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# Application of process modelling and simulation to evaluate administrative burdens at the law-making stage

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**Abstract.** The number of the legal regulations is increasing, which implies additional administrative burdens for entrepreneurs. Evaluation of the legal acts efficiency in terms of administrative burdens, is usually conducted after the adoption of provisions. Improvement of existing legislation is a difficult and time-consuming task. Therefore, the aim of conducted research was to develop a method permitting the assessment of administrative burdens in the course of law-making. We propose to apply techniques of business process modelling and reengineering to improve quality of law during law-making. The main contribution of the article is a method based on application of Business Process Model and Notation (BPMN) to design processes introduced by the legal acts. The presented method, due to application of modeling and simulation analysis, permits to precisely assess administrative burdens following from the regulations. The method enables to compare different variants of a legal regulation planned to be established. The presented method was practically applied to the process of registration of a civil law partnership in Poland. It was proved within the conducted research that the process redesigning permits to cut significantly the costs and duration of process both for entrepreneurs and public administration. Due to application of the proposed method the precise data was received, which enabled to compare the costs of burdens in the different variants of the regulations implementation. This case empirically confirmed that application of our method could enhance the quality of public processes regulated by legislation.

**Keywords:** law-making process, legislation; business process reengineering; business process simulation, BPMN, administrative burdens

## 1 Introduction

A legal system is efficient, when it does not squander away the limited resources allocated to it. Evaluation of how the limited resources are applied is the domain of economics encompassing the study of efficiency. Efficiency criteria in economics allow assessing whether a specific allocation of resources is proper. In the opinion of some representatives of the economic analysis of law, e.g. Posner [20], application of efficiency criteria permits to shape the law to fulfil its fundamental purposes without wast-

ing the limited resources. One of the purposes of the system of law is to remove inefficiencies of the market mechanism through deployment of regulations governing business activity. Regulations of the economic law generate additional costs for businesses that have to observe those regulations. This paper focuses on one of the costs of such regulations, namely, administrative burdens. Administrative burdens constitute a serious barrier in the development of enterprises in the EU. According to the data published by the European Commission [9], annual administrative burdens in the EU account for 3.5% of the EU's GDP. Of that, 60% include administrative burdens resulting from domestic legislation and 40% from the EU legislation. This paper presents a method of accurate evaluation of administrative burdens at the law-making stage. Due to the application of process modelling and simulation, it is possible to compare different variants of a legal regulation planned to be established. The presented method permits the legislators to make a decision based on measurable cost of administrative burdens to be incurred by enterprises.

The paper is organized as follows. Section 2 discusses the efficiency criteria and shows how they can be applied to evaluate the costs of administrative burdens. Section 3 presents the method used to assess the costs of administrative burdens based on business process modelling and simulation. Section 4 shows how the presented method has been applied in practice to analyze the process of registration of a civil law partnership. Section 5 concludes the paper and shows the areas for future research.

## **2 Efficiency criteria in the economic analysis of law and their application to evaluation of the costs of administrative burdens**

The goal of the economic analysis of law is improvement of law efficiency. Economically efficient law increases social well-being. A legal system will support social well-being if it identifies and eliminates the defects of the market mechanism and removes any signs of inefficiency in the area of non-market behavior. Legal solutions that take into consideration the achievements of the rational choice theory should create adequate stimuli to influence economic calculus of legal entities, thus discouraging them from behaviors that affect efficiency, and to promote behaviors supporting effective allocation of resources [8]. The changes introduced in the legislative process should take into account the economic calculus, i.e., a balance of benefits and costs following from a specific legal solution. Vilfredo Pareto, an Italian economist, proposed the basic efficiency criterion. In Pareto's understanding, efficiency occurs when, as a result of changes in allocation of resources, the situation of any person may not be improved without deterioration of the situation of another one. In the case of law, Pareto's efficiency criterion may be applied to evaluate whether or not a specific legal regulation (e.g. introduction of licenses or permits) will have a favorable impact on efficiency. The Pareto's criterion serves to evaluate the condition (allocation) occurring as a result of introducing certain regulations. It cannot be used to determine whether the projected change of law causes efficiency to grow or decrease.

In response to the limitation of the Pareto's criterion, Nicholas Kaldor and John Hicks formulated new efficiency criterion. According to N. Kaldor, this criterion takes the following form: allocation X is preferred to Y if, as a result of transition to X, the individuals who benefited from the change are able to compensate the decreased utility of those who incurred losses due to the change and despite of that fact they still enjoy higher utility than before the change [13]. A legal regulation is efficient in Kaldor-Hicks sense if the benefits from the introduction thereof exceed the related costs. The application of this criterion in the economic analysis of law is related to the concept of wealth maximization. Efficiency in Kaldor-Hicks sense is in line with wealth maximization as the changes of law that meet this criterion, lead to an increase in aggregated wealth as a difference between benefits and costs. It results from the fact that the wealth of the parties to the exchange increases so much that they can compensate the drop in wealth of others, who incurred losses in consequences of the exchange [4].

Based on the Kaldor-Hicks criterion, R.A. Posner formed a criterion that became the most popular efficiency criterion under the economic analysis of law. Instead of the notion of utility used in the Kaldor-Hicks criterion, R.A. Posner uses the notion of social wealth. According to R.A. Posner, wealth is the value of everything that exists in a society, expressed in money [26]. The Posner's criterion is formulated as follows: the transition from the initial state X to state Y maximizes social wealth if a surplus, measured in money, of benefits over costs is achieved in Y.

The Posner's criterion is the most frequently used. The application of this criterion helps assess efficiency of various legal regulations. This assessment consists in answering the question whether the projected legal regulation will provide a surplus of benefits over costs in comparison to the existing regulation or absence thereof.

The introduction of legal regulations generates various types of costs for entities covered by them. Administrative burdens are costs incurred due to performance of administrative obligations as specified in legal regulations. What is characteristic of these costs is that they would not be incurred in absence of such regulations. Two types of administrative obligations are distinguished. The first kind include obligations imposed by the state to regulate the market, for example the registration of business activity or a permit to run a business in a specific economic sector. The second kind includes information obligations, i.e., reports, tax returns, etc.

This paper focuses on administrative burdens for at least three reasons. First, importance of administrative burdens as barriers to develop business in Europe particularly for SMEs. The second reason is that the initiatives taken so far to reduce administrative burdens are not considered sufficiently effective. The last but not least reason is that administrative burdens are not very often analyzed in terms of transaction costs, within the meaning of the economic analysis of law [8].

The importance of transaction costs for the operation of enterprises was noticed by Ronald Coase in his breakthrough paper [6]. He stressed that the costs of organizing a transaction inside an enterprise are the primary factors that explain the existence and development of businesses, while the size and scope of a business are determined by the relative entry costs. In Coase's opinion, the legal system must assure the lowest possible transaction costs. The concept of transaction costs was developed by Oliver E.

Williamson [25] under the new institutional economics, who drew attention to the need to optimize transaction costs.

In this paper, we propose a method, called CAB (The Costs of Administrative Burdens), that helps to optimize administrative burdens included in the transaction costs due to the application of business process modelling and simulation. The aim of method CAB is to help legislators to make correct decisions regarding administrative burdens at the law-making stage.

### **3 Application of process modelling and simulation to evaluate administrative burdens at the law-making stage**

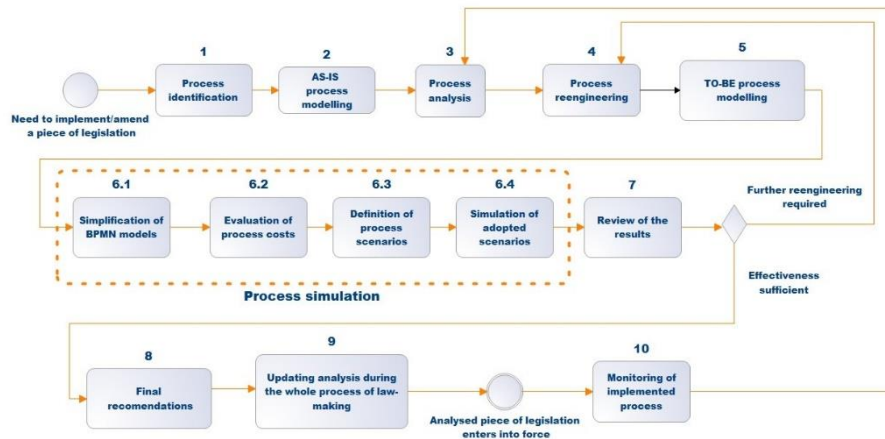
The fulfilment of administrative obligations imposed by legal regulations requires a series of activities set out in legal regulations. The sequence of activities performed is a process, therefore, to evaluate the level of administrative burdens, one may use a number of techniques developed under Business Process Management (BPM). BPM includes a set of concepts, methods and techniques that support business process modelling, analysis and management [10]. BPM is inter-disciplinary in nature, as it combines knowledge of information technology and management science [24]. In this paper, we present the application of four BPM techniques: business process modelling, analysis, reengineering, and simulation. The research presented herein is based on application of the Business Process Model and Notation (BPMN), version 2.0, as set out in standards ISO/IEC 19510<sup>1</sup>.

We are proposing a method, called CAB, based on said techniques, which permits to assess administrative burdens depending on different variants of legal regulations. Figure 1 presents individual steps of this method.

The CAB method is applied at the law-making stage. It begins with the identification of the process that is followed from the draft of legislation and will be an administrative burden for enterprises. The result of process identification is a general description of the course of the process from the perspective of both public institutions and enterprises.

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<sup>1</sup> ISO/IEC 19510 Information technology – Object Management Group Business Process Model and Notation



**Fig. 1.** The steps of the CAB method

Based on this description, during the second step, a model AS-IS of the process is prepared. The process modelling is done with the use of BPMN. The prepared AS-IS model should reflect the course of the process according to the draft of legislation in as much detail as possible,.

The third step is the thorough analysis of the legal, organizational and technical aspects of the process. To this end, the analysis covers all legal regulations that impact the process, both national and local. At this step also broad consultations are handled with process stakeholders, who include not only process participants, but also other entities influencing the process. The consultations are based on interviews, questionnaires, or workshops. The analysis is made up of two stages. In the first stage, the process correctness is analyzed in order to identify process errors such as: inconsistency, incompleteness, or loops. In the second stage, process efficiency is analyzed. The purpose of the analysis is to find such fragments of the process that may be improved, e.g. bottlenecks or redundant activities.

The fourth step is process reengineering that is defined as the fundamental redesign of the process to improve its efficiency, measured by cost, quality and time [2].

Then, based on the results of the reengineering, the different process variants in the form of BPMN TO-BE models are prepared.

During the sixth step, simulation analysis is performed for the AS-IS process instance and for various TO-BE process variants. The purpose of the simulation is to evaluate efficiency of alternative process variants based on the adopted simulation scenarios. The most important value of the simulation is the possibility to assess alternative process variants as early as at the law-making activities. It is very important, because any change of the established law is time-consuming and difficult to implement. The simulation runs in four stages.

In step 6.1, in the case of complicated processes, the prepared BPMN models are simplified and adjusted to the needs of simulation. Only those process elements that affect process efficiency are taken into account. The critical path method can be used

to identify those process elements that should be simulated. Moreover, process models are parametrized, which means that the durations of process activities are determined. Historical data regarding process implementation, gathered during interviews, are used for the purpose of parametrization. In the case of processes that have not yet been put into practice, the use of data from similar processes is assumed. Parameter data must be statistically significant.

In step 6.2, process costs are determined. To this end, the costs of each activity of the process are determined using the standard cost model, SCM [12].

In step 6.3, scenarios are defined, which determine certain assumptions necessary to carry out the simulation. The assumptions pertain to such parameters as: duration of simulation, number of process triggers, resource usage, etc.

In step 6.4, adopted scenarios are simulated. Simulation reports are drawn up, which include such information as, for example: average and minimum process time, process costs, and resource consumption.

In step 7, the results of simulation are reviewed in terms of the level of the administrative burden. The best process variant is the one for which the total administrative burden costs are the lowest among the analyzed variants.

In step 8, the best process variant is recommended to legislators as a contribution to documents drawn up in the legislative process.

It is assumed that the recommendations following from the application of the CAB method are submitted to legislators at the very beginning of the legislation process. Hence, it may happen that the legal regulation draft will be subject to multiple changes during the further stages of law-making activities. According to the CAB method, simulation analysis need to be applied at each stage of legislation process, whenever the draft of legislation is amended. This would help to identify how the proposed changes influence the processes and costs of administrative burdens.

Entry into life of the analyzed act of law does not conclude the CAB methodology. At this stage, processes following from the new law are ex-post evaluated to assess their real influence on administrative burdens. Carrying the analysis out basing on actual data pertaining to process implementation will help to further improve processes and in consequence reduce administrative burdens.

Since the application of the CAB method requires knowledge of the BPM techniques, it is assumed that the analysis will be carried out by external experts supporting legislators.

#### **4 Case study – registration of a civil law partnership**

The CAB method has been used in practice to analyze the process of registration of a civil law partnership in Poland. In this case, the CAB method was modified, as the works were not related to law-making process. The main objective of the CAB method application was to verify whether the process of registration of a civil law partnership in Poland could be more effective.

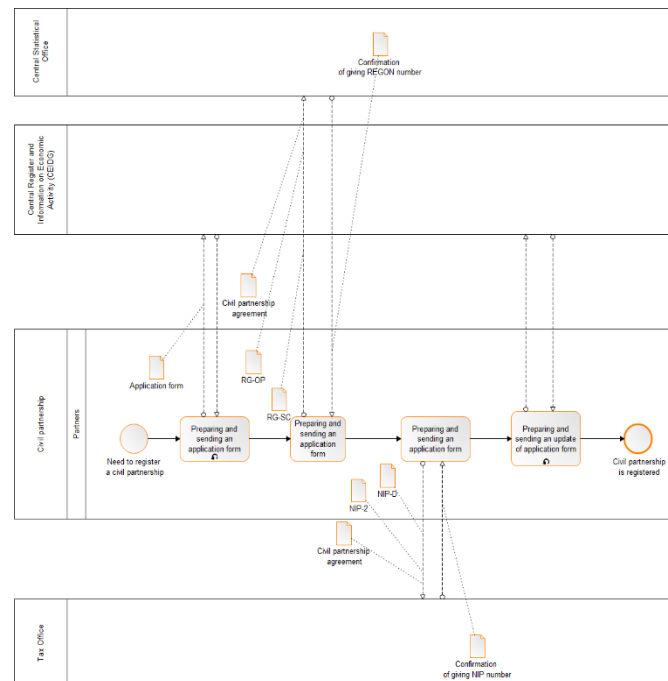


Civil law partnership is a quite popular legal form of business activity in Poland. It is often used for business activity of such professionals as doctors, architects, or accountants.

In step 1, the civil law partnership registration process was identified. It was not an easy task, because in Polish legal regulations this process is set out in a number of acts of law and relevant implementing regulations. Moreover, on the part of public administration, three independent entities participate in the process: municipality offices, tax offices and branches of the Central Statistical Office. The regulations regarding the registration of a civil law partnership are supervised by various ministries, such as the Ministry of Economic Development, Ministry of Finance and others.

As the process of civil law partnership registration is already set out in regulations, in the next stage the AS-IS process model in BPMN has been prepared (see Fig. 2). iGrafx Process Central 2011 has been used as a tool for process modelling and simulation.

To prepare the model, the practical execution of the process in three entities has been analyzed: Poznań City Hall, Central Statistical Office Branch in Poznań, The First Tax Office in Poznań. These entities represent all types of public administration involved in the process. During the analysis, the duration of individual activities was measured. In addition, in interviews with individuals involved in process implementation, information on the process has been gathered.



**Fig. 2.** AS-IS BPMN diagram

Originally, the civil law partnership registration process is comprised of four steps:

1. Each partner in a civil law partnership registers as sole proprietor. There are two registration methods available: electronically via the CEIDG<sup>2</sup> system or in municipality office.
2. On behalf of the entire partnership, one of the partners requests that the Central Statistical Office branch assign the REGON<sup>3</sup> (Statistical Identification Number) to the partnership. This activity requires a visit in the office.
3. On behalf of the entire partnership, one of the partners requests the Tax Office to assign the NIP<sup>4</sup> (Tax Identification Number) to the partnership. This activity requires a visit in the office.
4. The partners in the civil law partnership update their respective entries in the CEIDG system by entering the REGON and NIP numbers in the civil law partnership he or she is a partner in. There are two CEIDG system entry update methods available: electronically or in the municipality office.

In the third step of the CAB method, a detailed analysis of the civil law partnership registration process and documents exchange during the process has been made. Process model in the form of BPMN permitted to identify the following problems:

- the process is not effective from the point of view of entrepreneurs registering a civil law partnership,
- during process execution, public authorities do not exchange information,
- the analysis of documents exchanged in the process shows that the entrepreneurs must submit the same data to the public administration several times.

To remove the identified problems, the process has been restructured and its model TO-BE has been developed (see Fig. 3). The following changes have been made:

- an entrepreneur submits only one application with all the information necessary to establish civil law partnership,
- the application is submitted electronically via the CEIDG system or in the municipality office,
- public administration exchanges the information between its units, without involving the entrepreneurs.

Then, to check which model offers lower administrative burdens for entrepreneurs, process simulation has been carried out.

The following simulation scenario has been adopted:

- average number of applications to register a civil law partnership in one municipality office: 968,
- each application is submitted by 1 applicant,

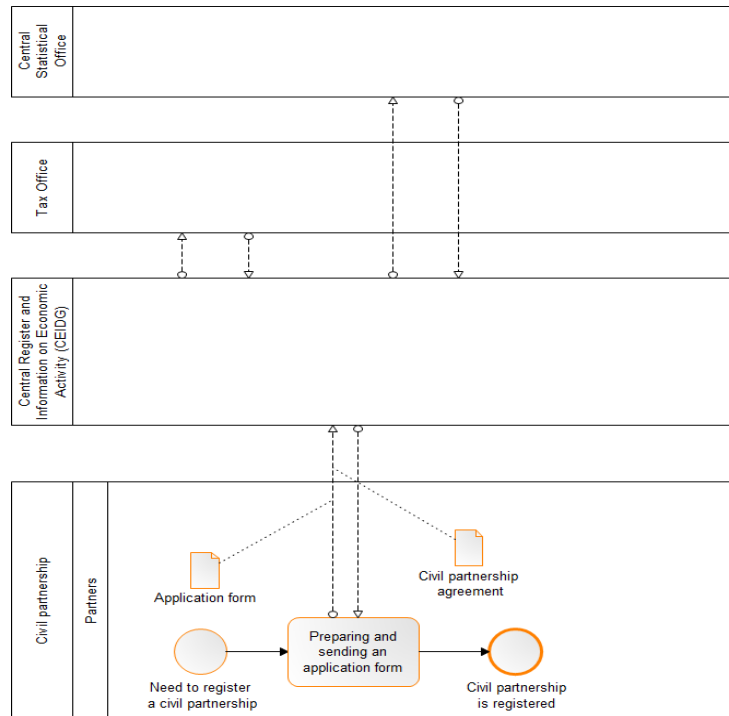
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<sup>2</sup> The Central Registration and Information on Economic Activity (abbreviated to CEIDG) is a register of enterprises operated by natural persons in the territory of Poland.

<sup>3</sup> The REGON number is required for statistical purposes.

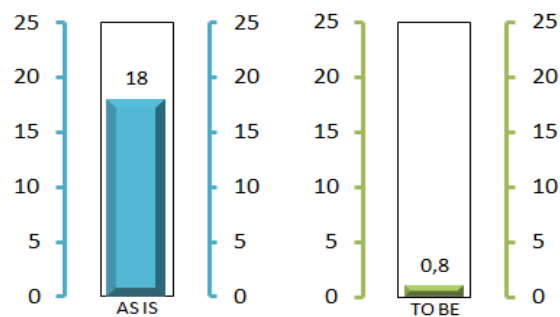
<sup>4</sup> The NIP number is required for fiscal purposes.

- simulation duration, 1 year = 264 working days,
- working time: 8 working hours.



**Fig. 3.** TO-BE BPMN diagram

The results of simulation shows that the registration of a civil law partnership would take on average one day after implementation of the proposed changes, instead of 18 days. (see Fig. 4).



**Fig. 4.** Average duration of civil law partnership registration

The proposed process changes would also reduce costs incurred by entrepreneurs in relation to the registration of civil law partnership. In the TO-BE version, the registration costs incurred by entrepreneurs are by 70% lower than in the current process variant.

The simulations performed confirmed that the proposed process changes considerably improve the efficiency of the civil law partnership registration process. The improvement of efficiency pertains not only to the ratios related to the process carried out by enterprises, but will also cause the drop of costs incurred by the public administration.

The report has been submitted to the Ministry of Economic Development, as a contribution to the proposals of amendments of law governing the registration of a civil law partnership.

## 5 Conclusions

In this paper, we have presented the CAB method that permits to evaluate efficiency of legal regulations during the course of law-making process. Due to the application of techniques used in Business Process Management, the CAB method helps to assess the level of one type of transaction costs incurred by enterprises, i.e. administrative burdens. We have proved that due to such techniques as modelling and simulation of processes, legislators may obtain measurable data regarding the effects of legal regulations planned for introduction. Thus, they are given an opportunity to make rational decisions with regards the projected changes of law. Law-making is a multi-stage process during which the proposed regulation is changed a number of times. The CAB method allows immediate verification of how the proposed change will affect the administrative burdens incurred by enterprises. The devised CAB method is particularly valuable in case of optimization of processes that are regulated in many acts of law. Process modelling gives an opportunity to show all activities related to a specific need of the enterprises, not only a single official activity. Such an approach was applied during the analysis of civil law partnership registration process that helped to significantly improve the efficiency of the entire process. Efficiency improvement is followed by saving of time and costs incurred by enterprises related to the regulatory actions of state. What is important, the proposed improvement of processes boost efficiency of operation of not only enterprises but also public administration.

One of the value of the presented method is its applicability in practice. However some steps need to be taken to implement this method within the law-making activities. Firstly, the business process analysts need to be involved in the legislative process. BPMN specialists should participate at any stage of the law-making process. During the legislative activities they would be responsible not only for developing the BPMN diagrams from scratch but also for modifying them according to the amendments introduced to the proposals of legal acts.

Secondly lawyers and policy makers, who are currently the main actors of law-making process, should be familiarised with the basics of business process modelling. They

should be able to understand the BPMN diagrams, which should not be very challenging, as the BPMN was developed to be understandable by all business users.

The CAB method should be practiced at each stage of legislative processes. Any changes of law, proposed during a legislative process, need to be analysed in terms of their influence on processes. Legislators should be aware of the consequences of their decisions.

We are aware that the application of the CAB method may prolong law-making process, but the application of this method could result in a reduction of failures in legislation. This would significantly limit the need for law amendments in the future. This would be especially important at the present time, when the number of legal acts adopted all over the world is constantly growing.

The CAB method presented in this paper demonstrates that the economic analysis of law may be enriched with methods from other fields, including the management science. The application of Business Process Management methods gives an opportunity to carry out further research activities on the improvement of the law-making process. These works may pertain to other types of regulation costs such as direct financial costs or substantive compliance costs.

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