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## **BUSINESS PROCESS MANAGEMENT MATURITY MODEL AND SIX SIGMA: AN INTEGRATED APPROACH FOR EASIER NETWORKING**

***Abstract:** Business process management maturity model enables description of "as-is" enterprise's state, from the perspective of process management maturity. In the hart of this model there are five factors or levers, critical for successful business process management implementation. These factors are: strategic alignment, process management, methods and technology, employees and business culture. Mentioned factors influence the state or the level of enterprise's maturity. The level of process management maturity can be: initial, define, management, quantitative management, continual improvement. When maturity factors or levers are analyzed simultaneously with maturity levels one can formulate two-dimensional business process management maturity model. However, concerning some shortfalls of this model, it is desirable to ennoble it with Six Sigma philosophy and methodology. This model can be very helpful when an enterprise has to make decision concerning different forms of networks, like joint ventures or strategic alliances. However, Business process management maturity model can help managers to make decision concerning franchising, because franchising success depends a great deal on maturity of an enterprise which represents franchisee buyer.*

***Key words:** model, management, business processes, maturity levels, change levers, Six Sigma.*

### **Introduction**

For the enterprises that do not show willingness to increase business performances' level can be said that they are in the state of apathy or indifference. Leaving this state assumes initiation of some changes. One of the characteristics of successful enterprises is continual ambition for reaching perfection in all segments of business. This can be accomplished through continual implementation of changes or improvements. Though perfection is almost impossible, an enterprise can get closer to it with continual business improvement [1]. It is the only way for an enterprise to get the epithet "high performance organizations". One of the characteristics of high performance enterprises is that basic work unit is team, and not individual, which work is

controlled by superior. Exactly for this reason, organizational structure of these kinds of enterprises becomes “flat” which means that it has less hierarchical levels [2]. Therefore, accent is not on vertical distribution of power, but on horizontal cooperation for process realization improvement. Concerning previously, process orientation and management based on processes intrudes as one of the conditions for providing high performances.

Business process management represents holistic management approach, focused on identification, definition, realization, measuring, analysis, and continual improvement of business processes [11]. This implies that top managers have to understand business processes and to be included into their improvement. Also, this implies information system usage, clearly defined responsibilities and accountability, and supportive, innovative business culture. Some of known models for business process management evaluation are embodied in awards like Deming’s Prize, MBNQA, EFQM and others.

Business process management significance has been inspiration for many authors that were trying to formulate business processes management models. At the Software Engineering Institute (Carnegie Mellon University) at the end of last century Capability Maturity Model was created by Watts Humphrey. The aim of this model is to discover how much enterprises for software production are successful in process management. The assumption of this model is that the enterprises in which managers understand processes and manage them systematically much easier and faster can respond to customers’ demands or fulfill obligated orders. On the contrary, the enterprises, which do not have clearly defined processes, which are not consistent in tasks realization and which do not use processes’ performances measures, can hardly predict how much time and costs will they need for tasks realization [9].

Today, there are a great number of models that describe enterprise’s maturity through business process management, but they can roughly be divided into two groups. The first group of models has focus on specific changes (concerning process management) which enterprise has to introduce in order to ensure continual increase of processes’ performances. Models that belong to the other group are based on the idea that enterprises improve the way of business process realization (for example, with introduction of information technology), but not necessarily the way of process management [9]. Though it can not be said which group of models is better, the conclusion is that in focus of the first group of models is introduction of long-term and in focus of the second group of models introduction of short-term changes.

If some differences between models are neglected, it can be said that all of them describe evolutionary way of improvements, which leads enterprise from the immaturity state, with non consistence activities and processes, to the maturity state, with disciplined activities and processes. In that sense, business process maturity models include maturity levels, which are connected with process significance, with opportunities for measurement and control and with opportunities for process’s improvement. One of their significant characteristics is that they appoint critical aspects of business process management over time.

## **1. Business process maturity models (BPMM)**

BPMM enable managers to describe current state of an enterprise, from the process management maturity perspective. With analysis of current state (as-is state) and desirable state (to-be state), based on BMPP managers can identify “weak points” of enterprise (process) and focus on its improvement. The primary aims of BPMM are [13]:

- Describing current state or current strengths and weaknesses (as-is),
- Determining desirable maturity level, depending on key factors of business process management (to-be),
- Making business process management improvement easier, through maps, which show how desired state can be reached.

Hamprey, Maull and Tranfield (2003) were the first ones that were writing about process management from the aspect of maturity. They have studied software reengineering of business processes in 33 enterprises and defined the three reengineering programs: strategic, process and cost-based. According to these authors the management based on business processes can start by focusing on the processes or costs, but the higher level of maturity means understanding the importance of strategic focus [7].

According to some surveys, at the beginning of this century there have been over 150 process maturity models [14]. The most of them are very similar with model, which was formulated by Rummler and Brache. This model includes six levels or zero level and five steps to business excellence. The levels are [14]:

0. Managers are not aware about the need to manage and improve business processes,
1. The awareness of the need of process management and improvement is developing, but action on that issue is still absent,
2. There are some process redesign projects, but without sustainable continuous process management,
3. Significant results in the process redesign are achieved, but also there are few business processes which are managed from start to finish and continually improved,
4. Processes, which are relevant to customers' satisfaction, or key processes, are subject to continuous management and improvement,
5. All processes, including key and supporting, are subject to continuous management and improvement.

Rosemann and de Bruin (2005) developed a model, which observes strategic business process management through holistic enterprise management. This model is known under the name of Business process management maturity model. In the heart of this model there are five factors, critical for successful implementation of process management. A similar model, called Business process maturity model, appeared in 2006<sup>th</sup> year, and was promoted by Curtis, Weber and Gardiner. Hammer (2007) also accepts the phase approach to process management, and emphasizes that all the previous stages must be fully completed before the move to the next phase (to the higher level of maturity). Hammer's model clearly highlights the difference between process maturity and the enterprise maturity (business processes management maturity). In order to analyze processes' performance, the model takes into account the maturity of five drivers, and they are: design (purpose, context and documentation), performers - implementers (knowledge, skills, and behavior of employees during the process realization), owner (identity, activity and authority), infrastructure (information systems and human resources) and measures (definition and use). When it comes to an enterprise's maturity, Hammer emphasizes four skills, and they are: leadership (awareness, commitment, style, and behavior), culture (team work, focus on customers, responsibility, and attitude towards change), expertise (staff and methodology) and the way of managing (process model, responsibility, integration). However, the models proposed by Curtis and Hammer are based on the Rosemann and de Bruin model, and are very similar.

Therefore the following pages will point out the characteristics of Business process management maturity model (BPMMM), formulated by Rosemann and de Bruin.

Though, BPMMM facilitates the development of process management it, as other process management models, can not offer concrete solutions, or methodology which would allow managers to surpass the gap between actual and desired state. In this sense, these models can be qualified as descriptive and not as prescriptive models. Therefore, the last few pages of the paper contain the proposition for enriching BPMMM with the improvement methodology.

## **2. Business process management maturity levels (phases)**

BPMMM includes five stages of an enterprise's maturity, which are levels of process management improvement. The order of phases is logical, because results achieved in one phase are the foundation for the implementation of the following phases. In this way, the strategy of advancing (on which the model is based) represents a map for continuous process management improvement. At each level, enterprises develop new business skills, behave differently and show a higher level of business culture. These levels or stages are:

1. Initiate (Enlightenment),
2. Define (Stabilization),
3. Manage (Standardization),
4. Manage Quantitatively (Systemization),
5. Improve Continuously (Optimization).

1. When managers are not aware how important is to manage and improve business processes, the enterprise is in the phase of apathy. Due to some managers' initiative, the enterprise passes into the next phase, the initiate phase. From this level enterprises start trip to business improvement. At this level enterprise lacks the consistent realization of processes or practices for performing business activities. Some managers become aware of importance of process management approach. However, the processes are still not defined, there are no measures of their performances or they are used ad hoc. Since there is no "organized" business process management, duplication of efforts directed to goals achievement often occurs. So, although there is awareness about the need for process management and improvement, actions on that issue are absent. Employees are often overloaded, because managers fail to align the scope of certain operating units (work or organizational unit) and available resources for the execution of tasks in the same unit. The most frequent problem is not connected to employees, but to managers, in the sense that managers fail to create a stable environment in which employees can perform their duties in disciplined and professional way. Instead, managers are engaged with everyday "fire extinguishing". The success of these enterprises usually is the result of excellent individuals, and not a consequence of disciplined, sustainable processes. This means that even when there are professional individuals (managers and employees, in general), if systematical development of their skills and expanding knowledge is absent, success will not be sustainable. The conclusion is that this first level is characterized by inconsistency in achieved results, as well as in activities and processes inconsistency. In this phase or state of enterprises can be compared with the silos, because there is no clearly defined process, which would disturb clear differentiation of functions (organizational units). If one can say that at this level there is process

management, then it boils down to “extinguishing local fires”, but not to the management in the real meaning of the word.<sup>1</sup>

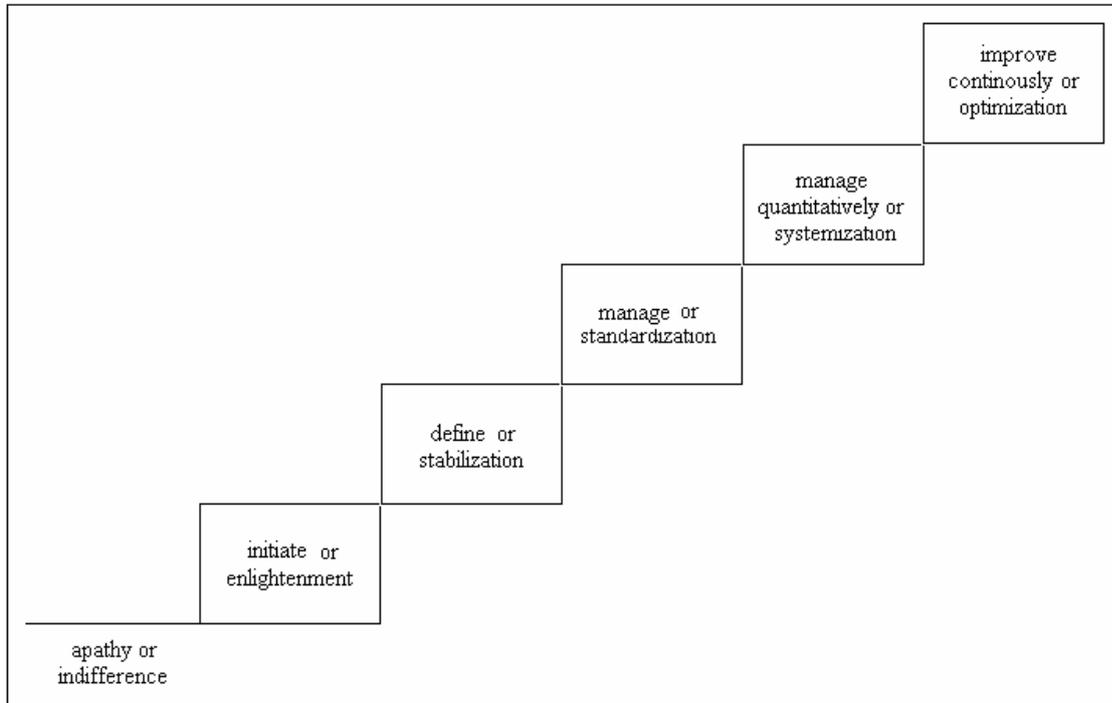


Figure No. 1. Business process management maturity levels

2. The first step on the road to business improvement is stabilization of tasks' performance or stabilization of "local" activities. If employees are constantly overloaded, inadequately trained, etc., initiatives for process management will not give the desired results. The primary focus of this second level is to establish control by managers. Managers also have to give adequate instructions to employees to ensure correct realization of activities, but also to ensure repeatability of activities. At this level it is necessary that managers define processes and show how they are realized (as-is state), in order to discover variations in the methods and procedures used for their realization. Also, at this level responsibility of managers is defined, the plans for the process implementation are refined, and coordination between the individuals involved in implementation process, but also between the actual process and other processes that have the role of the supplier or user of specify process, is established. On this, second level the focus is on solving problems related to providing adequate resources (including human resources) necessary to implement activities, define responsibilities, establish control of the implementation of activities, etc. Thus, the second level or second phase of process management maturity is characterized by identification (or partly identification) of (key) processes and by periodically performance measurement. In this sense, control is limited to certain activities and data are inadequate for the improvement. In this phase, there are projects for redesign of processes (or parts of processes), but without sustainable and continuous process control. This

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<sup>1</sup> In the 1990s the most of the enterprises were between the first and second phase, which is logical, because then the most enterprises began to analyze and implement the process approach. In this sense, the transition from the first to the second level of maturity is connected to business processes reengineering.

shows that managers understand the importance of process management, but that it is not yet accepted at the enterprise level (as a whole). Bearing in mind that local activities have been stabilized, for the enterprises at this stage can be said that they are in tactical integration. However, this refers to integration of individual activities, as part of the process, which means that this integration is still, in the majority of cases, limited by functions (organizational units).

3. Management phase means that the majority of the processes in the enterprise are clearly defined, as well as processes' performances are continuously measured. Also, at this stage, significant results in process redesign are achieved, and there are some business processes which are managed from beginning till the end. One of the characteristics of the management phase is standardization of business processes. After providing activities' realization stability, the next is process standardization. This is achieved by identifying the best practices (in the implementation of individual activities), and spreading them through the whole process. In this way, the synchronization of procedures and instructions for the process realization is established. Also, standardization involves the establishment of a unified system of measures, which makes it easier for managers to identify opportunities for improvement, and learn on the basis of experience. The process standardization is significant factor for development or improvement of business culture, which is an important prerequisite for successful implementation of the next phase or next level of process management maturity. This is the first phase in which the processes are managed, and therefore the enterprise state during this phase may be described as process orientation. However, data obtained by measuring are used for process improvement only occasionally (ad hoc), which is a significant lack of management phase.

4. Phase characterized by systematic processes' performance measurement and control is quantitative management phase. In the quantitative management phase all processes in the enterprise are clearly defined, including key and supporting processes. Significant characteristic of this phase is that the data obtained by measurement is used for the improvement of business processes. Usage of unique measurement system makes it easier for managers to manage processes "quantitatively". In the quantitative management phase application of financial performance measures is very important, but also the application of non-financial measures and particularly statistical measures and instruments. This is because the basic condition of processes' predictability is establishment of statistical control, and then statistical stability. In that sense, it is necessary to monitor process realization and to use appropriate measures and instruments, in order to identify variations, but also their sources (generic or specific), because understanding and control of variations represent prerequisite of predictability of processes' results. Also, an important task that should be done within this phase is the integration of inter-related processes that belong to different organizational units. Namely, standardization, which has been done in the third phase, facilitates the integration of activities, as part of the process within a single organizational unit. However, bearing in mind that some processes stretch across multiple organizational units, it is necessary to make their "connection", the harmonization of standards and measurement system. This can be significantly facilitated if there is the position of process "owner", which follows the process from beginning till the end, regardless of which organizational units it runs. In this way, business process management at this level is not only information technology, but becomes a way of enterprise management, because enterprise management is based on process management. Concerning previously, it can be said that the enterprise at this stage can be defined as an optimized enterprise.

5. When the enterprise is at the fourth level, this means that it has stable and predictable processes. However, if fast and frequent changes in the environment (especially in terms of

customers' demands) are considered, in order to increase the possibility that the processes' results will match the users' requirements, it is necessary to provide continuous process improvement. This implies a proactive approach, which represents the fifth level or stage of maturity. This last stage of maturity of process management is utopia for most enterprises. At this stage, all the processes are clearly defined. Measurement and control of their performances is carried out systematically, and obtained data are analyzed quantitatively and qualitatively. The results of the analysis are used for continuous, proactive process improvement. All processes, including key and supporting ones, are subject to continuous improvements, so therefore the process management becomes routine. Also, at this stage business culture, which implies continuous change, is promoted, because the improvement of business culture or the establishment of supportive, innovative business culture (that contributes to continuous improvement activities and processes) becomes everyday job for all employees, regardless of function or organizational unit in which are engaged. Business as a whole is the subject of optimization: the connection between the processes is established, perfect exchange of information is provided and duplication of activities is avoided. In addition to the enterprise's business processes inter-relation, process approach expands outside the enterprise, above all, bearing in mind the customers (users) and suppliers, and therefore at this stage the enterprise represents the intelligent network.

It is important to emphasize that the maturity of process management may not be maximized, but optimized. This means that an enterprise does not have to reach the last, fifth level of maturity, but the level of maturity that is appropriate and sufficient to achieve its objectives. However, it is desirable for business processes management to be at least at the third level, when the enterprise is in the state of process orientation.

"Maturing" of business process management actually refers to the way of completing tasks by the manager [9]. Levels of maturity present stages of managers' development and their process orientation. If in an enterprise one or more processes are not realized efficiently, managers may try to solve problems and improve the process by themselves or they may engage professional consultants. In the case when they engage experts from the outside, and they improve (redesign) processes (they become more effective and / or more efficient), the question arises whether there is the greater maturity of the enterprise, concerning business processes management. If the managers responsible for the improved processes continue to behave as they are before the improvement, the question is what and how lasting the effects of the improvement will be. This means that there is a difference between the improvement of the specific processes in the enterprise and the improvement of enterprise's (managers') management capabilities.

### **3. Business process maturity factors**

De Bruin [7] has been highlighted some factors as the most important ones, and they are: strategic approach, governance (process management), methods and information technology, people (employees) and culture. At the lower level these factors are further defined based on a variety of skills, identified through the Delphi study.

Strategic focus refers to sustainable, continuous connection between strategic priorities and key processes, which enables the achievement of enterprise's objectives, and leads to higher processes' effectiveness. Process management involves the establishment of relevant and transparent responsibility, decision making, and compensation connected to the process

realization, which contributes to efficiency growth. The methods include approaches and techniques that support and enable consistent process realization, during its entire life cycle. Information technology includes software, hardware and systems for information management that enable and support the realization of the process during its life cycle. Employees are individuals or groups who are, due to appropriate knowledge and skills, directly involved in process realization. Culture refers to the collective values and beliefs that give a special form to structured processes and influence the attitudes and behavior of employees. The lack of this model can be considered the fact that it only emphasizes the important elements for reaching business processes management maturity, but it does not emphasize the connection between them.

The first factor, labeled as a strategic approach, can be shown in the following way. Process management planning is related to the harmonization of structuring, ranking, and implementation of processes with strategic goals. Correlation between strategy and capabilities of the process should show whether and to what extent is the ability of process enough to “respond” to demands of strategy and how the problem of discrepancy between the abilities and requirements of the strategy can be solved. Architecture is related to the formalization of process approach in the enterprise, and involves identification of all the processes (from the beginning till the end), starting from the strategic requirements, as well as their decomposition on the lower levels. Process measures must be defined by keeping in mind the aims of the enterprise, and they have to include process measures and outputs measures, as well as financial and nonfinancial measures. Users of the processes’ results or its stakeholders include all individuals and groups, and other processes that are related to specific process, and therefore it is necessary to identify them, primarily for determining and taking into account their demands. According to some authors initiatives for the business process management usually remains without results (or without the desired results) due to absence of strategic approach. In that sense, these authors suggest that a strategic approach is "holy grail" of successful process management. Ghose [7] in favor of that adds that the strategy usually is very generally determined (at the high level of abstraction), so that designers of business processes do not have (specific) information for their structuring. This indicates the need for strategy concretization and what is equally important, the need for communication in the enterprise.

One of very important factors of process management maturity considers employees (including managers). Skills and abilities of employees are crucial for the realization of tasks, whether they are realized through the functional or process orientation of the enterprise. However, due to the fact that higher level of maturity involves defining the key, and then the other processes, the knowledge about process management is very significant. The process owners necessarily possess this knowledge, but not rare their close associates, too. This includes education and learning about the processes, their importance, and the manner of management, development, measurement and control of their performances. If the process is performed within a single function (organizational unit) it is assumed that employees communicate and share information, which means that they cooperate and apply team work to improve the process. However, if the process runs through several organizational units, communication and collaboration should be stimulated and developed. This is especially difficult to achieve in the enterprises where functional division is expressed. In such enterprises a business culture has a great role, which means that managers have to pay considerable attention to building and supporting innovative business culture.

According to some authors, identified factors of management based on the processes are independent variables. The assumption is that higher level of maturity of these factors will have a positive impact on the level of business performance, as the dependent variable. However, between the above mentioned factors there is a correlation and interdependence. The following example describes the correlation between process management and culture, as maturity factors. If the enterprise is currently in a position "A" (Figure No. 2.), where it lacks experience in process management, but managers have a clear position about what is needed for processes management, reaching higher level ("C") means that additional experience is needed (example, through more individual improvement projects). Therefore, the position "A" refers to the fact that the lever of change or of higher maturity level is business culture. Otherwise, if the enterprise is currently in a position "B", where leaders lack awareness about the preferred model of behavior, but there is significant experience in process management, business culture transformation is required. Therefore, the position "B" refers to the fact that the lever of higher maturity level is process management.

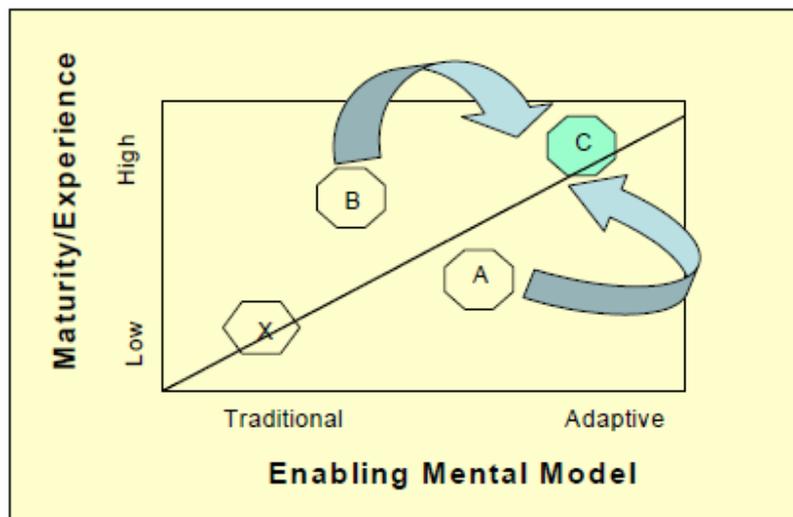


Figure No. 2. Process management and mental model (culture) as maturity factors [14]

Y-axis can be expressed through the application of the Six Sigma methodology, while the x-axis can be expressed through the business culture. In fact, this example leads to the conclusion that the process management maturity level (y-axis) and the awareness of the importance of management processes (x-axis) have to be balanced. This means that it is not enough to focus only on the process maturity, but also on the competence of managers (leaders) to manage processes or, in the other words, on the maturity of enterprise management, which is based on the processes.

#### 4. Connection between factors and levels of business processes' maturity

Research that is conducted by de Bruin [7] resulted in identification of two variables that are important in all stages of development (maturity) of business processes management, and they are commitment of managers and employees support to business process management (which actually represents a business culture that affects certain critical factors of successful

business process management). However, de Bruin did not specify whether some of the factors have a greater importance comparing to the others in some stages of process management maturity.

If business process management is viewed through previously shown five-stage model it can look like very simple one, as it is shown as one-dimensional and linear. However, the business process management model can be neither one-dimensional nor linear. In this sense, a two-dimensional model is suggested. The first dimension includes five components or factors that represent levers of change, and they are: strategy, processes, technology, employees, culture. The enterprises usually only consider the three levers, including: employees, processes and technology. However, if these three are not connected to strategy it may happen that the process, although efficient, does not provide necessary or desired results. Also, if the usual three "represented" levers are not adequately supported by business culture, their cohesion, necessary for achieving desired results, will hardly be provided. Mentioned five levers of change and development of process management are actually components for providing or increasing the ability of each enterprise. With increasing capabilities of enterprise one comes to the other dimension of the model, and this dimension represents already mentioned process maturity states [8]. As noted, the states of process maturity are: silos, tactical integration, process orientation, optimized enterprise, and intelligent network.

Silos represent the worst scenario and a starting point in development of business process management. As from the name of this state can be concluded, enterprises at this stage operate in the context of functional silos, geographical silos, production silos etc. These individual groups are trying to optimize their part of enterprise (usually through increasing efficiency), but they are usually not based on strategy in order to provide effective solutions. In addition, silos can be transferred to the information field, which means that decisions are made within a "silos" based on limited information, without taking into account the information from the internal or external environment. Key lever in this phase is the business culture. If the awareness of managers about the need for process management expands to other employees or if they act as promoters of business culture change, awareness about the importance of process orientation will spread across the enterprise.

The first step on the road to excellence is an attempt of enterprise self integration. This attempt is usually based on the initiative that comes from the department of information technology. Thanks to information technology, multifunctional cooperation is greater. This means that managers are able to make better decisions, because they have access to information from all parts of the enterprise. Despite the advantages in comparison to the previous state, tactically integrated enterprises do not have clearly defined processes from beginning till the end, and are still functionally structured. Employees are still interested in providing efficiency of organization unit in which are engaged, and not for optimization of the process as a whole. At this stage, more accurate for movement from the silos state to the state of tactical integration, technology is a significant lever of change. Without defined measures and instruments of analysis, as well as without information technology there is no coordination of activities and facilitating the process repeatability.

The next step on the road to excellence is a switch from state of tactical integration to the state of process orientation. This transition involves top - down approach, which means that leadership and process orientation spread from the top of the enterprise. This means that it is not enough to provide only a significant process (or parts of the process) efficiency improvement, but also the effectiveness. The most important lever of change in this phase is process. Without

defining process from beginning till the end, as well as without identifying the process owner and measures of the processes' performance there is no process orientation.

Process orientation is a prerequisite for the creation of optimized enterprise. Optimized enterprise includes a commitment to continuous process improvement. This means that process (re)structuring and its continuous improvement influence effectiveness and efficiency of the enterprise as a whole. Significant characteristic of this phase is analysis of the possibility of outsourcing some (no key) processes. In this phase, special emphasis is given to training and development of employees, because they represent critical lever for providing optimized enterprise state. Employees training and learning, their knowledge and skills, as well as communication and collaboration, affect the time needed for reaching the optimized enterprise state.

The enterprise becomes the intelligent network, when all that is present in the optimized enterprise state begins to spread to the partners, especially suppliers and customers. Business processes in this phase are observed even wider than in previous phases and through them experience and achievements are transferred to the partners. In this way, the intelligent network is created. The intelligent network acts proactively and has a great ability to generate competitive advantage. This will be possible if the enterprise has long-term, strategic approach and therefore the most important lever is strategy. So, to reach this state the enterprise must define processes starting from the strategy, because in this way they will be directed towards strategy implementation. This means that processes have to be defined by using top-down approach, and for their continuous improvement this principle should be combined with the down-top principle.

When managers analyze the situation in which the enterprise is, they suppose to translate the situation into the model for business process management. In particular they should determine in which state (silos, tactical integration, process orientation, optimized enterprise, and intelligent network) is each of the levers of change (strategy, processes, technology, employees, control). In this way, managers can see whether all the levers are at the same level of development (maturity), but also which of the levers are "slow" compared to others, so they should focus on their adjustment and improvement. This shows that the model is not linear, because levers of change may be in different states of maturity. For example, if the enterprise when it comes to strategy and technology is in the process orientation state, but when it comes to business culture, employees and processes in the silos or tactical integration state, it will not be able to realize the opportunities and benefits of the process orientation state, because some levers are behind or are at the lower levels of maturity (Figure No. 3.). If there is a gap between the levers, managers' task is to eliminate these gaps, because only in this way the enterprise will be able to reach higher level of business process management maturity.

One criticism of process management maturity models, based on the Humphrey's maturity model, refers to the focus on the practice of managing all processes, and not only of the key processes [5]. However, such criticism is not reasonable. Namely, the goal of BPMMM is to transfer a process improvement philosophy to the management of the enterprise as a whole. In order for this to be possible, it is not enough to manage (and improve) only the key processes, but also other processes (support processes) that support the implementation of the key ones.

	S	TI	PO	OP	IM
strategy			X		
process management		X			
technology			X		
employees		X			
business culture	X				

S - silos  
 TI - tactical integration  
 PO - process orientation  
 OE - optimized enterprise  
 IN - intelligent network

Figure No. 3. Two-dimensional, nonlinear business process management maturity model

A significant lack of business process maturity models is the absence of a methodological approach, which would represent a map for managers how they could easier reach higher levels of maturity. Therefore, this model belongs to descriptive models and its effects can be valid only with the parallel application of appropriate methodological model. In this sense, as one of the future challenges, there is a formulation of the process management model, which will, besides the description of the enterprises maturity state, enable managers some kind of road map for reaching higher levels of business process management maturity.

### 5. Six Sigma concept and process management maturity

When methodological, disciplined approach is mentioned, one of the concepts that are imposed as a basis for BPMMM improvement is Six Sigma concept. Ideas on which this concept rests are very similar to the ideas of BPMMM. Six Sigma concept helps enterprises to formulate, integrate and realize the vision, mission and goals, and therefore to sustain and grow in the environment with growing customers' requirements and intensive competition. Also Six Sigma helps managers to ensure knowledge sharing, but also to spread it across the enterprise, how information could be transformed into new business practices [10].

Six Sigma views process management and process improvement and measurement as daily responsibility of all employees, and above all operational managers and direct executives of

business processes. This concept contributes that quality and costs, as well as their relationship, become an integral part of each employee's job, which is the basic difference and advantage of Six Sigma in comparison with the other concepts for quality improvement. Six Sigma requires not only involvement of employees (in implementation of Six Sigma projects), but also their full commitment [1]. Important prerequisite for the implementation of Six Sigma concept is that enterprises have a process orientation. In this sense, on the following pages there is an attempt for integration business process management maturity model and Six Sigma concept.

Six Sigma can be viewed as a philosophy of management, as a statistics, but as a process, too, since it represents accumulation of employees' intelligence and abilities, and their channeling to the priorities. Six Sigma viewed as a process, involves a gradual, but continuous expansion of process orientation through enterprise, and can be used as a guide for managers, in order to enable them easier enterprise transition from lower to higher maturity level.

### 5.1. DMAIC methodology as basic part of Six Sigma concept

Six Sigma methodology helps managers to find sources of competitiveness inside the processes or exactly there where resources and capabilities are combined and used. It suggests that it is usually possible to improve processes' efficiency, not by changing combination of resources and capabilities, but by eliminating variations and defects, which appear as a consequence of variations. Defects waste enterprises' time and money, but, they also have bad influence to its reputation and customers' satisfaction. Exactly for that reason processes' have to be managed in a way that Six Sigma concept suggests, through five-step methodology. This way of process management provides managers precise and relevant information and decision-making based on facts and not on guess and intuition [1].

In order to eliminate and prevent defects, Six Sigma concept offers two methodologies [4]: DMAIC (define, measure, analyze, improve, control) and PIDOV (plan, identify, design, optimize, verify).<sup>2</sup> While, DMAIC methodology is used for improving existing business processes, PIDOV methodology is used for creating new product designs or process designs in such a way that it results in a more predictable, mature and defect free performance. These methodologies are very similar and they imply defining requirements of external, but also of internal customers, **p**lanning and **i**dentification of business processes needed for accomplishing these requirements, **m**easuring performances of existing processes or **d**esigning new processes, **a**nalyzing results of measurement or **o**ptimization of designed processes, **i**mplementation of improvements, and **c**ontrol of improved processes or **v**erification of designed processes. Implementation of these methodologies implies basic knowledge about process and statistics measures and tools, some technical knowledge and project management skills. It means that, process and project management need to be merged for successful implementation of Six Sigma concept and its methodologies [4].

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<sup>2</sup> Some authors consider that first two phases of PIDOV methodology, plan and identify can be merged into one phase, because their activities are strongly connected and they cannot be separated successfully.

## **5.2. Six Sigma approach to process management improvement**

For facilitating the transition from zero to start or the first level managers' – leaders' initiative is sufficient. But the transition from the first to the second level involves definition, selection, and separation of key processes, which corresponds to the define phase of the DMAIC methodology. The significant characteristic of the third level is measuring, and at the fourth level in the focus is analysis of process performances. Fifth level corresponds to the implementation of changes or continuous improvement and process performance control. This connection of two mentioned models is logical and possible. However, shown connection is linear, which is usually unrealistic.

If it is assumed that the business process management maturity can be achieved by gradual introduction of process approach, the things have to be done in the following order:

1. Define processes or parts of processes inside the functions (organizational units),
2. Define the process from beginning till the end regardless of the organizational unit which it runs, while in the meantime introduce instruments for measuring the performance of the processes from point 1,
3. After defining the key processes, other (support) processes have to be defined, while in the meantime, the measurement is done at the level of process as a whole (regardless of the organizational unit through which extends), and the team begins to analyze information obtained by measurement,
4. The inter-connectivity and processes networking is following, but also the harmonization of processes (from point 2) performances measures,
5. Finally, the initiative (based on an analysis) from the top of the enterprise is following, as well as formulating ideas for processes improvement or method for the process management, and continuous monitoring and controlling performance of projects for the process improvement.

The idea is gradual, but constant business improvement, or in this case, business process management improvement. In fact, higher business process management maturity means continuous improvement of business processes management. However, Six Sigma as a methodological approach can be used on the second level of process management maturity, because at this level key processes are identified from beginning till the end, and it is necessary to use measures and instruments in order to identify, and then use opportunities for improvement.

Table No. 1. Six Sigma improvement process management philosophy

	initiate	define	measure	analyze	implement	control
level 5		defining the link between the processes and key stakeholders	connection of performance measures with strategy and objectives	analysis of processes' performance influence on the enterprises objectives	taking initiative from the top of the enterprise and formulation of the ideas	monitoring and control of projects for the process improvement
level 4		defining the link between the processes and the processes network	harmonization of process performance measures	analysis of mutual influence of processes on their performances	implementation of ideas for process improvement	control of successfulness of implemented improvements
level 3		defining the others (support) processes	measuring performance of the whole processes	processes' performances analysis		
level 2		defining the key processes from the beginning till the end	measuring process performances inside the functions			
level 1		defining the processes inside the functions				
zero level	managers' (leaders') initiative					

## 6. Business process management maturity model significance for networking

Constant race for attraction of customers affects all management decisions, and, among all, the decision concerning connection with other enterprises. This connection can be more or less strong, depending on type of relationship between enterprises. However, regardless it is about merging or acquiring another enterprise or it is about forming joint ventures or strategic alliances with another enterprise and also regardless the reasons for networking managers have to consider if the “another” enterprise is “good enough”. In this sense, “good enough” means that another enterprise is worth taking over some risks concerning partnership.

When it is about making decision about networking, managers have to accomplish a lot of analysis. Among other analysis that are usual and common when it comes to networking, managers could use Business process management maturity model (or one of this kind of models).

Depending on objectives of making some kind of partnership, managers may consider that some factors are more important than the others. For some enterprises or their objectives will be more important strategic approach, for others governance (process management), methods, information technology, people (employees) or culture. Usually managers chose few factors that will be more important than the others. Then it is necessary that managers accomplish management maturity level analysis for the chosen enterprises, potential candidates for partnership. Overall picture about candidates is important but not sufficient. What is also needed is analysis of each maturity factor. In that sense, it is possible that one enterprise has higher management maturity level than the other, but that maturity level of the most important maturity factors in the first enterprise is lower than in the other. For example, if one enterprise wants to form a partnership with an enterprise in country with specific national culture, then culture may be the most important factor. Concerning also that the enterprise has no "capital" problem and that it can invest in building the information technology in potential partner, the information technology may be considered as the least important factor. In this case, the advantage will have the enterprises which business culture is more similar to business culture of enterprise that wants to form a partnership, no matter what is the level of information technology, as maturity factor.

## **7. The level of process management maturity in Serbia**

In July and August 2007 in Serbia, the research was conducted for diagnosis of the state of Serbian economy about the implementation of management approaches. The sample comprises 60 enterprises, of which 33 belong to the category of small and medium-sized (up to 250 employees) and 27 to the category of large enterprises category (stratification is carried out in accordance with the ratio of number of employees in small and medium-sized, on the one hand, and in large, on the other). This sample can be consider as random, may not be completely representative, but certainly informative. In this paper will be highlighted only the research results that can give a picture about the process approach in Serbian economy and about managers' awareness of its significance.

In total number of the enterprises, the ones that apply the Balanced Scorecard model are participating with 18%, while the model Prism performance is present in only 7% of the enterprises in the sample. This means that even 75% of enterprises do not use models for the formulation and implementation of strategy. This may be a significant problem, because the basis of successful process approach implementation is strategic focus in the process definition.

Application of business concepts (just-in-time, total quality management, Six Sigma) is considered in relation to the origin of the majority of capital in order to check whether the origin of capital affects the presence of the mentioned concepts and whether there is a possibility that the entry of foreign capital changes the situation in the Serbian economy in terms of application of modern concepts. This can be checked by application of the  $\chi^2$  test. The results of the analysis showed that the basic hypothesis is not rejected, which means that there is no relationship between the origin of capital, on one side, and the application of just-in-time, total quality management and Six Sigma, on the other. This means that despite the "influx" of foreign capital (because of the lack of business culture transformation) the application of concepts that exist in the most of European and international enterprises does not yet characterize Serbian enterprises. This indicates the importance of business culture (and indirectly national culture) as the factor of process management maturity.

When it comes to control (which may also point to presence of process focus), except for the control of finished products, that is considered, the control of unfinished products and operations is much more presented than statistical process control (which is in the Figure No. 4 in the "red zone", as a warning that should be introduced in business practice). This means that statistics is not yet enter Serbian enterprises or that the enterprises are not familiar with the statistics (or at least not enough). Statistical process control represents standard for enterprises in developed countries (according to iSix Sigma research, statistical process control in the 2005 was present in 76% enterprises, while in Serbia this percentage was 20%).

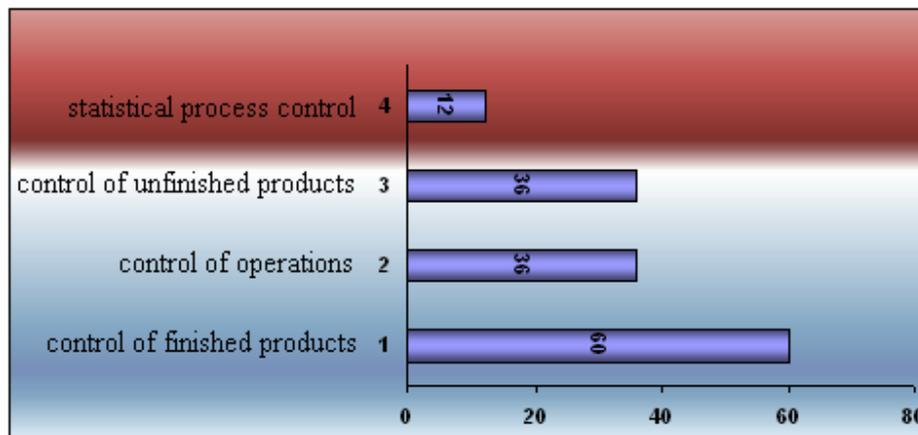


Figure No. 4. The levels of control in Serbian enterprises

In order to determine the extent to which statistical analysis is “unserious” in Serbian enterprises, it is analyzed which measures are used for monitoring process duration. Only 23% of enterprises in the sample measure and monitor variations in duration, while the average process duration is present in more than 50% of enterprises. A significant warning for Serbian economy is the fact that even about 30% of enterprises in the sample do not measure and do not analyze the duration of the process realization. The measures that are used in the most of the enterprises are capacity usage and process efficiency, while very rare used measures are process capability index and sigma quality level.

In the enterprises that apply some of the instruments of analysis, usually applied instrument is the flow diagram and cause and effect diagram, while instruments such as regression analysis and tests of statistical significance, are very rare. Cost analysis at the enterprise level is immanent to all enterprises in the sample. However, what is significant is that the analysis of costs at the process and activities level is present in only 12 and 4 enterprises, respectively, but the situation is somewhat worse in small and medium-sized enterprises compared to the large.

## Conclusion

BPMMM can be represented as a combination of coverage and skills (proficiency), and therefore it can be said that it is actually a combination of effectiveness and efficiency. In terms of process management, coverage or effectiveness refers to the degree in which the principles of business processes management are implemented and applied. Proficiency or effectiveness

shows the quality of implementation of the business process management principles. Reaching higher levels of maturity demand coverage and proficiency improvement, at the same time [12]. This model should help managers to identify the state in which the enterprise is and to, eventually, take the initiative for the improvement of process management or for reaching the higher level of process management maturity.

The separation of process maturity and process management maturity according to some authors [11] is very important. If one or a small number of critical processes have high level of maturity, it does not mean that the process management in the enterprise is at the high level of maturity. One of the reasons of process maturity can be a heroic effort of individuals, which may be short-term and short lasting. However, a great maturity of at least one process is indicator that the enterprise is on the way to reach higher level of process management maturity.

Based on the analysis of some research results it can be said that Serbian enterprises are in the second phase or at the second level of business process management maturity. The enterprises identify business processes mainly inside the functions, except for the key processes. Also, they use some measures of process performances, but their use is still sporadic and without analysis of the results of measurement for making business decisions. In this sense, the wanted state for the majority of enterprises in Serbia is process orientation (the third level of processes management maturity). This state means that all processes are identified, their performances measured, measures of performances harmonized between processes (due to internal benchmarking), and data collected by measurement analyzed for better decision-making. As it was pointed out the most important lever or factor of change from tactical integration to the process orientation are processes. In this sense, the task for managers in Serbia in the future will be to identify the processes from beginning till the end, to determine the process owners, as well as to adopt methodological approach for measurement and analysis of the processes' performances, and, what is most important for processes' improvement. For this purpose, Six Sigma concept implementation can be very helpful.

Partnership with the enterprises from developed countries can be a great chance for Serbian enterprises development and growth. Concerning this, it is important that managers in Serbian enterprises consider what could be the most important maturity factors for potential partners and to take some actions to improve them. Improvement concerning maturity factors is necessary if managers want to intrigue and attract foreign partners.

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