CATEGORIZATION OF IMPROVEMENT CONCEPTS AND METHODOLOGIES

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Abstract
Over the years the academics have been continuously developing and the consulting companies have been continuously adopting new concepts and methodologies. In fact, there are too many methods available and many of them became fashionable. Without previous studies in the field it is difficult, to get insight into all of them or to be able to distinguish between the fads and proper improvement methods. Executives and managers do not have sufficient time to orientate themselves in the "jungle" of fashionable methods and techniques in order to solve specific problem. The purpose of this paper is to review what is available and guide the selection of concepts making significant difference in organization-wide improvements. Moreover, this paper will create the basis for further research focusing on the practical application of the concepts.

Key words: Process improvement, Organizational change, Management concepts and philosophies, Improvement techniques and tools

Introduction

The 21st century brings many challenges for global industry, which is affected by the world wide economic crisis. Many companies across the world are seeking different ways to improve their operations or are seeking the ways for their survival. Management strives to improve quality, reduce cost and decrease cycle time in order to increase customer satisfaction. Managers in the organizations often face difficulties with the choice of an appropriate methodology, because the business world offers variety of: improvement programs, business improvement strategies, management concepts and philosophies, improvement systems, methodologies for performance and quality improvements and change programs. The experts and consultants market their own terminology; hence do all terms mean the same or are there some differences?

Various studies and practices have proved that some methods have been successful and some methods have failed or even completely died. Practitioners and researchers have been arguing that the popularity of the older improvement methods was not justified by performance improvement and the success of implementation at any given time. Although, in the business world new modern improvement methods and techniques have been regularly promoted, it is challenging to select the most appropriate one. Managers lack knowledge and require skilled resources for the analysis and research of improvement possibilities. Moreover, managers do not understand what role they have to play in process optimization which can result in their little commitment to lead change. The surveys conducted by leading consulting companies prove these statements, as lack of leadership support is one of the top three reasons for project failure in the global survey conducted by McKinsey (Spanyi 2009:1) and in the survey conducted by IBM (Jörgenssen, Albrecht & Neus 2007).

The main purpose of this article is to examine some management concepts used for organization-wide improvement. Moreover, academic viewpoints and the evolution of these methods will be discussed. The theoretical findings from this article will lay foundation for an understanding of the differences between various improvement approaches and provide a guidance for their selection. Finally, the contribution of this research is in suggesting and presenting one of the possible categorization of improvement approaches, methods and techniques.

1. Basics about an organization and its processes

According to Greasley (2006:11) an organization can be understood from two different perspectives: the functional and the process view. The *functional view* sees an organization as a number of functions and departments. The *process view* sees an organization as a number of interrelated processes. The importance of the process view is that the business is no longer considered as a set of separated functional areas but as a set of processes linked together in order to meet customer needs. The researchers from various disciplines present their field specific perspective on processes and create their own specific terms.

Operation management specialists (Schroeder 2000:4; Greasley 2006:5, Kruger & Ramphal 2009:18) use the term operations processes. Business process management experts (Jeston & Nelis 2008) advocate business processes thinking. Quality management professionals (Badiru & Ayeni 1993:84) focus generally on processes and quality thinking. Finally, Social science expert (Statt 2004) diagnoses organizations processes according to the models from a social perspective. In fact, all practitioners independently of the field of study have one in common: to support organizations to improve their processes and thus organizational performance.

The processes in an organization are in the literature differentiated in various categories. Greasley (2006:11) distinguishes between individual and functional processes. *Individual processes* can be carried out by separate individuals. *Functional processes* also known as cross-functional processes occur within a department or across several functional areas. Moreover, the author categorizes processes according their design into *manufacturing* and *service processes*. Other categories can be created depending upon the type of resources entering into the process: material, information and customer processes, furthermore from the perspective of process activity into operations and management processes.

Another categorization provide by Jeston and Nelis (2008:94) is based on the process perspective representing the highest-level view of an organization. Their depiction of the processes is shown in following categories:

1. *Strategic processes* – this level represents strategic processes, which must ensure that the underlying processes are meeting, and continue to meet, the specified objectives.
2. *Core processes* – this level represents the core, or main, business activities of the organization.
3. *Support processes* – this level represents the non-core processes, which support the core processes of the organization.

The literature (Badiru & Ayeni 1993:175; Schroeder 2000:5; Greasley 2006:9; Barnes 2008:6; and Kruger & Ramphal 2009:18) uses for description and explanation of a process so called transformation model. The transformation model, depicted in Figure 1, describes transformation process which converts process inputs into process outputs. Inputs are resources, such as people, equipment, materials, information, machines, measurements, methods and environment. Process outputs are generally goods or services.

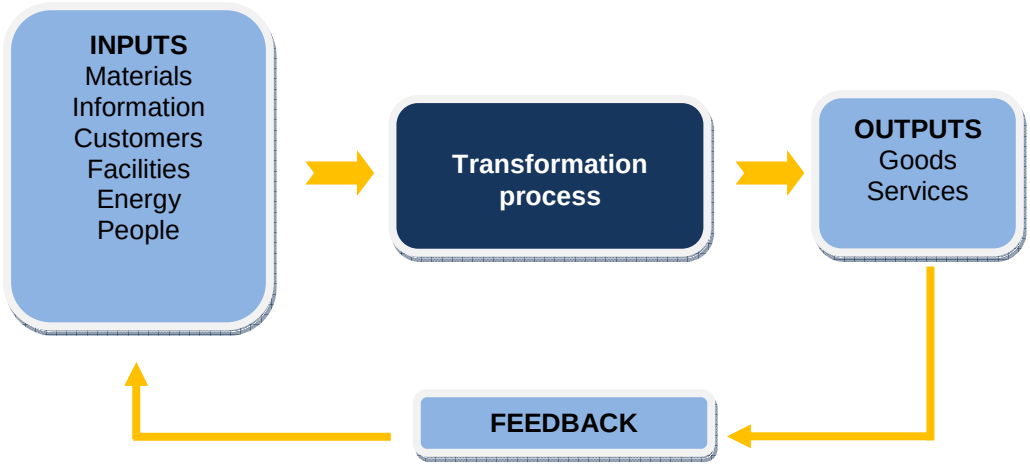

Figure 1: Transformation model

Some (Kruger & Ramphal 2009:18 and Badiru & Ayeni 1993:175) construct his model with the feedback loop connecting inputs with outputs. This feedback process will inform organization about the process performance and deviations from set standards. In order to improve a process, it is essential to understand the fundamentals of all the above mentioned concepts and components.

2. Focus on process improvement

In the literature is a consensus that improvement should be directed to a specific problem of a process. However, it can also involve the whole organization in order to meet their strategic objectives. The essential point in any improvement is to measure performance in a relation to company´s strategy. The literature (Badiru & Ayeni 1993; Schroeder 2000; Greasley 2006; Barnes 2008; Basu 2009 and Kruger & Ramphal 2009) recommends to use following performance measures for process improvement: product quality, process flexibility, work-in-process inventory, lead times, material handling time.

Organizations must have effective and efficient processes in place in order to achieve required level of competitiveness. Focus on the process improvement can result in reduction of a redundant tasks, work standardization, simplification and integration of working activities. Process improvement should be guided by a comprehensive improvement programme, which will identify ways to move the process from a current state to a desired state of higher performance. When this is supported by proper training, skilled people, effective tools, and management commitment, it will bring many advantages to the organization.

International process management practitioner Spanyi (2009) discuses trends in evolution and application of improvement methods and tools. In his opinion, the array of popular process improvement methods has been growing; however business leaders do not provide substantial support to project improvement teams. According to the author, lack of leadership support is one the top three reasons for project failure. Further analysis of the root causes reveals two significant reasons. Firstly, the leaders are not interested to make improvements and secondly, they do not have knowledge on how to improve.

In researcher's opinion the latter reason is very adequate for the busy business environment. Every leader is at the same time seen as a change manager and consequently various improvements are expected. In order to support leaders to understand the differences between numbers of improvement methodologies the following section will provide an overview about categorization of improvement methodologies.

3. Categorization of improvement methodologies

As mentioned earlier, the aim of this chapter is to suggest a categorization of the improvement approaches and present a path to orientate in the methods "jungle". Although in the literature are possibly hundreds methodologies it is impossible to review all of them. However, one possible classification of improvement philosophies, strategies, methods and approaches is illustrated in Figure 2.

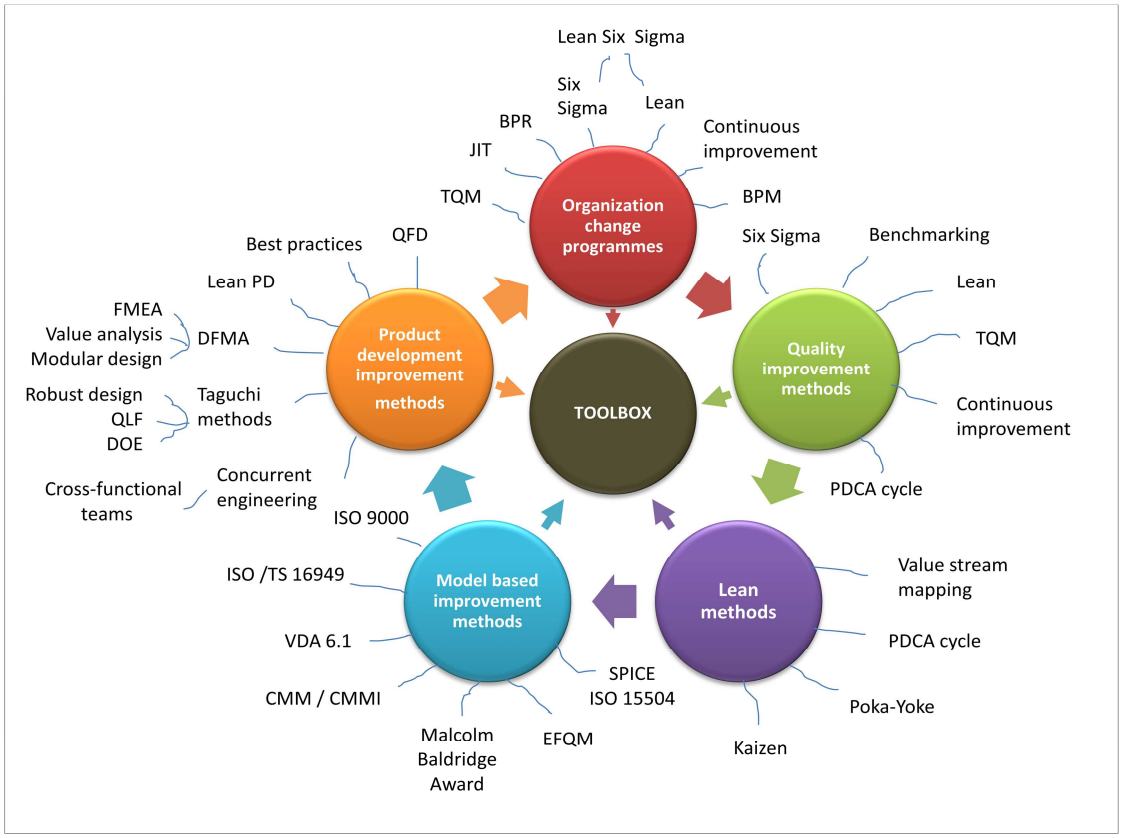

Figure 2: Categorization of improvement methods

Figure 2 presents five main categories: Organizational change programmes, Quality improvement methods, Lean methods, Model based improvement methods and Product development improvement methods. In the centre of Figure 2 is a toolbox containing vast number of tools and techniques, which are required for the progress of any improvement initiative.

According to Basu (2009:xiv) the literature uses terms tools and techniques interchangeably, however the author differentiates these two. Tools are defined as "devices with a clear role and defined application", whereas techniques are defined as a "collection of tools". Moreover, in order to use them effectively training is required to build up

understanding, knowledge and skills. An example of a toolbox grouping tools and techniques in relation to specific approach is presented in Figure 3.

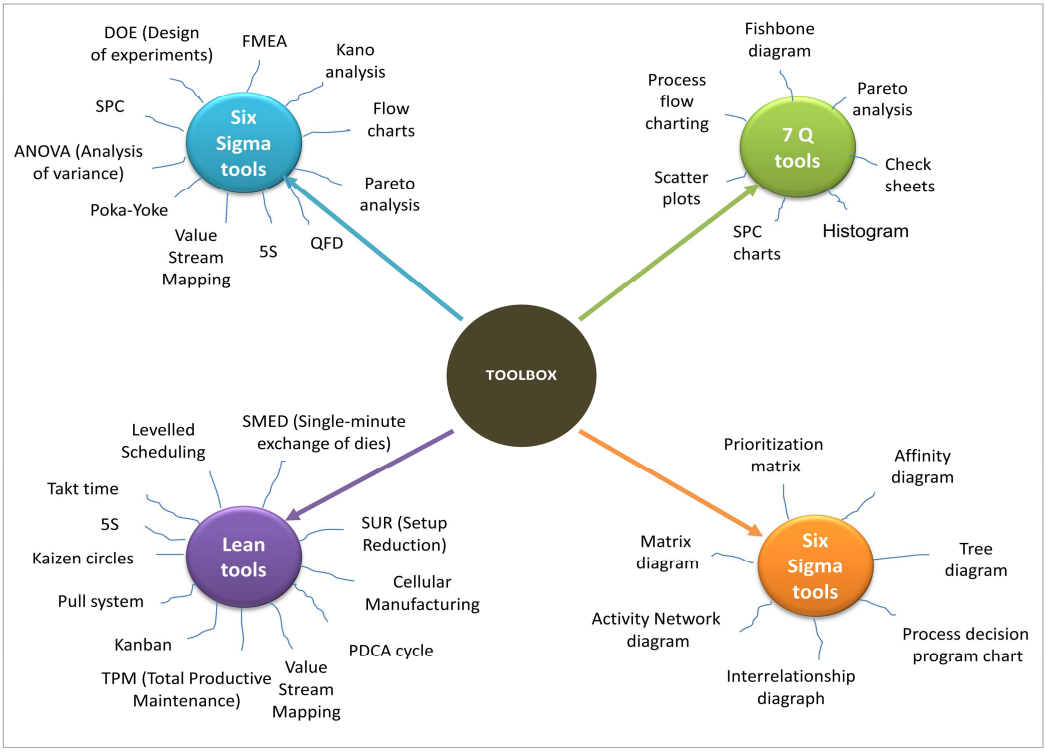

Figure 3: Toolbox as a set of tools

3.1 Organizational change programmes

As mentioned earlier the focus of this article is on methodologies which have significant impact on the improvement of organizational processes and can be used as organizational change programms. In order to provide an overview and short description of methodologies an extensive literature study was conducted from sources such as: Kulpa and Johnson (1993); Blair and Meadows (1996); Womack and Jones (1996); Schroeder (2000); Rye (2001); Armstrong (2003); Greasley (2006); Hughes (2006); Barnes (2008), Naslund (2008) and Basu (2009). Two methods highlighted in the late 1980s and 1990s by organizational scientists and practitioners were Total Quality Management (TQM) and Business Process Reengineering (BPR).

TQM – Total Quality Management

Total Quality Management concept was originally developed in Japan in the late 1940s and is based on the American quality concepts spread in Japan by Deming and Juran. The methodology has evolved from simple *quality inspection* focused on testing finished products with no emphasis on prevention. The next stage in the evolution was *quality control*, which introduced statistical techniques to control the process. It was followed by *quality assurance*, which introduced a comprehensive quality management system. The focus was toward proactively preventing quality problems and attacking their root causes. Finally, the last stage building on the previous ones is the *TQM philosophy*. All four stages should be viewed and understood as a continuum, because they are not totally distinguishable from one another.

According to Armstrong (2003:275) and Barnes (2008:275) TQM focuses on the long-term high quality standards in terms of products and services with aim to deliver value and satisfy customer´s expectations. TQM philosophy is built on the belief that quality needs to be defined from the customer´s point of view and that its pursuit will deliver improvements in corporate performance. Greasley (2006:395) supports this perception and states that TQM is a philosophy and approach aiming to ensure that high quality is a primary concern throughout the organization. The primary goal is to develop awareness at all levels in organization: quality is vital to the success and the future of the company. According to Rye (2001:20) TQM encompasses change related to four key elements: systems, processes, people and management.

Blair and Meadows (1996:102) add that the foundation of TQM is a continuous commitment contemplating cultural change of whole organization. Moreover, TQM requires organization-wide commitment and involvement of all employees and it is based on the philosophy of continuous improvement (CI), or *kaizen*. It is seen as a never-ending improvement journey, rather than as a short destination. TQM uses a wide range of tools and techniques, such as Statistical Process Control (SPC), Seven Quality Control Tools and Seven Management Tools. The improvement cycle in the methodology is based on Plan-Do-Study-Act (PDSA) stages.

The success and failure of TQM programms in the U.S. and Europe have been well documented by researchers and their studies all over the world. However, the main criticism is that the failure of TQM efforts is due to a vague definition of TQM, as the concept continuously changes and develops. Barnes (2008:276) believes that the terms TQM and Just-in-time (JIT) are inseparable, as they are concepts of the successful Toyota Production System (TPS). The holistic nature of the TPS integrates both concepts and it requires taking a systemic view of the production system.

JIT – Just-in-time

Just-in-time philosophy was pioneered at Toyota in the 1950s, but adopted by Western companies only in the early 1980s. The objective of JIT is the improvement of a manufacturing organization's return on investment, quality and efficiency. According to Womack, Jones and Roos (1990) and Liker (2007) JIT means to produce and deliver the right item at the right time in the right amount, at the right place. In other words, there are regular deliveries of customer ordered materials or goods in small quantities when required in a perfect quality. The cornerstone of JIT are zero-inventories and reliability of suppliers. For this reason the relationship between producer and suppliers is of very high importance and the producer's assistance to adopt the JIT system at the supplier's organizations is required.

The main components of JIT production are *kanban* and production leveling named *heijunka. Kanban* is a system for scheduling in the production line, based on visual tools, mainly cards to produce only the requested items. Production leveling or *heijunka* assures the sequencing of orders and the redistribution of produced quantities and varieties evenly over time. Both components emphasize effective changeover of machines, small lots, capable processes and multifunctional workers.

The JIT concept can be implemented organization-wide. The term JIT is often used in literature interchangeably with lean production and lean manufacturing - as an integration of a philosophy and techniques designed to improve performance. Although Schroeder (2000:363) indicates that the JIT philosophy is also called lean production on the other hand Naslund (2008:275) states that "Lean is an updated version of JIT".

BPR – Business Process Reengineering

The Business Process Reengineering methodology has been developed in the US since the early 1990s. BPR uses a step change approach, based on the introduction of new technologies and new ways of working. The focus is on the analysis of a business from a process perspective rather than from a functional perspective seeing an organization as a series of processes. The cornerstone of the methodology is that major breakthrough changes must result in fundamental and radical process redesign. BPR emphasizes the elimination of non-value adding activities, simplification and integration of tasks and automation of processes.

Organizations should be aware that BPR is complementary to continuous improvement. According to Rye (2001:20) BPR is more "top-down" managed change approach than TQM and there are many similarities between the both. However, BPR encompasses change related to four key elements: 1. business processes, 2. management and measurement, 3. jobs and structures, 4. values and beliefs.

As mentioned earlier, TQM is based on the philosophy of continuous improvement; however BPR should be treated as a project, with a specific start and end date. Once the project has finished and the process is streamlined and reorganized, continuous improvement can be introduced in order to maintain incremental improvements over a long period. Therefore, BPR and CI should be integrated together in an improvement initiative to achieve more effective improvements.

Although literature delivers many success stories about the BPR on the other hand there is also evidence that many BPR efforts failed or did not deliver expected results. In spite of the criticism of BPR - due to lack of attention on human side and dismissal of employees - its major contribution is the use of process perspective. BPR is just one of many tools that can be used for process reengineering, improvement of process flow and elimination of non-value-added work. BPR methodology has been further developing and it creates the basis for many recent developments in management, known as Business Process Management or Business Process Improvement.

Six Sigma

Six Sigma methodology was invented in the USA in 1981after Motorola launched successful improvement program and received in 1988 the Malcolm Baldrige National Quality Award. Six Sigma is a business management strategy, which aims customer-oriented quality improvements of processes by means of measurements and data analysis to identify trends and causes of deviations. It seeks reductions of variation in manufacturing and business processes and uses metric of defects per million opportunities. Basically, it is a data-orientated approach using a set of quality management tools including SPC methods. This is a point of many critics as the statistics are difficult for many employees to understand and make effective interpretation of the results.

Six Sigma follows two major improvement methodologies based on the Plan-Do-Check-Act cycle: DMAIC (define/measure/analyze/improve/control) used for existing processes and DMADV (define/measure/analyze/design/verify) used for new processes. Within the individual phases of DMAIC or DMADV projects, methodology utilizes a variety of tools and techniques established in quality management. For example: Quality Function Deployment (QFD), Pareto Charts, Failure Mode and Effect Analysis (FMEA), Taguchi methods and lots more.

Six Sigma is a method recommended to improve process capability and achieve measureable improvements in revenues through increasing effectiveness and efficiency. Researchers and practitioners apply Six Sigma in either manufacturing or service industries as a single method or as a part of an improvement program in combination with CMMI (Capability Maturity Model Integration) or Lean. The knowledge and expertise differentiates according to following levels: White Belts, Green Belts, Black Belts, Master Black Belts and Champions.

Lean

Lean is a modern improvement philosophy designed to enhance organizational performance. Recently the lean concept is one of the most wide-spread and successful attempts and it is valuable for the improvement of profitability and competitiveness. This concept was introduced at Toyota in the 1950s and is described in the famous book written by Womack, Jones and Roos: "The machine that changed the world" (1990). The origin of lean is in the automotive industry; however there are many applications across various industries, government and healthcare services. Lean might be adopted either in the big scale as an organization-wide initiative or in a small scale on a departmental level. Even the size of the business is not an issue – as both, the giant factory or a small business can benefit from it.

The concept is based on five basic lean principles introduced by Womack and Jones in their following book "Lean thinking" (1996). The fundamental lean principles are: 1. Customer value, 2. Value stream, 3. Flow, 4. Pull, 5. Perfection. Lean emphasizes number of approaches, such as: teamwork, producing according to demand pulled by customer, producing in smaller batches with quick setups of machines, cellular production and some other tools and techniques. Lean manufacturing or lean production is process management philosophy derived from the Toyota Production System (TPS), significant for doing more with less – less time, less space, less effort, less inventory- while adding value to customer. The focus is on the elimination of waste (*muda*) and improving the work flow. Once non-value added activities and waste are eliminated consequently the quality and productivity improves while production time and cost are reduced.

The core of the lean concept are philosophies, such as: Just-in-time (JIT), Autonomation (*jidoka*), Total Quality Management (TQM) and *kaizen*. Lean is on the other hand a set of tools such as: Value Stream Mapping, 5S, Kanban, Poka-Yoke, Total Productive Maintenance, Single Minute Exchange of Dies (SMED), Lean Six Sigma and others. Even fundamental quality methods, such as the Failure Mode and Effect Analysis, Quality-Function Deployment or Statistical Quality Methods fit into Lean.

Continuous improvement

The concept of continuous improvement originates in Japan and as never-ending process deals with an on-going effort of improvement. These efforts can systematically increase quality of products, services and processes and can also improve productivity, satisfaction of employees and customers. Improvements can be accomplished on an evolutionary basis by seeking incremental changes over longer period, known as *kaizen* - or on a revolutionary basis, seeking breakthrough improvement in a short time, known as *kaikaku or kaizen blitzes*. The lean experts Womack and Jones (1996:27) recommend applying the combination of *kaikaku* and *kaizen*, which can produce endless improvements.

The philosophy of kaizen will not work without the acceptance of all employees in the organization and their creative energies. Leadership from top management for executing the program is vital to ensure its success. The aim of continuous improvement is to reduce variability of the product or process and eliminate errors or waste. Successful implementation of the concept requires introduction of the PDCA cycle, quality circles, problem-solving methods, suggestion schemes and monitoring techniques within an organization. The methodology utilizes a set of tools, such as: Brainstorming, Pareto analysis, Cause and effect diagram, Flow diagrams, Check sheets, etc. The CI philosophy seeks to embody change into the organizational culture and it is a fundament for JIT and TQM philosophy. All philosophies are cornerstones of the Toyota Production System and fundamentals to the success of Japanese industry.

BPM – Business Process Management

Business Process Management (BPM) methodology was popularized in the early 2000s and can be considered as a successor to BPR. The concept has evolved over a long period as a result of a merger of three main streams, namely scientific management, BPR and TQM philosophy. BPM is a holistic management approach, which attempts to improve processes continuously with support of information technology. The synthesis of process improvement methodologies such as ISO norms, *Kaizen*, Six Sigma, Lean Six Sigma enables process-oriented change and process improvement sustainability within the organization.

3.2 Popularity of improvement methods

Based on the theory reviewed in previous section it can be concluded that there is a large number of methodologies available for the improvement of an organization. Moreover, from the literature review can be seen that improvement methods are evolving and each era emphasizes specific method. The overview is illustrated in following Figure 4.

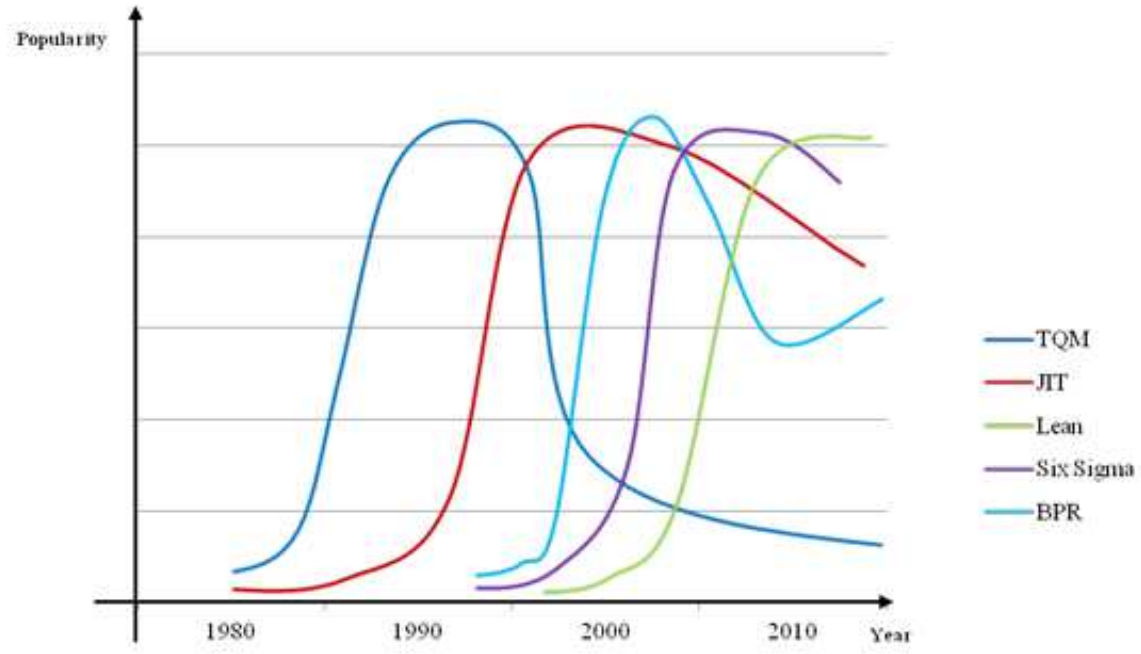

Figure 4: Popularity of improvement methods

4. Recent academic viewpoints about improvement methodologies

The academics and practitioners present in the literature many widely divergent viewpoints regarding improvement methodologies. More significant are critical discussions about improvement approaches, if they are real improvement methods or fads - repackaged versions of previously popular methods. Statt (2004:362-3) states that TQM and BPR were two of the leading fads of recent years and one of the most recent fads is the Emotional Intelligence or Emotional Quotient (EQ). According to Kruger and Ramphal (2009:105) BPR and TQM are exactly the same methodology. Meteer, Hummel, Wicks, and Nolan (2004:113) state that the approaches TQM, BPR and Six Sigma do not adequately address the broader practical issues of implementing changes across complex organizations.

Naslund (2008:269) explores similar phenomena with the organizational improvement methods and compares Six Sigma and Lean with TQM and JIT methods. The main conclusion of his research is that Lean and Six Sigma essentially share the same fundamental approach to change with JIT and TQM. The ideas behind JIT and Lean are very similar to the ideas in the quality methods; however one difference could be the strong focus on the manufacturing industry in JIT and Lean movement.

Similarly, the group of researchers Andersson, Eriksson and Torstensson (2006:293) suggest that Six Sigma should be rather seen as a methodology within the larger TQM framework. According their study Six Sigma has the same common features as TQM and it does not, in principle, contain anything new. Although TQM is often misunderstood, as it is blurred and unclear, Six Sigma and Lean can be the appropriate approaches for the improvement in organizations in order to make progress in the field of quality management. Both methods include the elements of the corporate culture and human factor and have clear road-maps for implementation.

4.1 Integration of methods

Historically it is a fact that highly-effective process improvement programs involved synergies and the integration of multiple methodologies. In the 1990s, in the era of BPR and TQM, Davenport (1993:7) recommended the integration of both methods to enhance operational performance into a single coherent program of operational change. He believes that the best change programs emerge from cooperation between the quality and reengineering approach. Recently in the lean era Huffman (2008:4) suggests further investigations into lean techniques, which can quickly improve profitability and competitiveness without large expenditure. The future prediction from Naslund (2008:281) is that there will soon be a new method promoted, which will be more process oriented, as there is a need for a process-based approach to organizational improvement efforts.

The main purpose of any improvement method is to improve organizational performance, by means of quality, productivity, profit or other measures. The challenge for many companies is to understand that process improvement is not only a short-term project within a limited environment as a single department. The optimization of processes should be seen from the holistic - system perspective, to view and improve the organization as a whole system consisting of interrelated functions and processes. As mentioned earlier organization is a collection of processes, where processes are collection of steps and the perfection of steps needs a specific collection of techniques and methods. The task for all employees is to focus on the improvement of the steps, as they will result in improvement of the process. Furthermore improved processes will contribute to the improvement of the whole system.

Importantly, companies need to use the talents and ideas of all employees in all areas and at all levels.

Concluding remarks

In the academic and practitioner world there are many discussions about what the best quality management model is and what the best method for process improvement is. The aim of this article was to bring clarity about the most well-known process improvement and management philosophies and methodologies. The main question to research and to answer in this article was to determine from the literature what methods are generally used for process improvement. The findings of the literature study show that exact separation of the methods and approaches is almost impossible. Many concepts are the fundaments for the development and evolution of successive methods or they complement previous ones. It is also important not to underestimate the fashionability and trendiness of certain methods at a specific time. As a result, this article presents an overview of most significant methods and one of many possible categorization opportunities.

To conclude this article, there is not one method to recommend that works for all organizations in the same way. There is no one right path to follow. In some instances, an organization will need a radical quick approach such as BPR and in other situations a softer on-going improvement will be required. Leaders who wish to make changes and improvements in their own organizations should be aware of the existence of various concepts and methodologies. More important is their role to develop own vision and strategies for improvement. Leaders need to commit to lead the improvement initiatives and create a culture where change is welcome. As it has been discovered, it is possible and it is recommended to mix the right "fusion of tools and techniques" that are needed to make an improvement journey achievable and successful.

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