The New Approach to Monitoring and Recording Of the Tax Based On the New Technological Solutions and Knowledge Bases

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Abstract:
In this paper, we propose a different use, presentation and observation of the tax system in Bosnia and Herzegovina based on ontologies, knowledge bases and new software solutions. The idea that this region comes to a supportive business environment that would allow a more stable business, more foreign investment, development and higher employment rate. Something that could provide in one segment a stimulating business environment is the possession of registries of all tax levies. Therefore, here we propose the use of ontologies and new software solutions based on Protégé for recording and monitoring of the tax. We propose a different way of recording tax levies and through an iterative approach we will form the knowledge base of the tax system in Bosnia and Herzegovina.

The keywords: taxes, knowledge bases, new software systems, more efficient exchange of knowledge

1. INTRODUCTION

The tax system represents the totality of the tax forms of one country and represents a set of tax forms that are connected with common objectives which taxation should achieve. There are two basic objectives that should be achieved by taxation, namely: fiscal and non-fiscal objectives. Fiscal objectives imply that with taxation it is necessary to raise sufficient funds to settle various public expenditures. Non-fiscal objectives are related to the effects which are achieved by the tax policy in the fields of economic and social life.

Tax systems differ between countries. Those differences are primarily caused by the political and economic system. The place and the role of certain forms of taxation are different in the industrialized countries and in the countries that are in the transition phase.

Each country that could provide funding of military, police, judiciary, public administration and similar must have at its disposal a certain amount of money, which will be expressed through a system of public revenues. Under public revenues are included funds that the state collects or obtains by fiscal means and on the basis of their fiscal sovereignty [1]. The largest portion of these revenues the state collects from taxes in the tax system.

In financial theory under the tax system are implied public revenues and public expenditures. That system includes a collection of various forms of taxes, contributions, fees and other charges that exist in the country, where, while maintaining the characteristic of each form of revenue provides their homogeneity primarily in the objectives and effects to each of these forms of public revenues and the tax system as a whole.

Bosnia and Herzegovina is a complex social community which is consisted of three legal and economic systems and is formed of two entities the Federation of Bosnia and Herzegovina (which has 10 cantons and 84 municipalities/cities), the Republic of Srpska (which has 63 municipalities/cities) and the District of Brcko.

Accordingly, there are: Taxes on the state level, taxes on the entity level, taxes on the District level, the Cantonal taxes – taxes on the cantonal level, municipality/city taxes – taxes on the level of a municipality/city. A good portion of the tax is divided between the state, entities, cantons and municipalities.

For example: taxes on agriculture and forestry belong to the municipalities/cities, the tax on the income from self-employment is divided between entities and municipalities/cities in the ratio of 75% :
25% [2], while the annual income tax; tax on income from copyrights, patents and technical innovations; income from capital; tax on rental income and similar belong to the budget of the entity and the taxes on added value, customs revenues and excise duties belong to the state of Bosnia and Herzegovina. In this paper, due to the volume we will deal more with taxes at the state level rather than the entity, cantonal and municipality/city taxes.

In Bosnia and Herzegovina are distinguished direct and indirect taxes. Direct taxes are: personal income tax, corporate income tax, taxes of citizens, taxes on tobacco and the like, while the indirect taxes are: VAT, customs, excise and road tolls.

We can cite the fact that according to the World Bank study in 2014 of 189 countries B&H is on the 135th place according to the criteria for “the simplicity of paying taxes”. From all of the EU Member States, France has the biggest tax on workers’ salaries - 47%. In Germany amounted to 45% and in Austria, Italy and Hungary about 40%. Below 30% are levies on the wages of the workers in the UK, Iceland and Switzerland and between 30 and 35% amount in Netherland, Norway, Poland and Bulgaria.

It is believed that the taxes in Bosnia and Herzegovina (B&H) are too high and that the collection system is rather expensive and irrational according to its level of development. Because of their height a small number of business systems and citizens pay them and even those who want to pay give up when they encounter a very complex tax bureaucracy. They often assess the tax system as “the tax hell”. Everyone warns that the taxes are too high, and that the regulations that govern them are complicated, so that the tax officials themselves badly interpret them. Everybody agrees that this tax system is a big burden for business subjects and citizens, but nobody does anything to improve the situation. High taxes, frequent changes in tax regulations and their often arbitrary interpretation are one of the reasons for the poor performance of their collection.

In this paper, we propose some of the solutions which can provide the business systems (enterprises, organizations and institutions) and natural persons an easier and faster coming to the necessary knowledge of the tax system in Bosnia and Herzegovina. For this we will use new software solutions based on knowledge bases and ontologies.

2. NEW SOFTWARE SOLUTIONS AND ONTOLOGIES

Ontology presents a conceptual idea for expressing knowledge. Chi and Hsu [3] the approach to the development of ontology define as a process of inclusion and acquiring knowledge, its storage, finding and use. Ontology defines a particular area through the dictionary of fields, basic concepts, classifications of these concepts and connections of the concepts with the defining of the rules that govern among them. This is a detailed description of the structure of an area of knowledge, with the formal definition of mutual relationships and connections between different elements of that area [4]. It is used for knowledge representation, knowledge management, modelling and shaping of the databases, searching and downloading of the required knowledge.

Boose and Gaines [5] describe ontologies as knowledge of a domain in a generic way and provide understanding of that domain and represent a set of terms and relations between them, which describe a particular domain or area of knowledge. The domain can be any subject area, regardless of its level of generality.

One can ask the question: Why to develop ontology in the monitoring system of the taxes in Bosnia and Herzegovina? We think it would be more efficient to share information and knowledge and to use better the knowledge domain analysis. Tax system based on ontology would provide: software agents to seize the necessary information and knowledge to arrive to the necessary knowledge for more efficient management of the tax system in Bosnia and Herzegovina.

Paulheim [6] defines three reasons for using ontology: better transparency, better interaction between the system and the user, unique knowledge base. Why these reasons wouldn’t be used in the system of keeping track of all types of taxes?

There is no unique methodology for the development of ontologies and in this paper we will use iterative approach. We will mention the basic knowledge of the tax system and some individual taxes and then through certain revisions and improvements to reach a basis for a new system of
managing the tax system. Knowledge base will be extensible and will be able to provide a necessary information and knowledge to the citizens and business systems.

That model that we propose is based on a lot of research of Savvas [7] and Vassilakis [8] who had first introduced the method of modelling the ontology in the domain of e-Business. Those who work on the implementation of the new concept of serving are using the ontological model in order to provide semantic interoperability in a multi-agent environment.

Ontologies allow to achieve a higher level of functionality through [9]: increased precision in searching, linking information and knowledge on pages with their associated knowledge structures and inference rules, the exchange of knowledge between people and software, providing structure for the transmission of information in the field of linked data, and the possibility of upgrading and changing in accordance with the needs.

Here we present only a part of a necessary knowledge required to effectively use ontologies in the managing process of the tax system in Bosnia and Herzegovina.

There are a large number of languages and tools for describing ontology. Among ontological languages, OWL (Web Ontology Language) is mostly in use and the tool for editing ontology “Protégé-OWL “. OWL is a development environment presented by the World Wide Web Consortium (W3C).

Protégé is a open source platform that allows users to: read and store ontologies, updating and defining characteristics of logical classes and carrying out the causes and update. Protégé allows the display of meaning of the terms and relationships between those terms. It was developed in the Stanford Research Center of Biomedical Informatics at the faculty of Medicine at Stanford University in California [10].

Here we used Protégé platform for reading and storing ontologies, for updating the knowledge necessary for managing the taxes. To achieve this, we adhere to the W3C recommendations for a formal description of concepts, terms and relationships in Web Ontology Language (OWL).

In this paper, we will update basic knowledge about taxes using Protégé platform.

Although, there is a large amount of knowledge their presentation in this paper will be presented only through several screens.

3. THE KNOWLEDGE BASE OF THE TAX SYSTEM IN BOSNIA AND HERZEGOVINA

With the help of the Internet infrastructure and information technologies it is now easier to come to knowledge than ever before. But in the sea of information it is difficult to come to knowledge which is needed in some point. From large amounts of data it is very difficult to come to the desired knowledge or to filter the necessary information. Now the knowledge bases are increasingly using for storing, searching and sharing of knowledge.

Under the knowledge base is implied the collection of facts and rules that the users can provide a specific data, information and knowledge in a particular area. It is a central repository for information, or collection of interconnected knowledge. Here we use it to update the necessary knowledge of the tax system in Bosnia and Herzegovina and it can efficiently provide all necessary information and knowledge about its users.

The role of the knowledge base is to help customers in their search for knowledge, and that they come to the requested information and knowledge faster, easier and from more sources and to share knowledge with other users. It includes relevant national and international regulations, guidelines and strategies, manuals, review articles, professional papers, reports, case studies and similar.

Here we will mention that there are taxes on the level of the state of Bosnia and Herzegovina, taxes at the entity level, taxes at the level of District, Cantonal taxes – taxes on the cantonal level, municipal/city taxes – taxes on the level of municipality/city. Part of the tax is divided between the state, entities, cantons and municipalities.

Due to the limitations of the paper here we only present a part of taxes and a small part of the knowledge base of the tax system in Bosnia and Herzegovina. We will only present the value added
tax, income tax, tax on weapons and the tax on the games of chance, (Figure 1) by using Protégé platform.

![Protégé platform](image)

Figure 1. Knowledge base of the tax system

3.1. VALUE ADDED TAX

Value added tax (VAT) [11] is the most widespread system of taxation of goods and services in the world and it has been applied in more than 120 countries worldwide. This tax is one of the indirect taxes and it is not collected directly from persons who are taxpayers but from persons who are considered to be the final consumers. It allows countries bigger public revenues, especially in countries that are in the classical systems had many problems with tax collection. It’s characteristic that the burden of taxation is borne by final consumers and thus is affected by the poorer strata of the society.

VAT is levied on: goods and services which a taxpayer within the performance of its activities carries out on the territory of Bosnia and Herzegovina for a fee and the import of goods into Bosnia and Herzegovina. The supply of goods involves the transfer of rights to dispose of the things to the person who may dispose of these things as owner. Goods are considered to be items, groups of items and economic goods in which include: water, electricity, gas, heating energy or similar and the supply of goods is considered the transfer of the right to dispose of the goods for a fee based on the decision of the state authorities, local government, or under the law, goods under the contract on the basis of which the commission is payable on the sale or purchase of goods, delivery of goods under a contract of a rent on a certain period, the transfer of rights to dispose of newly-built construction objects or economically divisible units within these objects, the transfer of business assets of a taxpayer by an authorized person, the use of goods of a taxpayer for non-business purposes and the exchange of goods for other goods or services.

The subject of taxation with a VAT is every delivery of goods or services in the territory of Bosnia and Herzegovina for a fee, private consumption, the entry of goods into the customs territory of B&H, and the supply of goods which is performed for a fee, without compensation or with more favorable conditions to the tax payers and their representatives as well as other recipients.

The supply of goods is the transfer of rights to dispose of the things to the person who may dispose of these goods as an owner.

The knowledge base is updated with all the knowledge of the value added tax (Figure 2.) such as:

- The supply of goods on which the VAT is paid (Prometom dobana na koje se plaća PDV) (Transfer of the right to dispose of goods for a fee, the delivery of goods under contract on the basis of which the commission is payable on a sale or purchase, transfer of business assets of the taxpayer and the like).
Persons who are liable to pay VAT (Lica koja podliježu plaćanju PDV), (Taxpayers who perform the supply of goods or services that are subjected to VAT, a tax representative appointed by the taxpayer who has no headquarter in Bosnia and Herzegovina, the recipient of goods and services related to the construction of immovable property, and the like).

What makes the tax base (Šta sve čini poresku osnovicu) (excise tax, customs duties and other important charges, as well as other public revenues, any indirect costs which the taxpayer charges to the recipient of goods and services, any amounts that are charged on returnable packaging and the like);
Services that are exempt from the paying of the VAT, goods relieved from payment of VAT, (Usluge koje su oslobodene od plaćanja PDV-a, Dobra koja su oslobodena od plaćanja PDV-a), and similar (Figure 3.):

Now there is a real chance for reducing the tax benefits of the economic entities on the basis of direct taxes (corporate tax rate and income tax rate since 2008 have been 10% and are one of the lowest in the region). Customs rates are largely harmonized with the rates in the EU, and the VAT rate of 17% is within the average rate in EU (which established that the standard rate of the VAT may not be less than 15%).

3.2. INCOME TAX

Income tax in Bosnia and Herzegovina is prescribed by the law on income tax [12] and is paid by all natural persons who earn income. Under the income of natural persons is meant the sum of taxable income earned in the tax year. Personal income on which the income tax is paid are the net salary and all financial and non-financial revenues, fees and profits which the taxpayer produces on any basis, if the law doesn’t exempt them or they are taxed otherwise.

In the countries of the region the levies are lower than in Bosnia and Herzegovina. So, for example, for the salary of 1,000 euros in Macedonia the employers pay taxes and contributions in the amount of 540, in Serbia 670, in Montenegro 660 and in Slovenia 740 euros. In Bosnia and Herzegovina for the salary of 1000 euros is paid the sum of 800 euros.

In the knowledge base is represented knowledge about (Figure 4.):

![Figure 4. Ontograf – Income taxes](image)

Taxable income (Prihodi koji podliježu oporezivanju) (personal income, income from self-employment, income from copyrights, and similar).

Incomes that are free from tax (Prihodima koji su oslobodeni poreza) (severance pay in case of retirement, severance payments at dismissal, health insurance compensation, compensation for funeral expenses, etc.),
What does not pay tax on income (Na šta se ne plaća porez na dohodak) (pensions, income from protection of war veterans and protection of civil war victims, income deriving from children and maternity allowances, unemployment compensation and similar),

Natural persons who are tax-exempt (Fizička lica koja su oslobođena od plaćanja poreza) (heads of foreign diplomatic missions, heads of foreign consulates, officials and experts of technical assistance of the United Nations Organization and similar).

3.3. TAX ON WEAPONS

Weapon is considered any device that is designed or intended for launching of projectiles, gas, liquids or other substances through the thrust of powder gases, air pressure, gas pressure or other propellant as well as other objects whose basic purpose is carrying out the attack [13]. In the knowledge base is entered all necessary knowledge about tax on weapons, and here we only present the types of weapons Figure 5.

![Figure 5. Tax on weapons](image)

The taxes are paid on the following types of weapons (Porezi se plaćaju na sljedeće vrste oružja): (firearms that ejects projectile with the thrust of powder or other gases, air guns, which with the thrust of air or compressed gas eject missile, gas guns, which eject or discharge gas or other substances harmful to health, fragmentation weapons, which explode under the influence of explosive or flammable materials and similar).

3.4. INCOME FROM GAMES OF CHANCE

By games of chance we consider games in which participants have the same opportunities of gaining winnings with direct or indirect payment of a certain amount, and the result of the game depends exclusively on chance or an uncertain event in the game. Under prize winning games we consider games which are organized in order to promote their own products and services for participation in which it is not required special payment, as well as the games which are organized publicly – via telecommunication systems, where participants are not required to deposit for participation in the prize game by which it is created the possibility of winnings in goods and services.

Under entertaining games is considered games on the computers, simulators, video machines, pinball machines and other similar appliances, which are put into operation by coins or tokens, as well as darts, billiards and other similar games in which they participate on a fee for participation and in which the participant cannot realize gain in money, property or rights, but the right to one or more free games of the same kind.

Winnings from games of chance can be in money, goods, services or rights. Payment of winnings guarantees organizer with all his assets.

For games of chance the organizers pay fees (taxes) which are income of the budget.

Tax on the winnings from games of chance is payable on winnings from lottery games, except from the classic raffles and on winnings from prize winning games in goods and services. The payer of tax on winnings from games of chance is any individual who receives the winning. The tax base for winnings from games of chance is every single winning. The winning that consists of things and rights,
the tax base is a market value of asset or right in the moment of realization of winning. Tax on winnings calculates the organizer and deducts it from each winning before the payment of the rest of the winning to the winner.

Necessary knowledge on tax for games of chance is presented in the knowledge base, and here a part of that knowledge is presented in Figure 6.

![Ontograf – Taxes from games of chance](image)

**Conclusion**
In this paper the authors have dealt with a very complicated tax system in Bosnia and Herzegovina. In order for the tax payers could understand easier the tax system and its obligations we have proposed the use of new software tools based on knowledge bases and ontologies. We think that they would be able to provide a necessary knowledge to all potential investors so that this region comes to instigative business environment.

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