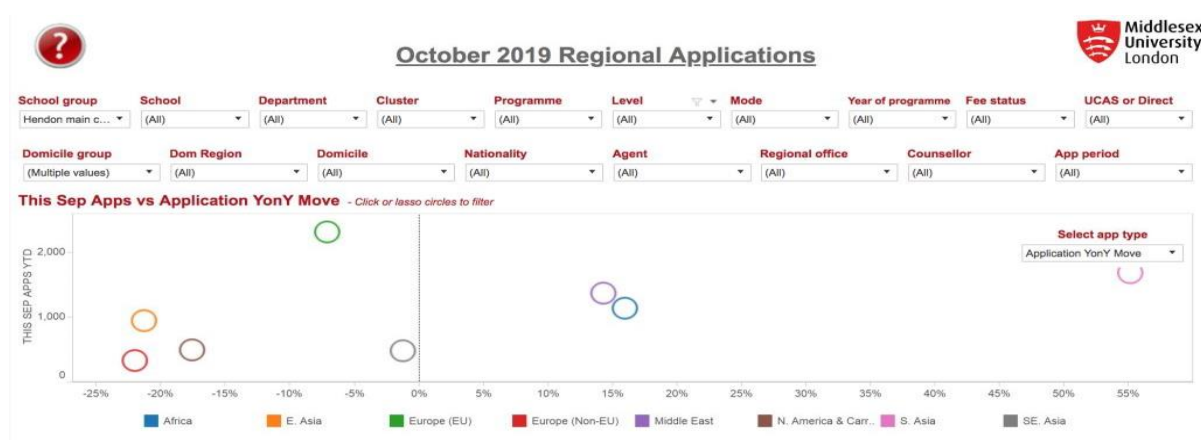
- The analytics processes to be performed on the data, and their purposes.
- The interventions to be carried out.
- The retention and stewardship of data used for and generated by learning analytics.

Cases of Learning Analytics

In this section we briefly discuss some examples of how analytics can help academic institutions to improve the effectiveness of their operations. Figure 1 shows regional application to the Middlesex University programmes, allowing identifying trends with previous years and attractiveness of programmes to certain regions.

Figure 1.

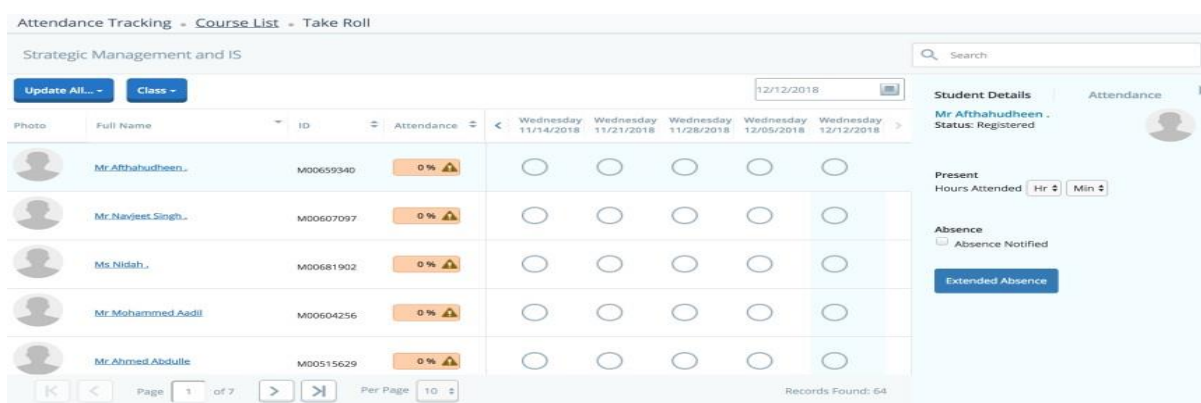
Regional applications



The next figure shows the interface used for attendance monitoring. As a result the attendance for specific modules can be viewed in different formats and analysed on a weekly basis.

Figure 2.

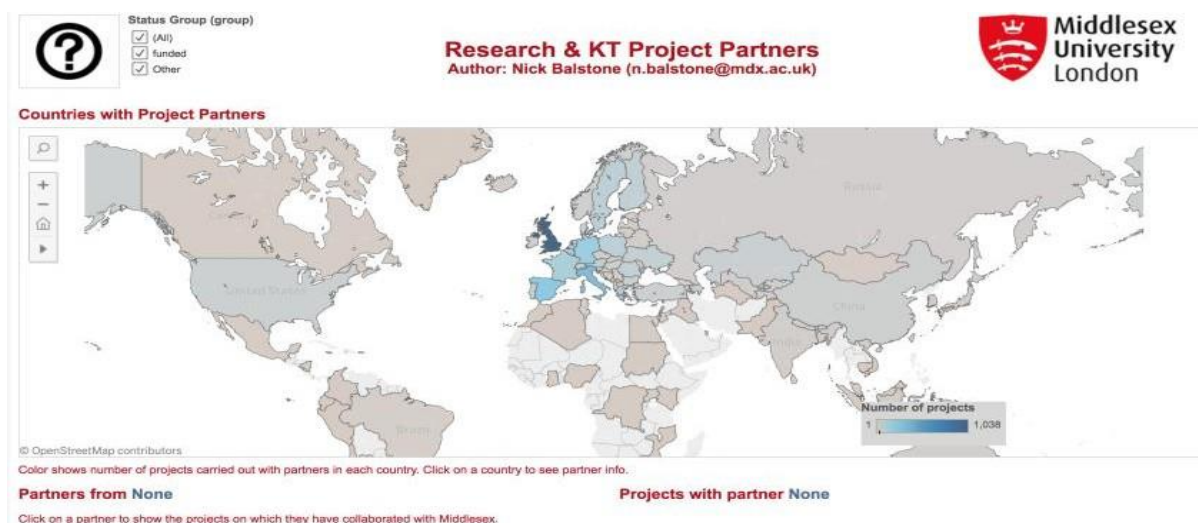
Attendance monitoring



The next figure shows the geographic dispersion of project partners in externally funded projects. This dashboard helps to determine potential partners for future research projects.

Figure 3.

Research and knowledge transfer partners



Finally the following two figures help the institution to assess the trends with respect to the grade analysis with respect to the final grades of modules (see figure 4) and the progression and achievement results at programme level, analysed per year (see figure 5).

Figure 4.

Grade analysis trends

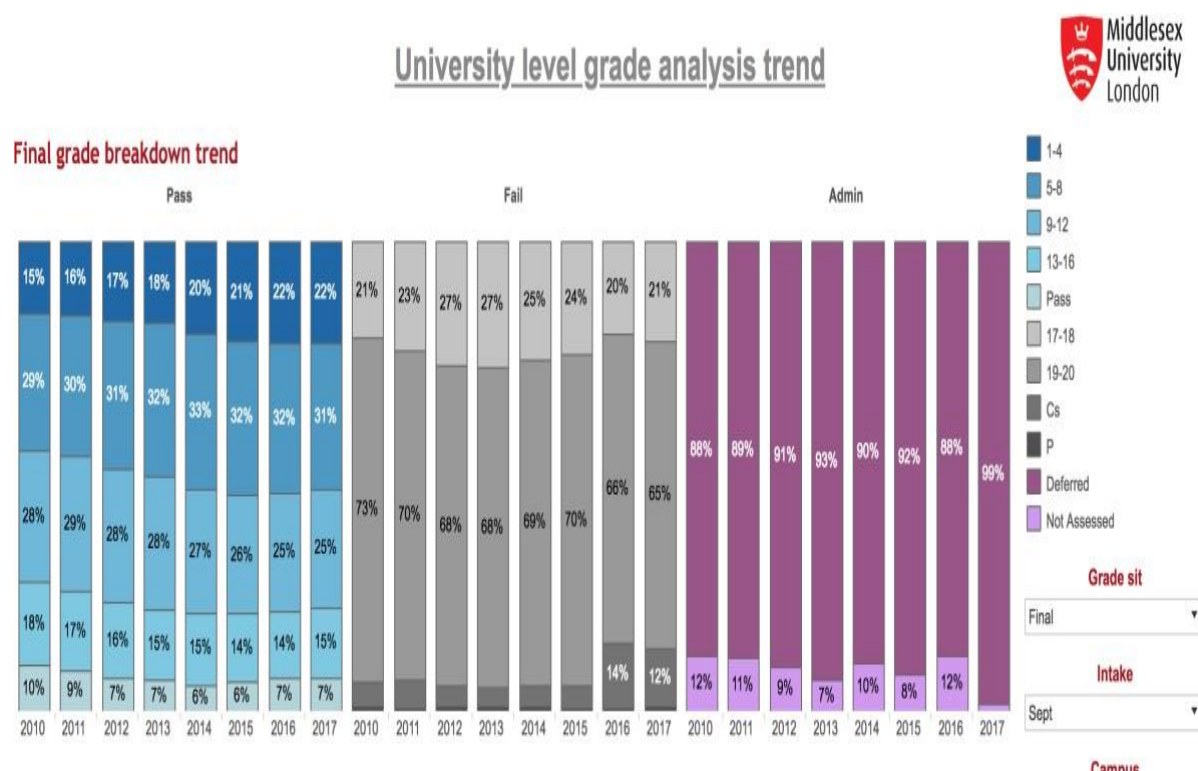


Figure 5.

Progression and achievement results



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“UNIVERSITY SOCIAL RESPONSIBILITY PRACTICES AS AN SMART INITIATIVE” (CASE IBAGUE UNIVERSITY)

Abstract

Nowadays society is facing social, economic and environmental problems. Most of these problems are the result of years of development promoted by no sustainable business initiatives. This scenario poses big challenge for all social institutions no matter its nature.

Universities as educational institutions with social sense have lot of potential for being smart initiatives developers; they might promote social sustainability programs and usage of environmental friendly technologies. This behavior would constitute a smart business initiative from educational perspective and university social responsibility approach.

The document aims to research and analyze the current smart university initiatives carried out by Ibague University located in Colombia, and characterize its social responsibility model. This includes its university social responsibility policies, plans and actions. The paper also aims to determine if smart university actions and generated impacts results from structured projects or isolated initiatives In order to measure Ibague University social responsibility initiatives, the methodology includes a diagnosis for the stage of development of USR policies in the university. The diagnosis was held by applying interviews to administrative and academic staff as well as surveys for students, subsequently, a model characterization of programs and plans is made and finally an assessment of remarkable impact actions. Finally, the document seeks to show that in order to enhance the impact that educational institutions can have on society, it is necessary to implement a structured University Social Responsibility model which will constitute a smart business initiative, becoming a reference model which may be implemented or used as guidance for other educational institutions.

Keywords: Smart Initiatives, Social sustainability, University Social Responsibility, Structured model, Corporate Governance, Corporate Social Responsibility, reference model.

Introduction

Educational institutions have been identified not only as knowledge developers, also as agents of change due to the fact that prepare and shapes the future professionals and studies or creates new concept tendencies, this gives them power to switch the mindset direction of future generations. Right now the world has started the new age of digitalization which comes with critical social and environmental problems, this situation asks for a redraw of the known processes with the presentation of initiatives with a core component on sustainability from all the guilds including the academic. The concept of sustainability on the new management model is a central part of smart business philosophy according to Smart Axiata Co (2017). In that order of ideas, effective actions related to sustainability could be understood as a smart initiative or smart business model. For that reason this researching studies the University Social Responsibility structure in Ibague University, a regional medium sized university with around 7.000 students and more than 11.000 graduated with 38 years old, and tries to answer if this educational institution efforts for being responsible are the result of the planification and prevention of impacts or in the other hand are a reaction matter, also measures and analyzes the impact of those actions into their internal community and finally presents a description of the remarkable USR model implemented by the Ibague University which could be seen as potential smart initiative to be shared with other institutions as a frame of reference and consultancy to undertake its responsibility.

1. Project descriptions

1.1.Problem Justification

Our society is facing a variety of problems that affect us in many ways such as social, economic and environmental areas. This is the result of years of development without the society's awareness of human activities consequences in long term. Some of the most common problems are poverty, contamination, inequalities, unsustainable consume tendencies and unsustainable economic models that affect each individual. According to Bexell and Jonsson (2016) this situation raised many questions especially about the responsibility of taking corrective actions.

In order to find the best solution to all these issues, right now there are movements and initiatives towards taking over the impacts and externalities generated by the society. At the moment one of the most known is the 2030 Agenda for Sustainable Development created in September 2015 by UNDP - United Nations Development Programme, where after several discussions of world leaders 17 SDG – Sustainable Development Goals were presented, attempting to promote smart initiatives focus on reaching those objectives as the end poverty, the protection the planet and construct peace and prosperity. In accordance with Bexell and Jonsson (2016) “The formal adoption of the new goals triggered a phase where the allocation of responsibility at different levels takes center stage”.

With the purpose of accomplishing those goals, the UN - United Nations - has established alliances and announced strategic partnerships like the universities and that's why agreeing with Paul, D. (2018) “*They've selected 17 universities around the world that will serve as 'Academic Impact' Hubs for each of the SDG. Each university will be charged with promoting scholarships and best practices for its respective Goal*”.

The global academic community has the capacity to use their policies, plans and actions to involve the community in this commitment and that is what we called University Social Responsibility, "Is the response that has the University forming responsible citizens with their environment, generating creative ideas and committed people to help to solve social and environmental problems" (University of Sipan, 2017).

This is why this research project proposes to characterize the University Social Responsibility Practices performed by Ibague University, because it's aim to identify if the university efforts in the different matters are the result of a structured and planned process or they are just isolated initiatives, and through the analysis of the different procedures that are undergoing in the university, measure the impact level on its internal community, identify which are smart initiatives and recommend some improvements for other similar education institutions to undertake this important responsibility task.

1.2.Initial Situation

Social responsibility was mostly related to large companies or international organizations, but today everybody is called to be engaged with it. In accordance with Baca, H. (2015) social responsibility could be understood as: "Integral responsibility (economic and social) under which the organization, during the exercise of its functions, it's conscious of the real and total effects of its actions on the environment, adopting a positive position toward the consideration of values and expectations".

The social responsibility it's getting more relevance each day on the international discussions, an example of it are smart initiatives as the creation of Sustainable Development Goals (SDG) by the United Nations Development Programme (UNDP), Global Reporting Initiative (GRI) standards, new international guidelines as ISO 26.000 and the release of the Green Paper by the European Commission just to name some. According to the International Organization for Standardization (2017), "ISO 26000 talks of social responsibility and not corporate social responsibility because its guidance is applicable to all types of organizations and not only to industry or private companies". Therefore, the definition involves even the academic guild as responsible to carry out sustainable activities and that is the reason today we're talking about University Social Responsibility (USR) as an effective initiative on the creation of sustainability.

In order to understand the importance and complexity of University social Responsibility, becomes relevant to define it as: "the Institutional capacity to generate and apply universal principles and values, whereby four key processes: management, teaching, researching and extensions, which are focused on improve the community (intern and extern) quality of life, minimize negative impacts and optimize pledged benefits of the university" (Baca, H. 2015).

Thus, to accomplish this important task Vallaey, F. (2008) proposed that it has to exist a kind of contract between the university and the society as follows:

You society, guarantee me autonomy and resources, and i University give you (1) democracy through the education of students and responsible citizens, (2) more responsible science and open to the solution of humanity's social problems and (3) better, equitable, innovative and sustainable development with competitive and engage professionals.

Despite the academic institutions efforts to be more responsible, they have not explored all the potential they have as a social responsibility hub yet. Based on Sassen, R and Azizi, L. (2018) in their research paper entitled Assessing sustainability reports of US universities:

“Sustainability reporting by universities is still in its early stages. The findings show a clear focus on the environmental dimension, whereas the university and the economic dimensions see lower levels of reporting. The social dimension is rarely addressed”.

As a conclusion, based on Hart and Northmore (2009):

Despite widespread acknowledgement that universities should contribute to the development of the society of which they are a part, the problems in measuring university–community engagement include a lack of focus on outcomes; a lack of standardized instruments and tools; and the variety of approaches currently being adopted. (p. 3)

All of these problems are originated due to a low investigation about suitable universal management models for the implementation, supervision and evaluation of University Social Responsibility as an effective initiative.

1.3.Theoretical Framework

In order to give a more objective theory basis, the following are the advances that the concept of University Social Responsibility (USR) has had through the time by certain important authors in the topic.

Table 1.

Theoretical framework

Author	Year	Concept
Universidad Construye País	2006	The ability that has the University of disseminate and implement a set of principles and General and specific values, through four key processes, such as the management, teaching, research and extension University, responding to the Community College and to the country where it is inserted.
Sánchez, Herrera, Zarate.	2007	It's defined as the relationship between the role played by the institutions of higher education to train human resources and generate knowledge, and what society demands.
Vallaey F.	2007	The University Social responsibility is a management policy of the ethical quality of the University that seeks to align its four processes with the University mission, its values and social commitment through the achieving institutional consistency, transparency, and participation from all the University community with multiple stakeholders in good College performance.
Vallaey F.	2008	The University Social responsibility is a policy of continuous improvement of the University towards the effective implementation of its social mission through 4 processes: ethical and environmental management, formation of responsible citizens, production and dissemination of socially relevant knowledge, social participation in promotion of a more human and sustainable development.

Prepared by the author

2.Objectives

This project seeks the following objectives:

- Determine if university social responsibility efforts are the result of a structured and planned process involving policies, organizational structure, actions and resources allocation; or on the contrary this efforts are result of isolated initiatives not supported by institutional planning and resources
- Identify and characterize the model and practices of university social responsibility performed by the university
- Suggest university social responsibility practices for other universities by exchanging findings
- Assess the impact level of university social responsibility practices executed by the institution.

3. Methodology

Investigation design and approaches

The investigation is based on an observational and cross-sectional study. The authors gathered the information once in a single moment in time, getting an overview without any influences on the university activities that could change the results. In order to get results as much objective as possible, this research used a mixed method, involving both qualitative and quantitative data through a specific tool for each, so as to determining the university structure around USR through the qualitative information and evaluating its impact on the internal community with the quantitative information.

Sampling technique

The sampling technique relied on researcher's selection bearing in mind the investigation purpose, thus the technique is non-random sampling and based on convenience. In the specific case of this research the University's structure around USR will be pored through. Therefore, our sample has to be related with the USR's departments, projects, subjects, activities or decisions within the University.

Study population

In this investigation only internal stakeholders were interviewed, those individuals were classified are divided as follows:

- Management area as Dean and USR responsible staff.
- Employees: Full time teachers with at least one year work experience at the University and related with social responsibility programs or subjects, and employers on management areas with at least one year work experience at the University and involved with social responsibility departments, programs or activities.
- Students: Only current students on professional courses with at least one year studying at the university and enrolled on subjects related with Social Responsibility.

Variables

- Politics: This variable refers to those general directions defined by the highest level of management, which seeks to complement the achievement of objectives, facilitate the implementation of strategies and are general guidelines for decision making within an organization (Medina, M. 2012). For the purposes of this study, this variable is important because it reveals the level of integration of USR from the top management of the University.

- Plans: This variable tries to explain those steps set out by the university trying to achieve a established goal in the future through projects, for a specific topic which in this case focus on USR.

- Projects: The projects represent those specific activities orientated to the accomplishment of a plan previously presented, in this instance particular for USR purposes.

Research Tools

This investigation used a mixed method; therefore two types of research tools were needed. For the compilation of qualitative information a semi-structured interview was applied to the USR responsible, who supplied the information about the principal politics, plans and projects that the University has been executing. In the case of quantitative information and impact and effectiveness measurement of USR efforts, surveys with option of answer were rated from 1 to 5, 1 as the lowest and 5 as the highest possible score.

Both interview and surveys questions were based on questionnaires developed by the Ethos Institute in the year 2017, which “is a management tool that aims to support companies in incorporating sustainability and corporate social responsibility (CSR) into their business strategies, so that it becomes sustainable and responsible” (Instituto ETHOS, 2016).

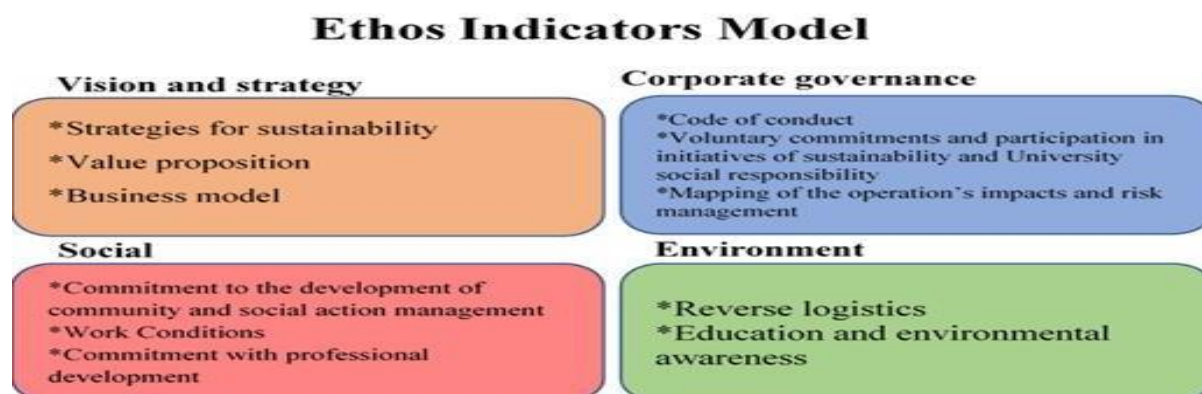
For the research purpose, Ethos indicators was used as it has been a methodological tool proved by the Institute which has 20 years of experience in carrying out its mission of sensitizing and contributing to the companies in a socially responsible way, in addition these indicators are easy to understand. They become a tool for assessing how much sustainability and social responsibility has been incorporated in business, thus helping to define sustainable strategies, processes, policies and plans for the organization which match with our research objectives.

Data digitization and Analysis

In an effort of facilitating the organization of the document and measurement of results, all research tools were recorded. The investigation analyzed the information collected following the Ethos indicators model, which was grouped in four dimensions that were deployed in themes inspired by ISO 26000, which in turn, were broken down into sub-themes and later into indicators (Instituto ETHOS, 2016). Modifications were made on some indicators and terms depending on the needs involved in the research, as well as only two or three indicator by dimension which could have any relation with USR were taken into account.

Graphic 1.

Ethos Indicators Model



Prepared by the author

Into the four dimensions that are handled in the ethos indicators, the first one is called **Vision and strategy**, this dimension has as main theme the analysis of the strategies used by the University for the established mission implementation. This dimension is focused on employees and was measured through three indicators:

- Strategies for sustainability, these indicator asses if the University incorporates aspects related to sustainability and social responsibility in both strategies and planning.
- Value proposition, these indicators allows us to know if the institution incorporates sustainability and responsibility as a differentiating aspect in the provision of services and consequently as a competitive advantage.
- Business model, according to the Ethos Institute this indicator is about knowing how to integrate sustainability attributes into the management processes of the university and its business model.

The corporate governance dimension is associated with topics that guide the university, to structure its management aligned to University social responsibility that comprises from its purpose and implementation of Policies to their integration with the company's management processes. This dimension is directed toward the management area as Dean and is measured by indicators such as:

- Code of conduct, this indicator analyzes the norms of behavior adopted by the University, in order to formalize them and disseminate them in their sphere of influence.
- Voluntary commitments and participation in initiatives of sustainability and University social responsibility, seeks to measure the participation of the university in initiatives that contribute to sustainability and generate influence in the process of improvement of ethical behavior.
- Mapping of the operation's impacts and risk management, in an attempt to prevent and mitigate impacts, this indicator review the university knowledge about its externalities on the socio-environmental aspects to thereafter being in constant diagnosis and improvement.

In social dimension the matters related to relationship with the community is highlighted (for this study only applies for internal community) and participation in its development, as a begin of a reciprocal link that can contribute to the strengthening of civil society and the improvement of the public good with development goals of the professionals

and citizens in general. This dimension is directed toward students and the indicators used in this dimension are:

- Commitment to the development of community and social action management, evaluates the contribution of the university in the relieve of the community social problems and the relationship maintained between them.

- Work conditions, quality of life and workday, assess the University efforts as a worried employer of the wellbeing of its employees by providing them good working environment and optimal work guarantees.

- Commitment with professional development, measure the integral education the University gives to their students as a conscious professional about worldwide problems and its mission as an agent of change and developer of a sustainable world through the exercise of its activities.

Nowadays, the society faces a big challenge related to the **environment**, that's why generate environmental awareness it's a great impact on society as it allows meeting the problem in a joint way. This dimension is focused on students and to measure the impact generated in this dimension by the University, are taken into account indicators such as:

- Reverse logistics, the objective is to measure the plans of recycling, reduction and reuse of solid waste generated in an environmentally positive way, to reduce the negative impacts post-consumption.

- Education and environmental awareness, Universities must create educational projects, programs and campaigns that create environmental awareness in students, employees, and linked community.

Expected results

This paper presents a descriptive approach focused on the characterization of the Ibague University structure around the USR (policies, plans and projects). Furthermore, the effectiveness of each referred dimensions were measured in the institution, in order to evaluate strengths and weakness to finally suggest better practices for USR. Those results could constitute as a frame of University Social Responsibility reference and consult.

Stages of the project

In order to achieve all objectives; the project was divided in four parts as following:

- Diagnosis: Designed to identify politics, plans and projects of the university. This diagnosis was composed by the interviews for USR responsible or person in charge of related issues.

- Measuring action impacts: Intend to evaluate the implications and approach by dimension of USR's actions, indicators of the surveys will be taken into account for this purpose.

- Analysis and comparison: It seeks to identify strength and weakness in university's procedures, evaluate and characterize it and lastly propose improvements and better practices for integral USR.

- Sharing best practices: Those practices identified as smart initiative due to its effectiveness, were presented as a reference model for other universities consultancy.

4. Results and findings

4.1. Diagnosis

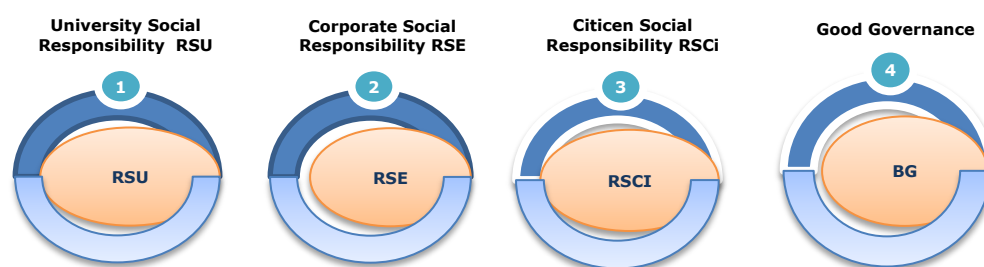
Once the stage of the interviews with those in charge of the area of university social responsibility was concluded, a genuine interest on the part of the University of Ibague was identified to advance and structure a comprehensive model of university social responsibility management. This interest arises from the premise of work consigned in its corporate identity, which includes the phrase “Committed to regional development” as a slogan. As a result of the strategic planning processes, the university began to work on a series of initiatives tending the structuring of a University Social Responsibility Model.

On the basis of the cultural differentiation that countries may have, the diagnosis started with the approach characterization of the high education institution, so that might explain better the background of the policies, plans and projects structuration.

The University of Ibague developed its own model of integral social responsibility which comprises four nodes of action: **University Social Responsibility, Social Corporate Responsibility, Citizen Social Responsibility and Good Governance** units. This allows the institution to have influence in all the areas involved as well as enhance processes of a managerial character. The institution efforts are toward both for internal and external community, in turn, the University of Ibague develops initiatives focused on the construction of a sustainable society through the formation of students and citizens committed to the transformation of society and the care of the environment. This university social responsibility approach makes more feasible the integration of USR policy with the general managerial platform of the organization.

Graphic 2.

Integral Social Responsibility Model



Prepared by University Social Responsibility Office

As an effort to make the USR Model a structure framework for developing actions, the Ibague University developed institutional Policies, Plans and Programs which are described in the following paragraphs.

In terms of Policies, Ibague University has developed documents and policies aiming the redesign of the company's organizational structure, focused on having a well-functioning

dependency with resources allocation, which promote and follow up USR initiatives. The University of Ibagué under agreement 317 of 2014 presents a policy for its model called “*Integral Social Responsibility*”, which is a strategy of integration between government, enterprises, university and community looking for higher impact on population welfare and socio-economic development. The ISR (integral social responsibility) model as the university called it emphasizes in more than only qualification of the internal functions; it is also about an educational and proactive task of social responsibility with all sectors in pursuit of regional development. That’s why the model of Integral Social Responsibility comprises all aspects including: **University Social Responsibility, Social Corporate Responsibility, Citizen Social Responsibility and Good Governance** units, all these four nodes of action were provided with goals, procedures and resources in order to promote and conform a dynamic, integrated and well defined USR Model, which would contribute to the overall goal reaching of “Being compromised with Regional development”.

Referring to programs resulting from the ISR Model, the Ibagué University currently features four smart initiatives:

- Social knowledge management: This is about the generation of new knowledge around the resolution of social, politic, economic, cultural and environmental problems as well as makes public the findings that could improve the quality of life in the population. This program is linked to the academic researching projects performed by professors.

- Social responsible institution: Following the standards of Global Deal, GRI and the guidance for social responsibility ISO 26.000 the university performs preventive and strategic projects to decrease the impact that its operations has on the society and environment.

- Social participation: This includes the participation of the university on different forums about problems that the city is facing or discussions seeking the regional development. This participation pretends to help to solve those issues from the academic field. Academics are sent to take part in governmental working spaces and exchange ideas and propose initiatives that can meet the community problems.

- Training: Promote and support training processes at all levels of education. This seeks for enhancing staff competences in terms of pedagogical and technological tolls usage in teaching.

Some of the projects resulting from the Integral Social Responsibility Model developed by the Ibagué University are:

“Peace and Region”. This program focuses on sending students from last semester of bachelor to work in small towns located in throughout the department territory, So far the University has been linked with 89, 100, 140 and 225 projects annually since 2015. This smart initiative is included in the curriculum of all bachelor degrees as one of the requirements for getting graduated. “Peace and Region” program remarkably constitutes as a comprehensive training strategy of the University of Ibagué, created in 2011 in order to complement the disciplinary training of the last semester students of their different academic programs with a systematic scenario of citizen training, which is structure from the formation

of interdisciplinary teams that during an academic semester are linked to projects that address regional issues in the real context of the municipalities of Tolima. In this way, “Peace and Region” promotes the strengthening of public and private organizations and the articulation of local entities and actors which work for the sustainable development of the region; in the same way, it clearly dynamizes the teaching, research and social projection functions of the University. On average, 82 projects are executed every year. The projects are framed in three areas: Institutional strengthening, Social and economic development and Health and education area.

“Bachelor Architecture programme and its social engagement”: The architecture students from the classrooms have designed different architectonic projects for some regions of the city, seeking the heritage conservation of local infrastructure and socio-economic development of the surrounding communities. In that way, the knowledge goes further than only the classroom borders, to solve social problems and boost the economy.

“Solid waste, from problem to opportunity program”: The University after a review of cases of success, explicitly from one developed in Cuautla México, the University formulated a project of a landfill adapted for the needs of the south of Tolima, it focuses on the promotion of biogas usage as a natural and as sustainable source of electric energy generation. Furthermore this program makes possible getting value out of solid waste produced by community.

“Innovation at the service of Tolima’s special coffees program”: The University took part of discussions and established alliance with the regional government and the departmental committee of coffee growers of Tolima (department in which the Ibagué University is located), in order to formulate a proposal to generate higher value on the regional special coffees and in this manner increase the incomes of the coffee growers. This project consist on providing technical assistance to coffee grower on matters related to good agricultural practices, crops technification, analysis of the potential exporting offer, foreign trade and international logistics.

“Avancemos” program: This project began as an initiative of literacy for vulnerable communities and consists in offering basic and intermediate education to people considered as grown up compared with the average of ages in this levels of education, whose want to complete or validate its secondary academic training. Besides offering the ending up of basic and intermediate studies to adults, the program is also designed to teach how to learn by themselves by providing them with methodologies and learning tools which enable those students to develop a self-learner skill.

4.2. Analysis

The following table belongs to the quantifiable results of the applied surveys. The numbers with bold are identified as the highest score by indicator and will be analyzed afterwards.

Table 2.

Ethos Indicator Assessment for Ibague University

Indicator	Scores		
Strategies for sustainability	1: 0,00%	2: 14,29%	3: 10,71%
	4: 35,71%	5: 39,29%	
Value proposition	1: 0,00%	2: 4,76%	3: 28,57%
	4: 28,57%	5: 38,10%	
Business model	1: 0,00%	2: 4,76%	3: 19,05%
	4: 47,62%	5: 28,57%	
Code of conduct	1: 0,00%	2: 0,00%	3: 0,00%
	4: 100,00%	5: 0,00%	
Voluntary commitments and participation in initiatives of sustainability and University social responsibility	1: 0,00%	2: 0,00%	3: 0,00%
	4: 33,33%	5: 66,67%	
Mapping of the operation's impacts and risk management	1: 0,00%	2: 0,00%	3: 20,00%
	4: 40,00%	5: 40,00%	
Commitment to the development of community and social action management	1: 2,22%	2: 8,89%	3: 37,78%
	4: 33,33%	5: 17,78%	
Work conditions, quality of life and workday	1: 6,67%	2: 15,56%	3: 23,33%
	4: 34,44%	5: 20,00%	
Commitment with professional development	1: 5,56%	2: 14,44%	3: 32,22%
	4: 30,00%	5: 17,78%	
Reverse logistics	1: 5,19%	2: 10,37%	3: 40,74%
	4: 34,81%	5: 8,89%	
Education and environmental awareness	1: 4,44%	2: 8,89%	3: 22,22%
	4: 40,00%	5: 24,44%	

Prepared by the author

The following ratings are between a range of 1-5, being 1 the lowest and 5 the best score according to the compliance of each indicator by the university. This analysis covers the Ibague University in the four categories assessed.

Vision and strategy

The University presents a high level of incorporation of sustainability in their plans and strategies with a score of 75% of total answers between a 4 to 5 rate on the indicator *Strategies for sustainability*, this could be underpinned on a complete policy dedicated to the preparation of responsible actions under the agreement 317 of 2014, which not only takes into account the USR, it also presents its own model called Integral Social Responsibility and it's carried out through four specifics plans. On the other hand such planning has been taken as

differentiating aspect on the provision of educational services as the indicator *Value proposition* shows a rate of 66,67% score of the total answers between 4 to 5, being 5 the highest. Thus the University of Ibague integrates sustainability attributes into the management processes of the university and on its business model, this conclusion is confirm by the indicator *Business model* which built up a rating of 4 with 47,62% following by a mark of 5 with the 28,57% of the total answers.

Social and environment

- Commitment to the development of community and social action management.

This indicator seeks to measure the impact generated by the university in mitigation of the social problems, the students of the University of Ibague rank the social impacts in a range of 3 to 4 points with a percentage higher than 50%, this high qualification is based on the plans and projects that are developed in the university that in turn seek to contribute in the society, plans like "Social Participation" through which the university participates in different forums that seek to improve regional development with the aim of solving these problems from the academic realm.

The Ibague University also implemented a training plan that seeks to promote and contribute to regional training processes at all levels of training. This last plan is linked to the project "Avancemos", this project was born as a literacy initiative that offers to the population basic and intermediate education so that they can complete their studies and develop a skill and self-learning.

- Work conditions, quality of life and workday.

The University of Ibague is concerned to maintain suitable work conditions for each of the people who is part of its work team, in addition to this, the quality of life and welfare of their employees is reflected in the good environment that these employees are provided with. Students have qualified this indicator with a percentage higher than 50% in a range of 4 to 5, taking into account the way in which they perceive the University acting towards their employees.

- Commitment with professional development.

The objective of this indicator is to measure the effectiveness of the education provided by the University of Ibague in the training of students as professionals. Students place the rating of this indicator in a range of 3 to 4 points with a percentage higher than 60%, this qualification is based on that through plans such as "Management of social knowledge", the University of Ibague seeks to generate new knowledge that contributes to the resolution of social, economic, political, cultural and environmental problems in order to improve the quality of life of the population. The university also carries out projects such as "Architecture programme and its social engagement", which aim to make students ' knowledge go beyond the boundaries of the classroom and to solve social problems and promote economy of the region.

- Reverse logistics.

This indicator seeks to measure the alternatives and plans for recycling, reduction and reuse of solid wastes executed by universities. The students of the Ibague University locate the qualification of this indicator in a range of 3 to 4 points with a percent higher than 70%. This qualification is based on the plans and projects currently carried out at the University of Ibague such as, the "Socially Responsible Institution" this plan is developed according to the standards of global Deal, GRI and the orientation for the Social responsibility. In addition to this is a project known as "Solid Waste, from the problem to opportunity" through which the university presents a project of a landfill adapted to the needs of southern Tolima, this project aims to use biogas to generate electrical energy and give value to solid waste. This has become a smart initiative in terms of environmental care.

- Education and environmental awareness.

This indicator seeks to measure the effectiveness of universities in creating projects, programs and campaigns that create environmental awareness in stakeholders. Students at the University of Ibague Place the qualification of this indicator in a range of 4 to 5 with a percentage higher than 60%, as the university constantly develops recycling campaigns, campaigns that encourage students to use bicycles instead of automobiles, implemented solar panels within their educational campus and many more initiatives that contribute positively to the environment.

4.3. Sharing Best Practices

According to the practices presented previously on the diagnosis and the evaluation made it on the measurement of action impacts, it's possible to present the best and most effective practices of each dimension that could composed a smart initiative from the academic point of view.

Vision and strategy: The planification of USR from its strategic direction as well as the consideration of all responsibilities spheres such as University Social Responsibility, Social Corporate Responsibility, Citizen Social Responsibility and Good Governance, composed the best practice from the vision and strategy dimension. This approach set up a well-defined and functional Integral Social Responsibility model which may be implemented and adapted by any other educational institution regardless its background.

Corporate governance: For the purposes of integration of the policies and strategic directions with the company management processes, it's found that the implementation of standards as Global Deal, GRI and the guidance for social responsibility - ISO 26.000, the university could perform better preventive and strategic projects to decrease the impact and contribute to the end of the gap on gender inequalities.

Social: As a begin to the strengthening of civil society and the improvement of the public good, it was identified that those inclusive and equity initiatives generate a high impact in the internal community, in addition to those initiatives of social participation through which the university participates in different forums in order to solve these problems from the academic field.

Conclusion

– Implementing Integral University Social Responsibility initiatives as a structured process generates greater impact in the academic and surrounding community than working on isolated initiatives. Working on well-defined policies and organizational structures about USR certainly constitutes a smart initiative. Besides this ISR model makes academic and administrative staff get more familiar with the topic and giving them a wider vision about what can be classified as a USR practices and how to contribute on this matters.

– In order to enhance the USR acknowledge, commitment and performance and understand this effort as a fruitful smart initiative. Universities policy makers should set environments which favor the USR dynamics. These environments require the creation and establishment of overall USR policies resulting from top directors meetings and communicated downstream in organization. This way every academic and administrative staff member would feel part of a structured strategy and would potentiate their contributions.

– Even when university social responsibility is a global and well known topic, it is not possible to propose a standard model of USR because each country has a different approach about how to carry out those responsibilities; however, it is possible to share better practices that could be adapted, imitated or even improved by each organization. It is important to remark that USR practices must be thought based on cultural frames of reference and community needs, which differ widely from country to country.

– The universities that are seeking to carry out the university social responsibility to contribute to the formation of socially responsible professionals must include in their academic plans those ethical and social values related to the professional exercise of their students. This is a valuable strategy for getting all academic community involved in the topic.

Recommendations

- This research can constitute the basis for further analysis to be conducted by each institution. Potential new researches could aim the characterization of each academic institution particular approach on USR. This way organization would identify its most suitable working areas, community needs and potential actions for developing USR practices.

- Regardless the different cultural frameworks in which USR practices are developed, every valuable practice or initiative performed by one institution should be considered and assessed by another before discarding it, as there is always something interesting to be imitated, improved or exchanged among academic institutions. A policy, strategy or plan that is not highly accurate in an environment could work differently in another.

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FEATURES OF PROFESSIONAL BEHAVIOR OF AN AUDITOR

Abstract

In any profession, there are certain rules of behavior during work, including, in addition to direct activities, communication with people around us. This is especially important for audit activity, which is characterized by high ethical requirements for honesty, fairness, and integrity, providing complete confidence in the results and conclusions of an auditor. The article discusses the specifics of audit activity, its impact on the professional behavior of an auditor, his relationship with the management of the audited organization, tax authorities and other consumers of audit services. Particular attention is paid to overcoming the violations of ethical principles that create a fertile ground for corruption and financial fraud in business.

Keywords: audit; professional behavior; corruption; financial control; ethical principles.

A modern audit is a professional activity of auditors and audit organizations in carrying out independent extra-departmental audits of financial statements, payment and settlement documents, tax returns and other financial obligations and requirements of economic entities. From the standpoint of international standards, audit services are primarily tasks that ensure the auditor's confidence in the absence of significant distortions of the client's financial statements [7, 12].

The main objective of the financial audit is to professionally assess the veracity of the financial statements of economic entities and the compliance of their financial and economic operations with the applicable state regulations and the provisions of constituent documents. In addition, the auditor can evaluate the financial condition of the organization, its solvency, the rationality of the production or expected financial investments and expenses, verify the correctness of the calculation and payment of taxes, confirm or not confirm the expenses and income received, make recommendations for their optimization. Most of the estimated

performance indicators of an economic entity are formed according to system accounting; the auditor must check the correctness of its organization and implementation, their compliance with current legislation and the provisions of the accounting policy of the enterprise.

Particular attention is paid to the accuracy of the financial statements. During the audit, it is necessary to verify in detail, for each article of the balance sheet, statement of financial performance and other forms, the correctness of the formation of the corresponding amounts. When assessing the performance of tax reports and declarations, one should be guided by the current tax legislation in the country. When auditing public sector organizations, the inspector must comply with special requirements, including ensuring state security.

In their activities, auditors should be guided by specialized ethical requirements for the profession, established by international and domestic standards and codes. International ethical rules contain mandatory requirements for the audit profession:

- honesty;
- objectivity;
- professional competence and due care;
- confidentiality;
- professional behavior.

They are described in detail in the accounting, scientific and specialized literature [4, 6, 8]. The same principles are present at the basis of national auditing standards, but they are, as a rule, formulated more specifically and rigidly [1, 11]. In their work, auditors are usually guided by the national standards of the respective country.

To fully satisfy the requirements of the profession, it is not enough for the auditor to be a highly qualified specialist in accounting, economic analysis, taxation and financial control. A special standard of behavior is required at and outside work. Professional behavior is a relatively new concept in management. It means that a professional accountant, including an auditor, must always act in accordance with the high reputation of his profession and refrain from any actions, statements and actions that could harm her.

Any behavior of a specialist is manifested in his attitude towards people with whom he works together or for whom he works (customers, users of the audit). Most of the auditors of medium and large companies work in a group, together in a team of different gender, age, qualifications, life experiences, character, individual behavior of people, which, however, should be a single team. Without mutual respect, mutual assistance and understanding, this is difficult, or not possible at all.

Auditors should be impeccable in the opinion of those who have or intend to deal with them. Honesty and objectivity of audit findings requires that the influence of prejudice, bias, and conflict of interest be eliminated. There should be no doubt about the bias of the audit judgment, its dependence on the “powers that be,” on kinship, friendships, and personal relationships. Should be completely excluded:

- Financial relations of clients on any issues, except for settlements for the services provided;
- The work of the auditor and his immediate family in a managerial position with a

client organization;

- Performing management functions and making management decisions at the audited enterprise;

- Personal and family relations with the management of the audited company;

- Receiving a fee from one of the clients, which constitutes a significant share in the total amount of the auditor's income;

- Acceptance by the auditor of goods, services, signs of special attention and excessive hospitality;

- The predominant participation in the capital of the audit organization of persons not related to audit practice;

- The work of the former partner of the audit organization in a managerial position in the audited company;

- Actual or possible litigation between the auditor and his client;

- Long-term participation of the same certified auditors in audits of financial statements of the same client [9, p. 112].

Audit organizations are prohibited from participating in commercial activities and the provision of other paid services to economic entities whose activities they verify.

The auditor to a much greater extent than a professional accountant who is employed by the company is free and independent not only in relations with the management of the audited company, but also in relations with the director of his own audit organization. The director of the company cannot be specified, recommended, especially ordered, what kind of conclusion is necessary or desirable to come from the results of the audit. This is entirely up to the auditor to decide, guided by his professional judgement.

In principle, the choice of methods for checking the reliability of financial statements and assessing the legitimacy of the facts of economic life should be free, although it is desirable for the audit organization to have its own standards and rules on this subject, which are, however, recommended for a specific auditor.

The content and methods of checking financial statements depend on legislative and other regulatory requirements for accounting and auditing. During the verification of the accuracy of the reporting, the auditor should be guided only by official provisions that determine the volume and forms of reporting, the procedure for filling them out, the composition of costs, the methodology for generating financial results, operations for the implementation of joint activities, etc. He has no right to deviate from these regulatory documents, interpret them arbitrarily, recommend to the enterprise a different solution to accounting problems, must carefully monitor all changes in the composition and content of regulations, the emergence of new documents, the adjustment and cancellation of existing and previously existing [8, p. 146].

The audit should not create additional difficulties in the work of accounting of the audited organization. The contacts of its employees with auditors should be minimized. Regular employees of the enterprise can be involved in the inventory of property, but it must be carried out under the supervision of an auditor.

In relations with the management of the audited organization, it must be borne in mind that auditors have the right to:

a) examine from clients all the primary documentation, accounting records and reports of financial and economic activities without withdrawal, get acquainted with official correspondence on these activities, receive clarifications on any issues from any officials;

b) receive, upon written request, information necessary for conducting an audit from third parties, including with the assistance of state bodies;

c) check the availability of cash, securities, materials and goods, the status of settlements and obligations;

d) independently determine the forms and methods of the audit based on the requirements of regulatory enactments, ISAs, as well as the specific terms of the contract with economic entities;

e) involve on a contractual or contractual basis in the audit of auditors working independently or in other audit firms, assistants without the right to audit and other specialists, with the exception of those who cannot audit this client in accordance with the law on auditing.

The audit organization or the auditor may refuse the audit if the client fails to provide the necessary documentation and other conditions stipulated by the contract.

Auditors and audit organizations are required to:

1) When conducting audits and providing other options for services, fully proceed from the requirements of the legislation and other regulatory acts;

2) Carry out audits at a high professional level, objectively assess the financial condition of the enterprise, its property, liabilities and results of business activities;

3) To ensure the preservation of commercial and official secrets, not to disclose without the consent of the owner the confidentiality of transactions and operations, the results of inspections and conclusions, except as provided for by legislative acts. Data obtained during the audit, evidence of corruption and other misconduct, can be made public only after the entry into force of a court decision; [4, 9]

4) To ensure the safety of documents, registers, statements and conclusions received and drawn up by auditors during the audit.

To provide managers and other officials of the client enterprise with comprehensive information about the requirements of the legislation regarding the audit, the rights and obligations of the parties, and after reviewing the opinion of the auditor (audit organization) - about the regulations on which the comments and conclusions of the auditor are based.

According to ISA, the auditor should organize his work in such a way as to be ready to detect violations of the rules that distort the content of financial statements, carefully consider the evidence of errors, inaccuracies and direct falsifications in the accounting. The auditor is obliged to remind the management of the client company of the responsibility for conducting internal control in order to prevent or detect these incorrect facts [7, 12].

Clients are forbidden to take any actions that limit the possibility of a comprehensive objective assessment of the results of the financial and economic activities of their enterprises,

in particular, prevent the receipt of primary documents and data, conduct control checks and inventories, and restrict access to places of storage of material assets.

According to international audit standards, the inspector should immediately be oriented to the fact that there may be errors, inaccuracies and even possible falsifications in the financial statements [12, p. 37]. It is always necessary to remind the management of the client's organization of their personal responsibility for this. At the same time, bookkeeping should be given the opportunity to correct the errors identified by the auditor, after which they make up the final version of the audit report. In an ethical relationship with the chief accountant and the head of the enterprise, the auditor should be neutral, but if there is a conflict of interests and opinions between the director and the chief accountant, it is necessary to support the legislatively directed position of the chief accountant [9 p. 129]. While checking the correctness of tax calculations and payments, one must proceed from the requirements of tax legislation.

The auditor behaves differently in relations with the tax authorities in situations where they make claims against the client and the auditors who checked his activities. The auditor does not have the right to sign a positive opinion on the reliability of the financial statements until the client removes significant comments on the results of the audit, including the part of taxes payable to the budget. But if the remarks are eliminated and the conclusion is signed, the auditor is obliged at all subsequent stages to uphold its correctness, to protect the client organization from unreasonable claims and claims, including from the side of the tax authorities. If, upon preliminary consideration or by a court decision, the tax authority is found to be right, the auditor should fully compensate the additional costs incurred by the client.

The most important principles and features of the professional conduct of the auditor are defined in international and national codes of audit. They oblige him:

- Comply with generally accepted moral norms and principles; be guided in behavior and relationships with people by moral standards accepted in human communication;
- Based on the priority of public interests, take into account the interests of not only customers, but also other consumers of accounting (financial) statements;
- Be conscientious in the performance of their duties, professionally competent and available to communicate with the staff and management of the organization;
- To observe the principles of objectivity, independence, confidentiality, not to use the information obtained from the audit to the detriment of the interests of the client or for their own benefit [7, 9 p.204].

The code of conduct for a specialist in any profession requires creative application in practice. This is not a list of strict rules that are mandatory for implementation, but rather a guide to action in each specific situation. In addition to professional knowledge and the ability to apply them in practice, you need to have a high level of general culture and intellectual development.

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THE AZERBAIJANI MODEL OF SETTING UP ACCOUNTING SYSTEM BASED ON THE INTERNATIONAL FINANCIAL REPORTING STANDARDS

Abstract

The article reflects on the process of establishing an accounting system in the Republic of Azerbaijan based on the IFRS in the context of the new economic environment, the approaches used, the problems in the practical application of the new system and ways to solve these problems.

Keywords: national accounting standards, methodology and practice of accounting, practical problems.

Introduction

In the context of economic globalization (we think that no pandemic can stop this process but can only change its speed, directions and forms), an increased role of financial statements requires reconsideration of various elements of accounting theory, practice and methodology. This necessity is observed in all countries which are pieces of world economic system because international flows of capital, material and labor resources create a need for the owners of these resources in continuous precise, correct and timely systematized information about the same resources.

Reconstruction, in other words, reforms of accounting has been continuing for more than 29 years in the independent Republic of Azerbaijan in terms of transition to the new economic system and change of business circumstances. However, neither objective full evaluation nor analysis of the results of this process have been implemented. Therefore, it is an important task to prepare forecasts about the current situation and subsequent development directions in the field of reforming accounting and reporting. Of course, it should be accepted that radical changes have been implemented in Azerbaijan to create normative-legal basis for accounting and reporting, however, unfortunately, these measures have not been realized with regard to the practical aspects, in other words, perfect accounting system has not been yet established and various forms are still being used.

As seen from the above, there is a need for the new methodological approach on accounting and this should enable to uncover the contents of various accounting types, to show their development process and unify them in one methodological point. This approach requires new view on the comparison and role of accounting theory, practice and methodology.

Purpose of the Study

The purpose of the article is to present an overview of the process of setting up the new national accounting system in Azerbaijan in accordance with the international standards by separately discussing two aspects (establishing legal framework and practical implementation) thereof to reveal the key challenges faced with regard to thoroughly applying the new standards in the practice and make recommendations on their solution.

Main Text

Developing methodological grounds of the national accounting system based on the IFRS: Azerbaijani model

One of the main problems in accounting is to change traditional approaches to acceptance, evaluation and reflection of capitals, assets, revenues and expenses as the information elements of a business unit's financial situation and activity. Assets, capitals, revenues and expenses must be understood in the same manner by the all participants of economic processes (legislators, managerial board, accounting department, tax authorities, scientists and etc.). In other words, there is a need for unification of these definitions.

From other side, it is necessary to separately consider methodology, because only an activity ensuring systematizing theoretical knowledge and practical skills logically related with each other can guide scientific values to current problem solutions [1]. Surely, development of the methodology as a practical activity area can happen only by adopting and applying accounting laws, national standards, chart of accounts, regulations and other normative documents as well as summarizing the results of such applying. In other words, methodology and regulatory framework ensure to systematize and evaluate practical implementation of fundamental theoretical knowledge on accounting, and naturally, this leads to a number of objective questions:

- If the regulatory frameworks are different in various countries, then are not there any generally accepted common standard on accounting (as in case of other sciences)?!
- Can or do the IFRS play the role of common standard in this area?
- How effective is the adopting national accounting standards and their adaptation to the IFRS?

- Should implementation of the IFRS cover the whole economy or only its part (for example, only companies listed on stock exchange or entities of public importance and etc.)?

Answers to these questions enable to express thoughts on formation of precise accounting information and whether this information is comparable or not in different countries. In other words, identity of methodological grounds stipulates existence of comparable economic information on financial (accounting) reports. Namely based on this the Law on Accounting was adopted in 2004 in Azerbaijan and the norms of the previous Law of 1995 concerning organization of accounting and forms of financial reports had not been inserted in the new Law [2]. The new law provided for reconstruction of national accounting system in our country in accordance with the most advanced practices worldwide. Adoption of the new law also gave start to the process of changing methodological grounds of accounting due to the change in the hierarchy of the regulating documents. The Decree of the President of the Republic of Azerbaijan on adoption of the Accounting Law determined exact functions and responsible areas of central executive authorities and other state regulative

bodies in the area of regulation of accounting and reporting. The main purpose was to achieve development of accounting system and transparency of financial reports on the basis of international financial (accounting) standards. It was planned to develop and implement the following in order to realize this purpose:

1) Applying the IFRS (with translation into Azerbaijani) and National Accounting Standards (NAS) as prepared on the basis of the IFRS in the commercial entities;

2) National Accounting Standards for non-commercial entities on the basis of the International Accounting Standards for the Public Sector (PSIAS).

Furthermore, according to the Law on Accounting [3], the Ministry of Finance as a central executive body implementing administration in the field of accounting had to:

- develop the NAS and recommendations on application of the NAS and the rules of maintaining accounting;

- give a consent to application of normative-legal acts and recommendatory documents of other executive bodies and off-budget state funds prepared within their authorities;

- develop and approve simplified accounting rules for small business entities;

- cooperate with professional accounting firms in the country to improve national accounting system.

As one can see, the Law permitted the organizations of specific profile to develop normative-legal acts and recommendatory documents relating to accounting. However, these acts and documents can be applied only with permission of the Ministry of Finance as the main regulating body in the field of accounting.

The Law also stipulates that the accounting rules, forms, contents and frequency of the financial reports for credit organizations shall be determined by the Central Bank of Azerbaijan but again can be applied with the permission of the Ministry of Finance.

At the same time, the Law on Accounting requires to establish Accounting Advisory Board in the country and obliges the Ministry of Finance to adopt accounting and financial reporting issues (especially, implementation of the IFRS and PSIAS) by advising with the Board.

Thus, the new Law reflected all main requirements and positive trends in the international practice of accounting and financial reports.

And this was enabling all business entities (commercial and non-commercial organizations and physical entities in accordance with the Civil Code of the Republic of Azerbaijan) operating in the country to form their accounting and financial reports pursuant to the advanced provisions of the new legislation.

For the purposes of exactly determining the requirements for preparation of financial reports, all commercial entities are divided into 3 groups: (1) commercial entities of public importance (credit organizations, insurance companies, investment funds, private pension funds, legal entities listed in stock exchange and enterprises included in the list of the entities approved by the Cabinet of Ministers based on their annual turnover, number of employees and balance sheet total that must maintain accounting and prepare financial reports under IFRS); (2) small business entities (legal entities with lower revenue turnover and being subject to simplified tax and physical entities); (3) other commercial entities (medium size enterprises not covered by the 1st and 2nd groups). And non-commercial entities are divided into 4 groups: (1) state budget organizations; (2) off-budget state funds; (3) municipal authorities; (4) non-government organizations.

As we can see, the Law covered all types of accounting subjects and provided for use of different accounting and financial reports standards to various categories of entities. We think

that this is the most correct approach in the practice of countries moving to the IFRS because applying adaptive standard to each category based on its capacity, public weight, the outside interest shown on it in the country and abroad is the mechanism that can ensure the highest efficiency.

Thus, in the process of preparation of new methodological grounds of accounting and reporting that took its start in 2005, 37 NAS were developed and adopted on the basis of the IFRS during 2007-2009. In addition, the Cabinet of Ministers of the Republic of Azerbaijan approved the following rules and regulations:

- “The Rules on forms, content and filing of annual financial statements of non-governmental organizations” dated 25 December 2009 [4];

- “The Rules on filing, reporting periods and publishing of financial statements of commercial organizations and consolidated financial statements” dated 27 May 2010 [5].

Along with the above documents, the Ministry of Finance approved the following rules and regulations:

- “The Rules on maintaining simplified accounting in small entrepreneurial entities” dated 13 January 2009;

- “The Instruction on organization and maintaining of accounting in state budget financed organizations in accordance with the national accounting standards for budget organizations” dated 9 February 2012;

- “The Rules on filing, reporting periods and publishing of financial statements of budget organizations and off-budget state funds” dated 15 April 2013;

- “The Rules on maintaining memorial order accounting form on the basis of the IFRS and the NAS” dated 18 January 2016;

- “The Rules on maintaining accounting on the basis of the IFRS and the NAS for commercial entities” dated 30 January 2017;

- “The Rules on maintaining accounting for the public sector on the basis of the IFRS” dated 25 December 2018;

- “The Rules on maintaining accounting for small and medium size commercial entities on the basis of the IFRS and the NAS” dated 9 December 2019 [6].

Accordingly, it may be considered that the methodological basis of accounting to accurately reflect all features of the economic environment in the country was adopted by the legislative and executive authorities. Of course, it is expedient to add to the above list also the normative-legal acts (“The Rules on maintaining accounting for credit organizations operating in the Republic of Azerbaijan” dated 11 November 2005, “Chart of Accounts and methodological instructions on its use for the bank system of the Republic of Azerbaijan” dated 25 December 2012, and additional 8 Rules) [7] adopted by the Central Bank of the Republic of Azerbaijan for regulation of accounting and reporting in the bank sector. Several authors who conducted an analysis of the Azerbaijani experience of formation of the new accounting system in the economic literature considered lack of some of the IFRS or the relevant NAS as a disadvantage of this process [2]. However, in our opinion, these authors would agree with us that the process has not yet finished and logically the absent standards shall be adopted with consideration of the national features as the economic environment and the necessity for them are formed (for example, NAS 32 on the first application of the National Accounting Standards was prepared on the basis of IFRS 1 or NAS 30 on the financial statements in hyperinflation was prepared on the basis of IFRS 29). Of course, adoption of all currently valid international standards (37 IAS and 16 IFRS) requires certain

time during which the necessary economic grounds (environment) are being formed. In other words, we think that the process of preparation of the methodological grounds of the accounting system in the Republic of Azerbaijan in accordance with the international standards can be assessed as a good practice. But the question is why practical implementation of these methodological grounds is not so fast and efficient (this should consider such a nuance that the Ministry of Finance, a regulating body in Azerbaijan in the field of accounting in accordance with the IFRS requirements, does not hold control over maintaining accounting in business entities)?

The key challenges in practical implementation of the new accounting system

The following may be attributed to the problems that are currently arising in connection with practical implementation of accounting under the IFRS:

- lack of opportunities to use integrated automatized systems of financial and tax accounting in the field;

- low level of real transition of enterprises to the IFRS (even the new chart of accounts is not being used by the majority of enterprises);

- observing the fact that human resources with higher education specialized in accounting are not meeting the requirements of the contemporary economy and labor market and have to apply for additional chargeable accounting courses;

- lack of simple algorithm of automatized preparation and analysis of accounting reporting;

- although the necessity for the transition of the consolidated financial statements to the IFRS has been established for some business entities, yet a small number of organizations meet this requirement (for example, bank system, SOCAR, Azercell and etc.), most closed joint stock companies have not yet solved this problem.

Solvency of all these problems have a complex nature and reveals the truth that existence of a long period between creation of legal framework and its practical implementation is explicitly reflected in the process of setting up accounting system. Of course, we understand the impossibility of immediate moving by all enterprises (organizations) to the IFRS and as well we do not support this. This process should take into consideration such factors like circumstances and formation of available material and personnel base. However, at least enterprises with international economic relations, joint enterprises, stock companies, insurance companies and etc. should move to the IFRS. Such a transition may be not so important for municipal authorities, state budget financed organizations as well entities with no access to the international markets. At the same time, separate point of view should be formed with regard to the use of the IFRS by small business entities. It should be considered that accounting practice of big enterprises reveals a number of risks, specific circumstances, deemed assets and liabilities and other similar economic processes that we have never faced before. And this in its turn requires presence of the IFRS in order to express adequate response. Applying the IFRS brings up to the agenda reevaluation of the purposes of accounting reporting, that is requires change of the thorough conceptual nature of accounting. From this point of view, it is understandable to have in the new chart of accounts accounting objects like intangible assets, financial investments, lease liabilities, tax liabilities. Simultaneously, increase in quality of the information reflected in the accounting and reporting and ensuring access to this information for all interested parties are the main directions of the development of accounting and reporting. Before, as we noted,

reforms in the accounting field in our country have been realized to adapt it to the IFRS by establishing relevant normative-legal framework (main attention was directed to the accounting reporting rather than accounting process, adopted national accounting standards in accordance with the international standards), issuing methodological instructions and strengthening international cooperation. In our opinion, the last element of this process which is the preparation of the personnel with accounting and audit specialization meeting the new requirements in some way lags behind the other directions, and this opinion is supported by the current need in the labor market for the accountants who are able to maintain accounting under the new national standards and to connect financial accounting and tax accounting. Broader implementation of the IFRS in our country makes it of special importance to prepare qualified accounting personnel because applying the IFRS increases the quality of management reporting, attracts investors, broadens external debt (credit) opportunities as well meets more requirements of shareholders.

Thus the main problems of development of accounting in Azerbaijan can be as follows:

- extending the scope of applying national accounting standards prepared in accordance with the IFRS;
- establishing financial accounting and tax accounting in each enterprise in a parallel manner and complementing each other;
- preparation of accounting reporting in an understandable, comparable, transparent, confident manner and less expensive for analysis;
- preparation of personnel with accounting specialization who can ensure applying IFRS and correctly determine accounting policy of an enterprise.

Timely and efficient solving of these problems could help in establishing accounting system in Azerbaijan on the new grounds and formation of its reliable relations with the international community.

The requirements with regard to the accounting information like timely registering, objectivity, accuracy, compliance, reliability, comparability, correctness that took place before are not sufficient in the modern conditions of economic development and the more important problem becomes the role of such information for the purposes of planning, forecasting, analysis and control, that is meeting the requirements of the internal and external users for making efficient management, investment and other decisions. In other words, the increased requirements on accounting information objectively requires changing the functional directions of accounting and its transformation from an instrument for registering business transactions to an instrument for improvement of enterprises' business activity policy. Therefore, accounting should be organized in every business entity so that it could provide thorough and correct information about the same entity's activity. Naturally, the organization of accounting is strongly affected by both external (the requirements of legal acts on organization of accounting, bookkeeping for assets, capital and liabilities, preparation of financial statements and etc.) and internal (the requirements of the management and accounting department of an enterprise on the structure and content of the information, the requirements of the internal audit concerning this information, relevance of the expenses on formation of accounting information and etc.) factors. These factors as well the elements of the conceptual grounds of organization of accounting (forms, principles, subsystems, organizational structure, techniques and technologies of accounting, accounting policy of the enterprise, internal control system) determine efficiency of establishing and maintaining accounting in each business entity as a whole.

Conclusion

Based on the analysis in the present article, in our opinion, the process of preparation of the methodological grounds of the new accounting system in Azerbaijan in accordance with the international standards should be characterized as a good experience. However, it is also our conclusion that there are a number of problems to be solved to facilitate the rapid progress of the practical implementation of these methodological grounds. At present, we think that in order to achieve practical application of IFRS, the mechanism of organization of accounting in enterprises can be improved in the following areas:

- 1) improvement of organizational structure of accounting;
- 2) development of technology of accounting information processing;
- 3) improvement of accounting policy;
- 4) increasing efficiency of internal control system.

As evidenced from the above, development of theoretical issues, normative-legal framework of accounting as well methodological support of the accounting process and practical organization of accounting in response to the new requirements is one of the important tasks on the agenda.

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**INTERNATIONAL RATING SYSTEM “BENCHMARKING PUBLIC
PROCUREMENT”: POSSIBILITIES OF USING IN FORMATION OF DIGITAL
INFRASTRUCTURE IN THE ACCOUNTING AND FINANCIAL SECTORS**

Abstract

Taking into account that an important role the digital environment plays in the sphere of spending public money and public procurement, the purpose of the article is to study the methodology of assessing the effectiveness of the public procurement system by World Bank in order to determinate possibilities of its using in formation of digital infrastructure in the accounting and financial sectors. The methodologies of the World Bank's Benchmarking Public Procurement system are investigated. A comparative analysis of the Ukraine's place among other countries of the world, in particular among the group of countries of Europe and Central Asia and among some OECD countries, which are considered as a group of high-income countries, has been conducted. It is substantiated that the results of such comparative analysis will allow identifying risk areas, and relevant information can be used in developing recommendations and proposals for improving the effectiveness of the public procurement system. As a prospects for further researches the study of second-tier indicators and the methodology of evaluating the public procurement systems by the World Bank, taking into account its relatively short setbacks compared to other ratings, have been identified.

Keywords: digital environment, public procurement, public procurement system, international ratings, Benchmarking Public Procurement, efficiency, assessment, evaluation.

Introduction

In Ukraine, the need to formate the digital economy and society is recognized at the state level [1], and digital technologies are seen as one of the key drivers of sustainable development. The main goals of digital development are: accelerating economic growth and attracting investment; transformation of economic sectors into competitive and efficient ones; technological and digital modernization of industry and creation of high-tech industries; accessibility to citizens of the benefits and opportunities of the digital world; implementation of human resources, development of digital industries and digital entrepreneurship.

The main rating objectives of the Concept are the achievements in 2020:

- 30th place in the Networked Readiness Index (WEF) ranking (64th place in 2016);
- 40th place in the Global Innovation Index (INSEAD, WIPO) ranking (56th place in 2016);
- 50th place in the ICT Development Index (ITU) (79th place in 2016);
- 60th place in the Global Competitiveness Index (WEF) ranking (85th place in 2016).

An important role the digital environment plays in the sphere of spending public money and public procurement. Effective spending of public funds is an urgent task for all countries, so optimization of the process of public procurement is one of the priorities in the list of directions of its solution. Public procurement is not only a process of ordering products (goods, works, services), their production and supply (provision, performance), but also an instrument of performance by state government of functions in the field of national security and its components (economic, food, social, environmental, etc.), solving problems such as developing the market and maintaining a competitive environment, supporting certain regions and populations, developing specific industries and market actors, and more. But while public procurement can be an incentive for development, it can also be the basis for corruption and fraud. This is why public procurement requires constant monitoring, collection and analysis of a wide range of data, including international comparisons and evaluations.

Among foreign scholars, Daniel Kauffman pays considerable attention to the problems of public procurement [3; 2]. Control (audit, monitoring, auditing) of public (public) procurement is independent form of state financial control in accordance with the Law of Ukraine “On the basic principles of the implementation of state financial control in Ukraine” [5] and an important element in the implementation of public procurement policy in accordance with the Law of Ukraine “On Public Procurement” [4]. Researches on public procurement monitoring by representatives of civil society organizations at the local level in Ukraine [6; 8], public control of public procurement [6], corruption risks and the reliability of the public procurement logistics system [10] are presented in the scientific literature.

Important information on the effectiveness of the public procurement system is represented by an international rating prepared by the World Bank Working Group. But despite the fact that the methods of calculating international ratings and the directions of their use are quite widely represented in the economic literature, the rating of the efficiency of the public procurement system remains unaddressed. It is extremely important to study the place of each country in the international rankings with a focus on the effectiveness of the public procurement system as an important and integral element of government regulation and the business environment, identify the factors that influence changes in indicators. Firstly, it is necessary to understand the environment in which our country is perceived by international organizations, investors, lenders and other interested persons in order to determine the directions of improvement and their predictive influence on the position of our country in

order to increase its rating, including in the sphere of efficiency of public procurement systems. Secondly, the study and analysis of the components of the international rating allows improving the quality of preparatory work for public procurement in the field of innovation and the market for innovative products.

Purpose of the Study

The purpose of the article is to study the methodology of assessing the effectiveness of the public procurement system by World Bank in order to determinate its possibilities of using in formation of digital infrastructure in the accounting and financial sectors.

Main Text

History of Using and Methodology of International Rating System “Benchmarking Public Procurement”

Important information on the effectiveness of the public procurement system is represented by an international rating prepared by the World Bank Working Group. Benchmarking Public Procurement Performance Study launched by the World Bank in 2013. *Benchmarking Public Procurement* focuses on legal and regulatory environments that affect the ability of private sector companies to do business with governments. Three reports have been published:

(1) *Benchmarking Public Procurement 2015* [11], which covered 11 economies (Afghanistan, Chile, Ghana, Jordan, Mexico, Russian Federation, Sweden, Thailand, Turkey, Uganda, United States), and data was also collected later in the Russian Federation;

(2) *Benchmarking Public Procurement 2016* [12], which expanded geographical coverage to include 77 economies in seven regions (Ukraine has been included in the study since 2016);

(3) The *Benchmarking Public Procurement 2017* [13] report presents comparable data on public procurement laws and regulations across 180 economies.

The *Benchmarking Public Procurement 2017* report presents comparable data on public procurement laws and regulations across 180 economies to meet the various needs of different stakeholders for information, analysis, and policy action. It provides private sector firms with insights on issues involving their participation in the public procurement market, while offering policy makers information on their country's public procurement regulatory system and related business practices. The data also benefit the academic and research community by offering better tools and data on procurement systems and facilitating cross-country analysis.

In *Benchmarking Public Procurement 2016* indicators was aggregated by subtopic and designed to help policy makers evaluate their system's performance in a specific area of public procurement. Such indicators were evaluated:

(1) procurement life cycle: preparing bids, submitting and evaluating bids; awarding and executing contracts;

(2) complaint and reporting mechanism: availability of complaint and reporting mechanisms; first-tier review process; second-tier review process.

Scores was presented in five categories at the subindicator level: 0-20, 21-40, 41-60, 61-80 and 81-100. Economies with a score of 81 or more, which are considered close to good practice on a certain subindicator, was in the top quintile. Economies with a score of 20 or less was in the bottom quintile in the charts, which means that the economy has a lot to

improve in the light of internationally, accepted good practices and principles on what *Benchmarking Public Procurement* measures.

Two thematic pillars are covered by the *Benchmarking Public Procurement 2017* report:

(1) the procurement process, from the needs assessment to the implementation of the procurement contract;

(2) the public procurement complaint review mechanisms (Table 1).

Table 1.

**Two thematic pillars covered by the
Benchmarking Public Procurement 2017 [13]**

Two Thematic Pillars	
<i>I. The procurement process, from the needs assessment to the implementation of the procurement contract</i>	
<i>Needs assessment, call for tender, and bid preparation</i>	<i>Rationale:</i> The transparency of the bid preparation phase is critical because it is precisely at this moment that potential bidders can seek information and assess the opportunity to bid for the procurement contract.
<i>Bid submission</i>	<i>Rationale:</i> Once prospective bidders decide to bid for a public procurement contract, they need to comply with a variety of requirements in order to bid effectively and avoid having their bid rejected if it does not comply with the stated requirements. These requirements can create unnecessary hurdles. It is therefore important to make sure that the process is streamlined and easily accessible to all bidders.
<i>Bid opening, evaluation, and award</i>	<i>Rationale:</i> This phase is critical for purposes of transparency and integrity. It is important to make sure that enough guarantees are in place to protect the fairness and efficiency of the process
<i>Content and management of the procurement contract</i>	<i>Rationale:</i> The management of the contract is as important as the bidding process. Procurement contracts must be managed in a prompt and transparent way, and with sufficient safeguards, to protect suppliers from unilateral decisions and actions by the procuring entity.
<i>Performance guarantee</i>	<i>Rationale:</i> The performance guarantee protects parties in case of delays in the execution of the contract; however, to protect suppliers, the amount of the guarantee should be regulated.
<i>Payment of suppliers</i>	<i>Rationale:</i> Suppliers need to be paid on time. Delayed payments could hurt their cash flows, impair their ability to supply, and even put them at risk.
<i>II. The public procurement complaint review mechanisms</i>	
<i>Complaints submitted to the First-tier review body</i>	<i>Rationale:</i> When bidders or potential bidders notice flows in the procurement process, they should be able to file a complaint and receive a decision in a timely manner.
<i>Complaints submitted to the Second-tier reviewer body</i>	<i>Rationale:</i> If a first decision has been rendered concerning the procurement process before the contract has been awarded, the complainant should be able to appeal the decision to a second-tier jurisdiction

The two thematic pillars and eight key areas of the public procurement process covered by *Benchmarking Public Procurement 2017* are summarized in table 2. In *Benchmarking Public Procurement 2017* the methodology for evaluating the public procurement system includes the following groups of indicators that are:

(1) quantified in points (the maximum score for each indicator, which is quantified, is 100 points);

(2) not quantified and presented only in descriptive form.

Table 2.

**Thematic areas measured in
Benchmarking Public Procurement 2017 [13]**

Indicator	Description
<i>are presented in descriptive form and are quantified (resulting in a final score ranging from 0 to 100)</i>	
<i>Needs assessment, call for tender, and bid preparation</i>	This indicator aims at assessing the transparency and information flow at the preparation stage from the procuring entity's end. It looks at: (1) the consultation with the private sector; (2) the tendering method; (3) potential bidders' accessibility to bidding information.
<i>Bid submission</i>	This indicator looks at the requirements for suppliers to place bids, including: (1) registration with a government registry; (2) eligibility of foreign firms; (3) possibility of submitting bids online; minimum time frame for bid submission; (4) bid security requirements.
<i>Bid opening, evaluation, and award</i>	This indicator aims at assessing transparency at the bid opening and evaluation stages. It considers: (1) the method for opening the bids, including accessibility for bidders to the bid opening session; (2) the fairness of the bid evaluation; (3) notification and feedback to unsuccessful bidders; (4) standardized contract form used when awarding a contract.
<i>Content and management of the procurement contract</i>	This indicator looks at: (1) the relevant procedural requirements; (2) the possibilities of modifying or terminating the procurement contract when the contract is awarded and signed; (3) the acceptance of the completion of works by the purchasing entity and related procedures.
<i>Performance guarantee</i>	This indicator looks at the performance guarantee, including: (1) the purchasing entity's monitoring of the requisite performance guarantee and its amount; (2) return of such guarantee; (3) the existence of a separate entity to oversee the procuring entity's decision to withhold it.
<i>Payment of suppliers</i>	This indicator examines: (1) the procedure regarding suppliers' request for payment; (2) the time frame for the purchasing entity to process payment; (3) the time frame for suppliers to actually receive payment; (4) the interests or penalties available to suppliers in case of payment delays.
<i>are not scored and merely presented for contextual purposes</i>	
<i>Structure of the complaints mechanism</i>	This indicator looks at: (1) legal framework on complaints mechanism; (2) description of complaints mechanism; (3) choice of the authority before which filing a complaint.
<i>Complaints submitted to the First-tier review body</i>	This indicator examines issues regarding: (1) filing a complaint to challenge the tender and bidding process before the award is granted, including the complainant's standing; (2) cost of filing, duty to notify the procuring entity; (3) suspension of the procurement process; (4) independence and training of the complaint reviewers; (5) time frame for decisions; (6) legally provided remedies; (7) publication of the decisions.
<i>Complaints submitted to the Second-tier review body</i>	This indicator measures the process of appealing the first-tier review body decisions regarding: (1) the time granted to appeal the decision; (2) costs associated with the appeal. It also assesses the review process that takes place before the second-tier review body, including: (1) the actions required to trigger a suspension of the procurement process; (2) the time frame for a decision on the appeal; (3) remedies legally available at the second-tier review; (4) the publication of the decisions.
<i>Post-award complaints</i>	This indicator looks at: (1) process to complain same than for pre-award complaints; (2) standstill period after contract award to allow filing of complaints; (3) standstill time period (calendar days); (4) standstill period mandated in the legal framework; (5) standstill period set out in the notice of intention to award.

For each indicator developed, the scores of individual questions are averaged and multiplied by 100, resulting in a final score ranging from 0 to 100. The economies at the top of the range (with scores approaching 100) are considered to have a regulatory framework that closely aligns with internationally recognized good practices, whereas the economies at the bottom of the range (with scores closer to 0) have significant room for improvement in the particular area measured.

The description of each indicator allows a detailed assessment of the performance of each country's public procurement system, but comparisons between countries can only be made using quantifiable metrics.

Comparative Analysis of the Scores of Ukraine and Other Countries

In *Benchmarking Public Procurement 2016 and Benchmarking Public Procurement 2017* The World Bank has rated Ukraine's public procurement system at a rather high level. In 2016, three out of five indicators received a sufficient score within 61-80 points, two indicators ("submitting and evaluating bids", "availability of complaint and reporting mechanisms") were highly rated (81-100 points).

The assessment of the effectiveness of the public procurement system of Ukraine in 2017 by indicators covering the so-called procurement life cycle is as follows. The highest score (86 points) was obtained from the "bid opening, evaluation, and award". High marks (70 points) were obtained on the indicators "content and management of the procurement contract", "needs assessment, call for tender, and bid preparation". The average scores (59 and 50 points, respectively) were obtained for "bid submission and performance guarantee". For "payment of suppliers" Ukraine received only 37 points out of 100.

Analysis of the data from the countries covered by the study shows that the maximum score (100) was obtained by such countries as: Russia - on the indicator "needs assessment, call for tender, and bid preparation"; Ecuador, Peru, Philippines, Singapore, Suriname - on the indicator "performance guarantee"; Australia, Denmark, Finland, Italy, Republic of Korea, Spain, USA - on the indicator "payment of suppliers indicator".

The minimum score (0) was earned by: Antigua and Barbuda, Australia, Czech Republic, Finland, Hong Kong, Iceland, Ireland, Lesotho, Luxembourg, New Zealand, Norway, Singapore, Slovakia, Sweden, Vanuatu - on the indicator "Performance Guarantee"; Dominican Republic, Trinidad and Tobago, Vanuatu - on the indicator "Payment of suppliers".

By the indicator "Bid opening, evaluation, and award", Ukraine, along with Kazakhstan, Albania and Cyprus, has the highest scores among the countries in the group – 86 (table 3 and 4). The highest (maximum) number of points (100) by the indicator "Needs assessment, call for tender, and bid preparation" were awarded to the public procurement system in Russia. Romania received the highest rating (94 points) for "Bid submission", Kazakhstan (91 points) for "Content and management of the procurement contract", Bulgaria (94 points) for "Performance guarantee", Bulgaria, Kosovo, Lithuania (75 points) - for "Payment of suppliers".

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Table 3.
Rating of the 11 countries among 25 countries of Europe and Central Asia group
according to the Benchmarking Public Procurement 2017 [13]

Indicator	Kazakhstan	Russian Federation	Georgia	Moldova	Ukraine	Kyrgyz Republic	Tajikistan	Belarus	Azerbaijan	Armenia	Uzbekistan
Needs assessment, call for tender, and bid preparation	70	100	70	70	70	70	69	70	64	60	42
Bid submission	90	78	59	69	59	84	48	67	65	39	65
Bid opening, evaluation, and award	86	64	71	71	86	71	71	64	43	64	14
Content and management of the procurement contract	91	82	77	68	70	55	68	40	64	59	59
Performance guarantee	90	50	54	70	50	58	69	34	42	50	30
Payment of suppliers	50	33	67	37	37	33	33	50	30	33	37
Average scores	79,5	67,8	66,3	64,2	62,0	61,8	59,7	54,2	51,3	50,8	41,2

Table 4.
Rating of the 14 countries among 25 countries of Europe and Central Asia group
according to the Benchmarking Public Procurement 2017 [13]

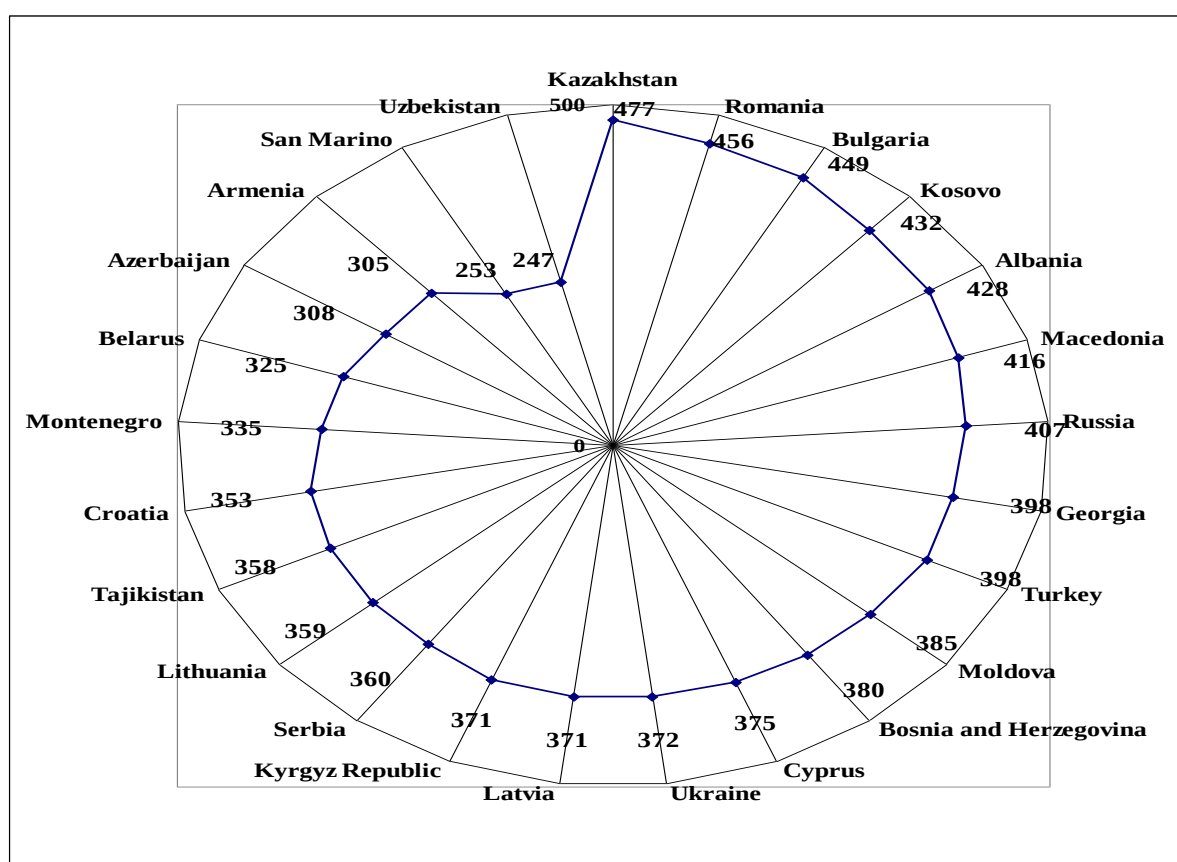
	Romania	Bulgaria	Kosovo	Albania	Macedonia, FYR	Turkey	Bosnia and Herzegovina	Cyprus	Latvia	Serbia	Lithuania	Croatia	Montenegro	San Marino
Needs assessment, call for tender, and bid preparation	67	88	76	70	78	68	58	70	68	70	70	70	70	32
Bid submission	94	67	81	78	84	67	77	57	71	52	39	67	50	80
Bid opening, evaluation, and award	64	43	71	86	64	79	57	86	57	71	79	79	64	14
Content and management of the procurement contract	82	82	59	68	73	73	73	73	50	68	82	40	68	32
Performance guarantee	82	94	70	78	50	74	82	30	50	42	14	30	50	58
Payment of suppliers	67	75	75	48	67	37	33	59	75	57	75	67	33	37
Average scores	76,0	74,8	72,0	71,3	69,3	66,3	63,3	62,5	61,8	60,0	59,8	58,8	55,8	42,2

It is informative to compare the estimates obtained by the Ukraine with the countries of Europe and Central Asia (a group covering 25 countries and Ukraine included), as well as with some OECD countries that are classified as high-income countries (figure 1 and 2). Given that the Report lacks a final score and a final rating, we consider it appropriate to make a comparison by the amount of points.

According to the data presented, European countries (mainly Eastern Europe) and Central Asia received at least 250 points (only Uzbekistan has 247 points and San Marino - 253 points).

Figure 1.

Rating of the countries of Europe and Central Asia group by the total number of points of assessment of efficiency of the public procurement system according to the Benchmarking Public Procurement 2017 [13]

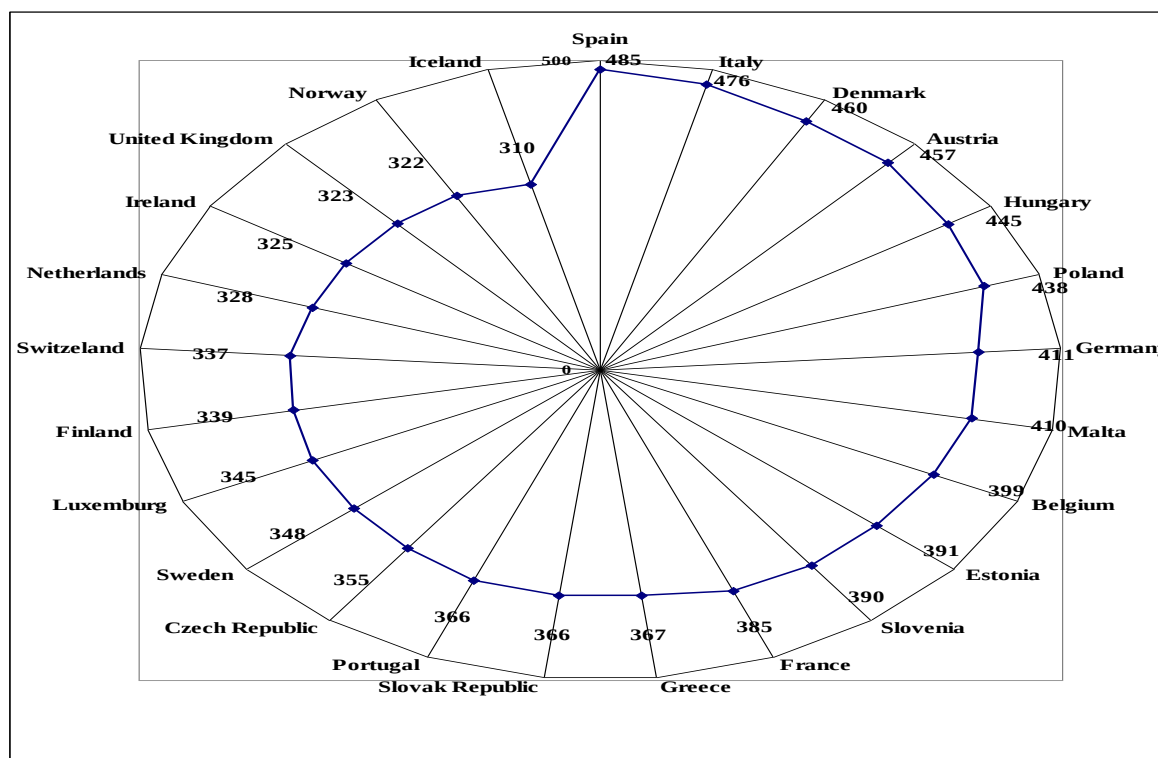


Points in the range from 301 to 400 were awarded to 16 countries (64% of all countries in the group), and 7 countries (28%) have points ranging from 401 to 500. Ukraine receiving 372 points (or an average of 62.0 points) is at 13th place, ahead of Latvia, Kyrgyzstan, Serbia, Lithuania, Tajikistan, Croatia, Montenegro, Belarus, Azerbaijan, Armenia, San Marino and Uzbekistan. The highest total score in the group was obtained by the public procurement system of Kazakhstan - 477 points (average score - 79.5)

According to the data presented, the total score of high-income OECD countries in Europe does not cross the lower limit of 300 points. Points from 301 to 400 were awarded to 17 countries, and 8 countries scored from 401 to 500.

Figure 2.

Rating of European countries included in the OECD high-income group by the total number of points of assessment of efficiency of the public procurement system according to the Benchmarking Public Procurement 2017 [13]



The highest score was received by the public procurement system in Spain - 485 points. According to the calculations, Ukraine's public procurement system outperformed high-income OECD countries such as Iceland, Norway, the United Kingdom, Ireland, the Netherlands, Switzerland, Finland, Luxembourg, Sweden, Czech Republic, Portugal, Slovakia, Greece.

Benchmarking Public Procurement also complements other initiatives that enhance the transparency of public financing in general, and assess the quality and effectiveness of procurement systems in particular. Such initiatives include the Public Expenditure and Financial Accountability (PEFA) framework and the Methodology for Assessing Procurement System (MAPS) of the Organization of Economic Co-operation and Development (OECD).

Conclusion

The public procurement methodology involves the actions of their participants at certain stages, which cover the so-called "public procurement lifecycle", which is why a lot of control and analytical work is needed to improve the efficiency of public procurement. Given the globalization of the economy, a comparative analysis of the procedures of their implementation with the corresponding systems of other countries of the world should become an important component of the evaluation of public procurement effectiveness. The results of such comparative analysis will allow identifying risk areas, and relevant information

can be used in developing of recommendations and proposals for improving the effectiveness of the public procurement system, especially in the context of reforming the law on public procurement and the introduction of the new system "Prozorro". As a prospects for further researches the study of second-tier indicators and the methodology of evaluating the public procurement systems by the World Bank, taking into account its relatively short setbacks compared to other ratings, can be identified.

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REFORM OF THE LEGAL FRAMEWORK FOR ACADEMIC STAFF DEVELOPMENT IN THE REPUBLIC OF BULGARIA

Abstract

In the focus of study are some of the main amendments to the national legal framework regulating the development of academic staff in the Republic of Bulgaria. In view of the discussed amendments in the legal framework, the author draws conclusions and offers critical opinions.

Keywords: academic staff development, academic positions, acquiring academic tenure, educational and doctoral degree (PhD).

Introduction

The reform of the legal framework concerning academic staff development in Bulgaria is related to a new period of country's development, marked by the adoption of the Law on the Development of Academic Staff in the Republic of Bulgaria in 2010 (ЗЗПЗПЗ)¹. Said law served to adopt a decentralized approach in awarding academic degrees and academic tenure. However, nearly two decades after the adoption of this approach, opinions on the transition from a centralized to decentralized model appear to vary considerably, as witnessed by the opinions of both the Bulgarian legislator and the public.

This explains why in 2018 new amendments were made, aimed at enhancing the quality in both scientific research and teaching at tertiary level, in Bulgarian universities and scientific organizations.

The purpose of the present study is to offer a brief overview of the legal framework regulating academic staff development in Bulgaria, and in particular, placing the focus of attention on the latest legal adjustments of 2018, in an effort to systematize them. On the basis of outlined changes in the norms, conclusions and critical opinions will be offered. Analysis of national legislation in the area of academic staff development will also serve to offer a critical opinion on the one hand, while on the other, said analysis can be used as a basis for

¹ Law on the Development of Academic Staff in the Republic of Bulgaria Prom., SG, nr. 38 dated May 21, 2010 ... am. and supplements, num. 30 of April, 3d, 2018, in force as of May 4th 2018, amend. 17 of 26.02.2019. This new legislative act repeals the former Law on Scientific Degrees and Scientific Ranks (ЗЗЧЗЗ) and ensures the transition from a centralized to a decentralized model.

future proposals towards sophistication of the norms and the model.

To achieve the purpose of study, the author has set to perform the following tasks:

- Present an overview of the current legal framework in the field of academic staff development in Bulgaria in view of the latest legislative decisions of 2018;

- Draw conclusions and offer criticism on the basis of analysis carried out.

The object of study is the legal framework for academic staff development in Bulgaria.

To achieve the purpose of study and associated tasks, the author has applied traditional methods in conducting legal research. The present paper does not intend to cover in detail all amendments to the current legal framework for academic staff in Bulgaria but it will throw light on legislative revisions as well as address some of the main concerns in the legal doctrine.

Exposition

The adoption of the Law on the Development of Academic Staff in the Republic of Bulgaria (ZARSRB) serves to provide for the transition from a centralized to decentralized model and regulate the scientific degrees and academic titles and tenure at universities. On the one hand, said transition is related to the overall social situation in the country, reflective of the ongoing democratic changes and a desire to do away with the centralized model in all walks of life, including tertiary education. On the other hand, based on the principle of academic autonomy and its decentralized approach, higher autonomy is given to universities and scientific organizations in matters such as academic staff career and development [4, pp. 407-417]. By 2010, the need to adequately address the dynamics in social relations has justified the decision of the national legislator to propose adoption of a new normative Act which is to replace the old model and offer the academic community better prospects for growth and career development as well as guarantee the quality of instruction and research at tertiary level. By linking academic tenure with the needs of individual universities, the model of decentralization presupposes not only the activity of the subjects but it serves to bridge science and education to the needs of society [5, pp. 349-357].

For the period of the above law operation in Bulgaria², an increase in the number of habilitated persons has been observed, particularly in the first years since the introduction of the new regulation. This, however, is not directly related to the quality of conducted research. According to NSI data, in 2017/ 2018 academic year, there were 3400 professors and 6283 associate professors working at higher schools in Bulgaria, which gives a total of 9683 habilitated persons. In comparison with academic 2008/2009, i.e. the period of operation of the old Law on Scientific Degrees and Scientific Ranks (3HCH3) and a centralized model in effect, the total number of habilitated persons reached 9414 in all, among which 2320 professors and 7094 associate professors³. The total number of habilitated persons for the

² From 2011 until the end of 2013 the number of professors has reached 1139 and the number of associate professors - 1324 in total. See shorthand for a session of the National Assembly under parliamentary control.
<http://www.parliament.bg/bg/plenarist/ns/50/ID/4055>.

³ Вж. https://infostat.nsi.bg/infostat/pages/resorts/result.jsf?h_2=1291

above two periods discussed, respectively for the two models, is similar and comparable, indicating that despite the criticism of the new decentralized model, the same has not led to an excessive increase in the number of habilitated persons in Bulgaria. Under the new regulatory framework, the ability of higher schools and scientific organizations to plan their staff career development is seen as a positive thing, taking into account those factors which influence the educational and research activities of the higher institution concerned [6, p. 15].

Alongside the positive sides of the decentralized model in awarding scientific degrees and acquiring academic positions, such as freedom of research in the country and possibility for self-regulation of the process, there are a number of shortcomings to consider too. In the opinion of some members of the public, external to the system, academic circles are compromised. As a way to address the need for fine-tuning the decentralization model so as to guarantee better control over scientific production and procedures for acquiring scientific degrees and academic positions [1, pp. 86-97; 2, pp. 80-98; 3, pp. 137-150] and align requirements at national level, a bill for amendment and supplement of the Law on the Development of the Academic Staff was submitted to the National Assembly in 2017. The amendments were adopted on 21 March, 2018 (SG, No 30 as of 3 April 2018). This update of national legislation aims at achieving the following effects:

- Unification of material requirements for members of academic staff at various higher schools and scientific organizations. The minimum national requirements are tied to scholarly and pedagogical criteria respectively. These requirements are regulated at national level by the Act of the Council of Ministers – III3PACPB (Decree 122 of June 29, 2018 for the amendment and supplement of the above Act – SG, No 56 of July 6, 2018.).

- Freedom given to higher schools and scientific organizations to pose additional requirements (in view of their needs) for applicants willing to acquire academic posts (i.e. assistant professor, associate professor or full professor) written in their internal regulations.

- Need to report scientific research, relevant to both members of academic staff in Bulgaria and to scientific production. Under Art. 2a of the Law on the Development of Academic Staff in Bulgaria, a public register is to be formed, acting as electronic database for publicized dissertation theses and for habilitated persons.

- Ensuring quality through revision of norms for the scientific juries. A major criticism of the previous regulation (in effect before the change in 2018) was that the scientific jury is set up according to the needs of the higher school or the organization announcing the competition. In order to overcome this deficiency, the provisions of Art. 4 of the Law on the Development of Academic Staff pose specific requirements for members of scientific juries among which the requirement for reporting/publicity. In addition, habilitates, members of scientific juries are to be entered in the NACID register, which will guarantee their compliance with the minimum national requirements, regardless of the period in which they were habilitated (in the order of the centralized model or the decentralized model).

- Effective control to ensure compliance with the norms regulating the development of academic staff in Bulgaria. This is witnessed by a greater administrative intervention of the state in procedures carried out by autonomous entities. Another step in that direction is the setting up of a new specialized body – the Commission of Academic Ethics.

Conclusion

The presented normative analysis of the latest amendments to the Law does not cover all possible aspects in the development of the academic staff in Bulgaria covered by our national legislation. Nonetheless, the study will serve to draw some conclusions, outline trends and offer critical opinion.

First of all, the legislator applies the decentralized model in awarding scientific degrees and earning tenure. The new amendments to the Law allow for correction of the norms in order to encourage the scientific potential while preserving the freedom of higher schools and scientific organizations to manage their internal affairs in the light of their needs.

Secondly, the regulation places special emphasis on the development of academic staff but also insists on monitoring of selection and employment procedures so that there is full compliance with existing regulations on academic development.

The completed update of the Bulgarian legislation cannot be treated one-sidedly. On the one hand, the effort to set uniform requirements for the academics is commendable but back in time, this effort is not legally justified, especially in relation to persons who were habilitated at the time the regulation came into effect. Said habilitated persons are required to meet the new minimum requirements if they are to be entered in the national register of NCID. Also, the procedure for plagiarism cannot be fully supported as it exaggerates the hypotheses over time or in relation to subjects who can initiate it. Eventually, this may lead to instability in the social relations.

Even though the regulation has been subject to some criticism, its positive effects cannot be ignored. It is a testimony to the efforts the legislator has made to guarantee the quality of tertiary education and science by stipulating the necessity for reporting the research work of Bulgarian scientists and make it visible to the world.

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EMPIRICAL ANALYSIS OF THE RELATIONSHIP AMONG THE GDP, CASH IN CIRCULATION, INTEREST RATE, OIL PRICES AND PRICE INDEX: ON THE EXAMPLE OF THE REPUBLIC OF AZERBAIJAN

Abstract

Our research focuses on the analysis of the relationship among Gross Domestic Product (GDP), cash in circulation, interest rate, price index and oil prices by applying modern econometric approaches. In this purpose, the stationarity, causality and cointegration relations of the appropriate (time) series were investigated, Vector Error Correction (VEC) model was developed, and the mutual variance decomposition of the model's variables were investigated. The analysis were carried out based on the quarterly statistics of [1] and [2] for 2010-2019 by implementing the EViews 11 SV Lite econometric package.

Keywords: GDP, cash in circulation, interest rate, price index, oil price, time series, stationarity, cointegration rank, VEC model, impulse response, variance decomposition.

Introduction

Money is an essential macroeconomic category that gives opportunity to analyze the inflation, periodic fluctuations, equilibrium in the economy, agreement's kind of the money and goods markets, and so on. Money is a financial asset and is used on trading purpose. A crucial feature of money is its high liquidity, it means, it can be exchanged for any other assets rapidly and with minimal losses. The amount of money in the country is controlled by the state, and in general, this function is realised by the Central Bank [4,5]. Quantitative expression of money is based on its turnover [4,5]:

$$MV = PQ, \quad (1)$$

where, M – is cash in circulation, V – the velocity of money; P – average price of goods and services; Q – the amount of goods and services sold. By using equation (1):

$$M = PQ/V \quad (2)$$

The money demand function as below:

$$\left(\frac{M}{p}\right)^d = L(r, Y) \quad (3)$$

where, r , Y and p are interest rate, income and price index, respectively.

According to (3), the amount of money demand is directly proportional to income and inversely proportional to interest rate [4, 5].

Statement of the problem

[9, 11] are devoted to the interval and point computations of single-factor relationships for macroeconomic indicators of balanced open systems. [10] is dedicated to the development of a mathematical apparatus consisting of a system of multifactorial relations of macroeconomic indicators, as the consumer and public expenditures, investment norms and tax burden, economic growth rate, general index of structural efficiency, etc. of unbalanced open economy. In [3] constructed a VECM(3) for the Azerbaijan Republic, which reflects the relations between cash circulation, GDP and interest rates, [6] was assessed the relations between household consumption, GDP and government income using the VEC (2) model.

Based on the methodology which are given in [3,6], let us analyze the state of the money market by using the quarterly indicators of the Central Bank of the Republic of Azerbaijan and Trading Economics [2] during the 2010-2019 (Table 1).

Table 1.

Some indicators that characterize the money market						
Years	Quarters	GDP (mln.man)	Cash in circulation M (mln.man.)	Interest rate r (in manats)	Crude oil price OP (in manats)	Price index P
2010	Q1	9551.6	4608.1	14.19	87.44	3.8
	Q2	19680	4855.2	14.96	78.18	4.9
	Q3	29308	5197.8	13.81	83.15	5.2
	Q4	41574.7	5793.2	13.13	101.01	5.7
2011	Q1	10421.1	5749.7	11.48	125.89	9.1
	Q2	22516.5	6198.3	10.82	116.74	8.8
	Q3	34583.1	6818.6	10.35	109.56	8.4
	Q4	50069	7658.5	9.78	110.98	7.9
2012	Q1	12289.1	7650.1	9.73	119.47	3.1
	Q2	25861.3	8183.9	9.51	104.92	2.2
	Q3	39760.6	8793.7	8.36	108.7	1.5

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	Q4	53995	9777.5	9.04	115.55	1.1
2013	Q1	12946.6	13989.2	8.64	102.37	1.2
	Q2	27202	15385	8.27	107.7	2
	Q3	42748	16366.1	10.26	108.84	2.3
	Q4	57708.2	16930	10.11	106.4	2.4
2014	Q1	13150.7	17674.7	9.77	108.07	20
	Q2	28743	18553.8	9.7	106.02	16
	Q3	44145.4	19443.1	9.66	85.86	15
	Q4	58977.8	20402.3	7.78	52.99	14
2015	Q1	11525	8055.5	8.07	66.78	2.8
	Q2	26265.1	7084.4	7.02	52.21	3.5
	Q3	40678.4	6050	6.62	49.56	3.7
	Q4	54352.1	5416.8	6.71	34.74	4.0
2016	Q1	125887	5613.5	5.88	48.13	10.8
	Q2	270023	6307	4.64	42.46	10.5
	Q3	434363	6194	5.65	48.3	11.2
	Q4	599877	6969.8	7.78	55.7	12.4
2017	Q1	152297	6661.8	11.43	51.73	13.2
	Q2	313106	7353.1	11.17	52.65	13.9
	Q3	500673	7707.8	8.44	61.37	13.9
	Q4	701351	8140.2	7.89	69.05	12.9
2018	Q1	1765	8110.5	11.8	75.17	4
	Q2	37009	7814.5	11.64	74.25	3
	Q3	57761.9	7527.1	10.62	75.47	2.6
	Q4	79797.3	8364.1	6.85	61.89	2.3
2019	Q1	18111.7	8219.9	9.27	72.8	2.1
	Q2	37825.2	9173.3	9.27	65.17	2.5
	Q3	58464.2	9352.6	9.22	60.23	2.6
	Q4	81681	10405.5	9.16	33.33	2.6

Source: Statistical reports of the Central Bank of the Republic of Azerbaijan and Statistics of Trading Economics.

Problem solution

It needs to be mentioned that whole analyzes were carried out by applying the EViews11 SV Lite package. In order to determine the relationship among the GDP, cash in circulation, interest rate, price index and crude oil price, let's use the preparation methodology of VAR and VEC models, which are the modern econometric models and express the dependence of endogenous variables on several lag prices of other endogenous variables [3, 6]:

I. Detection stationarity and integration of (time) series

In the first stage, let's detection stationarity and integration of time series in accordance with the variables GDP-general domestic product, M - cash in circulation, r - interest rate, p-price index and OP - crude oil prices. For this purpose, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests can be used, respectively. The Null and Alternate hypothesis of both tests are defined as follows: Null hypothesis (H0) states there is the presence of a unit root (indicating that this series is not stationary), Alternate hypothesis (H1) states there is no unit root. In other words, stationarity exists. Summarizing the results of these tests, we present them as in the Table 2 and Table 3:

Table 2.

Results of ADF test to detection the stationary of the series ($\sim I(0)$)

Augmented Dickey-Fuller Unit Root Test						
Null Hypothesis: Series has a unit root						
Exogenous: None						
Lag Length: 8 (Automatic - based on AIC, maxlag=9)						
Test critical values:		1% — -2.625606	5% — -1.949609	10% — -1.611593		
Indicators		<i>GDP</i>	<i>M</i>	<i>r</i>	<i>p</i>	<i>OP</i>
Augmented Dickey-Fuller test statistic	t-statsitics	0.403361	-0.354272	-1.272554	-1.780502	-1.093379
	Prob.*	0.7939	0.5507	0.1834	0.0715	0.2438

Source: Compiled on the basis of calculations made by the author.

Since all the estimated P-values (Prob) for the indicators based on Table 2 are greater than 0.05, it is feasible to mention that the series of *GDP*, *M*, *r*, *p* və *OP* possess unit root and they are not stationary with 95% confidence: $GDP \notin I(0)$; $M \notin I(0)$; $r \notin I(0)$; $p \notin I(0)$; $OP \notin I(0)$.

Table 3.

Results of the PP test to detection the integration of the series ($\sim I(1)$)

Phillips-Perron Unit Root Test						
Null Hypothesis: D(*) has a unit root						
Exogenous: None						
Bandwidth: 37 (Newey-West automatic) using Bartlett kernel						
Test critical values:		1% — -2.627238	5% — -1.949856	10% — -1.611469		
1-st difference of the indicators		<i>D(GDP)</i>	<i>D(M)</i>	<i>D(r)</i>	<i>D(p)</i>	<i>D(OP)</i>
Phillips-Perron test statistic	Adj. t-Stat	-12.32843	-5.497675	-6.148262	-6.535822	-4.976072
	Prob.*	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Compiled on the basis of calculations made by the author.

Based on Table 3, it is not difficult to remark that the series of statistical values of GDP, M, r, p and OP indicators consist of the 1st degree finite differences do not have unit root with 95% confidence (all Prob* probability values are less than 0.05) and they are stationary. Thus, the series in accordance with the GDP, M, r, p and OP indicators are first-orderly integrated, and $GDP, M, r, p, OP \sim I(1)$. In this case, it is crucial to prepare the model VAR(q) in the presence of cause and effect relationships between the indicators, and the model VEC(s) in the presence of a cointegration relationship, by using their first-degree finite differences among the given indicators [3,6].

II. Cause and effect analysis

Let's establish cause-and-effect relationships among the explored macroeconomic indicators through the Granger causality test. The results of the test are given in Table 4:

Table 4.

The results of Granger causality test			
Pairwise Granger Causality Tests			
Date: 05/11/20 Time: 01:26			
Sample: 2010Q1 2019Q4			
Lags: 5			
Null Hypothesis:	Obs	F-Statistic	Prob.
M does not Granger Cause GDP	35	0.31108	0.9014
GDP does not Granger Cause M		0.22063	0.9501
R does not Granger Cause GDP	35	3.09891	0.0268
GDP does not Granger Cause R		7.39495	0.0003
P does not Granger Cause GDP	35	3.80409	0.0112
GDP does not Granger Cause P		2.58560	0.0524
OP does not Granger Cause GDP	35	0.72501	0.6114
GDP does not Granger Cause OP		0.49917	0.7738
R does not Granger Cause M	35	0.42406	0.8273
M does not Granger Cause R		1.88483	0.1345
P does not Granger Cause M	35	0.23305	0.9442
M does not Granger Cause P		3.15347	0.0250
OP does not Granger Cause M	35	2.07787	0.1035
M does not Granger Cause OP		2.42428	0.0649
P does not Granger Cause R	35	0.56893	0.7230
R does not Granger Cause P		1.01264	0.4319
OP does not Granger Cause R	35	1.87657	0.1360
R does not Granger Cause OP		1.21909	0.3306
OP does not Granger Cause P	35	0.81038	0.5538
P does not Granger Cause OP		0.10023	0.9911

Source: Compiled on the basis of calculations made by the author.

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Based on Table 4, we can mention that between only two of these explored indicators including GDP and interest rate are the bidirectional causality relationship; from the price index to GDP and from currency in circulation to the price index exist an unilateral causality relationship.

III. Investigation of cointegration relationships

In order to study the cointegration relationship among indicators, let's use the Johansen cointegration test:

Table 5.

The results of Johansen cointegration test					
Date: 05/11/20 Time: 01:58					
Sample: 2010Q1 2019Q4					
Included observations: 35					
Series: GDP M OP P R					
Lags interval: 1 to 4					
Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	3	5	5	5	5
Max-Eig	4	5	5	5	5
*Critical values based on MacKinnon-Haug-Michelis (1999)					
Information Criteria by Rank and Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Rank or	No Intercept	Intercept	Intercept	Intercept	Intercept
No. of CEs	No Trend	No Trend	No Trend	Trend	Trend
Log Likelihood by Rank (rows) and Model (columns)					
0	-950.9327	-950.9327	-947.0221	-947.0221	-940.2055
1	-920.1112	-906.9752	-903.0655	-893.3796	-886.5644
2	-903.4205	-880.9287	-877.5792	-858.5093	-852.4804
3	-891.8862	-864.3691	-861.3458	-836.7488	-830.8200
4	-886.2207	-854.8808	-852.1159	-821.5240	-817.2544
5	-885.8661	-849.2189	-849.2189	-812.5609	-812.5609

Akaike Information Criteria by Rank (rows) and Model (columns)					
0	60.05330	60.05330	60.11555	60.11555	60.01174
1	58.86350	58.17001	58.17517	57.67884	57.51797
2	58.48117	57.31021	57.29024	56.31482	56.14174
3	58.39350	56.99252	56.93405	55.69993	55.47543
4	58.64119	57.07891	56.97805	55.45851	55.27168*
5	59.19235	57.38394	57.38394	55.57491	55.57491
Schwarz Criteria by Rank (rows) and Model (columns)					
0	64.49715	64.49715	64.78159	64.78159	64.89998
1	63.75174	63.10269	63.28560	62.83370	62.85059
2	63.81379	62.73171	62.84506	61.95851	61.91874
3	64.17050	62.90284	62.93325	61.83244	61.69682*
4	64.86258	63.47805	63.42164	62.07985	61.93746
5	65.85813	64.27191	64.27191	62.68507	62.68507

Source: Compiled on the basis of calculations made by the author.

Table 5 shows that the most appropriate model, based on the lowest AIC value (AIC=55.27168), is a quadratic trend model and the cointegration rank is 4:

$$H: \Delta w_t = A * (B'w_{t-1} + c_0 + d_0t) + c_1 + d_1t + \sum_{i=1}^q B_i \Delta w_{t-i} + \varepsilon_t ; \quad (4)$$

Where, $w_t = (GDP, M, r, p, OP)'$ is column vector, q – is an optimal lag length of VEC model, A and B – are the columns that are linearly independent, correction (sometimes called adaptation matrices [8]) and cointegration matrices, respectively. In addition, they are as below:

$$\left\{ A: \left| A = [a_{ij}]_{m \times r} \text{ and } rank(A) = r \right\} \vee \left\{ B: \left| B = [b_{ij}]_{m \times r} \text{ and } rank(B) = r \right\} ;$$

Additionally,

$$B_i = [b_{sp}^i]_{m \times m}; \quad c_0 = [c_{0i}]_{r \times 1}; \quad c_1 = [c_{1i}]_{m \times 1}; \quad d_0 = [d_{0i}]_{r \times 1} \text{ and } d_1 = [d_{1i}]_{m \times 1}$$

m – is the dimension of w_t column vector, in other words Number of response series. In our case: $m = 5$.

IV. Defining the optimal lag length

It is known that the passing from the VEC(q) model which prepare for the indicators system, to the appropriate VAR($q + 1$) model and vice versa are feasible. This judgment can be used to determine the degree of the model to be prepared, that means, the optimal lag length. In this purpose, let's use the determining criterion of the lag length:

Table 6.

Determining criterion of the degree of VAR model						
VAR Lag Order Selection Criteria						
Endogenous variables: GDP M R OP P						
Exogenous variables:						
Date: 05/11/17 Time: 03:17						
Sample: 2010Q1 2019Q4						
Included observations: 35						
Lag	LogL	LR	FPE	AIC	SC	HQ
1	-1015.558	NA	4.63e+19*	59.46045	60.57141*	59.84395
2	-995.3194	28.91205	6.53e+19	59.73254	61.95446	60.49954
3	-984.9779	11.81877	1.87e+20	60.57017	63.90306	61.72068
4	-956.3943	24.50025	2.48e+20	60.36539	64.80924	61.89941
5	-885.8661	40.30182*	5.16e+19	57.76378*	63.31859	59.68130*
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

By considering the Akaike Information Criteria (AIC) column in Table 6, we obtained that the optimal lag length for the VAR model is 5. This means that the degree (lag length) of the VEC model to be developed is $q = 4$.

V. Development of VEC(4) model

Let's create the VEC(4) model for the vector of economic indicators $w_t = (GDP, M, r, OP, p)'$ as in formula (4), being cointegration $rank = 4, lag = 4$ by applying EViews 11 SV Lite package:

$$\left\{ \begin{aligned} \Delta GDP_t &= -1.55GDP_{t-1} - 5.61M_{t-1} - 45771.66r_{t-1} - 11.54OP_{t-1} + 27099.06p_{t-1} + 0.49\Delta GDP_{t-1} + \\ &+ 5.03\Delta M_{t-1} - 7340.89\Delta r_{t-1} - 333.72\Delta OP_{t-1} - 16734.97\Delta p_{t-1} + 0.44\Delta GDP_{t-2} + 10.15\Delta M_{t-2} + \\ &+ 28997.18\Delta r_{t-2} + 329.67\Delta OP_{t-2} - 10311.68\Delta p_{t-2} + 0.24\Delta GDP_{t-3} + 9.41\Delta M_{t-3} + 35111.75\Delta r_{t-3} - \\ &- 31.36\Delta OP_{t-3} + 20566.67\Delta p_{t-3} + 0.93\Delta GDP_{t-4} + 2.75\Delta M_{t-4} + 47412.69\Delta r_{t-4} + 169.81\Delta OP_{t-4} - \\ &- 22508.2\Delta p_{t-4} + 5089.46t + 420911.33; \\ \Delta M_t &= 0.0077GDP_{t-1} - 0.206M_{t-1} - 2372.67r_{t-1} + 225.23OP_{t-1} + 609.07p_{t-1} - 0.02\Delta GDP_{t-1} - \\ &- 0.48\Delta M_{t-1} + 1515.13\Delta r_{t-1} - 37.82\Delta OP_{t-1} + 197.34\Delta p_{t-1} - 0.01\Delta GDP_{t-2} - 0.39\Delta M_{t-2} + \\ &+ 600.25\Delta r_{t-2} + 20.32\Delta OP_{t-2} + 60.56\Delta p_{t-2} - 0.01\Delta GDP_{t-3} - 0.18\Delta M_{t-3} + 35.51\Delta r_{t-3} + \\ &+ 49.52\Delta OP_{t-3} - 22.2\Delta p_{t-3} - 0.003\Delta GDP_{t-4} - 0.45\Delta M_{t-4} + 173.23\Delta r_{t-4} - 22.36\Delta OP_{t-4} - \\ &- 140.02\Delta p_{t-4} + 657.91t - 10947.06; \\ \Delta r_t &= 0.00001GDP_{t-1} - 0.0002M_{t-1} - 0.11r_{t-1} + 0.01OP_{t-1} - 0.58p_{t-1} - 0.00001\Delta GDP_{t-1} + \\ &+ 0.0001\Delta M_{t-1} - 0.32\Delta r_{t-1} + 0.01\Delta OP_{t-1} + 0.26\Delta p_{t-1} - 0.000001\Delta GDP_{t-2} + 0.00005\Delta M_{t-2} + \\ &+ 0.01\Delta r_{t-2} - 0.0019\Delta OP_{t-2} + 0.26\Delta p_{t-2} + 0.000002\Delta GDP_{t-3} - 0.000005\Delta M_{t-3} + 0.05\Delta r_{t-3} + \\ &+ 0.004\Delta OP_{t-3} + 0.28\Delta p_{t-3} - 0.000004\Delta GDP_{t-4} + 0.0001\Delta M_{t-4} - 0.08\Delta r_{t-4} + 0.03\Delta OP_{t-4} + \\ &+ 0.26\Delta p_{t-4} + 0.003t + 3.91; \\ \Delta OP_t &= 0.00014GDP_{t-1} - 0.00711M_{t-1} - 1.19r_{t-1} + 0.02OP_{t-1} - 8.88p_{t-1} - 0.00018\Delta GDP_{t-1} + \\ &+ 0.00543\Delta M_{t-1} - 3.15\Delta r_{t-1} - 0.5\Delta OP_{t-1} + 5.38\Delta p_{t-1} - 0.00011\Delta GDP_{t-2} + 0.00335\Delta M_{t-2} + \\ &+ 1.65\Delta r_{t-2} - 0.39\Delta OP_{t-2} + 4.49\Delta p_{t-2} - 0.00005\Delta GDP_{t-3} + 0.003\Delta M_{t-3} + 4.31\Delta r_{t-3} - \\ &- 0.24\Delta OP_{t-3} + 6.13\Delta p_{t-3} - 0.00005\Delta GDP_{t-4} + 0.004\Delta M_{t-4} + 5.44\Delta r_{t-4} + 0.26\Delta OP_{t-4} + \\ &+ 7.15\Delta p_{t-4} - 0.36t + 113.43; \\ \Delta p_t &= 0.00001GDP_{t-1} - 0.00008M_{t-1} + 0.39r_{t-1} - 0.15OP_{t-1} - 1.03p_{t-1} + 0.00001\Delta GDP_{t-1} + \\ &+ 0.00003\Delta M_{t-1} + 0.06\Delta r_{t-1} + 0.08\Delta OP_{t-1} + 0.15\Delta p_{t-1} + 0.00001\Delta GDP_{t-2} + 0.00003\Delta M_{t-2} + \\ &+ 0.84\Delta r_{t-2} + 0.07\Delta OP_{t-2} + 0.23\Delta p_{t-2} + 0.00001\Delta GDP_{t-3} + 0.00009\Delta M_{t-3} + 0.59\Delta r_{t-3} + \\ &+ 0.09\Delta OP_{t-3} + 0.34\Delta p_{t-3} + 0.00001\Delta GDP_{t-4} - 0.00011\Delta M_{t-4} + 0.76\Delta r_{t-4} + 0.07\Delta OP_{t-4} - \\ &- 0.16\Delta p_{t-4} - 0.49t + 25.72. \end{aligned} \right.$$

VI. Variance decomposition

The results of the calculations for the six quarters are compiled as a Table 7 and Figures 1-4 form in order to assess the impact part of their interaction with one-another on changes in economic indicators.

Table 7.

Decomposition of variance of indicators

Variance Decomposition of GDP:						
Period	S.E.	GDP	M	R	OP	P
1	65470.52	100.0000	0.000000	0.000000	0.000000	0.000000
2	81699.59	65.52705	23.56991	9.654180	0.292951	0.955905
3	91937.43	53.65791	18.88734	20.21805	2.299485	4.937219
4	108200.7	39.87485	15.80406	31.05089	2.460649	10.80954
5	129099.2	42.25166	18.00728	22.21780	1.770823	15.75244
6	142658.5	39.90716	19.80058	25.93723	1.451582	12.90344

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Variance Decomposition of M:						
Period	S.E.	GDP	M	R	OP	P
1	1800.278	5.174527	94.82547	0.000000	0.000000	0.000000
2	2300.295	3.199314	58.11804	14.19113	17.19124	7.300278
3	3232.493	6.180412	29.98985	42.41426	17.33070	4.084771
4	3643.554	5.759394	23.76233	48.37703	17.60981	4.491445
5	3858.803	5.137029	21.55812	51.62430	16.45307	5.227480
6	3924.282	6.380096	20.89904	51.30190	16.16449	5.254474
Variance Decomposition of R:						
Period	S.E.	GDP	M	R	OP	P
1	0.999178	1.286144	57.86646	40.84740	0.000000	0.000000
2	1.276527	11.53803	57.54690	25.28372	2.088119	3.543230
3	1.435010	18.67224	52.93005	20.87272	2.502338	5.022655
4	1.533309	23.64201	50.45320	18.78263	2.285095	4.837059
5	1.546718	23.38709	49.87351	19.27290	2.323254	5.143244
6	1.791149	20.41805	49.91200	23.76780	1.980977	3.921170
Variance Decomposition of OP:						
Period	S.E.	GDP	M	R	OP	P
1	9.550680	3.825507	32.89440	23.06320	40.21690	0.000000
2	13.63331	8.480808	18.13083	41.49428	27.96689	3.927196
3	15.97088	6.257544	33.81191	31.85528	22.24356	5.831701
4	17.28100	9.349407	36.13721	28.30656	19.37560	6.831225
5	18.65645	12.15958	40.06765	24.31433	17.05353	6.404908
6	19.99258	11.09101	44.01020	22.49527	14.85285	7.550672
Variance Decomposition of P:						
Period	S.E.	GDP	M	R	OP	P
1	1.067784	1.975070	2.064150	39.42620	4.435898	52.09868
2	1.364278	3.656329	3.251547	48.40459	12.27084	32.41670
3	1.988167	9.229032	5.620796	58.60250	10.97994	15.56773
4	2.110013	11.21464	4.993013	59.02458	10.07979	14.68797
5	2.206229	11.38228	9.765406	55.60870	9.268353	13.97527
6	2.609537	14.18812	25.36704	39.97564	10.13755	10.33164
Cholesky Ordering: GDP M R OP P						

Variance Decomposition using Cholesky (d.f. adjusted) Factors

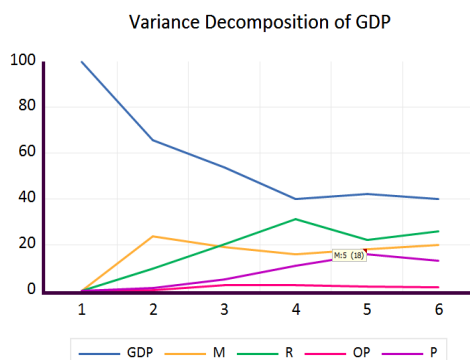


Fig 1. Variance decomposition of GDP

Variance Decomposition using Cholesky (d.f. adjusted) Factors

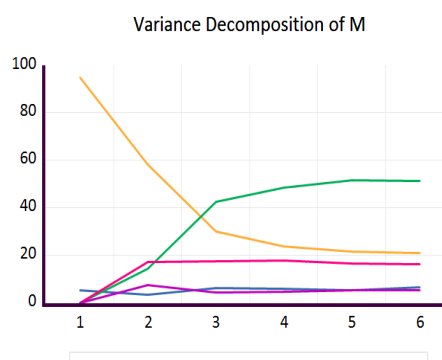


Fig 2. Variance decomposition of M

Variance Decomposition using Cholesky (d.f. adjusted) Factors

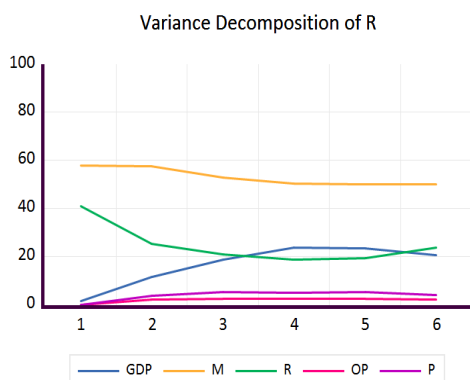


Fig 3. Variance decomposition of r

Variance Decomposition using Cholesky (d.f. adjusted) Factors

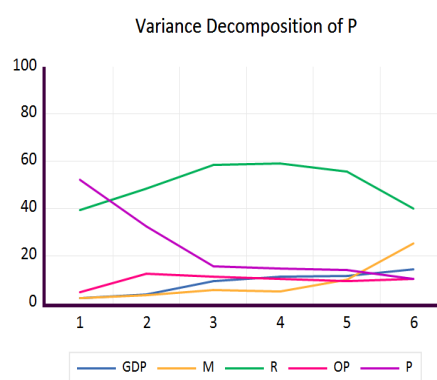


Fig 4. Variance decomposition of p

Conclusion

Vector error correction (VEC) model was developed for expressing the long-term relationship among gross domestic product (GDP), cash in circulation, interest rate (in manats), oil prices and price index by using the quarterly indicators of the Central Bank of the Republic of Azerbaijan and of the Trading Economics in 2010-2019. Based on this model the effects of each indicator on economic indicators for the sixth research period (quarter) it can be mentioned that:

- For *GDP* :

$$\rho_{GDP}(GDP) \approx 39.91\%; \rho_{GDP}(M) \approx 19.8\%; \rho_{GDP}(r) \approx 25.94\%; \rho_{GDP}(OP) \approx 1.45\%; \rho_{GDP}(p) \approx 12.9\%;$$

$$\rho_{GDP}(OP) < \rho_{GDP}(p) < \rho_{GDP}(M) < \rho_{GDP}(r) < \rho_{GDP}(GDP).$$

- For cash in circulation (*M*):

$$\rho_M(GDP) \approx 6.38\%; \rho_M(M) \approx 20.9\%; \rho_M(r) \approx 51.3\%; \rho_M(OP) \approx 16.16\%; \rho_M(p) \approx 5.25\%;$$

$$\rho_M(p) < \rho_M(GDP) < \rho_M(OP) < \rho_M(M) < \rho_M(r).$$

- For interest rate (*r*):

$$\rho_r(GDP) \approx 20.42\%; \rho_r(M) \approx 49.91\%; \rho_r(r) \approx 23.77\%; \rho_r(OP) \approx 1.98\%; \rho_r(p) \approx 3.92\%;$$

$$\rho_r(OP) < \rho_r(p) < \rho_r(GDP) < \rho_r(r) < \rho_r(M).$$

- For crude oil price (*OP*):

$$\begin{aligned} \rho_{OP}(GDP) &\approx 11.09\%; \rho_{OP}(M) \approx 44.01\%; \rho_{OP}(r) \approx 22.5\%; \rho_{OP}(OP) \approx 14.85\%; \rho_{OP}(p) \approx 7.55\%; \\ \rho_{OP}(p) &< \rho_{OP}(GDP) < \rho_{OP}(OP) < \rho_{OP}(r) < \rho_{OP}(M). \\ \circ \text{ For price index } (p): \\ \rho_p(GDP) &\approx 14.19\%; \rho_p(M) \approx 25.37\%; \rho_p(r) \approx 39.98\%; \rho_p(OP) \approx 10.14\%; \rho_p(p) \approx 10.33\%; \\ \rho_p(OP) &< \rho_p(p) < \rho_p(GDP) < \rho_p(M) < \rho_p(r). \end{aligned}$$

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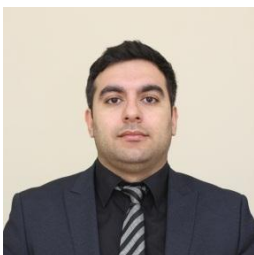
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THE EVOLUTION OF THE INTERNET AND THE ADVANTAGES OF ONLINE MARKETING IN THIS CONTEXT

Abstract

The Internet has become an integral part of our lives. The Internet and technology world has gone through many stages until online marketing has emerged. Online marketing, which is also called internet marketing, involves use of interactive, virtual spaces for the sake of promoting and selling goods and services. In fact, new synchronous, internet-based communication technologies had contributed to the restructuration of major economic sectors including marketing. The paper starts with the history and evolution of Internet and smart technologies as well as social media. The study continues with the different definitions of online marketing and ending up advantages of online marketing compare to offline marketing.

Keywords: Internet, social media, online marketing, offline marketing, digital age.

Introduction

If we look at 2018, there are more than 7.5 billion people in the world, and 3.5 billion people have access to the Internet [1, 12]. We want to be connected to the internet at any moment in our lives. Let's look at how much technology and internet history we have left behind so many Internet access opportunities and advanced technologies in many areas today. Because Online marketing, which is also called internet marketing, involves use of interactive, virtual spaces for the sake of promoting and selling goods and services.

Prior to the early 18th century, the world's agricultural sector dominated. The development of steam engines in 1750-1850 resulted in industrial revolution [2, 7]. In 1850-1915, factories producing electrical, chemical, oil technology, trains, steam engines brought the Industrial Revolution. The rapid development of many areas such as mechanized agriculture, automotive industry, radio, television, telephony, electronics, genetics, nuclear

technology and computer technology has been marked by the development of the 20th century.

In the mid-20th century, after the Industrial Revolution, the new "Digital Period" emerged and the rapid development of this revolution was based on information and communication technologies. Sometimes this revolution was called the "Information Age", "Digital Age" [3, 35-37].

In the 21st century, we achieve high speed development in the fields of touch technologies, space technology, nanotechnology, biotechnology, nuclear technology, alternative energy, intelligent mobile phones and more.

The first steps in computer science were thrown into Turing's car, developed by Alan Turing in 1936. This machine could make difficult mathematical calculations. With this machine developed by Alan Turing, the foundation of today's computer technology was laid and A.Turing was regarded as the founder of computer science [4, 12].

The Internet began in 1960 with the implementation of the ARPANET (Advanced Research Projects Agency Network) project. The US Department of Defense developed by ARPANET, the first network using Internet Protocol (IP) within this project. The first message through ARPANET was sent to a computer at the Stanford Research Institute from Leonardo Kleinrock's Laboratory, Los Angeles University, in 1970 [5, 67].

In 1982, TCP / IP ARPANET was presented as a standard network protocol.

In the 1990s, Web (World Wide Web) and the first browsers were developed on the Internet. The creator of the Web, Doctor of Computer Sciences Tim Berners-Lee, in 1989, developed the Hypertext Markup Language text format language in the Swiss CERN lab (HTML) and created the World Wide Web, which provides access to text documents from other points. Soon after that, he wrote a computer program that was the first Web browser in 1990.

In 1993, IBM Simon, the world's first smartphone, was created. In addition to being a mobile phone with a touch screen smartphone that was released in 1994, it also incorporated features such as a pocket PC (PDA), a fax machine.

Between the years 1990 and 2000, digital technology has been developed in close contact with e-mail, instant messaging, forums, blogs, social networks and e-commerce.

In 1994, the Netscape web browser came out and Yahoo! was established. In 1995, the Internet Explorer web browser was launched, Ebay and Amazon.com were created. In 1996, Hotmail, Yahoo!, Mail, and in subsequent years, which is quite popular ICQ instant messaging services of the program was presented to the public. In 1998, the Google search site and Paypal were set up. In 1999, the MSN Messenger instant messaging software (Windows Live) and e-commerce site Alibaba.com was founded [6, 33-34].

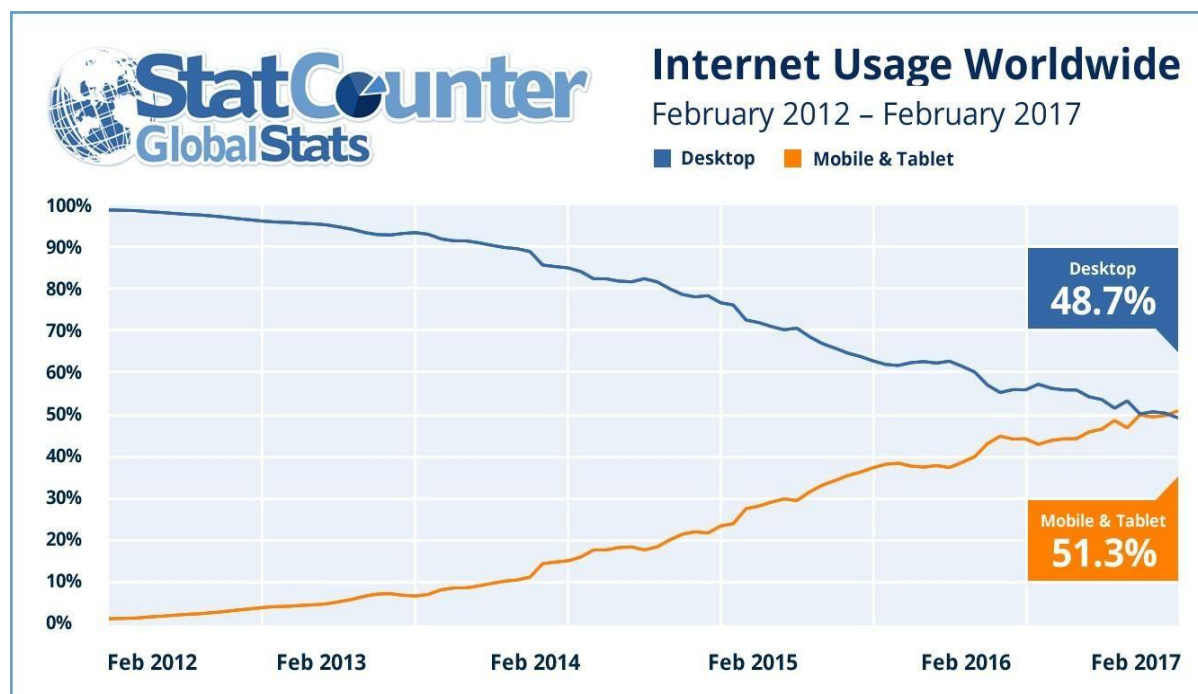
The year 2000 was a big crisis year for the internet industry. In March 2000, shares in NASDAQ, the stock exchange indexes of technology firms, began to lose much. This crisis, known as the "Dot-Com Balloon," has begun to withdraw from this sector due to the lack of resources left by the companies investing in developing computer and Internet technologies [7, 84].

In 2000-2006, the highly popular and heavily used in today's social media platforms were established. In 2001, Wikipedia and Blogger platforms, LinkedIn in 2002, Wordpress and Skype in 2003, Facebook in 2004, YouTube in 2005 and Twitter in 2006 were established.

Today, there are many web sites and programs which are dominate on the internet and we use them almost every day. According to Statcounter.com, mobile use of the Internet in 2017 has become a leader position than the use of the desktop.

Figure 1.

Comparison of using desktop computers and mobile devices between 2012 and 2017 in the world.



Especially in recent years, the number of people using the internet has increased significantly as an online sales channel and online marketing tool. According to research conducted by Deloitte, one of the world's largest international audit and management consulting firms, 49% of retail sales in the world are affected by digital media, which is reported to be 64% in 2015, and 95% predicted to be. According to the research context conducted by the company over the past years, 84% of buyers are doing research on the internet before shopping [8, 45-48]. What is online marketing?

Chaffey et al. (2000) simply define internet marketing as "the application of the internet and related digital technologies to achieve marketing objectives". This definition is a simple definition which, unlike the following ones, does not touch the important aspect of customer relationship. According to Kotler and Armstrong online marketing consists of measures and activities to promote products and services and build relationships with customers over the Internet. Burrett (2008) understands online marketing as — carefully targeting users and getting them to interact with you while they're engaged with the most personal, intimate medium ever invented. The most comprehensive definition has been articulated by Chaffey (2007), he defines online marketing as —Applying Digital technologies which form online channels (Web, e-mail, databases, plus mobile/wireless & digital TV) to contribute to marketing activities aimed at achieving profitable acquisition and retention of customers (within a multi-channel buying process and customer lifecycle) through improving our customer knowledge (of their profiles, behavior, value and loyalty drivers), then

delivering integrated targeted communications and online services that match their individual needs". As this relationship concept definitions show online marketing revolve around interaction and building relationship with customers, a point which discriminates it from traditional, offline marketing [9, 5-7].

There are many advantages of online marketing compare to offline marketing. Let's look at some of these advantages:

A world where everyone is equal

Unlike offline marketing, online marketing offers a more competitive environment. Smaller companies that can not compete with traditional budgeted big-budgeted ads can easily do this through online marketing, with the right media planning. Of course, the budget is also important in online marketing. However, planning can be greatly different from the budget's professional digital media specialist's maximum efficiency [10, 15-17]. For example, the constant costs of a company on television, radio, or newspaper ads require greater cost than similar ads in electronic media. However, the number of online audience sources exceeds the mass of traditional advertising. The development and maintenance of web resources that will work for the company's needs without significant changes over a number of years is usually beyond the cost of a minimal budgeted offline campaign.

Contact with the audience

One of the main advantages of online marketing is that the Internet has the chance to organize a remote dialogue with the target audience. Consumers can respond to any question and get the necessary information by emailing their product or service, by posting comments on social media or connecting them through online customer service. Therefore, the development of sites is considered as one of the first conditions for online advertising. Traditional advertising is almost impossible. In addition, various mechanisms, such as surveys, visit statistics, forums, communicative platforms, allow you to get the most out of your target audience, to take into account the choices of potential buyers and react to their changes. In this case, any online marketing campaign is targeted to the target audience and more effective results [11, 17-18].

Immediate result

When a person visits your brand website through your ad, when you fill in or purchase a form, you are instantly aware of it. Thus, with the help of online marketing tools, you can interrupt unsuccessful advertising on the spot and make changes to the ad performance and make it more efficient. On the contrary, you can support successful ones.

Long Term Efficiency

The continued enjoyment of many marketing campaigns is one of the greatest benefits of online marketing. For example, intelligent content marketing activities, such as blogs and official web site content, have the potential to highlight your product or service for years without changing or adding additions [12, 4]. Almost every online marketing method has "viral effect" elements that can serve your product every day.

Contact with mobile costumers

One of the main trends of the recent years is the increase in the number of users accessing the Internet from mobile devices such as smartphones and tablets. Unlike traditional

advertising, mobile ads follow such users, regardless of where they live. With the help of modern technologies, you can place targeted ads on phones and tablets, taking into account the features of each user. In addition to advertising placements and sites placement, mobile devices:

- push notifications directly to the device for direct communication with the device owner;
- display ads on social networks used by the device's owner;
- can analyze user's location and send ad messages only when they are in a specific location.

What is Marketing?

Before starting to discuss about online marketing we have to understand the meaning and aims of marketing.

Marketing is a business term that experts have defined in dozens of different ways. In fact, even at company level people may perceive the term differently. Basically, it is a management process through which products and services move from concept to the customer. It includes identification of a product, determining demand, deciding on its price, and selecting distribution channels. It also includes developing and implementing a promotional strategy.

The UK-based Chartered Institute of Marketing (CIM) defines the term as follows: “Marketing is the management process responsible for identifying, anticipating and satisfying customer requirements profitably”.

Here is the American Marketing Association's definition: “Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large”.

Marketing is a societal process, which discerns consumer's wants, focusing on a product or service to fulfil those wants, attempting to mold the consumers toward the products or services offered. Indeed, marketing is fundamental to any business's growth. The marketing teams (marketers) are tasked to create consumer awareness of the products or services through marketing techniques. Unless it pays due attention to its products and services and consumers' demographics and desires, a business will not usually prosper over time. Essentially, marketing is the process of creating or directing an organization to be successful in selling a product or service that people not only desire, but also are willing to buy. Therefore good marketing must be able to create a "proposition" or set of benefits for the end-customer that delivers value through products or services. Throughout this paper we will not differ between marketing, advertising and the term ad. Our understanding of the words is meant to be the same, and thus they will frequently be used. One term needs to be explained through viral marketing, which is a concept that have developed with the emergence of the Internet. Viral marketing spreads through social relations, and is considered a modern version of word of mouth marketing. Whether funny, surprising or with deep impact many small texts, pictures or even videos are sent from one user to another for various reasons [13,13].



Marketing refers to the activities of a business related to buying and selling a product or service. It involves finding out what consumers want and determining whether it is possible to produce it at the right price. The company then makes and sells it.

Marketing covers a vast area of business, including:

- how you communicate;
- the brand;
- the design;
- pricing;
- market research;
- consumer psychology;
- measuring effectiveness.

Online marketing

Online marketing is the art and science of selling products and services over digital networks, such as the internet and cellular phone networks. The art of online marketing involves finding the right online marketing mix of strategies that appeal to your target market and will translate into sales.

The science of online marketing is the research and analysis that goes into both choosing the online marketing strategies to use and measuring the success of those strategies. Online marketing includes Search Engine Optimization (SEO) and Search Engine Marketing (SEM). SEO is the process of fine-tuning your business website so that it ranks higher in search engine result listings when your potential customers enter search terms that match your product offerings.

SEO is free. Conversely, SEM is paid search marketing. For a (typically) pay-per-click fee, search engines such as Google will display your ad when a user enters a search using one of your keywords. SEM statistics can provide excellent feedback on the effectiveness of your advertising. Such statistics include the click-through rate the number of times your ad has been clicked versus the number of times the page containing the ad has been viewed.

Online marketing a pretty broad term that encompasses a range of marketing tactics and strategies – including content, email, search, paid media, and more.

These days, though, internet marketing is often used interchangeably with content marketing.

Why?

Because content marketing is the internet marketing of the present and future. Content Marketing Institute defines content marketing as:

- A strategic marketing approach focused on creating and distributing valuable, relevant, and consistent content to attract and retain a clearly defined audience — and, ultimately, to drive profitable customer action.

Think of it like this: content marketing (or inbound marketing) is in direct opposition to traditional advertising (outbound marketing), and in direct integration with the patterns and habits of today's generation.

We don't like to be sold to, we have our ad-blockers on, and we barely watch cable anymore.

Content marketing serves up content that addresses our pain points, and is there when we want it.

The benefits of online/digital marketing include:

- **Global reach** - a website allows you to find new markets and trade globally for only a small investment. [14]

- **Lower cost** - a properly planned and well targeted digital marketing campaign can reach the right customers at a much lower cost than traditional marketing methods.

- **Trackable, measurable results** - **measuring your online marketing** with web analytics and other online metric tools makes it easier to establish how effective your campaign has been. You can obtain detailed information about how customers use your website or respond to your advertising.

- **Personalization** - if your customer database is linked to your website, then whenever someone visits the site, you can greet them with targeted offers. The more they buy from you, the more you can refine your customer profile and market effectively to them.

- **Openness** - by getting involved with **social media** and managing it carefully, you can build customer loyalty and create a reputation for being easy to engage with.

- **Social currency** - digital marketing lets you create engaging campaigns using **content marketing** tactics. This content (images, videos, articles) can gain social currency - being passed from user to user and becoming viral.

- **Improved conversion rates** - if you have a website, then your customers are only ever a few clicks away from making a purchase. Unlike other media which require people to get up and make a phone call, or go to a shop, digital marketing can be seamless and immediate.

Together, all of these aspects of digital marketing have the potential to add up to more sales.

Of course, there are some disadvantages of online/digital marketing.

Disadvantages of digital marketing

Some of the downsides and challenges of digital marketing you should be aware of include:

- **Skills and training** – You will need to ensure that your staff have the right knowledge and expertise to carry out digital marketing with success. Tools, platforms and trends change rapidly and it's vital that you keep up-to-date.

- **Time consuming** – tasks such as optimising online advertising campaigns and creating marketing content can take up a lot of time. It's important to measure your results to ensure a return-on-investment.

- **High competition** – while you can reach a global audience with digital marketing, you are also up against global competition. It can be a challenge to stand out against competitors and to grab attention among the many messages aimed at consumers online.

- **Complaints and feedback** – any negative feedback or criticism of your brand can be visible to your audience through social media and review websites. Carrying out effective customer service online can be challenging. Negative comments or failure to respond effectively can damage your brand reputation.

- **Security and privacy issues** – there are a number of legal considerations around collecting and using customer data for digital marketing purposes. Take care to comply with the rules regarding privacy and data protection.

Conclusion

Using this information, market makers in the online marketing industry are preparing individual advertising campaigns for each segment of the targeted audience, making it more effective than traditional ad campaigns.

As you can see, online marketing has many advantages which you can carry your marketing activities to a higher level with. Digital or online marketing is the most effective way to reach your potential customers wherever and when they are looking for your services or products [15, 44].

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PRINCIPLES OF PERSONAL DATA PROTECTION

Abstract

The topic about the personal data protection principles and the protection of the natural person's data based on these principles is of great interest for both theory and practice. The article explores the application of the personal data protection principles. A focus is laid on the current and modernized basics for data protection as guarantee for better control and security of the natural person's data in the modern digital world. Based on analysis of these principles, the focal points of their application are established. This is the basis which outlines the practicality of the principles related to regulating personal data collection, storage and processing.

Keywords: principles, personal data, lawfulness, transparency, accuracy, confidentiality, accountability.

Introduction

Personal data protection principles have been acquiring ever greater public significance and acknowledgement over the recent years, as there is almost no sphere in the contemporary social, economic, public and political life which does not require the performing of activities relating to the processing and use of personal data, as well as acquiring access to such data. All that, undoubtedly, creates specific personal data protection problems linked to the danger and hazards from unfavourable consequences for the natural person. In this regard, in 2016 a new legal framework was introduced in the EU in the sphere of personal data protection, including Regulation (EC) 2016/679 of the European Parliament and the Council of 27 April 2016 concerning the protection of natural persons with regard to personal data processing and the freedom of movement of such data.

As part of the reform pack for data protection, the Regulation superseded Directive

95/46/EC¹ and has been applied directly by the EU member states as of 25 May 2018. It introduces a serious advancement in the right of natural persons concerning personal data as compared to the framework existing before. It aims at guaranteeing consistent and uniform application in the Union of the regulations for protection of the basic rights and freedoms of natural persons with regard to personal data processing.

Personal data processing is a globalised process requiring the introduction and development of universal principles of natural persons with regard to their personal data processing.

Until the introduction of the Regulation, personal data protection principles were internationally recognized in Convention №108² and Directive 95/46/EC, as well as in the national legislation – more specifically the Law on Personal Data Protection. The main difference there was in the normative support of the principles. While in the Convention they were elaborated in a separate chapter and in the Directive in separate provisions, the Bulgarian legislator had them elaborated as rights and obligations of the legal entities [6, p. 234-237]. This inexorably leads to decreased effectiveness in the application of the basics of inviolability of the person and personal life of natural persons. Undoubtedly, the adoption of a whole new regulation in the sphere of personal data protection leads to furthering and upgrading the already existing rules and regulations as well as achieving harmonisation of the regulation all through the EU without the need to have it officially transposed in the national legislation. Despite the fact that the Regulation does not arise from radically differing principles in the legislation which it introduces, it was necessary to systematise their range and manifestation within a consistent and integral legal framework which helped countermand the existing difference in the amount of protection guaranteed.

The need to clarify the principles within the Regulation is determined, on the one hand, by the recent significant changes in the already existing legal framework, and on the other, by the complexity of the process of transposing the new regulations, the manifestation of the significance of the principles in their different aspects, their ambiguous interpreting and construing, as well as the need to have them serve as a benchmark for interpreting and construing by the controllers and the legal authorities.

The goal of the article is to highlight and analyse the content of the principles in the Regulation in view of the new legislative changes guaranteeing the observance of the personal data protection rules through the full readiness of their implementation by the administrators when processing personal data.

¹Directive 95/46/EC of the European Parliament and Council of 24/10/1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data. OBL 281, 23/11/1995, p. 31-50.

²Convention 108 of the Council of Europe of 28/01/1981 on the Protection of Individuals with regard to Automatic Processing of Personal Data was modernized in May 2018. Currently the Report on its amendment is signed by 30 states, among which the Republic of Bulgaria, <https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/223/signatures> (10/06/2019).

Exposé

The principles of personal data protection apply to all controllers and concern any and all acts of data processing, because of which knowing them well is not an end in itself. Their main purpose is to maintain relevant control over non-public data which refer to the identifying of a certain physical person. They have special significance as they are the basis for a correct interpreting and application of the Regulation, as well as guidelines for controllers when processing personal data. Because of that the key to the observance of the applicable law is to abide by the following seven principles of data quality.

Principle of lawfulness, fairness and transparency

The first principle set out in Article 5, para. 1, (a) of the Regulation requires that personal data be processed lawfully, fairly and in a transparent manner. That generally means controllers must in the first place have legal grounds for processing personal data and secondly, never use such data in a manner which may have unjustified consequences for the persons concerned and thirdly, submit information on the legal grounds for the data processing.

Data processing is lawful when personal data controllers have legal grounds for the data processing. Because of that and in view of the principle of accountability, data controllers need to process such data on the grounds of the following legal requirements stipulated in Article 6 of the Regulation:

- a) when there is consent by the natural person;
- b) performance of contractual agreements to which the data subject is party;
- c) for compliance with a legal obligation to which the controller is subject;
- d) processing is necessary in order to protect the vital interests of the data subject;
- e) for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller or in a third party to whom the data are disclosed;
- f) for the purposes of the legitimate interests pursued by the controller, except where such interests are overridden by the interests or fundamental rights and freedoms of the data subject.

At least one of these conditions needs to be applied whenever personal data are processed. For instance, the information related to performing educational and other academic services for university students, PhD or postgraduate students collected via the application forms and enrolment papers for the establishment is processed rigidly on the legal grounds provided by a special law which is applicable in this case. The personal data the higher educational establishment is authorised to collect and store are explicitly stipulated in the Higher Education Law, the Ordinance on State Requirements for Enrolment of Students in Higher Educational Establishments in the Republic of Bulgaria. It is this special legislation which determines the admissibility and amount of the collected and stored data, because of which the processing of personal data of college and university students is also lawful as a rule. When assessing the lawfulness of data processing in this case, it is of great importance to observe not only the applicable law on personal data protection but the mandatory provisions of the special laws as well.

Fairness means particular behaviour of the controller concerning the data subject which

must be adequate and not excessive in relation to the purpose and is not contrary to accepted principles of morality³. The importance here is on the fact that this element of the principle requires from the controller to process the data fairly and openly, as well as give the data subject enough information about the performance of the processing activities and their purpose. The earliest stage of the realization of the right of the subject to be informed is the time of data collection. Fairness is important mostly in situations in which the data subjects have the right of choice whether to enter into a relation with the controller. If the data subjects are acquainted from the very beginning with the purpose of the data collection, they will be able to decide whether to enter in this relation⁴ or not, as well as the chance to prevent eventual misuse of this information or avoid future damage.

Transparency is the third element of this principle. Unlike Directive 95/46/EC and Convention 108, it has been formulated explicitly for the first time in the Regulation and upgrades the fairness principle. Transparency is guaranteed with the data subject's right to information, as well as with the data controller's duty to provide information. In this respect, data subjects need to be informed in a clear, unambiguous and easy to understand and accurate manner of the processing of their data. The controller should also individualise himself to the data subject, inform him about the processing operations of his personal data, about the grounds and purpose of this data processing, the rights he has in regard to the protection of his personal data and the ways they are exercised. It is imperative that the information given by the controller to the data subject be publicised (on the controller's internet page, for instance) and easily accessible, without that requiring too much effort. In this respect, the information cannot be hidden in general agreement conditions and/or inviolability declaration. This is especially relevant for the internet medium where, quite often, the announcements concerning data protection are unclear, difficult to access, not transparent and not always in full compliance with the applicable rules. We can take as an example the behavioural advertisements on the internet where both the increased number of participants in the provision of behavioural advertisements and the technological complexity of this practice do not allow the data subject to realise or know whether personal data are collected, by whom and for what purpose. As for behavioural advertisement, data subjects have to be informed about the identity of the provider of the network broadcasting the advertisement and the purpose of the data processing. The Data subject has to be clearly informed that the cookie⁵ will allow the advertisement provider to collect information about the visits to other websites, about the advertisements shown, about those of them which have been activated, the time of viewing, etc.

³ Unfair processing of personal data exists if the controller misuses his dominant position regarding the data subject in order to obtain his consent to process his personal data.

⁴ For more on the nature of the relation see [4, p. 22-26].

⁵ A cookie is a small text file containing letters and digits which is stored in the data subject's computer and is later used by the network provider. This text can have different functions, e.g. storing information about preferences, about the sessions or for identifying the subject via a unique identification code. In the context of behavioural advertising, a cookie allows the provider of the network which also provides advertising to recognise someone who had visited the site before, who visits the site again or visits another website which is a partner to the advertising network [10, p.7].

Principle of purpose limitation

The second principle set out in Article 5, para. 1, (b) of the Regulation requires that personal data be collected only for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes. This principle supposes that the purpose for which the data are collected should be clearly defined before the process of collection begins. This shall limit and prevent any uncontrolled data processing.

The purpose of the processing must be legitimate, not incompatible with the Regulation and must be clearly defined by the controller who stores the data. Practically, the controller must define beforehand clearly and explicitly the purpose for which he needs to process such personal data. Personal data can be collected and processed only for the purpose stated. Because of that, the processing shall be deemed inadmissible if the controller violates that purpose. Any new purpose different from the one initially stated means further processing. For instance, placing fast loan advertisements in the envelope together with the bills of the subscriber means further processing, since the controller processes further his subscribers' data for direct marketing purposes. In this case, this means further processing which is incompatible with the purpose for which the data have been initially collected. Because of that the collector is obliged⁶ to inform the data subject and receive their consent or process the data on other legal grounds.

The further processing will be permissible only if there is compatibility between the initial and the further purpose for which the data are used. In this case, no separate legal grounds are required differing from the ones for which the collecting of personal data was initially permitted.

No assessment of compatibility of purposes is required when the further processing of the data is for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes, as it is considered not to be incompatible with the initial purposes, as provided in Article 89, (1) of the Regulation, subject to implementation of guarantees by the controller in order to safeguard the rights and freedoms of the data subject [7, p.94].

Such guarantees are given through the implemented technical and organisational measures, which retain the processed information to the bare necessary minimum.

Principle of data minimisation

This principle, set out in Article 5, para. 1, (c) of the Regulation, requires the processing of personal data limited only to what is absolutely necessary for the purposes for which they are processed. The controller has the duty to process personal data only when such processing is adequate and appropriate. Also he is only free to process those data which are relevant and crucial for achieving the purpose and without which its realisation is not possible.

In order to keep this principle, it is necessary to assess the need of processing personal data, as well as determine the minimum amount of data compatible with and proportionate to the purpose at hand.

⁶ Such obligation to inform data subjects would increase the transparency of further processing and improve the exercising of the rights of the subjects with regard to other processing operations [9, c. 8].

Any data collection above the appointed minimum is excessive and unproportionate. For instance, when a natural person applies for a bank loan, the bank collects data about him in order to make sure that person will be able to pay regularly the loan deposits. Collecting any other information which does not bear relevance with this purpose (health, ethnicity, etc.) is unjustified and the bank has no right to require it. The data stored by the controller should not include irrelevant details. What is more, the bank does not need to know certain personal information which appears as excessive and unproportionate, especially in the cases when the purpose can be achieved without it.

Another infringement of that principle is collecting additional information about the natural person with the idea that it may be used for future purposes. It is inadmissible to collect and store personal data –just in case. Even in the event that the data subject has given his explicit consent, there are no legal grounds for such processing.

Principle of Accuracy

The provision of this principle as set out in Article 5, para. 1, (d) of the Regulation requires accuracy of personal data, and where necessary be kept up to date. In this sense the controller needs to check the reliability of the source of the information.

It is the controller's responsibility to observe this principle, but this does not always depend on his behaviour as much as it does on the conscientiousness of the data subject. It is recommended that the controller inform the natural persons about the necessity of their timely cooperation for updating their personal data whenever there is a change in them.

There is no infringement of this principle if the information is accurately recorded and provided by the data subject, as well as when reasonable steps are taken to guarantee the veracity of the information. In order to avoid any risk of causing damage to natural persons, data controllers need to take all reasonable steps to timely erase or rectify any inaccurate or plainly wrong personal data and also take the purpose for their processing into consideration. E.g., if the data are used for making decisions which may significantly influence the natural person, then every effort must be made to guarantee the accuracy (e.g., processing of inaccurate medical information about a patient may lead to a high risk to his health). If necessary, the data must be kept up to date, which will guarantee their accuracy.

Principle of storage limitation

The provisions set out in Article 5, para. 1, (e) of the Regulation, stipulate that personal data be kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the personal data are processed.

Storing personal data for too long, as a processing operation, can lead to serious problems, such as breach of the data subject's privacy, of his personal data and other of his rights, freedoms, and vital interests. For that reason exactly, the principle stipulates that personal data should be stored for a limited period of time only. This period can be regulated by the authorities or by the controller. In the first case, the controller is obliged to store the data for the period determined in the regulation. In Poland for instance, the employer is obliged to store the employee's work file for up to 50 years after the termination of the employment agreement [8, c. 16]. While in Bulgaria, and more specifically the Labour Code, does not provide period limits for the storage of the different types of documents, part of the

employee's work file. Such terms are specified in the provisions of the different laws, depending on the type of document and the information which it contains. Article 12, para. 1, of the Law on Accounting, for example, stipulates the pay statement record books must be stored for a period of 50 years, as of January 1 of the accounting period following the accounting period which the books relate to. In this respect, the processing of the data within the regulated period of time will be deemed legitimate and compatible with this principle.

When there is no appointed period for storing the data in the special laws, the data controller must appoint such a period himself, based on the purpose for which the data was collected. It is important that the controller substantiate the eventual reasonable period of time required for the achievement of the purpose for which the data are stored. The controller cannot store the personal data of participants in procedures for recruitment and selection of personnel for indefinite period of time or one which is too long. In this respect, the principle must be observed in the light of the initiation, realisation and completion of personnel selection procedures in a way which does not impair the realisation of the data processing purpose [12]. The Regulation does not explicitly define the period. But the amendments of the Law on Personal Data Protection of 26/02/2019⁷ redefined some special cases⁸ concerning data processing, including personnel selection procedures. In accordance with the provisions of Article 25k, para. 1 of the on Personal Data Protection, the employer or the employment authority, in their capacity as personal data controller, have to determine a period of time for storing the personal data, which can be no longer than 6 months, unless the applicant has given his consent on a longer period. In order to determine exactly the moment when the period starts, the controller also needs to take into consideration the period of protection of legal claims arising from the selection process. Therefore, the period for storage of the personal data of the participants in personnel selection procedures, as per Article 25k of the Law on Personal Data Protection starts the moment the procedures referred to end, respectively after the expiry of the term for their appealing. There is an exception to that rule when the applicant has given his consent his personal data to be used for the purposes of future recruitment and selection procedures. The legality to have the 6-month period extended depends on the will of the data subject, since he is the only one who has the right at all times and without explanation to withdraw his consent, as a result of which any further processing of the data is terminated.

After the expiry of the period for storing the personal data, the controller must erase or destroy them. One of the most significant changes introduced by the Regulation concerning citizen rights is the right to data erasure, or the right to be forgotten. This is not a new right; before, it was set out in the repealed Directive 95/46/EC, but is further developed in Article 17 of the Regulation. It allows the erasure of personal data when the data subject does not give consent for their further processing or when there are no legal grounds for their being stored [13, p. 9]. Erasure of data can be requested if they are no longer necessary for the

⁷ As amended, ST, issue 17 of 26 February 2019.

⁸ The largest number of special rules is provided for personal data processing in the context of employment and official relations. This is no surprise, as the Regulation has preserved the opportunity, also provided in the existing legislation on personal data protection, to allow deviations from the general rules when processing of personal data of personnel is at hand [2, c. 50]. For more on the employer's obligations concerning personal data in employment relations, see [1, c. 133-143].

realisation of the tasks of the controller who stored them. For instance, after paying off a loan, the file with the subject's data must be destroyed by the bank-controller of his personal data.

Personal data can be stored for longer periods only for archiving purposes in the public interest, for scientific or historical research purposes, if all appropriate technical or organisational measures have been taken so that the rights and freedoms of natural persons are guaranteed. Such measures can include techniques like data pseudonymisation or anonymisation whose application can lower the risks to the data subject and help data controllers to fulfil their obligations in relation to data protection.

In order to guarantee the observance of this principle, the controller needs to check periodically the necessity for continued data storage. The purpose of these checks is to determine whether the legal grounds for storing the already collected data by the controller are up-to-date and applicable, whether the need for processing these different categories of data still exists, as well as whether the purposes for which the data are collected have not been achieved before the expiry of the stipulated period for storing the data.

Principle of integrity and confidentiality

The sixth principle set out in Article 5, para. 1, (f) of the Regulations introduces the controller's obligation to process personal data in a way which guarantees an appropriate level of security. It is important to note that this principle refers to security in all aspects of personal data processing and aims at preventing the arising of unfavourable consequences from unauthorised or illegal processing, accidental loss, destruction or damage to the data.

This is a new principle proclaimed with the Regulation, even though the requirements for guaranteeing protection against unauthorised or illegal processing or accidental loss, destruction or damage by applying appropriate technical or organisational measures has been provided in the already existing legislation [3, c. 49-50].

Breaches in information security can lead to real damages for the natural person. Such damages in most cases include identity theft, false credit card transactions, mortgage fraud, etc. Because of this, the need and interest on the part of data controllers to take effective measures for guaranteeing real data security grows exponentially. The Regulation does not contain an extensive list of appropriate measures, but only guidelines for possible ones. Therefore, the assessment of which measures are appropriate to apply in each and every case is entirely the controller's obligation.

When determining what measures will be appropriate in any particular case, the controller has to assess all risks relating to data processing. In this respect, it is necessary to take into consideration technical advancements, the cost for applying the measures, the nature of the data, the scope and purpose of the processing, as well as the risks to the rights and freedoms of the natural person. Based on the risk assessment, the controller needs to introduce real and efficient internal protection mechanisms in order to guarantee data security. For instance, the data should be processed only by authorised personnel for this purpose exactly; the buildings and rooms where the data are stored have to be fire and break-in proof and protected against force majeure; the passwords for access to the data need to be known only to the authorised personnel and be changed regularly, as well as measures must be taken to guarantee the restoring of damaged or destroyed data.

Principle of accountability

The seventh principle set out чл. 5, para. 2 of the Regulation requires that the controller observe all the principles set out in Article 5, para. 1, and be able to demonstrate compliance with them. This principle is new and introduced with the reformed rules of the EC for data protection, as recommended by the Working Party per Article 29 of Directive 95/46/EC⁹. According to the Working Party, its inclusion in the new legislative framework will strengthen the controller's role and increase his responsibility in the processing of personal data [11, p.8].

This principle is realised through obligations which vary according to the risk. In view of enhancing the controller's activities towards applying the principle of accountability, the Regulation points a number of instruments, such as: keeping of a register about the personal data processing activities¹⁰; all the relations between the controller and the data processor; appointing an official directly responsible for personal data protection complying with the provisions of the law; documenting every breach of personal data security; observing all the approved codes of behaviour or approved certification mechanisms, etc.

Conclusion

In view of the above, we can recapitulate that the adoption of the new legal framework for personal data protection in the EU modernised the principles via the introduction of new requirements for transparency, access and erasure, and accountability, which helps increase the level of protection in all the spheres of modern society. In this respect, the punctual observance of the personal data protection principles is the key element for guaranteeing the safeguarding of personal rights. Moreover, their appropriate implementation will stop the practice of the absolutely uncontrollable collecting and use of such data and create conditions for quality personal data processing.

In order to raise the level of security, it is necessary that not only data controllers know the principles well, but also all the participants in the data protection procedures, so that they can be effectively applied. Knowing them well is not an end in itself, since the principles can be used for assessment of breaches in data processing as well as for determining whether there has been a breach in the natural person's rights. The principles of personal data protection define the boundaries of application of the legislative framework by regulating the collection, the processing of personal data as well as serving as a basis for construing cases of dispute between competing rights. They can help avoid all the limitations of transborder data flow between the EU member states with different standards, as well as decrease the risk of abuse with personal data.

⁹ The Working Party as per Article 29 is an independent European working party dealing with issues related to the inviolability of privacy and personal data up until 25 May 2018, i.e. the date of coming into force of Regulation (EC) 2016/679.

¹⁰ An analogous principle is set out in the e-registers for sick leave cards in view of the effectiveness of the specified procedure for introducing or storing of data under basic conditions for accountancy and control and a main goal – not allowing abuse of any security means, see [5, p. 55-61].

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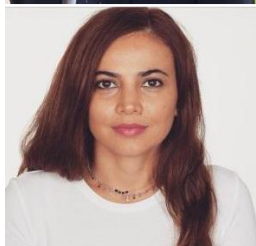
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DIVERSIFICATION STRATEGY FOR ECONOMIC DEVELOPMENT OF AZERBAIJAN

Abstract

This article is analyzing the potential of Azerbaijan to increase its` economic performance, measured by GDP. Saphiro-Wilk tests are used to test normality of data and ANOVA test is employed to generate homogenous intervals for GDP. Diversification strategy is designed based on economic strategy of countries situated in same homogenous group for GDP.

According to classical theory of economy, economic performance of a country (GDP) is influenced by 3 production factors: capital, labor and resources. Out of these 3 production factors, labor is intensively analyzed and compared with labor in European countries, proving that labor structure of Azerbaijan is sustaining a diversification strategy for economy.

Keywords: GDP, population structure, unemployment, Saphiro-Wilk, ANOVA, economic strategy.

Introduction

According to classical theory, the economy market has three components: capital, labor and resources.

Capital is defined as – all man-made goods used in further production of wealth [4]. It includes, among others, machinery, tools and equipment, buildings, raw material, transportation and communication means.

According to International Labor Organization, labor force is – the sum of persons in employment plus persons in unemployment [5]. Labor force is acting on a regulated market, called labor market. It is the market in which the amount of services, corresponding to tasks

well established in the job description, are offered for a price or remuneration [1].

Resources refer to all natural resources given by nature, as: oil, gas, water, air, forests and land.

Total output of an economy, measured by GDP, represents all goods produced and sold by a country. Total output is modeled by production factors, based on a mathematical relation of the following type:

$$Y=F(K,L,N)$$

where: Y= quantity of output, K=capital, L=labor, N=resources.

Circulation of capital and resources is not a critical issue anymore, considering globalization, but circulation of labor is still a critical issue due to negative social and economic consequences arising from workers mobility [3].

Delicate character of labor, among the 3 production factors, has determined us to choose it for our analysis.

In our study, we will analyze and compare GDP (as indicator of economic performance) and labor (as factor of influence for economic performance) for EU member countries and Azerbaijan.

1. Theoretical and methodological bases

Our study relies on statistical analysis performed on data provided by Eurostat and World Bank. We are using data recorded from 2007 until 2018 for GDP, structure of population by age and unemployment rate.

The main goal is to identify groups of countries having similar group countries and neighboring groups, in order to improve performances of their own countries.

An ANOVA test is performed in order to determine the above mentioned groups. Important to mention is that ANOVA test is conclusive only if input data follow a normal distribution.

Thus, before performing the ANOVA test, a Saphiro-Wilk test is performed in order to test whether hypothesis –data are following a normal distribution– can be rejected or not. The Saphiro-Wilk test was chosen due to its‘ performances for small samples of data.

All tests (ANOVA and Saphiro-Wilk) are performed with a 95% confidence level. Statistical analysis are performed using Statgraphics Centurion software.

2. Results and discussions

This section is presenting the statistical analysis performed, being split in 3 paragraphs, each one dedicated to an economic indicator (GDP, unemployment and structure of population by age).

2.1. Analysis of GDP

GDP values are obtained from Eurostat [6] for countries member of EU and from World Bank for Azerbaijan [7]. Considering that World Bank is reporting GDP in USD, an annual average exchange rate provided by statista.com [exchange rate] is used to convert GDP to EURO.

Thus, the following data are available for GDP recorded by EU countries and Azerbaijan during 2007 – 2018. GDP in billion euros is calculated at current prices.

Table 1.

GDP in billion euros, calculated at current prices

country /period	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
M										
CY	18.7	19.3	19.7	19.5	18.1	17.6	17.7	18.5	19.6	20.7
EST	14.1	14.7	16.7	17.9	18.9	20.1	20.7	21.7	23.6	25.7
LV	18.7	17.8	20.2	22.1	22.8	23.6	24.3	25.0	27.0	29.5
AZ	31.9	39.8	47.4	54.4	55.8	56.6	47.8	34.1	36.2	39.8
LT	26.9	28.0	31.3	33.3	35.0	36.6	37.4	38.8	42.2	45.1
SLO	36.3	36.4	37.1	36.3	36.5	37.6	38.9	40.4	43.0	45.8
HR	45.1	45.2	44.8	44.0	43.8	43.4	44.6	46.6	49.0	51.5
BG	37.3	38.2	41.3	41.9	41.9	42.8	45.3	48.1	51.7	55.2
L	37.0	40.2	43.2	44.1	46.5	49.8	51.6	53.3	55.3	58.9
SK	64.0	67.6	70.6	72.7	74.2	76.1	79.1	81.2	84.9	90.2
H	94.3	98.8	101.3	99.5	101.9	105.5	110.9	113.9	124.1	131.9
GR	237.5	226.0	207.0	191.2	180.7	178.7	177.3	176.5	180.2	184.7
P	175.4	179.9	176.2	168.4	170.3	173.1	179.8	186.5	194.6	201.6
RO	125.2	125.4	131.9	133.1	143.8	150.5	160.3	170.4	187.5	202.9
CZ	148.7	156.7	164.0	161.4	157.7	156.7	168.5	176.4	191.7	207.8
FIN	181.0	187.1	196.9	199.8	203.3	205.5	210.0	216.1	223.9	232.1
DK	231.3	243.2	247.9	254.6	258.7	265.8	273.0	282.1	292.8	298.3
IRL	170.1	167.7	170.8	175.1	179.7	194.8	262.8	271.7	297.1	324.0
A	288.0	295.9	310.1	318.7	323.9	333.1	344.3	356.2	369.9	386.1
BE	348.8	365.1	379.1	387.5	392.3	400.1	411.1	424.6	439.2	450.5
S	310.0	369.5	405.4	423.8	436.2	433.1	449.2	463.1	475.2	466.9
PL	317.1	361.8	380.2	389.4	394.7	411.2	430.3	426.5	467.3	496.5
NL	624.8	639.2	650.4	653.0	660.5	671.6	690.0	708.3	738.1	774.0
SP	1079.1	1080.9	1070.4	1039.8	1025.7	1037.8	1081.2	1118.7	1166.3	1208.2
IT	1572.9	1604.5	1637.5	1613.3	1604.6	1621.8	1652.1	1689.8	1727.4	1757.0
FR	1936.4	1995.3	2058.4	2088.8	2117.2	2149.8	2198.4	2234.1	2295.1	2353.1
UK	1725.4	1850.5	1894.9	2089.6	2074.0	2287.9	2611.9	2403.4	2338.0	2393.7
D	2445.7	2564.4	2693.6	2745.3	2811.4	2927.4	3030.1	3134.1	3245.0	3344.4

Performing a Saphiro-Wilk test, the hypothesis “GDP values for the period 2007-2019 are coming from a normal distribution” can’t be rejected with a 95% confidence level for the following countries:

Table 2.

Normally distributed GDP according to Saphiro-Wilk test with 95% confidence level

country	M	CY	EST	LV	AZ	LT	BG	L	SK
p-value	0.4060	0.7676	0.9569	0.9745	0.3017	0.9615	0.4263	0.9786	0.9962

country	H	P	RO	CZ	FIN	DK	A	BE	S
p-value	0.2234	0.2718	0.2794	0.0938	0.9900	0.9377	0.9492	0.9866	0.1098

country	PL	NL	SP	IT	FR	UK	D
p-value	0.9890	0.3859	0.1695	0.3389	0.9965	0.7730	0.9522

Performing the same test, the hypothesis “GDP values for the period 2007-2019 are coming from a normal distribution” can be rejected with a 95% confidence level for the following countries:

Table 3.

GDP not following normal distribution according to Saphiro-Wilk test with 95% confidence level

country	SLO	HR	GR	IRL
p-value	0.017231	0.025755	0.010784	0.02477

As a result of Saphiro-Wilk tests performed, Slovenia, Croatia, Greece and Ireland will be excluded from the ANOVA test performed to determine the groups of countries.

With a 95% confidence level, ANOVA test is indicating existence of 14 homogenous groups regarding economic performances. Those groups are:

Group 1: Malta, Cyprus, Estonia, Latvia, Lithuania, Azerbaijan, Bulgaria, Luxemburg, Slovakia;

Group 2: Lithuania, Azerbaijan, Bulgaria, Luxemburg, Slovakia, Hungary;

Group 3: Slovakia, Hungary, Romania;

Group 4: Hungary, Romania, Czech Republic, Portugal;

Group 5: Romania, Czech Republic, Portugal, Finland;

Group 6: Finland, Denmark;

Group 7: Denmark, Austria;

Group 8: Austria, Belgium, Poland;

Group 9: Belgium, Poland, Sweden;

Group 10: The Netherlands;

Group 11: Spain;

Group 12: Italy;

Group 13: France, United Kingdom;

Group 14: Germany.

Azerbaijan is present in two different groups, Group 1 and Group 2, together with countries like: Malta, Cyprus, Estonia, Latvia, Lithuania, Bulgaria, Luxemburg, Slovakia and Hungary.

Azerbaijan is generating it's GDP mainly from oil industry, while fellow countries from Groups 1 and 2 are generating their GDP from tourism (Cyprus, Bulgaria), IT industry (Estonia, Latvia, Lithuania) or production (Slovakia, Hungary).

What Azerbaijan can learn from this is that a diversification of it's economy may contribute to an increase of GDP. Thus also dependency on oil and gas prices and production is mitigated and situation like that from 2015 will be better handled and overcome. Idea is sustained also by Markowitz model applicable on stock market (diversification of portfolio is mitigating risk) [2].

Does Azerbaijan have necessary production factors for this diversification?

Regarding capital and resources we might definitely answer YES. Azerbaijan has the capacity to generate financial capital based on oil and gas industry, while infrastructure is already under development process. Resources are variate (oil, gas, metalliferous resources, non-metallic resources, agriculture potential – cotton, pomegranate, winery, tourism potential) and widely available in the country or in the Caspian Sea area.

For analyzing availability of labor, necessary for sustaining a diversification strategy, we will study the structure of population by age and unemployment.

2.2. Analysis of populations structure by age

According to Eurostat [9], Azerbaijan has the following structure of population:

Table 4.

Distribution of Azerbaijan population by age during 2007-2018

period	groups of age				
	0-14	15-24	25-49	50-64	>65
2007	23.80	20.80	38.50	9.80	7.10
2008	23.20	20.80	38.50	10.50	7.00
2009	22.60	20.70	38.40	11.50	6.70
2010	22.60	20.50	38.60	12.40	5.90
2011	22.30	20.00	38.50	13.40	5.80
2012	22.20	19.40	38.50	14.10	5.70
2013	22.30	18.60	38.60	14.80	5.80
2014	22.40	17.80	38.60	15.40	5.80
2015	22.40	17.00	38.70	15.90	6.00
2016	22.50	16.10	38.80	16.40	6.10
2017	22.60	15.30	38.90	16.80	6.30
2018	22.60	14.70	39.00	17.20	6.60

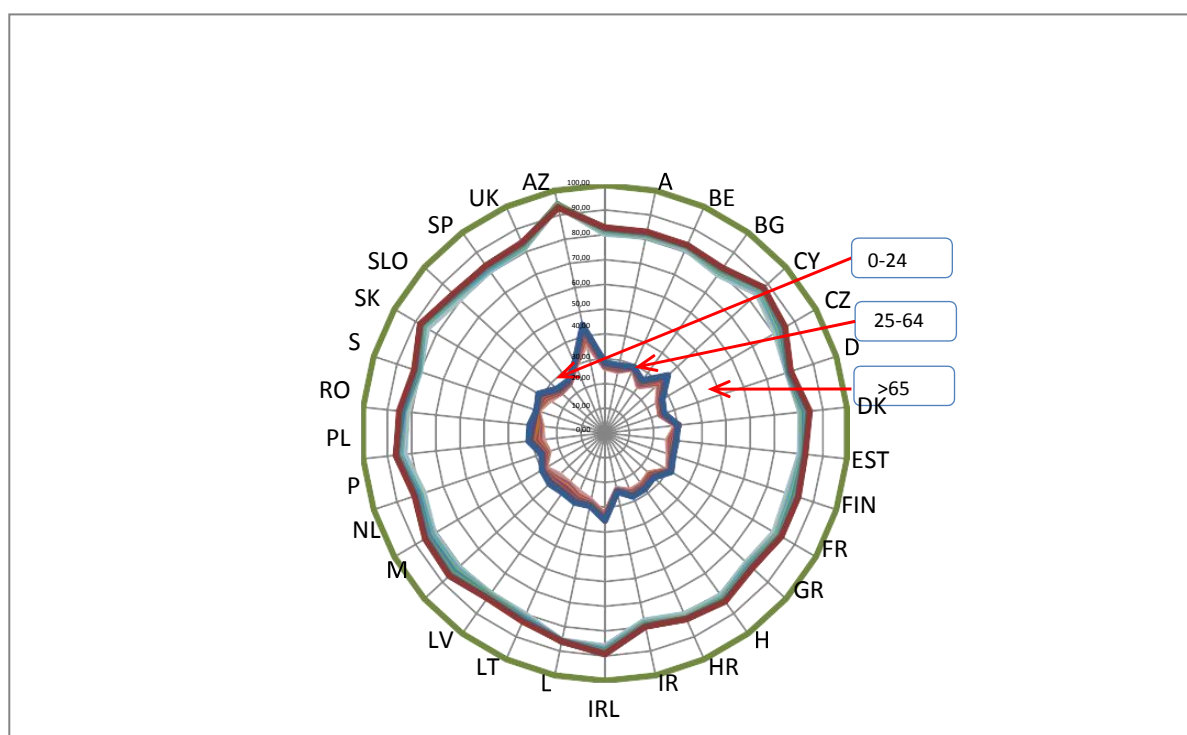
This distribution of population is very promising for sustaining the Azerbaijani economy, considering that approximately 40% of the population is under 24 years, approximately 50% of the population is between 25 and 64 years and only 10% is above 65 years old.

Young population (<24 years old) represents a potential labor force for sustaining development of IT and services, while mid-age population (between 25 and 64 years old) represents a potential labor force for sustaining diversification of industry.

Comparing population of Azerbaijan with population of European countries the following chart is obtained:

Chart 1.

Distribution of population by age in EU and Azerbaijan during 2007-2018



It is clearly visible that Azerbaijan has the best structure of population among all European countries. This remark is sustained not only by the above chart. The ANOVA test performed to identify homogenous groups reveals, with a 95% confidence level, that:

- 17 homogenous groups are identified for young population (0 to 24 years old), Azerbaijan being included alone in Group 17– an average of 41.1% of population is under 24 years old, compared with the lowest rated group with an average of 24% of the population.

- 13 homogenous groups are identified for mid-age population (25 to 64 years old), Azerbaijan being included in Group 1, together with Denmark and Finland - an average of 52% of the population is in this group, compared with the lowest rated group with an average

of 57% of the population.

– 14 homogenous groups are identified for old population (above 65 years old), Azerbaijan being included alone in Group 1 –an average of 6% of the population is in this group, compared with the lowest rated group with an average of 21% of the population.

As a conclusion for the ANOVA test we might say with a 95% confidence level that Azerbaijan has a young population, sustaining the conclusion generated by Chart 1.

Thus design of a diversification strategy for Azerbaijani economy is sustained by population structure and implementation of this strategy has high chances of success (considering structure of population).

2.3. Analysis of unemployment

Although Azerbaijan has a very good structure of population (the best in Europe – better than that of the direct followers: Cyprus and Ireland) is the unemployment rate sustaining a diversification strategy for economy?

Unemployment data are provided by Eurostat – for EU countries [10] and World Bank for Azerbaijan.

By performing Saphiro-Wilk test for all European countries and Azerbaijan, we conclude, that only in case of Romania the hypothesis – *“unemployment values for the analyzed period are coming from a normal distribution”* can be rejected with a 95% confidence level. Thus Romania is excluded from the ANOVA test.

The ANOVA test emphasizes with a 95% confidence level the existence of 11 homogenous groups. Azerbaijan is situated in Group 1, together with: Germany, Austria, Czech Republic, Luxemburg, Malta, The Netherlands, United Kingdom and Denmark. The average unemployment rate for this group is 5.6%, compared with the lowest rated group (Greece and Spain) with an average unemployment rate of 20.8%

According to these data, Azerbaijan has a low unemployment rate and thus an active population, well trained and with a good moral.

Conclusion

For increasing economic performances Azerbaijan might diversify its' economy, by adding IT, services, tourism and industry diversification to its' current economic structure based mainly on gas and oil industry.

This diversification is sustained by all 3 production factors: capital, resources and labor. Regarding labor, Azerbaijan has the best population structure compared to all European countries and an active and well trained population with a good moral, sustained by low unemployment rate.

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USE OF PREDICTING MODELS TO FORECAST THE APPEARANCE OF DOWNY MILDEW OF GRAPES

Abstract

Regarding the management of pests and diseases, forecasting models assist producers in estimating the possibility of disease in their crops and in the selecting and timing of preventative applications. The aim of this study was to evaluate the accuracy of weather-driven models for predicting infection by *Plasmopara viticola* in vineyard located in Giannakochori Naoussas, Macedonia, Greece. A spray programme, applied based on the models index, was compared with the conventional spray programme applied by growers. The results showed that the use of the model for scheduling spray applications reduced the number of sprays relative to the conventional spray programme, while achieving similar levels of disease control.

Keywords: Disease forecast model, *Plasmopara viticola*, vineyard.

Introduction

The system of precision agriculture has been introduced in European countries in the last decade of the 20th century. It spreads rapidly mainly in order to reduce chemical inputs (pesticides-fertilizers) in agricultural industry. So far, the introduction of this system in agriculture demonstrates the significant contribution to the protection of consumer health, to produce quality and safe agricultural products, to increase the economic performance of farm and environmental protection.

Plant protection is probably the most important and also the most difficult part of these systems. In particular, regarding the management of diseases, forecasting models assist producers in estimating the possibility of disease in their crops and in the selecting and timing of preventative applications. The use of fungicides (systemic or protectant), normally applied on a regular schedule throughout the growing season, to control downy mildew is an essential component of grapes in many parts of world. However, raising cost, environmental pollution and food safety has driven governments to force producers to consider more efficient approaches to the use of fungicides. A rational and cost-effective policy of fungicide use must consider the effects of environment, host, fungicide, and pathogens on the efficacy of downy mildew management. Analysis with plant disease models may aid these considerations. Computer-assisted Decision Support Systems (DSSs) have proven to be reliable in reducing the use of plant-protection products without affecting net returns in many countries (Murali

and Secher, 1996; Rogers and Stevenson, 2006; Tamošiunas et al., 2000).

The aim of this study was to evaluate the accuracy of weather-driven model for predicting infection by *Plasmopara viticola*, in Giannakochori Naoussas, Macedonia, Greece.

Materials and Methods

The generic model developed by Magarey et al. (2005) modified for downy mildew was used. All the experiments were conducted in the commercial vineyards of the Company Kir Giannis, located in Giannakochori Naoussa (Imathia Prefecture), where a telemetric meteorological station was established at the orchard level. The following parameters were used to run the model based on the results produced in the above experiments: minimum temperature, maximum temperature, optimum temperature, minimum leaf wetness, maximum leaf wetness. The leaf wetness is estimated from the hourly data.

The presence of overwintering inoculum was assured because the two peach orchards had shown leaf symptoms in the previous season and had not been sprayed with fungicide at leaf fall or at the end of winter. The vineyard was grown according to common cultural practices so that the results would be representative of those from commercial orchards. A spray programme applied based on the models index was compared with the conventional spray programme applied by growers. Three treatments were applied: unsprayed vines (control), sprayed according to the conventional spray programme and vines sprayed according to the model index. The experimental design was completely randomized. There were 4 replicates of 3 trees for each treatment.

To test significant differences between treatments, the Generalized Linear Models procedure of SPSS was applied (SPSS Grad Pack 17, SPSS Inc., Chicago, Illinois). Significant differences between treatments were tested by the Wald Test at $P = 0.05$.

Results and Discussion

Disease forecasting has become an essential component of quantitative epidemiology. The mathematics of disease dynamics is the core of several disease forecasting models that have been developed in the last four decades (Orlandini et al., 2008).

The results showed that the use of the model for scheduling spray applications reduced the number of sprays relative to the conventional spray programme while achieving similar levels of disease control. The number of sprays applied following the model was 2 less than the number applied following the conventional spray programme (Table 1).

Table 1.

Spray programme applied against downy mildew of grapes

Conventional Spray Programme		
Date of Application	Trade Name	Active Ingredients
6 th May	M45	Mancozeb
17 th May	Acrobat	Dimethomorph
3 rd June	Dynali + Forum	Difenoconazole: Cyflufenamid + Dimethomorph
15 th June	Forum	Dimethomorph
Spray Programme Applied According to the Model Index		
2/5/2014	Stroby	Krezomyl Methyl
18/6/2014	Ridomil	Metalaxyl + Mancozeb

There were no significant differences among the conventional spray programme and the spray programme applied according the model index. In contrast the unsprayed vines had a significantly higher incidence of infected leaves than vines in all other treatments (Table 2).

Table 2.

Level of infections from downy mildew in different treatements

Treatments	Percentage of Infected leaves	
Conventional spray programme	3.6	a
Spray Programme Applied According to the Model Index	12.8	a
Untreated control	23.4	b

This work indicated that the forecasting model can be used to predict infection by *Plasmopara viticola* and to schedule fungicide applications. Thus, growers in Greece should spray their vineyards only when the model predicts a risk for infection. Further investigations should be conducted to correlate the level of risk by *Plasmopara viticola* incidence in order to determine when fungicide sprays are economically justified.

Values in the same column followed by different letters are significantly different at $P=0.05$ according to Wald Test.

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Xülasədə tədqiqatın məqsədi, metodologiyası, tətbiqi əhəmiyyəti, nəticələri, orijinallığı və elmi yeniliyi qısa şəkildə əks etdirilməlidir.

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Məqalələr jurnalın rəsmi saytında www.audit-journal.az qeydiyyatdan keçərək və «Müəllif anketi» dolduraraq təqdim edilir. Məqalənin unikallığına, daha öncə digər nəşriyyatda nəşr edilmədiyinə və yaxud digər nəşriyyata çap üçün təqdim edilmədiyinə görə müəllif tam məsuliyyət daşıyır. Məqalənin nəşri üçün müəyyən edilmiş ödəniş köçürmə və ya nağd yolla həyata keçirilir.

6. Ədəbiyyat siyahısının tərtibatı.

Ədəbiyyat siyahısında son 5-10 ilin elmi məqalələrinə, monoqrafiyalarına və s. üstünlük verilməlidir. Mətnin altında sətirlətin istinadları məqsədəuyğun deyildir. İstinad olunan mənbənin bibliografik təsviri verildikən Azərbaycan Respublikasının Prezidenti yanında Ali Attestasiya Komissiyasının «Dissertasiyaların tərtibi qaydaları» barədə qüvvədə olan təlimatının «İstifadə edilmiş ədəbiyyat» bölməsinin 10.2-10.4.6 tələbləri əsas götürülməli.

Məqalənin mətnində istinad olunmuş mənbələr ədəbiyyat siyahısında əlifba sırası ilə yazılmalı və nömrələnməlidir. İstinad olunmuş mənbənin ədəbiyyat siyahısındakı nömrəsi mətdəki istinaddan sonra kvadrat və ya adi mötərizədə göstərilir. Məsələn: [115, s.32-33] və ya (115, s.32-33).

Məqalənin mətnində istifadə edilmiş mənbələr çap olunduqları dillərdə (əvvəlcə Azərbaycan, sonra türk, rus, ingilis, fransız, ərəb və s.) əlifba sırası ilə ardıcıl nömrələnərək siyahıda göstərilir. Siyahı aşağıdakı ardıcılıqla tərtib olunmalıdır: normativ-hüquqi aktlar, əlifba sırası ilə dillər üzrə ədəbiyyatlar, internet resurslar.

AUTHOR GUIDELINES

General information.

The scientific-practical journal «Audit» has been publishing by Baku Business University Press since 1999. The journal focuses on creation of a platform for international cooperation within exchanging the results of scientific researches in the spheres of audit, accounting, finance, economy, law, administration, determination of actual problems of the spheres listed above and to find out the solutions of these actual problems.

Thematic headings of journal:

- Audit, accounting, statistics;
- Budget, finance, credit;
- Directions of development of market economy;
- Law and administration.

The journal is published quarterly (4 times per year-March, June, September, December).

Submitted articles will be subject to double-blind peer review process:

- the reviewer does not know the personal information of the author / authors;
- the author / authors do not know the personal data of the reviewer.

The period of review is 5-10 days from receipt of the manuscript by reviewer. If additional time for review is necessary, this period may be extended at the request of the reviewer.

Only original (the results (or any part of submitted manuscript) used in the manuscript have not been sent for publication to any other journal nor have already been published) submissions are accepted for publication. All submissions are scanned for plagiarism and when plagiarism is detected the article is rejected for publication.

The editorial office of «Audit» follows the guidelines of Committee on Publication Ethics (COPE) on publication ethics.

Requirements to the content and structure of articles.

1. Submitted articles can be in Azerbaijani. English. Russian.

2. A full research paper should have following components:

- Full information about author (s) - name(s) of the author(s)/title, workplace and position, the address(es), e-mail address (right corner):

- Universal Decimal Classification (UDC) (left corner);
- Title of the article (the title should not exceed 12 words) (center);
- Abstract (100-200 words);
- Keywords - 6-8 items;
- Text of the article;
- References (10-15 sources);

- Abstracts and keywords in other two languages (for example, **if the article is in Russian, abstracts and keywords in Azerbaijani and English are necessary (with the information about the author and the name of the article in these languages), so is respectively for articles in English and Azerbaijani**).

Abstracts must consist of the purpose of the research, the methodology of the research, the practical importance of the research, the results of the research, the originality and scientific novelty of the research.

3. The structure of the text must consist of Introduction, the main text (subheadings can be used) and Conclusion. The content of Introduction is determined by the author. If there are subtitles in the text, their headings are given in the center in bold. The main results of the research are summarized in Conclusion.

4. Text design requirements.

- the manuscript should be 9-13 pages;
- font size – 14, type – Times New Roman;
- **margins**-right – 2,5 cm, left – 2,5 cm, upper – 3,5 cm, under – 3 cm;
- **indent** – 1;
- tables, diagrams, pictures, graphs and schemes should be colorful and high quality. Tables, pictures, graphs, schemes should be given in the text by typing the names and sequence numbers. The table and diagrams names and row numbers should appear at the top, the names and the number of the pictures, graphs and schemes should be written below.

5. Authors can submit their articles by registration on the official website of the journal www.audit-journal.az, filling in the “Authors Questionnaire”. Authors are fully responsible for uniqueness of the article and for it has not been published previously in other publishing houses or submitted for publication in other publishing houses. The payment determined for publishing is carried out either in cash or by transfer.

6. References.

When compiling a list of references, preference should be given to sources of the last 5-10 years. Sources must be arranged alphabetically in the list of references. The list of used literature should be compiled in accordance with paragraphs 10.2-10.4.6 of the section "Making a List of Literature" of the current "Rules for Compiling Dissertations". approved by the Higher Attestation Commission under the President of the Republic of Azerbaijan. A reference to the bibliographic source in the body of the article is given in square [9, p. 27-28] or round (12, p.135) brackets indicating the ordinal number of the source from the references and page number referenced by the author.

The used sources must be sequentially numbered in alphabetical order in the languages of publication (first, the sources in Azerbaijani, then in Turkish, Russian, English, French, Arabic, etc.). The list must be compiled in the following order: legal acts, literature in alphabetical order, internet sources.

ПРАВИЛА ДЛЯ АВТОРОВ

Научно-практический журнал «Аудит» издается с 1999-го года и является научным периодическим изданием Бакинского Университета Бизнеса. Журнал издается с периодичностью 4 раза в год (март, июнь, сентябрь, декабрь). К публикации в журнале принимаются ранее не опубликованные, либо не представленные для печати в другом издательстве оригинальные научные статьи в соответствии с тематикой журнала.

Все статьи, представленные в редакцию проверяются на уникальность посредством программы плагиата (в случае обнаружения плагиата, статья к печати не принимается), а также проходят двойное слепое рецензирование, о результатах которого авторам сообщается в течении 5-10 дней.

Редакция журнала «Аудит» придерживается международных стандартов в области публикационной этики, отраженных в рекомендациях Комитета по этике научных публикаций (Committee on Publication Ethics - COPE).

Тематические рубрики журнала:

- Аудит, учет, статистика
- Бюджет, финансы, кредит
- Направления развития рыночной экономики
- Право и управление.

1. К печати принимаются статьи на азербайджанском, английском, русском языках.

2. Структура представленных статей:

- информация об авторе (полное И.Ф.О., научная степень, представляемое учреждение (название), адрес (почтовый индекс, страна, город, улица), адрес электронной почты) – в верхнем правом углу;

- УДК статьи – наверху, слева;

- название статьи (до 12-ти слов) – посередине, прописным, жирным шрифтом;

- Резюме на языке статьи (100-200 слов);

- Ключевые слова на языке статьи (6-8 слов);

- Текст статьи;

- Список использованной литературы (10-15 источников);

- Резюме и ключевые слова на иных языках (если статья на русском – резюме и ключевые слова на английском и азербайджанском языках, на других языках – соответственно), с указанием названия статьи и информации об авторе на этом языке.

Резюме должно состоять из следующих элементов: цель исследования, методология исследования, практическая значимость исследования, результаты исследования, оригинальность и научная новизна исследования.

3. Структура текста статьи:

Статьи, представленные в редакцию для печати должны состоять из Вступления, основного текста (может состоять из подзаголовков) и Заключения. Содержание Вступления определяется самим автором. Если в основном тексте были использованы подзаголовки, их названия даются посередине, жирным шрифтом. В Заключении даются основные результаты исследования в обобщенном виде.

4. Технические требования:

- формат – А4;

- шрифт - Times New Roman 12;

- интервал – 1;

- объем – 9-13 страниц;

- поля: слева - 2,5 см, справа - 2,5 см, сверху - 3,5 см, снизу – 3 см;

- таблицы, схемы, диаграммы, рисунки и графики должны быть цветными и высокого качества, а также должны быть приведены в тексте с указанием названий и номеров. Номера и названия таблиц и диаграмм должны быть указаны вверху таблицы, номера и названия рисунков, схем и графиков указываются внизу.

5. Представление статей в редакцию для печати:

Статьи представляются к печати через регистрацию на официальном сайте журнала - www.audit-journal.az, путем заполнения «Анкеты автора». Ответственность за оригинальность статьи, а также за то, что статья не была ранее издана либо не представлена (не находится на рассмотрении) для печати в иное издательство несет автор. Плата, предусмотренная для печати может быть выплачена наличными либо путем перевода.

6. Список использованной литературы:

При составлении списка литературы, предпочтение должно быть отдано источникам последних 5-10 лет. Список использованной литературы должен быть составлен в соответствии с пунктами 10.2-10.4.6 раздела «Оформление списка литературы» действующих «Правил составления диссертаций», утвержденных Высшей Аттестационной Комиссией при Президенте Азербайджанской Республики.

Список литературы должен быть составлен в алфавитном порядке и пронумерован. Номер источника в списке литературы должен быть указан в тексте статьи в круглых (12, с.135) либо квадратных скобках [9, с. 27-28], с указанием использованной страницы.

Использованные источники должны быть последовательно пронумерованы в алфавитном порядке на языках публикации (сначала источники на азербайджанском языке, далее на турецком, русском, английском, французском, арабском и др.). Список составляется в следующем порядке: нормативно-правовые акты, учебники в алфавитном порядке, интернет ресурсы.

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