

**Biljana Tešić<sup>1)</sup>**

1) Ministry of Finance, The  
Treasury Management,  
Valjevo, Serbia  
{[biljana.tesic@trezor.gov.rs](mailto:biljana.tesic@trezor.gov.rs);  
[tesicb@sbb.rs](mailto:tesicb@sbb.rs)}

## **IMPROVEMENT OF BUDGET ACCOUNTING PROCESSES MANAGEMENT USING MANAGEMENT INFORMATION SYSTEMS**

**Abstract:** *Curent trends of globalization, changes in public finances management and budget reforms undertaken in the European Union and the world, created the need for increasing of efficiency and competence of management in order to attain effective management of processes of budget accounting in our country. Through identification and analysis of key processes and through defining of relations between processes, as well as through design of information architecture and structure of integrated model of management information system of budget accounting of local treasury, and based on modern ICT (Information Communication Technology) concepts, efficient process management is provided, by harmonization of process approach and functional approach. The paper presents basic characteristics of budget accounting management processes. Also, the paper presents an approach in using the method of critical success factors (CSF - Critical Success Factors) in modeling procedures of requirements of management of budget accounting in identification and analysis of key processes used for measuring the performances of MIS (Management Information System) budget accounting of local treasuries. The importance of processes management in the analysis of potential areas for improvement and enhancement of performances, also reflects in the identification of critical success factors of characteristic processes and defining of appropriate performances measures and goals for each process, necessary for analysis of effectiveness and evaluation of success of developed MIS. In accordance with the process approach, based on the analysis of effectiveness and quality of key processes of the system, the paper presents an integrated model of effectiveness and quality of developed MIS budget accounting of local treasuries.*

**Keywords:** *process management, management information system, budget accounting, improvement*

### **1. INTRODUCTION**

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. ([1],[7], [23], [24]).

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 [25] have shown that current solutions for local treasuries budgeted 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 [12].

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 [17] 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 of independent communication infrastructure on central level,
- projecting and establishing of 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, during MIS budget accounting of local treasuries development process [19], different process management processes of budget accounting, as well as management, stakeholder and user requirements were analyzed and then integrated.

The goal of this paper is to point out the significance of process management of budget accounting of local treasuries 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. The results of research concerning the measurement of

key performance indicators of characteristic processes are shown. Based on the obtained results, opportunities for improvement were analyzed, as well as the most important process parameters of MIS budget accounting of local treasuries.

## 2. BUSINESS PROCESS MANAGEMENT

*Business Process Management* (BPM) method ([13],[10]) has a significant place in designing MIS budget accounting because it provides modeling 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.

The biggest benefit of business processes management application [3] is that it enables the understanding of 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 of all business processes [8] 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, ([13],[11]) from the aspect of support to management on operative, tactical and strategic level, this research includes: defining of performances of key characteristics of processes, recording of data significant for monitoring of characteristics of key processes (time, deviation, quality), identification of object of measuring, addition of new attributes of 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.

## 3. MIS BUDGET ACCOUNTING OF LOCAL TREASURIES

In the process of budget management of local treasuries development, and in accordance with IS development life cycle (SDCL—*Systems Development Life Cycle*) ([4],[6]) 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 modeling results from analysis, identification and management of key processes point of view, which was the basis for process improvement of the developed MIS.

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 [2]. Keeping in mind the basic paradigm of business processes management, development planning of MIS budget accounting of

local treasuries [16] 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* [4], 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 modeling 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 [18].

Functional modeling phase is realized by applying IDEF standard and process-oriented method SSA–*Structured System Analysis* ([15],[20]). 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 modeling [10], data modeling, modeling of management needs interface and modeling

communication infrastructure of the system.

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 [22] 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.***

### 3.1 Definition and analysis of budget accounting management requirements

With a goal to obtain clear and continual connection of operational level with the higher, strategic level of management, 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. 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

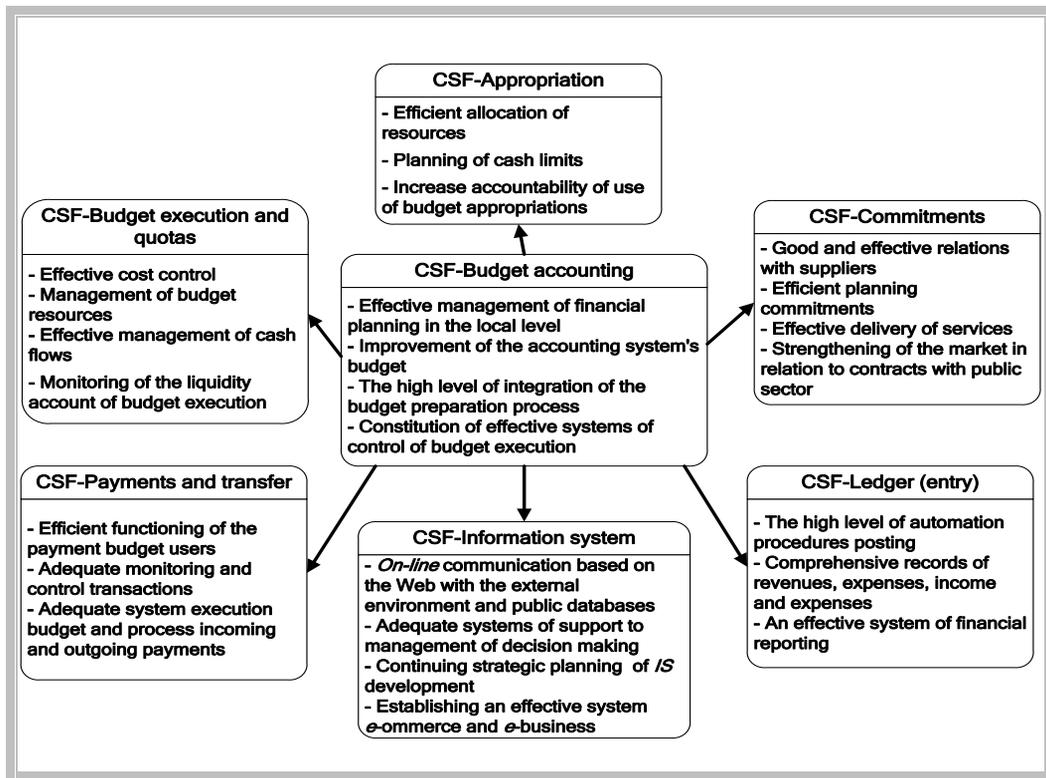
activities and leads towards defining and analyzing management requirements and needs.

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. 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 [5]. *Figure 1* show 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.

Model of requirements of management of budget accounting for information (*Figure 2*) is a set of interdependent activities and impacts related to internal and external information represented in a form, which management requires in order to make effective decisions.



*Figure1: Critical Success Factors of budget accounting of local treasuries*

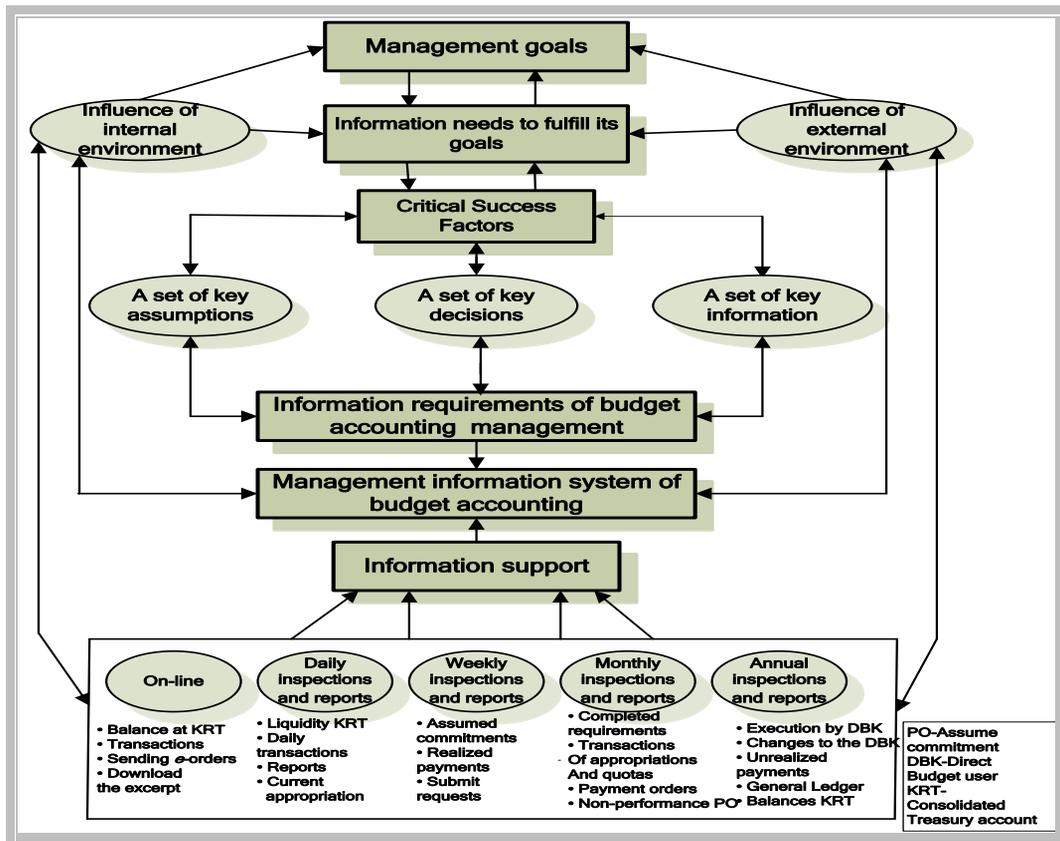


Figure 2: Model of management requirements

### 3.2 Choosing and defining the management process

*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.

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 through the organization the importance of satisfying user needs, as well as laws, standards and regulations,
- 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.

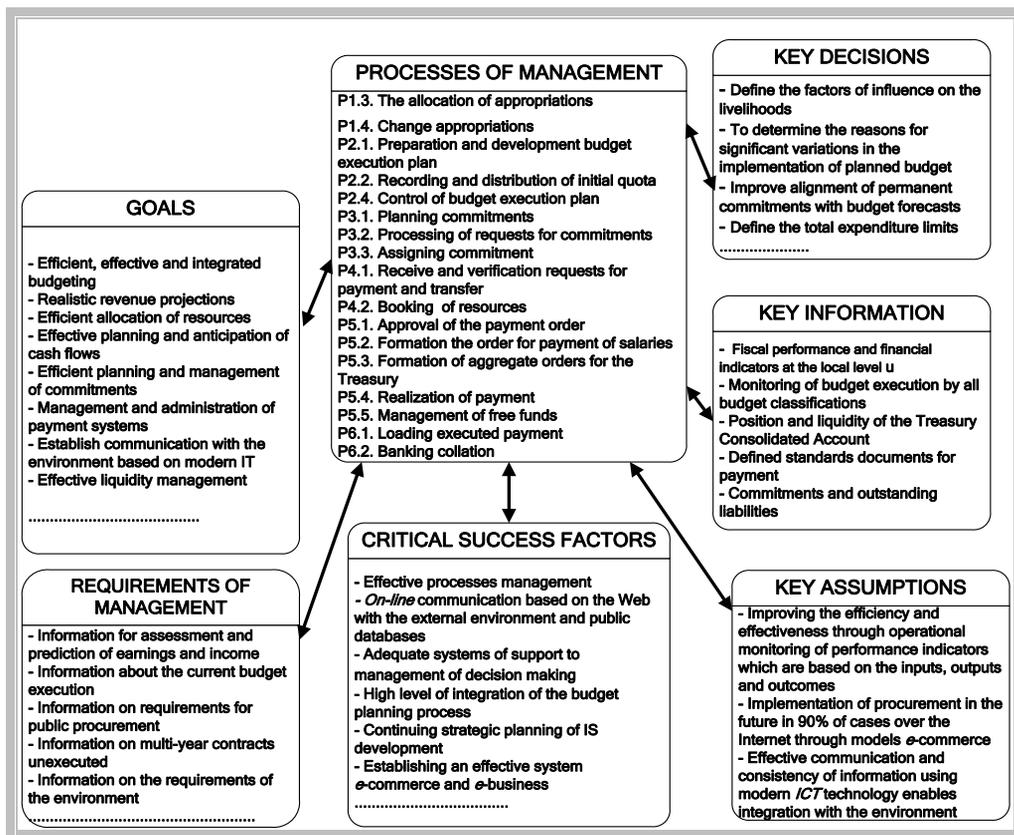


Figure 3: Processes of management in MIS budget accounting of local treasuries

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 3).

#### 4. MODEL FOR IMPROVING THE PROCESS OF BUDGET ACCOUNTING

In order to improve the effectiveness of methodology of budget accounting

process, it is necessary to achieve an effective improvement of key processes with a focus on TQM [9].

#### 4.1 Identification of key processes that need to be improved

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.

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 [26].

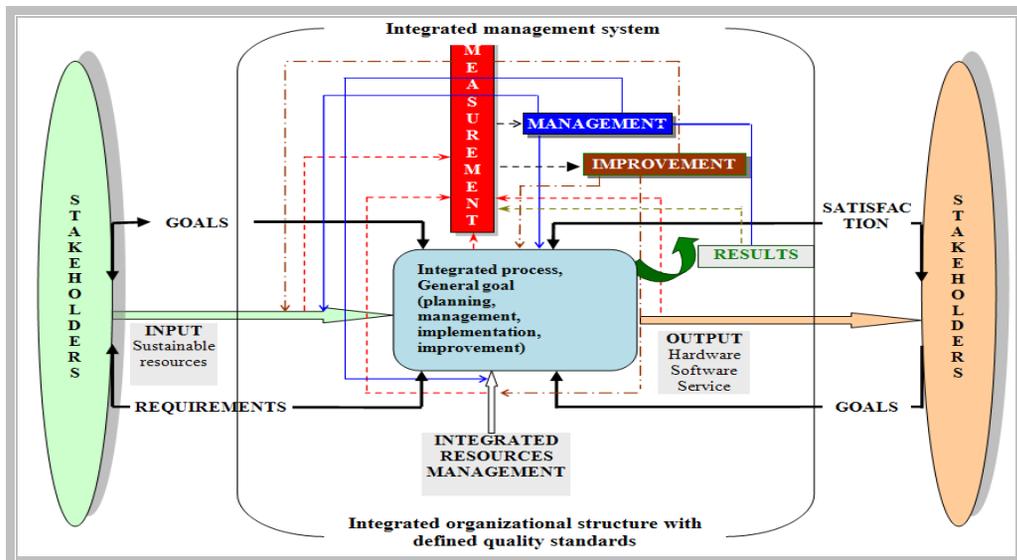


Figure 4: Integrated model of effectiveness and quality of MIS

Identification of key processes that should be improved included the definition of budget accounting process and selection of critical processes for improvement [14]. Within this activity, having in mind the CFS and user requirements, and by use of appropriate methods and techniques, modeling of quality and effectiveness of MIS has been performed, on which the defined integrated model of effectiveness and quality of the system is based (Figure4).

#### 4.2 Analysis of key processes

Identification of possibilities for improvement of key processes includes performance analysis of business processes, and problems that occur at regular cycles (past or future). One way to improve business processes is the combination of *BPM* and *Six Sigma* [21] strategies with strategies used for evaluation of performance and quality of the information system. The ranking of potential improvements of key processes is defined on the basis of characteristics, which in terms of critical success factors,

key indicators of process quality, indicators of the effectiveness of goals and expected results and effects of the implementation process, play a decisive role in ensuring the effectiveness and

quality of developed management information system.

The **Figure 5** shows the analysis of indicators of performance of MIS budget accounting processes.

PROCES	PROCESSES GOALS	CRITICAL SUCCESS FACTORS	RESULT OF IMPLEMENTATION PROCESS	EFFECTS OBTAINED BY THE FULFILLMENT OF THE GOAL	PROCESS PERFORMANCE INDICATOR	REFERENCE VALUE
Planning and Budgeting	- Budgeting within realistic revenue expectations - Allocative efficiency of funds	- Trends of budget revenues (at least two years back) - Total and sectoral restrictions on expenditure	- Integrated budget planning at all levels of management and decision making - A balanced and comprehensive budget plan	Clearly defined initial limits, Fiscal stability, Realistic projections of revenues and expenses, The allocation of responsibility and authority in the process of budget preparation and planning	The deviation of the expected revenue of real income in the previous two years (%)	<97%- Fully meets <94%- Satisfies <92%- Partially meets <90%- Unsatisfactory
Allocation of appropriations	- Ensuring compliance with the actual expenditure priorities - Clear definition and development of the strategic framework of priorities	- Budget plans are classified according to the budget classification codes - Respect and comply with the requirements of the budget users	Defined plan's spending budget for all budget positions	- The development of sector strategies and expenditure planning. - Ensuring compliance with the actual expenditure priorities, - Efficient budget planning process, - Effective preparation of initial limit	Relationship between structure of expenditure in relation to the approved budget (%)	>5% (in any of the last three years)- Fully meets 5-10% (in at most one of the last three years)- Satisfies 10-15% (in at most one of the last three years)- Partially meets 10-15% (in at least two of the last three years)- Unsatisfactory
Supervision of budget execution plan	The establishment of effective systems of control of budget execution	Comprehensive and timely recording, monitoring and control transactions on the basis of inputs, outputs and results	Management of funds and overdraft costs lower than anticipated	- Flow control costs - Control of budget implementation - Management of the given level of consumption for various sectors and activities	Deviation of expenditure from the originally planned primary expenditure (%)	5-10%- Fully meets 10-15%- Satisfies 15-20%- Partially meets >20%- Unsatisfactory
Assumption commitments	Effective planning and management and procurement responsibilities	Align ongoing commitments with budget forecasts	Plan commitments agreed with the plans for the execution of the budget commitments and payments during the year	Planning commitments in accordance with available resources	Outstanding commitments (percentage of the total expenditure)	<2%- Fully meets 2-8%- Satisfies 8-12%- Partially meets >12%- Unsatisfactory
Realization of payment	Establish communication with the environment based on modern IT	- On-line Web-based communication with the external environment	Electronic register of payment orders and electronic transfer of data	- Improvement of payment process - The appropriate division of responsibilities in the verification phase	The appropriate division of responsibilities in the verification phase	<97%- Fully meets <94%- Satisfies <92%- Partially meets <90%- Unsatisfactory
Banking reconciliation	Interoperability with systems from the environment and reliable alignment of expenditures with the General Ledger	Interoperability with systems from the environment and reliable alignment of expenditures with the General Ledger	Compliance with the process of budgetary accounting standard budget classification	- Support for automated receipt and statement processing - Timeliness and regularity of accounts reconciliation	Trends realizovanih transactions comply with the elements of the journal entry	<b>Daily</b> - Fully meets <b>Weekly</b> - Satisfies <b>Monthly</b> - Partially meets <b>Quarterly</b> - Unsatisfactory

**Figure 5: Analysis of process performance indicators MIS**

### 4.3 Process improvement

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.

## 5. CONCLUSION

From the analyzed data it is concluded 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.

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 providing 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 to 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 modeling (process modeling 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 of operative performances, creates an adequate basis and conditions for implementation of incremental, and radical improvements of process of MIS budget accounting of local treasuries.

## REFERENCES:

- [1] Allen, R., & Tommasi, D., "Managing Public Expenditure" A Reference Book for Transition Countries, SIGMA, OECD, Paris, 2001.
- [2] Anderson, J.T., *Strategic planning, autonomous action and corporate Performance*, Long Range Planning, April, 2000.
- [3] Arsovski, S., *Process Management*, Kragujevac: Faculty of Mechanical Engineering, University of Kragujevac, 2007.

- [4] Arsovski, Z., *Information systems*, Kragujevac: Faculty of Economics, University of Kragujevac, 2008.
- [5] Arsovski, Z., & Arsovski, S., & Mirović, Z., & Stefanović, M., “Simulation of Quality Goals: A Missing Link Between Corporate Strategy And Business Process Management“, *International Journal for Quality Research*, 3 (4) (2009) 317-326. ISSN 1800-6450, University of Montenegro and University of Kragujevac.
- [6] Avison, D., & Fitzgerald, G., *Information Systems Development: Methodologies, Techniques and Tools*, Mc Grow-Hill, London, 2006.
- [7] Blondal, J., „Budžet reform in OECD member countries: common trends“, *OECD Journal on Budgeting*, 4 (4) (2003) p. 10.
- [8] Chaffey, D., & Wood, S., *Business Information Management: Improving Performance Using Information Systems*, Prentice Hall, New Jersey, 2005.
- [9] Gotsch, S.B., & Davis, S.B., *Quality Management: Introduction to Total Quality Management for Production, Processing and Services*, Prentice Hall, New Jersey, 2006.
- [10] Havey, M., *Essential Business Process Modeling*, O'Reilly, 2005.
- [11] Harmon, P., *Business Process change: A guide for business managers and BPM and Six Sigma professionals; foreword by Davenport, T. H*, Burlington, Mass: Elsevier/Morgan Kaufmann Publishers, 2007. ISBN 978-0-12-374152-3.
- [12] Janssen, M., & Cresswell, A., “The Development of a Reference Architecture for Local Government”, In Proceedings of the 38th Hawaii International Conference on System Sciences, 2005.
- [13] Jeston, J., & Nelis, J., *Business Process Management*. Butterworth-Heinemann, Elsevier, Amsterdam, 2008.
- [14] Kaplan, R., & Norton, D.P., *Strategy Maps*, Harvard Business School Press, Boston, Massachusetts, USA, 2004.
- [15] Kendall, K., & Kenndal, J., *System Analysis and Design*, Pearson, Education International, Prentice Hall, New Jersey, 2005.
- [16] Kendall, K., & Kenndal, J., *Management Information Systems-Managing the Digital Firm*, Pearson, Education International, Prentice Hall, New Jersey, 2006.
- [17] Kim, H. J., & Bretschneider, S., “Local Government Information Technology capacity: An Exploratory Theory”, In Proceedings of the 37th Annual Hawaii International Conference on System Sciences, (2004) 121-130.
- [18] Lankhorst, M., *Enterprise Architecture at Work*. Springer Berlin Heidelberg, 2005.
- [19] Laudon, K.C., & Laudon, J.P., *Management Information Systems: Managing the Digital Firm*, Prentice Hall, New Jersey, 2006.
- [20] Lazarević, B., & Jovanović, V., & Dizdarević, P., *Designing information systems*, part two, Naučna knjiga, Beograd, 2003.
- [21] McCarty, T., & Daniels, L., & Bremer, M., & Gupta, P., *The Six Sigma Black Belt Handbook*, McGraw Hill, 2005.
- [22] Mogin P., & Luković I., & Govedarica M, *Principles designing of database*, II Edition, University of Novi Sad, Faculty of Technical Sciences, Novi sad, 2004.
- [23] OECD (2004), “The Legal Framework for Budget Systems: An International Comparison”, *OECD Journal on Budgeting*, Special Issue, 4(3) (2004), OECD, Paris.
- [24] PEFA (2008), “Guidelines for application of the PEFA-Performance Measurement Framework at Sub National Level”, *Public Expenditure & Financial Accountability*. Volume 2, March, Paris, 2008.
- [25] Tešić, B., *Management Information Systems of Budget Accounting of Local Treasuries in Web environment*, Unpublished doctoral dissertation, Faculty of Economics, University of Kragujevac, Kragujevac, 2011.

- [26] Tešić, B., „Quality, effectiveness and management information systems performance of local treasuries budget accounting“, *International Journal for Quality Research*. 5(3) (2011)159-168, ISSN 1800-6450, University of Monenegro and University of Kragujevac.