

# BUSINESS PROCESS MODELLING AS A TOOL TO IMPROVE PUBLIC SERVICES

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**Abstract.** *Public finance deficit makes it necessary to search for methods and tools to improve public services. Improving public services can be based on improving processes. Given the complexity and the number of processes in public institutions it becomes necessary to use computer tools of process management. The paper presents the possibility of using business process modeling tools to improve the processes of the public sector. The article uses the results of the research and development projects implemented in Polish public administration to illustrate the specificity of the public services. Based on the analysis of the possibility of the modeling tools used, the criteria of the efficiency of processes and multi-criteria analysis of customer's needs the principles of process modeling have been presented.*

**Keywords:** *BPM in Public Administration, Process Modeling.*

## 1. Introduction

Increased knowledge among citizens prompts today's administration to continually seek methods that enhance its performance. From among a great many concepts dedicated to improve administration likely to be applied, process management deserves special attention. Basically, the concept rests on the assumption that at the core of the improvement is optimization of processes rather than the optimization of function embraced in traditional concepts. Such an approach is consistent with the concept of the New Public Management, whereby measures proven in the business sphere are implemented in the public organizations. Putting the process management into place in public administration should, just like in the business sphere, trigger bolstered effectiveness and efficacy as well as improved quality of services provided [3]. Moreover, implementation of

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process management across public institutions is supported by the need to gain insight into the situation of citizens' needs, legal requirements and relevant alignment of the manner in which public services are delivered to them. With limited financial resources, any efforts seeking to boost effectiveness and quality of services allow for meeting needs among an increased number of citizens. C. Pollitt and G. Bouckaert propose that while assessing effectiveness of tools used in public management, it is necessary to take into consideration four levels of outcomes: operational, organizational processes, enhancing of positive system features and bringing public administration in line with the model of modern state [7]. Additionally, these levels may be employed for evaluating process management.

The focus on processes and common application of process management methods leaves organizations oriented on customer needs which are in line with one of the NPM models. The tools exploited in this model concentrate on citizens' expectations as to the quality of public services delivered. Modzelewski argues that flat organizational structures used for process management facilitate the quest for excellence and the assessment of operations through outcomes. Whereas A. J. Kozuch [4] proposed to base on the target costing combined with investigation of public services features significant from the recipients' viewpoint, while designing the reference process models. Overall, such an approach appears to be more comprehensive and to better incorporate citizens' needs.

When implementing process management into the public administration, it is typical to face resistance among employees. Essentially, this resistance largely results from the urgency for changes attributed to the fact that processes always tend to run across the organizational structure and they require delegation of powers by heads. On the whole, the method for assessing processes, put forward by A. J. Kozuch additionally involves citizens' participation. On the one hand, the participation exposes services' features being significant from the citizens' viewpoint, and on the other hand it reveals the financial ramifications for services delivery processes adjusted to these requirements. Thus, design of reference processes boils down to practical performance of services that are consistent with reference process models obtained in this way. This paper disputes the application of tools used for business process modeling while creating reference models for public service delivery processes.

## **2. Specifics underlying process management across public administration units**

Due to feedback occurring in relationships with surrounding setting, public organizations should be classified as open systems with flexible boundaries constantly adjusting to these relationships [5]. Specific relationships of public organizations with the setting may be also observed while exchanging resources. Social participation in determining and shaping relationships with administration has a positive impact on efficiency of public services. Contribution to the decision-making process makes it possible to better customize operations to social expectations, thereby translating into a higher level of meeting the needs and increased citizens' satisfaction.

Polish public administration stands out for its high degree of formalization, rigid hierarchization and internal structure. These characteristics make it particularly hard to implement process management grounded on social participation. The research shows that the same processes executed across diverse public administration units are differently designed and conducted, and thus demonstrating the paucity of operational standardization, diverse levels of the quality, different costs across specific units [9].

The selection of the level at which public services are delivered seems key for the public sphere, because it drives tasks, duties and costs for running public administration. Execution of the increasingly growing public services basket requires crafting appropriate techniques and methods for operations, instruments adjustment and incorporation of numerous external factors. Frequently there is the need to find a middle ground, thereby opting for some operations to the detriment of others, or deferring decisions in time. Therefore, any improvement of administration's operations unleashes reserves, and thus allowing for delivery of public services to more persons in need.

The process approach regards the organization as a set of repetitive and clearly defined processes that mutually percolate. In business, such an approach aims at boosting competitiveness of organizations in a dynamically changing environment, whereas in the public sphere it allows for delivery of services with higher quality to a wider group of citizens. Principally, this is made possible thanks to decreased costs through clear designation of phases for process accomplishment, their monitoring and eliminating potential bottlenecks.

Initially, process management sought to optimize costs and production time. Such a perspective was adopted, for example, by Taylor. The development of management methods led to a new approach termed as Business Processing Re-engineering. The concept referred to radical overhaul of the organization structure and use of process management methods. Today, process management is associated with the concept of the Business Process Management and centered on effecting continual changes to organization functioning. At the heart of the approach is the overall view of the organization that enables the identification of all possible processes occurring within it. This concept presumes a broad support of business processes by IT tools in the form of software, reinforcing modeling of processes and stimulation of their accomplishment.

In general, process management has been put into operation across public institutions relatively recently, primarily in the context of implementation of quality management. This approach causes that the process is seen as a set of independent and mutually interacting operations that transform inputs into outputs. Put differently, the process approach tends to be constant and systematic recognition of processes within an organization, their management and continuous improvement.

From the business viewpoint the process is a set of interconnected, structuralized operations or activities which serve the specific purpose. Therefore, each business process is characterized by an explicitly formulated and measurable goal, identified input and output as well as repetitive and measured outcomes. The business process understood in this manner is typical to operations conducted by both business institutions as well as public sphere. Hence, it appears that tools utilized in the business sphere, following their simple adaptation, will be useful for modeling processes in the public sphere.

Given the specifics underlying operations that form processes, the following types of business processes are identified:

- managerial processes – supervising organization's operations, e.g. corporate governance, strategic planning;
- operational processes – conducting manufacturing or service operations, and participating in setting up a value chain, e.g. shopping, production, sales;
- auxiliary processes – supporting operational processes, e.g. accounting services, personnel services, technical maintenance.

The displayed classification of processes is consistent with the specifics inherent to public organizations. The distinctions between the business and public sphere do not originate from the manner in which

processes are run, but from the hierarchy of objectives significance, which has no impact on the specifics of processes. From the perspective of organization effectiveness it is important to define the process owner whose role is to supervise the progress and accomplishment of the process. Basically, such a person should understand the essence of the whole process as well as possess competences to pin down the tasks assigned to individuals and organizational units that execute the process. In the public sphere, due to the immensely formalized structure and prevailing culture of the role it is difficult, without organizational shifts, to indicate the owner of the process involving a few organizational units.

To gauge and enhance the processes it is essential to determine the measures likely to unequivocally evaluate their efficiency. In an effort to assess processes the following measures are typically used [1]:

- costs,
- quality,
- duration,
- flexibility,
- timeliness,
- relevance to an organization,
- relevance to a customer.

On the whole, costs, quality and duration time are regarded as principal measures. Thus, the gist of effective process management comes down to minimizing process costs, reducing duration time and enhancing quality. Improved quality and reduced duration time generally entails increased costs, and thus processes management is an ability to select such an alternative which delivers top quality product or service with the lowest possible costs within the time period acceptable to the recipient.

In the reference literature, the concept of efficiency is used for assessing the operations of the organization as well as its part. Specifically, the concept has a tremendously extensive and ambiguous scope. It is usually assumed that the efficiency is rated by the following measures:

- effectiveness,
- cost-effectiveness,
- beneficiality.

While assessing the level of objective accomplishment in terms of effectiveness, only anticipated outcomes of activities, without their costs, are taken into account. The degree of compliance between the effects of operations accomplishment with its assumptions is adopted as a measure of effective operations, whereas cost-effectiveness is a ratio between

outcomes of activities and their costs. The attention should be paid to the fact that while examining the costs of operations it is necessary to take into consideration their tangible as well as moral dimension. By linking cost-effectiveness with effectiveness it should be claimed that those who approach (move) closest towards the objective projected and at the same time making lowest investments, function more efficiently, in other words this is a specific trade-off between needs and possibilities.

Beneficiality is mostly understood as a difference between the value of activities and their costs. Therefore, we deal with beneficiality of activities when the outcome of activities is higher than costs incurred. Otherwise, we talk about the adverse impact. Władyka M. argues that in the case of activities with the same cost-effectiveness and degree by which they approach the objective set, those distinguished by higher beneficiality tend to be more efficient.

Meanwhile, assets complementary to efficiency are precision, simplicity, rationality and reliance. The significance of extra assets for gauging efficiency is rather marginal in its character and it is frequently ignored while assessing the efficiency of activities.

Dimensions of efficient activities are applicable as a criterion for evaluating the organization of all sectors. However, it should be kept in mind that while assessing the organization across business sector, the efficiency assessment is greatly facilitated, because operating profit is a primary and easily measured assessment criterion, though its application as a efficiency measure carries some shortcomings which are addressed in detail by Domańska-Szaruga [1]. Regarding operations conducted by public organizations, measurement of efficiency presents some problems, as the effect of organizational activities does not help to attain benefits by it, but seeks to satisfy social needs. The level of this satisfaction is hard to be gauged, and thus the efficiency assessment itself may have some errors.

Recently it may be noticed that measures used in the private sector are commonly adapted to the public sphere. Principally, this is driven by limited revenues and related necessity of enhancing activities efficiency. Yet, while implementing methods and techniques proven in the business sector into the public sector, it is crucial to do so with particular caution. Differences in the specifics underpinning the operations conducted by business and public organizations may lead to the solutions efficiently functioning while not producing the benefits anticipated but actually causing losses. Therefore, it appears expedient to design the patterns for

activities conducted by public managers and rested on process management while assuming that the assessment of processes will incorporate the specifics of the public sphere, based on the measures proven in the public sphere.

### 3. Electronic tools used for modeling business process

In the context of process management, process modeling should be viewed as a set of activities performed by process analytics within an organization. Hence, process modeling aims at mapping out the manner in which an organization operates and designing improvement methods. The modeling effect is the presentation of the process model perceived as a structured, mostly graphic representation of the process. The representation depicts the progress and sequence of specific process steps.

In process management practice, modeling is frequently associated with mapping of processes. However, these concepts are not synonymous. Broadly speaking, a map merely shows relationships between processes and objects in the process, whereas a model demonstrates the progress together with all characteristic performance parameters and indicators. Having analyzed the model, the conclusions may be drawn as to the impact of potential disruptions on the process, and diverse decision-making variants may be theoretically verified without any actual activities and incurring related costs.

Business process modeling is related to the need for graphical representation of business processes designed for their optimization and documenting. Appropriate creation of the process model requires familiarity with the whole organization's structure, the process objective and resources involved. An important aspect for modeling is the choice of certain notation, used for modeling the specific business. Currently, the notation that received the largest popularity is *Business Process Modeling Notation* (BPMN) designed to modeling processes.

As revealed by Bitkowska, tools that shore up business process modeling may be classified as follows: [1]:

- tools designed for building diagrams – principally used for visualizing and mapping processes (Microsoft Visio, Flowchart (Micrografix),
- CASE tools – used for modeling processes that are integrated with IT solutions (Designer 2000, Oracle, Select Enterprise),

- tools for designing and improving processes – they allow for advanced analyses and simulation (ARIS Toolset, Igrafix, Adonis),
- tools for modeling processes within the system ERP.

The selection of the tool and notation plays a tremendously vital role at further work phases. IT developed a specialist language applied for object modeling – Unified Modeling Language UML. The application of this language seems to be the best solution for IT-aided business process modeling. Though, from the perspective of the business user, the solution poses challenges because it requires IT knowledge concerned with object perception of the reality. This knowledge area is particularly hard to be transferred to persons without any IT education and background. In an effort to facilitate processes mapping, the standardization primarily based on **Business Process Execution Language (BPEL)** and **BPMN** was put into place, thereby combining advantages brought by object approach and standards for business process modeling.

Overall, IT tools designed for modeling processes respond to the need of graphical illustration of the events sequence. Specifically, these tools are exploited for optimizing and monitoring of process effectiveness, planning of organizational structures, generating descriptions of job positions, keeping accounting of process cost, and implementing quality standards [6]. Broadly these tools make it possible to visualize processes as well as model, coupled with the opportunity of effectiveness simulating and its assessment. The instance of the tool used for modeling processes as well as comprehensive managing them is a product offered by the company BOC – Adonis. The concept of the software originated at the University of Vienna. Today the application enables mapping processes, analysis and simulation of tracks, analysis of costs carriers, automatic generation of documentation and so forth [8].

Simplicity and low number of symbols used for depicting processes makes the schemes, devised by their means, are characterized by their immense clarity and ease in interpretation. Furthermore, the universality of the notation provides the possibilities of transferring models across various applications.

The primary objective of process modeling is:

- to understand the manner in which an organization operates,
- to depict processes accomplished,
- to assess effectiveness and performance of processes,



- to map out possible improvements,
- to evaluate the compatibility of processes with the strategy,
- to programme changes and new solutions.

The IT solution proposed allows for bringing together processes mapped with the organization's resources and current organizational structure. Due to the solution it is likely not only to optimize processes but also to define the extent to which resources were harnessed and outline encumbrances of individual organizational units.

Adonis as a system supporting the process management may operate in the following modes:

- modeling,
- analysis,
- simulation,
- evaluation.

In the modeling mode, data illustrating an organizational structure, resources available, documents used, schemes for process sequence and parameters revealing resources involved are entered into databases of applications. On the whole, data entered into the system include, among others, costs of specific activities, their duration time and quality parameters. Thus, this helps to, among others, automatically generate summaries disclosing reserves and bottlenecks while tapping into resources. Moreover, having mapped processes it is possible to automatically generate documentation for processes, alongside documents critical for their execution. Meanwhile, the modeling process itself is carried out with the use of fairly intuitive graphical interface that is largely intended for creating a process map. Parameters illustrating the process (duration time, costs, etc.) may be entered in the graphical mode during process modeling as well as in tabular mode after modeling is completed.

The analysis mode seeks to prepare a statistical analysis of processes. The application makes available a wide variety of pre-defined reports and tools that enable generating reports according to individual criteria. Then, reports compiled by applications allow analytics to produce analyses and conclusions for improvement.

From the perspective of process improvement, the core functionality of the system is the possibility of generating simulations illustrating the course of the process with parameters entered. Accordingly, it is possible to judge the consequences of changes projected, determine the need for personnel, identify bottlenecks, pinpoint work burdens and specify the duration time for both the whole process as well as for individual operations.

The ongoing process management is buoyed up by the evaluation function. In effect, introduction of actual data into databases gives an opportunity to compare the manner in which process is executed with model assumptions. Based on that, non-conformance reports are prepared, thereby exposing problematic activities and critical resources. Due to these analyses, it is possible to swiftly correct activities and minimize adverse effects sparked by non-compliance between actual course of process and projected course.

The exploitation of electronic tools intended for process modeling across public organizations facilitates update for course of process, triggers swift implementation of changes and standardization of operations performed by administration. Adequate process modeling minimizes the number of bottlenecks, reduces the completion time and helps to assess the use of resources.

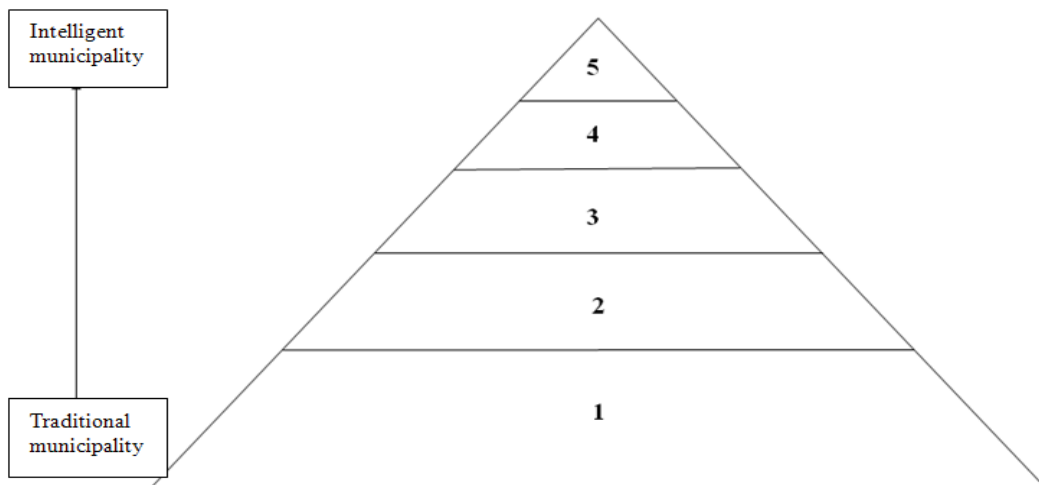
## **5. Business Process Modeling on the example of the intelligent municipality**

In response to the intensification of global competition, many organizations throughout the world have developed international operation strategies to establish a worldwide production, distribution and marketing network. In the era of knowledge economy, companies are facing dynamic competitive and rapid changes in global marketplaces. They have to emphasize the creation, accumulation, diffusion, transferring and application of knowledge to accelerate product, service and process innovation and value creation to meeting the needs of customers. There is an increasing importance of innovation in which knowledge turns into the main source of competitive advantage. Innovation in private and public sector is one of continuous interactive learning that occurs in the context of formal and informal relationships between organizations. Innovation can assume many forms, including incremental improvements to existing products, applications of technology to new markets, and uses of new technology to serve an existing market. This process is not completely linear. Innovation requires considerable communication among firms, laboratories, academic institutions, and consumers – as well as feedback between science, engineering, product development, manufacturing and marketing [12].

According to W. Wereda the model of transformation of the traditional municipality into intelligent one should be supported by different tools of Business Process Modeling. The factors determining an

advantage enjoyed by the intelligent municipality in the region, alongside effective management of finances (capital resources) principally include:

- Exchangeable relations and value transfers for partners;
- Efficient exploitation of the territory of the municipality (land resource) and its workforce (labor resource);
- Creation of marketing image of the municipality (also through good brand and image);
- Promotion of the municipality;
- Use of state-of-the-art techniques and IT technologies in establishing and maintaining relationships with partners and interest groups [10];
- Effective governing by individuals adequately selected and professionally groomed and educated in the field of public management;
- Treatment customers as partners of the municipality, not applicants (enhancing the quality of handling customers from each interest group, partners/stakeholders).



**Figure 1.** Transformation from traditional municipality into intelligent one.

*Source:* author`s own elaboration.

Explanation:

- 1 – meeting the needs of the local community at the primary level and executing tasks specified by the law;
- 2 – developing of the growth strategy and the creation of the municipality management programs in times of crisis, as well as seeking sophisticated sources of financing;

- 3 – building a good image of the municipality and promotion of the unit (using the latest techniques and information technologies) to establish and maintain relationships with partners and stakeholders;
- 4 – belonging to different organizations and participation in the rankings of local, regional, national and international fairs, exhibitions and other events within a range of at least regional level;
- 5 – creation of own "intelligent" image of the municipality in the region, as well as the use of knowledge and value innovation in the municipality of relying primarily on inter-organizational relations, stakeholder relationship management and other aspects of business process modeling.

When creating an intelligent municipality, local authorities should harness in its functioning seven core “habits” which distinguish it from traditional municipalities. These cores should mainly be supported by different aspects of business process modeling:

1. An intelligent municipality has leaders (front men) who persuade a local community that more is to won than lost by “hooking up” to a so-called local broadband economy<sup>1</sup>;
2. Intelligent municipality is open to shifts;
3. An intelligent municipality fosters visions inspiring to activities and sets ambitious viable objectives;
4. Intelligent municipalities create “heroes”- leaders;
5. Intelligent municipalities “do not rave” about technology, but as far as reasonably possible put in place technological solutions (Bell, Jung, Zacharilla, pp. 22-32);
6. An intelligent municipality creates its image in the region and across the country;
7. An intelligent municipality nurtures relationships with its partners and interest groups through improving customer service;
8. An intelligent municipality develops e-administration and continuously improves the functioning of the Office in the direction of pro-client orientation [11].

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<sup>1</sup> Local broadband economy characterizes by establishment of new companies and industries on the local area; boosting local firms to convert them into global exporters; enabling export and import of knowledge and skills; giving local school access to latest information; combining local health centres with leading medical centres to exchange experiences; combining enforcement of local law with national data templates; allowing local business and units to seek out global trade partners offering products with low costs and high quality; augmenting involvement among local community in the use of internet tools and new technologies; implementing service and product innovations on the local market.

## 6. Conclusions

The specifics behind Polish administration cause that, even though operations carried out by public administration units rely on the same laws, each administrative body executes the public services delivery process in a different way. In essence, the differences between processes not only lie in duration time, but also in their quality. In many cases, services offered to citizens prove to be overly costly; their execution takes too much time, thus revealing a waste of public resources.

Extensive implementation of methods and tools reinforcing the process management in public administration should prompt elimination of errors in service delivery processes at the first phase across administration bodies. Process modeling and their connection with documents and legislative acts allows for conducting a review of legislative acts and procedures applied in administration bodies. Subsequently, processes modeled will be subject to analysis and improvement. The improvement should be accompanied by examinations of inhabitants' needs showing significant features of services provided. So, the services defined in this way will better meet citizens' needs.

Taken together, a combination of model bases from various administration bodies helps to establish benchmarking and indicate reference course of processes. Reference processes should be marked by the lowest cost, shortest time and quality expected by recipient. The modeling process appropriately executed should also place an emphasis on handling exception and non-standard situations.

To recap, a reference model base, developed and continually upgraded, may also be a valuable tool for testing any types of changes ahead of their implementation. When it comes to the public administration, a reference model base may be used for initially assessing costs incurred by implementation of alterations to legislation as well as public services delivered.

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