EFFICIENCY OF LOGISTICS PROCESSES IN CUSTOMS PROCEDURES

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Abstract: *Nowadays, international trade growth is very high. Customs are very important links in international supply chains. Due to losses in time, the changes in customs operations are necessary for easier crossing the border. Efficient customs operations are prerequisite for faster supply chains. In this paper efficiency of logistics processes in customs procedures is analyzed. PCA-DEA approach with one input (labor) and eight outputs (number of realized customs procedures) are used in this paper. Proposed approach increases discriminatory power and shows its great applicability. Customs houses in Serbia should increase efficiency increasing the number of realized services and optimizing number of customs officers.*

Keywords: *Logistics processes, Efficiency, Customs procedures, PCA-DEA*

1. INTRODUCTION

The evolution and the growth in international trade is very intensive in the last two decades. Many economies recognized that the trade play major role in the economic growth. International trade has made the changes in customs services. International trade involves goods crossing borders in different procedures. The role of customs are: protection of financial interests, protection and improvement of international trade, protection of society, etc. Customs clearance is the most important factor in international trade. Country competitiveness is result of customs service efficiency and effectiveness (Zamora - Torres et al., 2013).

The problem of measuring efficiency in public sector is more complex than efficiency measuring in private sector. The main problem in efficiency measuring in public sector is identification of relevant inputs and outputs (Benazić, 2012). Organizational changes in Serbian customs influenced the efficiency of customs services. The main objective in this paper is to develop approach for measuring efficiency of customs services in Serbia.

The paper is organized as follows. The next section analyzed basic approaches for customs efficiency measurement. The third section described Serbian customs system in more details. The proposed model is used for evaluation of fourteen customs offices in Serbia. The concluding remarks and future research directions are given in the last section.

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2. APPROACHES FOR CUSTOMS EFFICIENCY MEASUREMENT

Regardless of the ownership each organization (public or private) tends to realize activities on efficient way. Evaluating performances in public sector has been investigated in the literature for a long time (Boyle, 2006). In the public sector problem is a lack of direct correlation between revenues and expenses. Also political factors influence public organization to focus on goals achievement, rather than resource optimization.

In the literature there are different approaches for efficiency measurement. The European Commission has established its Measurement of Results (MoR) project for the customs services of member states. Work on measuring the results of customs activities performed by member states is underway and the results achieved enable member states to compare their performance to the Community standard and act to improved customs operations where necessary (Benazić, 2012).

The importance of customs efficiency is also recognized in World Bank Organization. This organization developed LPI (Logistics Performance Index). The main element of LPI is efficiency of customs (Arvis, 2016). In that manner there are different aspects of customs efficiency evaluation:

- Customs efficiency in International LPI (the efficiency of the clearance process (i.e. speed, simplicity and predictability of formalities) by border control agencies, including customs);
- Customs efficiency in Domestic LPI (quality and competence of service of customs agencies, clearance and delivery of imports and exports, transparency of customs clearance, provision of adequate and timely information on regulatory changes, number of agencies for imports and exports, number of forms for imports and exports, etc).

Special emphasis in LPI is on efficiency of customs administration. In that manner this index includes the efficiency of customs procedures perception by the private sector, as well as the extent of services provided by customs authorities and related agencies. The effectiveness and efficiency of clearance processes (time, documents, costs, etc) by customs as well as related, border control agencies is also important element of LPI.

The most of the approaches in the literature are based on DEA (Data Envelopment Analysis) method. However, DEA method have some disadvantages and in some situations could not be applied. In this paper new approach is proposed.

3. SERBIAN CUSTOMS SYSTEM

The Serbian customs system is organized in six division and fifteen customs houses as shown in figure 1. *Division for customs affairs* and international customs operations, among others, performs following activities:

- monitoring and analyzing implementation of customs, foreign trade, foreign exchange and other regulations, that are implemented in goods treatment permitted by the customs;
- control of Custom Houses operations within affairs of conducting customs permitted treatment of goods and customs administrative procedure and provides professional assistance to Custom Houses at these activities;
- participates in preparation of regulations that are implemented in goods treatment permitted by the customs;
- monitors carrying out of signed conventions and agreements, their amendments and implementation, estimation of needs and possibilities for bilateral and multilateral customs agreements conclusion, drafts preparation and adjustment, realization of their adoption procedure in line with national legislations and monitoring of their execution;

- monitoring of EU regulations within the scope of customs, monitoring World Customs Organization and regional initiatives and other activities within the scope of Division's competence, etc.
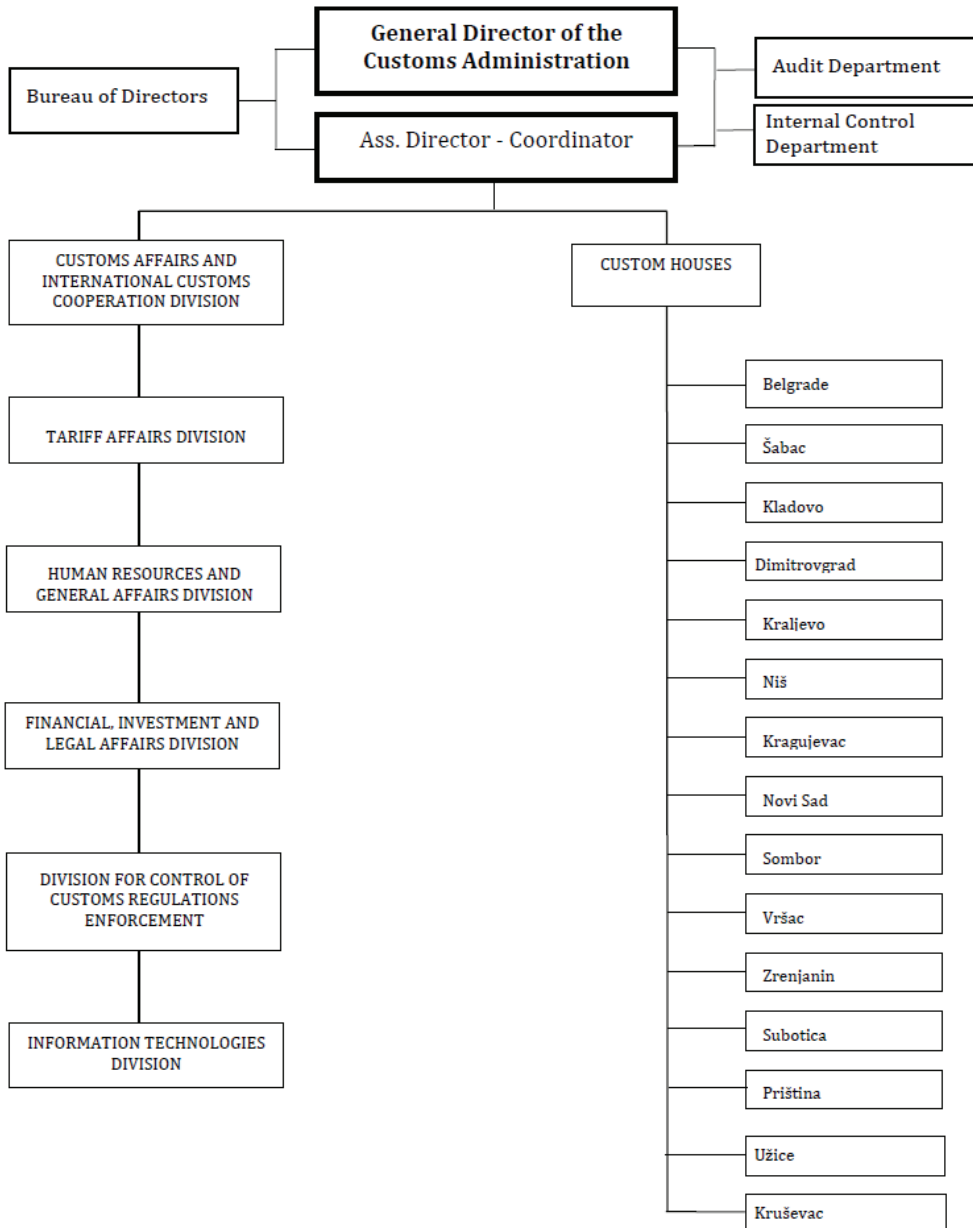

Figure 1. Customs administration organizational structure (source: http://www.upravacarina.rs/en/Pages/Default.aspx)

The basic operations of *division for tariff operations* are: monitoring and analyzing implementation of customs and other regulations within the scope of Customs tariff, customs

value, taxes and excises; monitoring, analyzing and control of Rules of Origin implementation and preferential; monitoring and analyzing of tariff policy instruments; external audit operations; customs laboratory operations; data processing and maintenance operations within Integrated Tariff of Serbia, etc.

As private companies customs administration also has *division for human resources and general affairs*. The main activities of this division are: analyzing and monitoring customs service organization and development, giving opinion on requests justifiability and procurement of conditions for opening new as well as for merging and abolition of existing Customs Administration internal units; implementing regulations within the scope of employment; participating in preparing draft law that regulates scope of Custom Houses' employment and proposals of the Customs Administration general acts which relate to rights, obligations and responsibilities within the scope of employment, salaries and other benefits, vestments and overalls, official designations and IDs of authorized Custom Houses, etc. *Division for financial, investment and legal affairs* performs following activities: preparing draft of the customs service medium-term development and modernization program; setting up annual plans and estimations of funds for regular business, equipment procurement; creating periodical and annual business analysis, etc.

Very important is *division for control of customs regulations enforcement*. This division deals with: suppressing trafficking, customs investigations and intelligence operations; legitimacy control of Customs Administration internal units in customs clearance operations, customs surveillance, temporary import-export, material and financial operations, collection of duties, prevention of illegal entry of weapons, drug, currency and other more severe violations of customs regulations, etc. Nowadays, for successful and efficient operation of customs operation crucial is information system. *Division for information technologies* performs following operations: monitoring development of customs service information and communication technologies; ensures functioning and rational exploitation of customs service information system; taking care on duly and uniform implementation of all regulations that are applied in performing customs service functions, etc.

4. NUMERICAL EXAMPLE

In this paper focus is customs administration efficiency. In accordance with the previous sections we analyzed set of fourteen customs houses and measured their efficiency. For efficiency evaluation one input and eight outputs are used. For customs service the most important resource is labor (table 2). As outputs in this paper, number of successfully realized customs procedures expressed in number of declarations are used. There nine basic customs procedures are identified: export (C1), temporary export (C2), re-export (C3), import - release of goods for free circulation (C4), temporary import (C5), re-import (C6), customs warehousing (C7), processing under customs control (C9).

Table 2: Inputs and outputs for efficiency evaluation (source:
http://www.upravacarina.rs/en/Pages/Default.aspx)

Customs house	*Labor (No)*	*Customs procedures (number of declarations)*							
		C1	*C2*	*C3*	*C4*	*C5*	*C6*	*C7*	*C9*
Belgrade	399	178403	15842	29362	426455	9629	7328	66940	1057
Kladovo	106	7844	249	1854	10249	1274	228	2493	1
Dimitr.	122	2617	15	6459	13620	565	80	3727	4
Kraljevo	110	41878	313	3341	35720	1809	296	5803	47
Niš	191	48038	1594	9916	56115	5840	1339	7446	134
Kragujevac	93	63209	3179	21690	41688	8578	2105	46567	54
Novi Sad	249	79760	2140	11405	106536	6963	974	13640	46
Sombor	69	17182	3103	2043	6508	1828	2937	4339	5
Vršac	82	11045	1651	1127	11367	456	962	667	1
Zrenjanin	65	26590	2112	6535	17729	5535	997	4904	1
Subotica	232	28188	817	21808	81044	5163	637	35800	6
Šabac	158	60765	851	12886	76504	8790	666	7594	28
Kruševac	35	24516	380	3791	20228	3701	78	4349	0
Užice	103	24698	222	8194	25706	2427	242	3214	103

For efficiency measurement we use the PCA–DEA approach. The PCA–DEA model for DMU_a used in this paper has the following form (Adler and Yazhemsky, 2010; Andrejić et al, 2013):

$$\max_{U_{PC}, V_{PC}} U_{PC} Y_{PC}^a \tag{1}$$

Subject to:

$$V_{PC} X_{PC}^a = 1 \tag{2}$$

$$V_{PC} X_{PC} - U_{PC} Y_{PC} \geq 0 \tag{3}$$

$$V_{PC}^t L_x \geq 0 \tag{4}$$

$$U_{PC}^t L_y \geq 0 \tag{5}$$

$$V_{PC}, U_{PC}, free \tag{6}$$

The results of the proposed model are shown in the table 3. Proposed PCA-DEA model has the large discriminatory power than the standard CCR DEA model. The average efficiency score in the proposed model is 0,45 with only one efficient customs office, while the average efficiency score according CCR model is 0,66 with fourth efficient customs offices. According results it is easy to see that customs house Belgrade and Kragujevac are the most efficient. The reason is relatively small number of customs officers and large number of realized services. In contrast to mentioned efficient customs offices, there are several customs offices with relatively low efficiency scores. In that manner customs offices Kladovo, Dimitrovgrad, Novi Sad and Užice realized relatively small number if customs procedures with large number of customs officers. According results it is easy to see that inefficient customs offices should improve efficiency reducing resources and increasing number of realized services.

Table 3: Resulting efficiency scores

Customs house	Standard CCR DEA	PCA DEA model
Belgrade	1,00	0,94
Kladovo	0,15	0,09
Dimitr.	0,23	0,11
Kraljevo	0,58	0,26
Niš	0,48	0,31
Kragujevac	1,00	1,00
Novi Sad	0,54	0,29
Sombor	1,00	0,75
Vršac	0,46	0,28
Zrenjanin	0,94	0,58
Subotica	0,53	0,31
Šabac	0,69	0,42
Kruševac	1,00	0,73
Užice	0,56	0,26
Average	0,66	0,45
Number of efficient	4	1

5. CONCLUSION

The importance of measuring efficiency of customs operations is recognized in the literature and in practice. The main problem is identification of representative input and output variables. In this paper proposed approach overcame the lack of existing approaches and increased discriminatory power. The efficiency of fourteen customs offices is evaluated using one input (number of customs officers) and eight outputs (basic customs procedures). The results show the great applicability of proposed approach. In order to increase efficiency inefficient customs office need to increase number of realized customs procedures and to reduce number of customs officers. In the future research it is important to include other indicators of customs operations such as quality indicators, indicators of corruption, time indicators, etc. In that manner it is also important to define new corrective action for efficiency improvement.

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