

# Process Management and Success Factor Analysis of Management Information System of Budget Accounting of Local Treasuries

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## Summary

The goal of this article is to point out the significance of process management of budget accounting of local treasuries and critical success factors method application focused on management requirements and processes, through all the MIS development phases, which ensures advancement of business processes as well as monitoring their output values. This way, from process effectiveness and success analysis of MIS budget accounting of local treasuries point of view, conditions for analysis and measurement of process results and further improvement possibilities are ensured. Research results of characteristic processes key performance indicators are also shown. Based on the obtained results, possibilities of improvement as well as MIS budget accounting of local treasuries most significant trends are analyzed.

## Keywords

process management, management information system, success factors, budget accounting, key decisions, performance

## 1. Introduction

For the past period of time, in the area of budget accounting process management, from the automated information systems point of view, the dominant kind of information systems were function-based information systems based on relatively outdated concepts of designing information systems for management processes support in a very rigid hierarchical decision making system and vertical communication inside the system itself.

Research in the area of budget accounting management from the automated information systems support aspect were initiated, above all, by quick changes in government, budget accounting legislature, rapid development of information-communication technologies, decision making support systems, management needs for more efficient internal and external communications, inevitability of e-government application etc. (Allen & Tommasi, 2001; Blöndal, 2003; OECD, 2004; PEFA, 2008).

Due to organizational structures specificity, by researching current models of more developed EU (European Union) countries, it is obvious that there is no general management model of information systems for local treasuries budget accounting defined and applied in practice. Empirical research and analysis of the state of local

treasuries budget accounting in Serbia (Tešić, 2011a) have shown that current solutions for local treasuries budget accounting information systems are characterized by incompatible, partially developed and non-integrated systems, which do not provide document standardization, information structure coordination, interoperability with state level and integration with the systems from internal and external environment. The reason for this is that ICT (Information Communication Technology) solutions are designed according to specific demands of their organizational parts, based on independent applications, without strategic planning of an integrated IS (Information System) in information architecture as a basis for development and reengineering of a future IS. Technologies and solutions of existing information systems were not based on methodology that adhered to phases of life cycle of IS development, so this approach led to very heterogeneous autonomous and independent IS solutions (Jansen & Cresswell, 2005).

By comparison and analysis of existing models of projected information systems in Europe and the world, in terms of use of modern ICT, it was found that the demands of users at the local level (Kim & Bretschneider, 2004) are directed into development of management information systems of budget accounting that is based on process of

integration and implementation in a comprehensive system of public finances management, which implies:

- projecting and creating independent communication infrastructure on central level,
- projecting and establishing communication infrastructure of local treasuries, with using of already existing systems and capacities,
- defining standards of horizontal and vertical communication ICT,
- defining of basic functionality of IS budget accounting of local treasuries,
- implementation of international standards,
- enabled access to already existing (inherited) systems, exchange of data and information,
- integration of processes and application with systems from internal and external environment and
- redesign of working processes and improvement of key management processes in accordance with advantages and possibilities that modern informational communicational technology provides.

To achieve system synergy, stakeholder and user requirements were analyzed and then integrated during MIS (Laudon & Laudon, 2006) budget accounting of local treasuries development process, different process management processes of budget accounting, as well as management.

BPM (Business Process Management) method (Jeston & Nelis, 2008; Havey, 2005) has a significant place in designing MIS budget accounting because it provides modelling tools that make it possible to define concrete performance metrics, coordinated with strategic goals of the system, as well as connect them with specific activities of processes. Implementation of this activity's main goal is to identify key success factors of business processes in accordance with management requirements, and in view of this fact, define appropriate performance measures and goals for each business process to enable conditions needed for measurement and grading of MIS local treasuries budget accounting performance (Harmon, 2007).

The biggest benefit of business processes management application (Arsovski, 2007) is that it enables understanding all existing processes within the business system, and at the same time it shows problems and shortcomings that exist in their implementation. Based on this, business process management application helps with:

- reducing the time needed for business processes management,

- reducing business processes costs,
- improving business processes efficiency,
- improving business processes quality.

Business process management encompasses a group of methods that provide understanding, controlling and improving all business processes (Chaffey & Wood, 2005) in one system. Business process management includes:

- process management and their continual improvement,
- implementing procedures that reduce management time and ensure optimal resource usage,
- measuring expenses and quality of key business processes, as well as all additional activities,
- implementation of business process results tracking and documenting system.

In accordance with used process approach, (Jeston & Nelis, 2008; Havey, 2005) from the aspect of support to management on operative, tactical and strategic level, this research includes: defining performances of key characteristics of processes, recording data significant for monitoring of characteristics of key processes (time, deviation, quality), identification of the object of measuring, addition of new attributes of the object of measuring significant for control and managing, identification of deviation from given values of characteristics of objects of measuring and change of system configuration depending on change of key processes (addition, deleting and/or change of structure of activities and order of implementation of activities), that is, change of role and responsibility of system users.

In the first part of this paper, by applying the critical success factors method, an approach in modelling management requirements is shown in the MIS planning stage. Key decisions, information and assumptions are defined as a basis for identification and analysis of MIS budget accounting of local treasuries management processes. In the second part, based on identified characteristics of key processes, indicators for performance measurement and success analysis of MIS budget accounting of local treasuries are defined, and then the obtained results are analyzed.

## **2. Modelling of budget accounting of local treasuries Management Requirements**

In the process of budget management of local treasuries development, and in accordance with IS

development life cycle (SDCL – Systems Development Life Cycle) (Arsovski, 2008; Avison & Fitzgerald, 2006) and budget accounting system specifics, an approach of combined use of different methods for different phases in the life cycle was used. This paper shows MIS budget accounting of local treasuries modelling results from analysis, identification and management of key processes point of view, which was the basis for performance of the developed MIS grading and measurement.

In a modern business environment, planning of information systems is not only a management function but also a function that covers most aspects of strategic management (Andersen, 2000). Keeping in mind the basic paradigm of business processes management, development planning of MIS budget accounting of local treasuries (Kendall & Kennal, 2006) represents a significant phase in the development life cycle of this information system, from a point of view of defining system goals, user and organization requirements and needs for information, as well as identification and selection of key processes, data classes, data flow inside the system and towards systems from internal and external environment, information architecture and demands for management information system quality. By applying methodologies (BSP – Business System Planning (Arsovski, 2008), SSA – Structured Systems Analysis, SADT – Structured Analysis and Design Technique) and IDEF – Integration Definition) in the strategic planning of MIS budget accounting of local treasuries, a system analysis and goals identification, business functions analysis, analysis and identification of user and environment requirements, key process identification, system data flow and storage analysis and management requirements modelling has been performed, as a basis for an information system integrated model.

MIS development for budget accounting of local treasuries bases itself on the business organization architecture (Enterprise Architecture). It is an approach in which business and implementation models (software structures) are firmly connected to bring activities of MIS development and implementation in harmony with goals, mission and vision of budget accounting of local treasuries system (Lankhorst, 2005).

Significant aspect of contemporary approach to development and design of information systems is knowing and choosing appropriate methods of forming information for management in coordination with information requirements and management needs on all management and

decision making levels. Based on analyzed and defined management requirements, by applying critical success factors method (CSF – Critical Success Factors), decisions and information needed for realization of set goals within defined functional parts of budget accounting of local treasuries (budget planning and forming, appropriation processing, budget and quota execution planning, obligation assigning, payment requests record keeping, payment and transaction record keeping) were defined. To define system goals, factors critical to achieving the goals were determined and decisions that were key to critical success factors were defined. By using document content analysis method and performance and capacity analysis method (concentrated on overall system requirements), requirements and information were specified, and then management requirements modelling as management and decision making support were specified too.

### 2.1. Critical success factors of MIS budget accounting of local treasuries

Method of critical success factors (CSF – Critical Success Factors) as an efficient means of defining and identifying management information requirements was used to define and choose information needed for decision making process with a goal to obtain clear and continual connection of operational level with the higher, strategic level of management. Most critical success factors are internal, but some are external. Critical success factors analysis was performed from management point of view for two reasons: it encourages management to concentrate on key activities and leads towards defining and analyzing management requirements and needs.

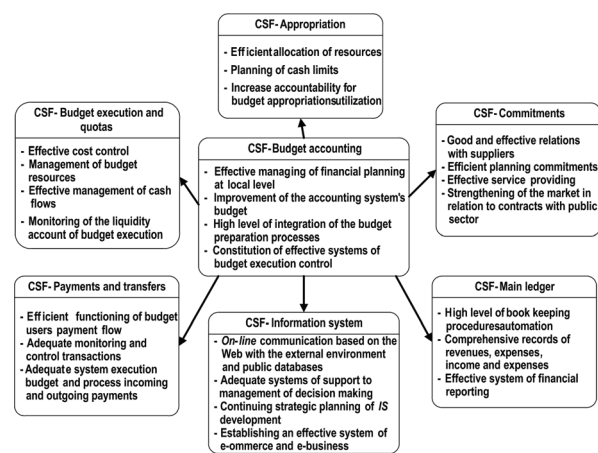


Figure 1 Critical Success Factors of budget accounting of local treasuries  
Source: Author

Apart from that, critical success factors are a means of successful goal achievement because they relate to ongoing operations management and key areas which require high performance and secure measures needed for management system control. Figure 1 shows defined critical success factors of budget accounting, as a system, and individual critical success factors for defining system functions.

For management needs, as decision-making support and a kind of goal determining tool, key information, key assumptions and key decisions were identified from analyzed critical success factors.

## 2.2. Defining decisions and information needed for making decisions

Key information is defined as decision-making support for management because it serves to monitor critical success factors and make key decisions. This information is identified as a group of information needs and requirements during critical success factors analysis.

Key information for management decision-making support of budget accounting is:

- information that relates to fiscal performance and financial indicators on the republic level,
- providing information for monitoring budget realization by all budget classifications (organizational, economic, functional...),
- insight into unidentified relations between resources, obligations and net property (capital),
- information needed for analysis of individual income relations to determine factors that influence their sources,
- data, information and know-how related to expanses and benefits of utilizing resources for a longer period of time,
- insight into the cash flow,
- data and information for monitoring and analysis of compliance with current economic and financial regulations and
- data and information for monitoring and control of expenses, the estimation of which is based on realistic income prognosis and capacities for establishing and realizing fiscal goals.

Key success assumptions, which mostly relate to environment and system interaction with environment, are an important basis for key success factors.

Key assumptions for budget accounting management decision-making support are:

- estimation of resource allocation between sectors (education, culture, social services etc.) can be determined with great accuracy based on functional classification,
- improving efficacy and effectiveness of operability monitoring is ensured by defining performance indicators which are based on inputs, outputs and outcomes,
- fiscal performance analysis and financial indicators enable a realistic income projections for the coming period of no less than two years;
- by implementing the e-business and e-commerce model supply processes for the coming period can be performed, in 90% of the cases, over the Internet,
- budget accounting process effectiveness is improved by means of using modern information and communication technologies,
- in the next five years direct and indirect budget users can, through local treasuries, use independent and automated budget accounting and
- modern technologies based on the Web enable communication with environment and ensure consistent information for budget accounting management.

Key decisions are decisions on which successfulness or unsuccessfulness of a certain process, action or activity depends.

Key decisions for budget accounting management decision-making support are:

- to analyze trends (at least for two past years) of basic budget income,
- to determine the most stable incomes from previous years to obtain a basis to evaluate future incomes,
- to define factors that influence sources of income by analyzing income relations by all budget classifications (organizational, economic, financing source, functional),
- to determine the reasons behind all significant deviations between actual realization in the past and planned amounts for coming years,
- to define quantitative and qualitative frame for progress assessment in improving performance of local budget systems,
- to define overall limitations for expenses,
- to define economic assumptions for management to improve budget preparation, assessment and anticipation,
- to improve compatibility between constant obligations and future prognosis and
- to analyze why a certain budget item or program is needed, when it is needed, what is its goal and duration.

In addition to defining information and decisions needed for decision-making through analysis of critical success factors, analysis also represents input values for building a strategic data model and decision-making application development for all levels of management. By research and analysis of management information needs it is possible to secure a basis for development of an integrated data warehouse model and other modern information architectures needed for decision-making support applications development.

### 2.3. Choosing and Defining the Management Process

Functional modelling phase is realized by applying IDEF standard and process-oriented method SSA–Structured System Analysis (Kendall & Kennal, 2005; Lazarevic & Jovanovic & Dizarevic, 2003). Key processes and data classes are identified and analyzed, i.e. incoming and outgoing data flow that connects processes and subjects inside the system as well as system and environment, management and decision making process modelling (Havey, 2005), data modelling, modelling of management needs interface and modelling communication infrastructure of the system.

Defining ownership over processes and identifying management processes represents a significant activity for analysis of success factors of budget accounting of local treasuries management information system. Management processes are aimed towards interactions with environment processes, planning, control, measuring, monitoring, analyzing, improving, advancing, system management and decision-making. Information flow is aimed towards management processes so that management has timely and quality information needed for making valid business decisions.

From the process ownership point of view, management is tasked with defining processes that need improving, and because of that, other management roles and responsibilities for functioning inside the system need to be defined. All users of budget accounting of local treasuries information system, and above all management, are responsible for maintaining and developing an effective and efficient management system. Continual development, improvement and advancement of management system, local treasury management fulfils in the following ways:

- by establishing a business and quality policy,
- by determining business and quality goals,
- by planning business and quality,
- by completely including all the employees in the process of fulfilling the requirements of the management and decision-making system,
- by transmitting the importance of satisfying user needs, as well as laws, standards and regulations through the organization,
- by conducting reassessment of management and quality systems,
- by providing the needed organizational structure and resources,
- by planning a continual improvement and corrective measures,
- by controlling business and quality achievement,
- by identifying critical processes that need improving,
- by re-planning and redesigning the system and
- by designing and mapping new processes which includes process re-engineering.

By analyzing management requirements for information on all management and decision-making levels, strategic, tactical and operative, processes were identified in which management plays a key role, and by improvement of which the advancement of pre-set goals is meant to be achieved. Basic criteria for management process selection of budget accounting of local treasuries are process' goals, management requirements for the process, as well as critical success factors, key decisions, key information and key system development assumptions, considering the role they have in management decision-making, process realization and achievement of defined goals (Figure 2).

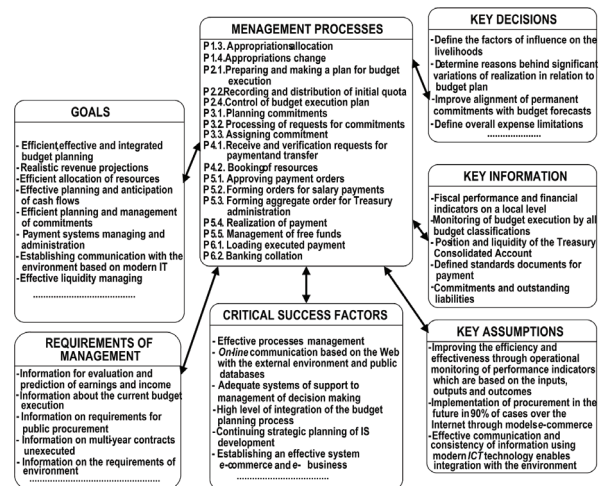


Figure 2 Processes of management in MIS budget accounting of local treasuries

Source: Author

By using the obtained results of system analysis (identified processes and data classes, process and data content and their significance, process execution management, business activities management), integrated model for management information system for supporting process management of budget accounting of local treasuries in Web environment is developed in accordance with defined goals, developed model of management requirements, process model, data model, different decision-making level users' needs interface model, designed database (Mogin & Lukovic & Govedarica, 2004) and system's application software architecture. System analysis encompasses system decomposition to separate components as well as functioning analysis of every component and their interactions. By applying associative matrix processes/data classes, logical subsystems of MIS budget accounting were defined: budget planning and preparation, appropriation processing, budget and quota execution planning, assuming obligations, payment and funds transfer and accounting with financial reporting of funds sources. Figure 3 shows context system diagram, with relations between the system and environment and connections (data flow).

### 3. Model of Analysis and Evaluation of Success Factors of MIS Budget Accounting of Local Treasuries

Methods and techniques that focus on effective and efficient achievement of goals with the concept of establishing process-oriented organizational structure, based on defined key information about need and ways of fulfilling users' demands, were used for analysing budget accounting information system management. Process-oriented organizational structure is a consequence of integrated development of system. Strategic management, as the highest of all management levels, is directed to values, goals and mission within the functional entities of the business system. Strategic managing stands for establishing of system of control of managing, integration of strategic and tactical decisions and implementation of strategic plans and related goals (Arsovski, Arsovski, Mitrović & Stefanović, 2009).

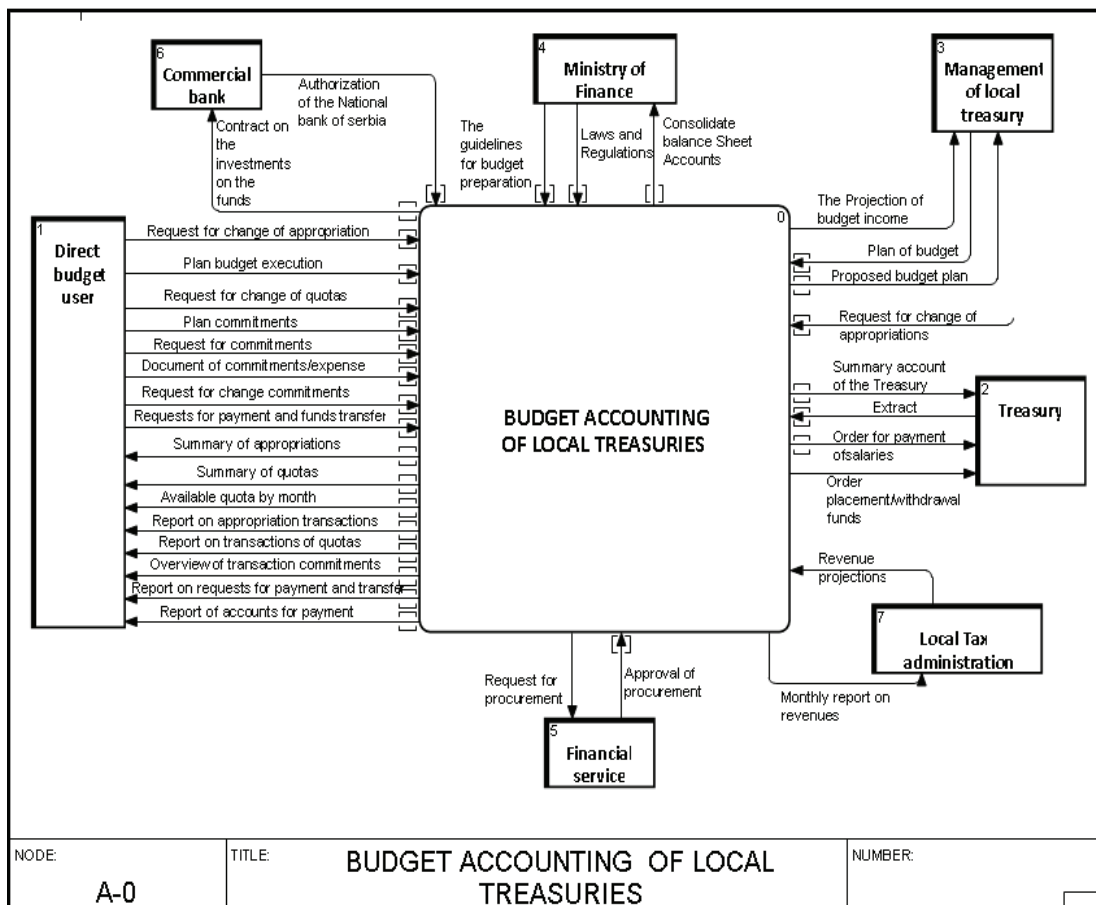


Figure 3 Context diagram of MIS budget accounting of local treasuries  
Source: Author

### 3.1. Identification of key process characteristics

In the process of development of management information system, process inputs are defined by requirements, needs and goals of management and other system users, by regulations, standards and other specifications.

On the level of processes, process lists were made (Kaplan & Norton, 2004), and based on these lists, measures and goals of processes were analyzed through questions: Are the defined goals of key processes connected to each other and to goals of the system? Are the business processes decomposed into logical and efficient processes and sub-processes, and is the managing of processes and of performances of processes adequate? On the level of activity, these questions were analyzed: Are the activities and standards that refer to users requirements in accordance with the requirements of processes? Does the system meet the requirements of activities and are the phases of activities, in logical order, compatible with expected results and defined characteristics of process quality? Basis for analysis of quality and effectiveness of processes of budget accounting and identification of processes which need to be promoted consists of: defined responsibilities and ownership over processes of accounting, identified critical success factors (CSF) and establishing of adequate system of measuring of quality and effectiveness of processes.

**Table 1** Analysis of effectiveness of the process

Goals of processes	Process	Activity
Compatibility between projections and budget planning, and needs of budget users	Preparation and making of plan of budget execution	P 2.1.1 - Making of projection of budget outcome
Defining of strategic frame of priorities		P 2.1.2 - Compatibility between projection of budget income and plans of budget execution P 2.1.3 - Considering and adopting of plan of outcome of budget users
Critical success factors (CSF)	Planning of cash limitations for budget users Managing of budget sources	
Result of process	Making Izrada of plan of spending for budget users in accordance with determined volume of outcome	
Indicators (characteristics) of quality of processes	Relation between planned budget outcome and planned outcome for previous year (subtraction) (%) Participation of budget users in process of preparation and formulation of budget (yes/no)	
Effect achieved by achievement of goals	Development of sector strategies and planning of outcome; Providing of compatibility between real outcome and priorities; Unique process of budget planning; Preparation of initial limits	

Source: Author

The aim of realization of this activity is to define the results of processes, adequate indicators of quality of processes and effects of certain processes, through identified key success factors and defined goals for every process. An example of process analysis is presented - Preparation of plan of budget execution (Table 1). Target effectiveness standards were formulated for every process and activity, and requirements of performances of processes were defined.

### 3.2. Indicators of success factors of MIS budget accounting of local treasuries

Model of performances of MIS of local treasuries budget accounting includes: all forms of organizational system, all the phases of system life cycle, all forms of quality and effectiveness during all phases of development and all system users.

Based on the model of quality and model of effectiveness, key performance indicators are defined (Table 2), i.e. indicators of success of developed MIS, which represent integrated evaluations of performances of these groups of indicators:

- Realization of budget planning - indicates the extent to which the planned budget represents real realizations, examines variations between outcome, planned and actual income as well as the influence of obligations on the structure of planned outcome;
- Universality and transparency - examines distribution of information with central level which reflects on effective information resources and local finances management;
- Predictability and control of budget execution - evaluate the efficiency of management to effectively, accurately and promptly allocate resources within the planned budget.

**Table 2** Examples of key performance indicators of MIS budget accounting of local treasuries

INDICATOR	GRADE
IK 1 - Total outcome compared to approved budget  <i>Dimensions that are assessed:</i> The difference between actual primary expenditure and the originally planned expenditure of primary	<i>Grade and the minimum necessary conditions:</i> 4 - Deviation of actual expenditure against the planned 5% higher than planned spending, in one of the last three years 3 - Deviation of actual expenditure against planned is 10% higher than planned expenses in one of the last three years 2 - Deviation of actual expenditure against planned was 15% higher than planned expenses in one of the last three years 1 - Deviation of actual expenditure against planned is 20% higher than planned expenses in one of the last three years
IK2- The structure of expenditure in relation to the approved budget  <i>Dimensions that are assessed:</i> The extent to which the difference in the structure of primary expenditure is greater than the total variance of primary expenditure (IK1)	<i>Grade and the minimum necessary conditions:</i> 4 - The difference in the structure of expenditure is greater than the overall primary expenditure deviation for up to 5% in any of the last three years 3 - The difference in the structure of expenditure is greater than the overall primary expenditure deviation for 5% to more than one of the last three years 2 - The difference in the structure of expenditure is greater than the overall primary expenditure deviation for more than 10% at most one of the last three years 1 - The difference in the structure of expenditure is greater than the overall primary expenditure deviation for more than 10% in at least two of the last three years

Source: Author

One way to improve business processes is the combination of BPM and Six Sigma strategies with strategies used for evaluation of performance and quality of the information system.

Six Sigma model, a concept connected to improve processes and the way of achieving the improvement of system quality, or evaluation of performances, was used. SPC (Statistical Process Control) is a basis for Six sigma methodology (Gotsch & Davis, 2006; McCarty, Daniels, Bremer & Gupta, 2005).

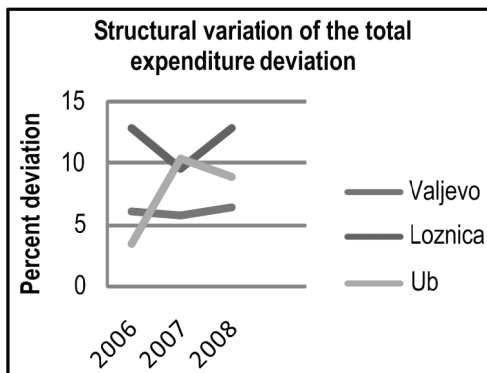
Data from the sample of three local treasuries in the period of three consecutive years was used for the research concerning indicators of success of projected system (Tešić, 2011b). Indicators IK1 and IK2 were chosen, because the results of statistical analysis of these indicators could point out the quality and effectiveness of the process of developed MIS compared to current state (Table 3).

**Table 3** Performance evaluations for indicators IK1 and IK2

Local Treasury Valjevo			
	IK1	IK2	
Year	The total expenditure deviation	Structural deviation	The relationship of structural variations of the total deviation
2006	2,75	8,74	5,99
2007	21,54	27,22	5,68
2008	6,7	13,1	6,4
ASSESSMENT	2		
Local Treasury Ub			
	IK1	IK2	
Year	The total expenditure deviation	Structural deviation	The relationship of structural variations of the total deviation
2006	11,5	15	3,5
2007	15,6	26	10,4
2008	11,2	20,1	8,9
ASSESSMENT	2		
Local Treasury Loznica			
	IK1	IK2	
Year	The total expenditure deviation	Structural deviation	The relationship of structural variations of the total deviation
2006	16,7	29,5	12,8
2007	24,2	33,8	9,6
2008	30,7	43,5	12,8
ASSESSMENT	1		

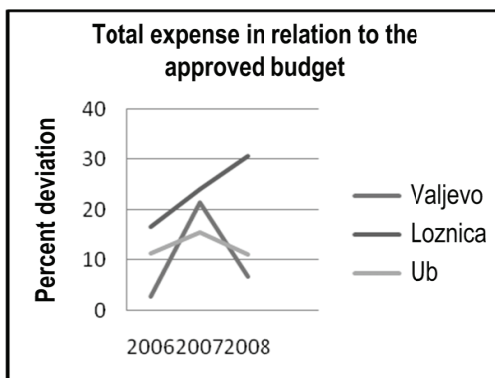
Source: Author

**Chart 1** IK1- Relationships and Trends



Source: Author

**Chart 2** IK2- Relationships and Trends



Source: Author

Chart 1 shows that, within the observed interval for the chosen sample, local treasury Loznica has a negative trend of outcome realization compared to budget plan, which points out the low level of quality and effectiveness of process of planning. We can see that there are some oscillations in local treasuries Valjevo and Ub, deviation in 2007 is greater than in other two years. These indicators point out the need for multiyear planning with an aim of reduction in variability in system performances. Relations between analyzed local treasuries are somewhat expected, considering the fact that the budget affects the quality of planning process. Result of analysis of deviation of outcome structure (functional classification of budget) compared to total planned outcome (Chart 2) show that local treasury Valjevo has the same trend of deviation of fund allocation with the budget plan in all three observed years, local treasury Ub has a significant deviation in last two of three years, with a tendency of reduction, and local treasury Loznica has the highest level of deviation with a negative trend.

### 3.3. Analysis of results and opportunities for improvement of processes of MIS budget accounting of local treasuries

Grades for indicators IK1 (total outcome compared to approved budget) and IK2 (outcome structure), on observed sample consisting of three local treasuries, indicate that there is conflict between planned and realized funds, both at the aggregate level and within the sector planning. Low grades indicate that planned budget funds are not supported by goals of distribution in primary areas.

It is concluded from the analyzed data that there is a relationship between successful business and application of MIS to transform key processes and thus provide information support necessary for effective monitoring and management of processes. Checking key performances, based on the analysis of results of measurement of processes goals shows that it is possible, by use of model of measurement of key performance indicators, to identify the state of defined processes of developed system, which provides information for monitoring and processes management. Analysis of results indicates that, based on identified lower score of quality characteristics of key performance indicators of the processes, areas of improvement of processes could be identified.

Identification of opportunities for improvement includes analysis of performances of business processes, as well as problems that occur in specific



cycles (past or future), which relate to the costs of implementation of business processes, the added value accomplished when these processes are realized, the quality and effectiveness.

Improvement includes all changes, from small changes to complete re-engineering of business processes. It contains procedures: The establishment of the basis (internal and external) in the general case involves consideration of process flows, measures and achieved results, limitations, organizational structures that support improved business processes and roles and responsibilities of management and Designing and mapping of new processes that involves re-engineering of business processes in order to meet the baseline and achieve the improvement of identified key processes.

#### 4. Conclusions

Management of business processes is one of the main goals for any organization that wants to improve their business and to focus on customer requirements. In addition, management of business processes is a prerequisite for increasing the effectiveness and performance of MIS budget accounting of local treasuries.

In accordance with the role of the management structure and management of budget accounting of local treasuries in the process of effective decision-making, development of management information system improves the decision making process and allows more efficient monitoring and management of processes of budget accounting. Management and provision of quality of identified processes, based on analysis of key performance indicators of management information system of budget accounting of local treasuries, is required for efficient and effective realization of defined goals and the projected effects of the system. Determination of goals helps define the parameters for analysis and evaluation of success and the results of processes and allows the management structure to evaluate and improve the system in critical activities of processes.

The primary business processes, support processes and management processes that are defined in the system development procedure, represent a basis for the formation of network of performances based on a model of network of measure of system performances.

The process of monitoring, control and measurement of performances of processes of developed MIS, which is based on the results of process modelling (process modelling and analysis, managing the execution of processes, business

rules management, document management and content management, management of business activities) is successfully provided by use of process-oriented methods of BPM - Business Process Management, which, by analytical approach, also represents a tool of management of quality. Application of process management that is focused on improving operative performances creates an adequate basis and conditions for the implementation of incremental and radical improvements of process of MIS budget accounting of local treasuries.

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## Biljana Tešić

University of Kragujevac  
Faculty of Economics  
Đure Pucara Starog 3  
34000 Kragujevac  
Serbia  
Email: [tesicb@sbb.rs](mailto:tesicb@sbb.rs)

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