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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 economic activity and production. This relationship was studied in two different ways by

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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}^d and Input 2 is y_{i2}^d and and input j is y_{in}^d , 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.

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

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:

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

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

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.

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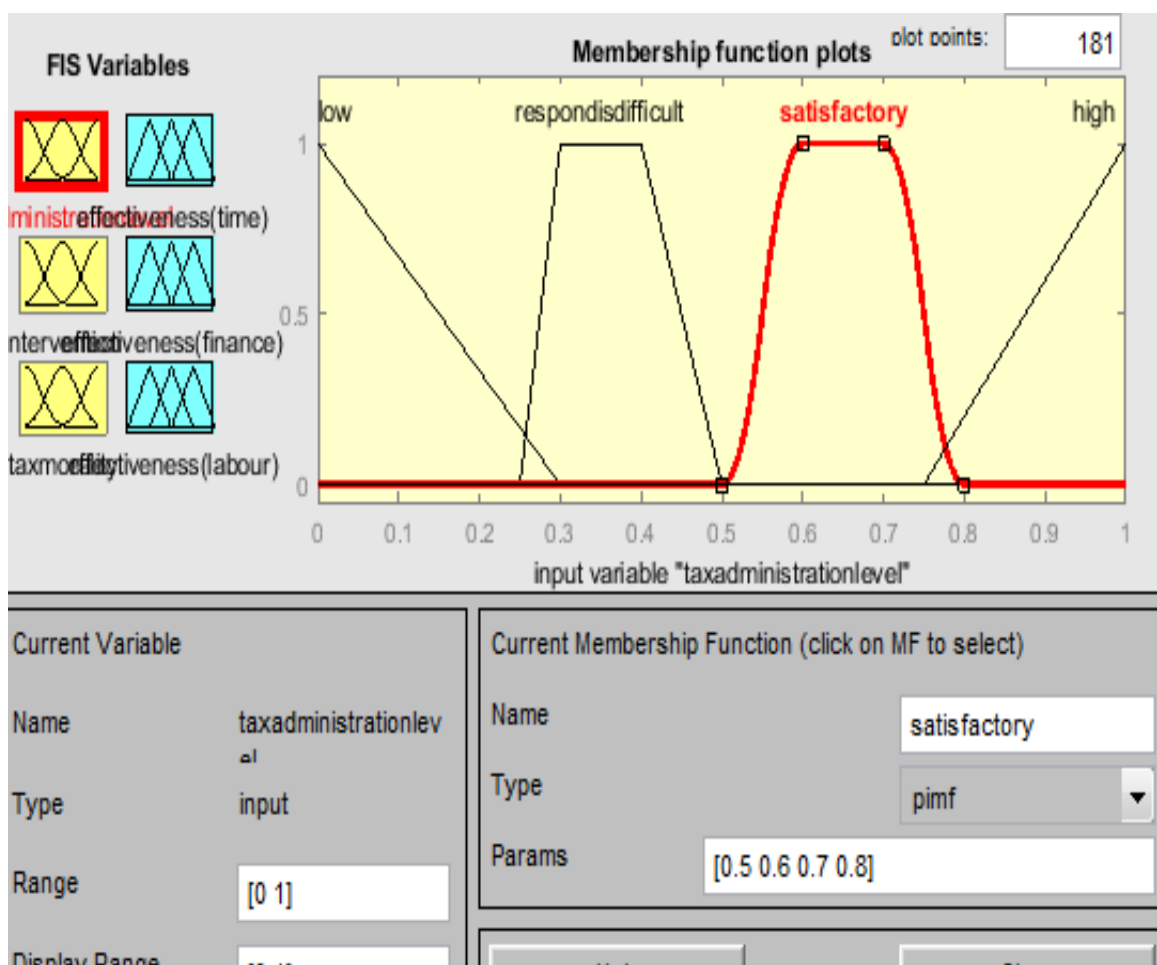
qualitative indicators with the new term “effectiveness” for each of the financial, time, and labor expenditures was obtained.

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.

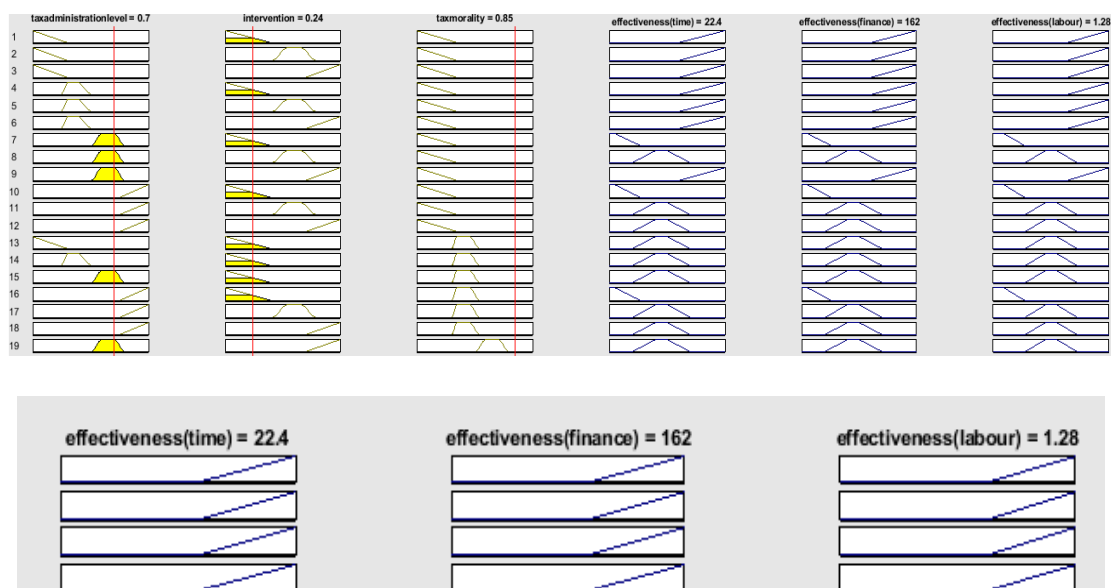
Membership functions of the “organization level of tax administration” input variable.



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.

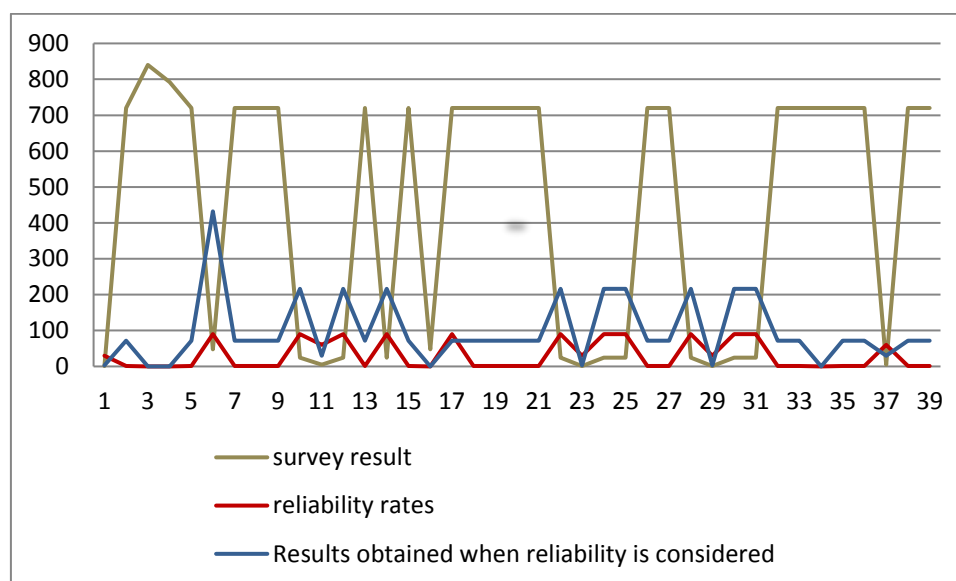
The results of the proposed methodology according to only the time spent and comparison with the World Bank's Doing Business report

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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