

IMPLEMENTATION OF HYBRID (INTEGRATED) METHODS FOR PLANNING PROCESS OPTIMIZATION

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Abstract

Purpose. The present article aims to point out and compare key points and practices of the application of Lean principles and selected tools in combination with project management methods and tools for planning process optimization both on academic and practical level.

Design / methodology / approach. For the purpose of a multi-dimensional theory-based narrative review of the subject with several different methods of data collection are used: documental and comparative analysis, review of scientific literature and systemization-synthesis of information, content analysis. An analysis is based on a qualitative paradigm and focus to supply chain management (SCM), Total Quality Management, Change management and Continuous Improvement theories..

Findings. Results of the multi-dimensional evaluation of the subject suggest that principles of the Lean system and Kanban tools can be successfully applicable and compatible in planning process activities and its optimization both separately and as a part of hybrid (integrated) methods.

Research limitations / implications. The research are of a limited scope from a few points of view: first, it is noticed that a limited quantity of research is made within the field of using hybrid (integrated) methods, especially in the case of academic research performed in Lithuania. So, there is no concrete Measurement Model or step by step guides how these methods should be implemented, what are key issues in this process and how results should be evaluated. In addition, there is a limited orientation to such fields as public and non-governmental sectors and organizations, where the need of planning and overall change management is even more significant and missing. Furthermore, this article is based on a narrative type of review towards a scientific literature where findings and theoretical conclusions are outlined from a holistic interpretation contributed by the reviewers' own experience, mentioned theories and models by using the method of information systemization. In relation to that, case studies and comparative analysis towards a practical implication are not sufficiently elaborated from the point of theoretical overview, therefore, they have not been within the focus of scientific analysis in this paper. The fourth limitation might be the complexity and the dynamics of a planning process as well as the primary orientation of the Lean system and tools directed to the manufacturing and industry sector.

Practical implications. Summarized and underlying research and its findings may serve as a basis for a relevant input to a further scientific discussion regarding the optimization of planning process and adoption of hybrid (integrated) methods in this or related fields. It addition, it might be useful within a practical implementation of new methods of project or process management and planning.

Originality / Value. The main point of the paper is to underline that there are options to combine different process and project management tools and principles in this specific and complex field as planning. Since planning itself is considered as a continuous activity

throughout the process and is usually carried out dynamically in parallel with a performed task / job, Lean tools combined together with project management application may serve a very useful and effective way to ensure a more structured and, therefore, successful process handling. Moreover, the selected research object and findings are also valuable in terms of the process improvement in public sector organizations. Since the limitations of Lean tools are their lack of diversity in applicability to an ongoing process, as they are rather applied to a moment and static process phase, and limitations of project management are its unclear structure and abstractness, this particular paper points out and analyzes the possibilities of both Lean tools and project management merging as a proper method.

Keywords: hybrid (integrated) methods; planning process; optimization of planning; Lean; Kanban.

Research type: general review.

Introduction

A dynamic and complex business environment, automation of business processes and Generation Z can be equalized to several factors which are considered quite influential. These factors consist of development and activities of various organizations, changes in the attitude towards process management, and an improvement in application of new methods. Lean principles and tools in combination with project management tools or traditional planning tools are a proper alternative solution for organizations seeking for the business process optimization. It is efficient to use this strategy due to a certain preconditional background which naturally encourages using internal resources, proposes a deeper engagement of employees towards a daily working routine, and accelerates introducing the Continuous Improvement culture. Nevertheless, only about 10% of organizations implement main principles and tools of the Lean system and ensure the continuity in the future practice successfully (Salonitis and Tsinopoulos, 2016). Moreover, when focusing on the case of Lithuania, it is important to notice that a scientific discourse on the Lean application in organizations has not been much elaborated so far and a number of studies in this field are of a limited scope, especially in the case of implementing so called hybrid (integrated) methods (Čiarnienė and Vienažindienė, 2013, 2014). Therefore, in this paper the process of planning is taken into account from a deep theoretical perspective because this process type not only influences activities within organizations but also attributes a quite complex content, a high level of integrity with other process types and employees, and a wide scope of usable methods and tools.

The planning phase is an integral part of each organization's project and process management, necessary for the effective implementation of the organization's goals at both strategic, tactical and operational levels. However, main methods and problem solutions of this phase have been focused mainly to the operational production level for quite a long period. This is grounded by the fact that strategic planning as a separate academic discipline was recognized and started to be used only in the mid of the 20th century (Dole and Cervone, 2014). At this point, it is important to notice that along with an increased focus on the strategic planning and its holistic understanding, new challenges have arisen. To be more precise, a too deep focus is switched to the planning process as such instead of strengthening the control of implementation or evaluation of outcomes following the planning; and this may lead to situations with negative influence on firm innovation or incompatibility of long-term goals to the

dynamic environment too (Dole and Cervone, 2014; Zhang and Ge, 2015; Arend, Zhao and Song, 2015). All these listed consequences together with many practical planning tools and methods for planning used in practice indicate the complexity, dynamism and integrity of this phase with other processes in organizations and its wide scope of possible problems. In parallel, the rapidly evolving business environment and globalization requires organizations to increase their competitive advantage, adopt more flexible management systems, and change the attitude towards the content and ways to manage business processes (Serafinas and Ruželė, 2014). The term Lean itself is understood as *economical manufacturing* or *cost saving-effective production* in the context of Lithuanian academic research. Accordingly, it has a strong association to the factors mentioned above as well as marks the evolution of organizational management over the past 3 decades (Huxley, 2015). It is recognized that Lean principles and tools are based on the practice of industrial organizations, and, therefore their modifications or combinations should be carefully considered and measured before applying them to service-oriented organizations and similar type of organizations. In addition, it is important to the organization to feature an appropriate level of maturity in terms of both new management process and culture (Urban, 2015). Therefore, the practical situation of Lean validates the argument why only the parts of Kanban's operating principles, updated or hybrid versions (such as Reactive Kanban, Conwip) or even combinations with other project planning tools (such as Scrumban) are applied in practice for the mentioned type of organizations. Key areas of application include planning of information acquisition and transfer processes as well as visual management. So accordingly to the mentioned, this article aims to reveal and compare practices of application in planning process optimization of the following: Lean principles and specific Kanban tools, project management (Agile) methods and tools, and hybrid (integrated) methods. Key objectives are: multidimensional evaluation of a planning process in modern organizations; review of specific and modified hybrid planning techniques or systems used by organizations; and application of Lean principles and hybrid (integrated) methods with planning systems and methods in organizations. To reach these objectives the following type of analysis are used: analysis and synthesis of scientific literature content.

Semantic and content evaluation of planning functions and processes in the context of nowadays organizations

In the scientific literature, planning as such is often referred as a management function in priority or the most important function of a manufacturing system, which determines the content and direction of other management functions (for example, management and control), and is evaluated in both narrow and broad point of view (Jin, Zhang and Shao, 2015). The narrow meaning of the planning process in organizations relates only to the identification of specific operational objectives, the choice of their implementing measures and a clearly defined outcomes plan. However, it is noticed that planning should be evaluated in a few directions: as a continuous, responsive and changing process, taking into consideration the factor of environmental changes; as a developing social factor that promotes specific employee activities, cooperation and involvement into the organization's activities (Bennett, Kadfak and Dearden, 2016). A total different understanding and level of importance of planning

exists in the context of project management outstandingly, where the planning phase relates to specific activities: project timetable and budgeting, project identification and description, etc. All these activities are summarized in several types of plans, using the concepts of guideline plan and detailed planning (Gagliardi et al, 2015). An important aspect for separation of planning values in organizations and project management is the main characteristics of the project: timeliness (certain duration) and uniqueness. All these factors require abandonment of the concept of planning as a continuous process and shift to the specific emphasis on project activities. In summary, planning is among the four major operational projects. At the same time, it is recognized as one of the main reason for poor project management situations which leads to project delays or price increases and overall so called inadequate performance planning (Gardiner, 2005). From a practical point of view, planning process for production is synonymous with several key activities: production planning timeline and scheduling. In a more detailed way, plan as a result and planning as a process consist the same systematic information need to turn raw or semi-finished products into finished products (Mingrang et al., 2015; Jin, Zhang and Shao, 2015).

Moving forward to the question of the planning problem, it was noted that complex planning processes relate to a number of problematic issues and situations that need to be addressed in the elaboration of the levels of management of all plans. Depending on the nature of the effect and the type of expression, the problem factors can be divided into three categories:

1. External environmental factors. They are indirect but important for the overall effectiveness of the planning stage and, the most important, arise irrespective of the organization (for example prices of raw material, production and process quality, environmental requirements, customer needs and demands) (Zhang and Ge, 2015).

2. Internal environmental factors which have a direct and significant effect for the planning phase. On the other hand, an organization typically is capable of managing and eliminating these factors. Possible example includes human resources and technology network, a communication network, and the soft part: coherence and implementation of planning processes (Dole and Cervone, 2014).

3. Planning methodology. It identifies problematic situations associated with using planning measures. It is noted that the current widespread use of advanced planning systems based on the use of information and communication tools is not able to reflect adequately and does not address decisions in a timely manner in relation to such changes as production volume, consumer demand, market competitors' actions. It is also noticed that the planning methodology might be only partially or not integrated at all with the other processes and systems used in organizations (Feng et al., 2011). Additionally, there are examples in practice that so-called *traditional planning methods* (for example, Gantt chart) used for managing standard projects (for example, construction of buildings) or Network-based scheduling methods are oriented only to the operational level activities but not compatible with Agile type or complex (hybrid) type of projects in strategic level (Kosztján, 2012; Feng et al., 2011; Wang, Zhang and Fuh, 2012).

Taking into consideration specific and modified planning techniques or systems used by organizations, it can be indicated that their application depends on a number of factors which are similar to the general planning problems: external and internal organizations environment, level of application of the plan (for example, strategic,

tactic or production-operating), information management, time indicators (for example, for management and synchronization activities), relationships with customer (Stefan and Radu, 2016). On the other hand, it is also noticed that not only the management of the above mentioned factors, but also the choice of the appropriate production operations, the order of their execution, the quality of production facilities and the qualified human resources have a great impact on the overall efficiency and effectiveness of the planned activities (Zhang and Ge, 2015). Coming back to the main planning methods used in practice, their possible categorization is presented in the table below.

Table 1. Main types of planning methods and related tools

Type of planning methods	Type of planning tools
Planning methods based on usage of mathematical calculation or algorithms	Linear programming; Dynamic programming; Transportation tables; Fuzzy logic mathematical programming; SIMPLEX method, etc.
Planning methods based on Computer-aided process planning systems (CAPP)	Manufacturing resource planning (MRPII); Advance planning and scheduling (APS); Supply chain management (SCM); Capacity requirements planning (CRP); Solver from Excel, etc.
Planning methods based on process / project design in future	Ideal state action planning method; The scenario tree based multistage stochastic programming model; The scenario planning methods; Future-based design method (FBD), etc.
Planning methods based on complexity and integrity	Integration of process planning and scheduling (IPPS); Distributed process planning (DPP); Design structure matrix / Dependency structure matrix, (DSM), etc.

Source: Composed by the researcher and based on resources: Zhang and Ge, 2015; Kosztyán, 2012; Mingrang et al, 2015; Feng et al. 2011; Stepchenko and Voronova, 2014, Yang et al, 2015; Stefan and Radu, 2016.

The classification of the above-mentioned planning methods is conditional and assists in distinguishing the general trends and dynamics of the current period in research area. Of course, it should be mentioned too that traditional planning tools as Gantt chart or network planning tools (for example, CPM, PDM, GERT) are still recognized and widespread in practice (Ong, 2016). It has to be noted that in the evaluation period, the concept of planning and the choice of methods in organizations is determined by prevailing tendencies and the application of combined solutions - the use of Lean system and similar hybrid (integrated) methods (for example, Kanban, Scrum, Scrumban, Agile, GT, etc.) (Berlec et al, 2014).

Content, dynamics and hybrid (integrated) methods of processes and project planning activities

As stated above, the planning phase is essential for each project or process in organization, characterized by its high complexity, dynamics and problems. Of course, a clear separation (in the theoretical sense) between these two types of activities is

determination accordingly to differences in the concept of planning, methods, and problems. On the other hand, planning in scientific literature is often regarded as a separate business process, so in terms of evaluating this phase in the context of process and project management, we characterize a broad (holistic) and limited meaning. Retrospectively, the beginning of the emergence of advanced planning systems is associated with the 20th century. The 1990s and the qualitative changes in the field of information technology at that time subsequently created the conditions for new, interactive and computer systems based on the process of planning and management of methods and systems, and the emergence of combined solutions for the saving of production methods of expression (Burgis, 2014; Lukic et al, 2017). The importance of traditional business management systems, including their inability to tackle planning challenges in the context of global competition, is also crucial. It is identified as one of the main reasons for integrating specialized, intelligent planning systems or their individual modules into existing business management systems. At the same time, we can talk about the need to move from pre-planning to *warehouse to real needs* assessment and planning (Burgis and Zakarevičius, 2014; Zühlke et al, 2017).

Beginning with a narrow assessment, it is important to discuss the methodology of project management: depending if the project is managed according to the Waterfall, Agile or hybrid project management methodology, the planning phase is differently assessed. The meaning of the planning stage according to the methodology described is given in the table below:

Table 2. Evaluation of the planning stage in 3 project management techniques

Technique	Place and meaning of the planning stage	Result of activities in the planning stage
Waterfall	Place: 1 of 5 process stage Meaning: completed and independent stage, do not react to the changes of environmental conditions, carried out in conjunction with the design scope of the project.	Final project management plan and related documents (lower level of plans).
Agile	Place: 1 of 5 process stage Meaning: repetitive and constantly changing phase. Changes in process are caused by changes in environmental conditions. Organizational culture, communication processes and human resource has a great impact too.	Project management plan which is periodically updated.
Hybrid (integrated)	Place: 1 of 5 process stage Meaning: Complex type of stage, which is implemented gradually - firstly by splitting the project into separate components according to disciplines or functions, and planning the implementation of individual components later.	Work Breakdown Structure, WBS) and plans for the implementation of individual works (activities).

Source: Composed by the researcher and based on resources: Robins, 2016; Baird and Riggins, 2012.

Essential differences between above indicated project management technique can be the meaning (volume) and output of the planning phase. Based on the traditional Waterfall methodology, the planning phase has clearly defined limits and a specific

output as a project management plan and other related documents. A coherent implementation and static plan are an integral part of the results of this technique's planning phase. The opposite approach to planning can be identified in Agile type and Hybrid-type techniques (Serrador and Pinto, 2015). The planning phase in this case is not completed at the beginning of project, but dynamic, ongoing and responsive, with outputs of a different form, for example, Work Breakdown Structure. It is noted that during the planning phase, using mentioned type of plan and managing the whole project in a hybrid methodology, positive results are obtained in way of high level, detailed implementation plans, shorter development times and faster response to environmental changes (Baird and Riggins, 2012). To sum up, it should be stated that in project management, during the planning phase, elaboration in form of a detailed analysis of the original idea of the project and the assessment of individual aspects is made in priority. In most cases, it is done by using an already mentioned decomposition or a SWOT method, as well as by subdividing all activities into two internal process groups: basic and auxiliary processes. At the same time, one of the main goals of this phase is not only the preparation of a detailed implementation plan (at operational level), but also updating it in a timely manner and making it compatible with the organization's strategy (Project Management Body of Knowledge, 2013).

Moving to a broader assessment of business process planning, it is noticeable that the planning stage or related individual actions can be identified at different hierarchical levels of management, in almost every basic and auxiliary process (Lukic et al, 2017; Bae et al, 2014). It is also noted that planning is recognizable and important not only during the current period in the organization, but also for the modeling future processes in accordance with the concept of Continuous Improvement, so called *Kaizen* and related methods for the development of Lean principles and system (Čiarnienė and Vienožindienė, 2014; Oropesa-Vento et al, 2015). The planning is found on the basis of this concept, based on the Shewart and Deming ideas and a cycle of control. In practice, in process management activities it is used as one of the stage of Continuous Improvement cycle.

In relation to hybrid (integrated) methods for planning process optimization, combination of the Kanban as one of Lean systems process planning and management tool and the Scrum as one of project managements tool is worth to mention (Ighravwe and Oke, 2017; Kuhrmann et al. 2017). This example of harmonization marks the shift from the traditional Waterfall project management technique to Agile and Lean principles based project management. Although the scope and characteristics of the named methods are different, there is a growing trend or popularity of such hybrid (integrated) methods project management methods such as Scrum-XP Hybrid, Custom Hybrid, or Scrumban (Stoica et al, 2016, 10th Annual State of Agile™ Report, 2016).

Adaptation and compatibility of Lean principles and methods with planning systems and methods in organizations

The term Lean is polysemantic and is used to define both individual methods and complexity of them, both the philosophy of management and the system of specific management principles and values. In addition, the term of Lean Management is not only determined by technical practices, but also incorporate so-called soft practices -

behavior and actions of employees and management (Serafinas and Ruželė, 2014; van Assen, 2018).

From a historical point of view, it is noted that the emergence of economical production is associated with the ideas of Taylor's scientific management or Ford's production organization, which were transferred and successfully adapted to the postwar Japan automotive industry, but not as template but with significant modifications, adding emphasis not only to ensuring process efficiency, but also a strong orientation to customer demands, quality assurance and human factor management in manufacturing (Aartsengel and Kurtoglu, 2013). The main assumptions of planning improvement under the system of economical production can be identified – the initial orientation of the planning process to the client: bringing the value to the client planning; the specific content of the planning process (complexity, high integrity); high requirements for the planning process and its participants. All these mentioned factors, in relation to economical production, determines relevant process improvement points and goals at the same time: the duration of the process is aimed to maximize the optimal procedural length of the planning process; process progress is aimed to standardizing the progress of the process and ensuring timely and well-defined presentation of information related to the planning process; action plan is aimed to minimize the occurrence of deviations, procedural errors and other types of problems. In addition, the modern business environment and organizations add that it focuses on gaining or maintaining competitive advantage and adapting to the changing market and customer needs. This determines that it is necessary to continuously improve all processes in the organization, apply the latest technological advances, both in production and in management (Burgis and Zakarevičius, 2014). At this point, we can distinguish the two main groups of measures that organizations use to achieve the above mentioned goals: Lean system and Advanced Planning Systems. It should be noted that although the causes and circumstances of the two process improvement methods are similar and interrelated (for example, static production and management processes, inefficient use of resources, elimination of practice and general process optimization needs), but in practice these methods are often implemented separately, by eliminating possible benefits from the use in integrated or parallel ways. In the case of the application of process improvement techniques, one of the main tools for this methodology, and also the Toyota Production System (TPS) tools, is Kanban. This is in practice well known planning and control tool, used in the multistage supply or production chain management, with the principles of consistent and optimal functioning of individual nodes, guaranteed by a special mark and card system (Ordysiński, 2013). At the same time, Kanban helps standardize and simplify the entire process, speeds up information transfer processes, and boost overall production efficiency and productivity (Al-Baik and Miller, 2015). The usage of this tool lets to optimize and control all process so that the materials used in the production of certain products reach the individual stages only then their real need arises. This feature of Kanban lets organizations in use to avoid the traditional, so called *production by plan* issue and need for Push system, where the individual stages of reloading and resource retention, respectively, leading to a longer lead time delivery (so called *Lead Time*) and a lower level of customer satisfaction. Thus, using the above-mentioned planning tool, the transition to the Pull System is more effective and with the use of visually visible signs (cards or planning tapes) a consistent production

process, more efficient use of resources and timely delivery of products are reached. In the aspect of historical development, Kanban has long been concerned only to control and optimize processes in supply chain or production chain located in manufacturing or some other industry type organization. However, it is currently widely used in planning both work and time at both on team and individual level and, most important, in organizations of various profiles and sectors. By using interactive digital techniques relevant applications as the transition to electronic Kanban (e-Kanban) version is made (MacKerron et al. 2014; Oh and Shin, 2012). Such versions are currently often used in conjunction with project management and planning methods (for example, with Scrum) or other business planning control systems (for example, ERP). It is added that some Kanban modifications are also found in Advanced Planning and Scheduling systems: Oracle's; JD Edwards and e-Business Suite, IFS AB, Infor ERP LN, SAP ERP, Deltek Costpoint, and Microsoft Dynamics AX. The application of E-Kanban also is confirmed by Toyota's example – it was successfully applied to external processes as working with suppliers (Ordysiński, 2013).

However, it is important to mention that research emphasized that it is still more effectively used in traditional production profile organizations, whose activities are based on separate processes with sufficiently stable, well defined environment and need to provide a limited number of services or products. In todays, especially project-based organizations, not only challenges for financial or human resources, production technologies sides exits, but there are many other factors as extremely dynamic environmental conditions and the need for high level management of information. Here can also be mentioned a shortened product production cycle, constantly changing consumer needs and diversification of activities also are influential (Barba, 2013; Ordysiński, 2013). It is agreed that implementation of mentioned tools, which organizations in practice actively use for optimization and development processes, is still under theoretical consideration and still seems to face similar problems, but both representatives of organizations and researchers confirm that their parallel implementation can reduce the number or impact of such problems. Other possible solutions are the following: the use of process evaluation and Enterprise Resource Planning system or other systems as a coherent process rather than a temporary project, as well as assessing not only the technical nature and indicators but also the social changes and climate in the organization (Chofreh, 2014; Hornstein, 2015).

Discussions

The general review of scientific literature has confirmed the position that the planning phase in the context of process and project management is still an essential step both in the current (ongoing) period and in the long run period. The main difference at this point is a change in forms of expression and volume, the practice of adapting hybrid (integrated) methods. But it is still an open question how this new type of methods is applicable in practice and how to measure its efficiency. Moreover, it is important to notice that at the planning stage a scope, design and process content are characterized by a high complexity, integrity and impact on the organization. Hybrid (integrated) methods are becoming increasingly widespread not only due to these reasons but also due to its great impact on the field of improving efficiency of planning activities and overall process standardization in organizations. On the other

hand, a comparative analysis and research about hybrid (integrated) methods and their application possibilities in different type and sector organizations are missing. Nevertheless, the practical application confirms that individual Lean system tools (for example, Kanban) are successfully used in the combination with project planning and management tools (for example, Scrumban). Accordingly, there is a need to figure out if the practical application of these methods really confirms the theoretical insights and models as follows: specific properties of supplement, high orientation and effective use of existing resources, easy implementation and maintenance, probability of reaching more sustainable and long-term effects.

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