

Agile Transformation in Project Organization: Knowledge Management Aspects and Challenges

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Abstract: The objective of the paper is to present knowledge management aspects of an Agile transformation as an organizational change resultant from introduction of a new Agile project management methodology in the context of the organizational learning theory. The research study was concentrated on Information Technology (IT) & Information and Communication Technology (ICT) projects which are considerably utilizing volatile knowledge resources. The paper responds to a research questions about potential knowledge management aspects, issues and challenges within Agile transformation process in terms of its pre-conditions and facilitators. Presented empirical research is based on a literature review and a quantitative analysis of multiple case studies of companies implementing new Agile project management methodology. The empirical research results were gathered with applying triangulation method of multiple case studies originated from document analysis, interviews and observation in order to reach higher reliability of research results. The detailed examination is focused on knowledge management aspects, issues and challenges within the Agile transformation process in large-sized project organizations. As shown by results of the research, the change in project management methodology significantly impacted the project organization as a whole. It was a source of comprehensive organizational changes in processes, technology, methodology, strategy, structure and organizational culture and it allowed for enhancing the competitive advantage of the organization. The key pre-condition and facilitator of an Agile transformation process is the knowledge management aspect. Project organizations and their senior executives have to address many knowledge management pre-requisites and challenges with a view to ensuring a successful transition process deployment. The research results revealed fundamental pre-conditions and demands in terms of: continuous training and workshops, coaching, mentoring, involvement of Agile coaches and champions, establishment of community of practice, rational support from executive team and learning organizational culture. However, the major Agile transition challenge to enterprises is to initiate a continuous learning process as a part of the learning organizational culture.

Keywords: project management, knowledge management, Agile transformation, organizational change, organizational learning theory, Agile methodology.

1. Introduction

Contemporary large-sized companies deliver advanced products and business services to customers through unique, innovative and complex projects and programs. A dynamic and unpredictable market competition brought many challenges in the complex IT and ICT project and program management. IT and ICT projects are widely used by nearly all industries to deliver their own projects by applying some advanced digital technologies. Some of the key challenges in the project and program management include: reduction of the time-to-market, a higher overall project efficiency and productivity, growing predictability of customer deliveries, increasing transparency of project planning, improving cooperation and communication between business and project teams, improving project and program portfolio management and developing the right organizational culture. The complex projects and programs require effective knowledge management, both in the field of technology and management.

In order to address the above challenges, the knowledge intensive project organizations are looking for new project management methodologies better adapted to dynamically changing business environment and customer expectations. Large-sized enterprises implement their complex and unusual IT and ICT projects and programs by applying an enormous quantity of continuously updated knowledge resources, both human-based experience as well as electronic databases and other online repositories (Cegarra-Navarro et al., 2016; Denning, 2016; Appelbaum et al., 2017). A strong market competition exhorts continuous project organization development in order to achieve a smarter and faster delivery of its product and service portfolio. Organizational development in project management methodologies requires addressing several knowledge management aspects, issues and challenges (Koskinen, 2012; Sullivan et al., 2013; Dikert et al., 2016).

Many IT and ICT project enterprises were applied or moved to Agile project management methodologies to cope with the key challenges through introduction of diverse organizational changes. The transition is better

known as an Agile transformation process requiring complex and long-lasting number of organizational changes at all levels of whole enterprise (Laanti et al., 2011; Gandomani & Nafchi, 2015; 2016; Dikert et al., 2016). Effective knowledge management is a critical precondition of a successful transition process in large-sized project companies. There are few comprehensive and detailed research studies in this area (Laanti et al., 2011). The empirical research presented in the paper filled the knowledge gap about wide-scale organizational changes caused by new Agile methodologies application seen from the knowledge management perspective. The key facilitators identified in this paper might come as a valuable feedback for management practice and management executive to proceed with an Agile transformation process smoother, at a lower cost, time and effort and to proactively mitigate a relatively high risk of related issues and failures.

The primary goal of the empirical research in this paper is to respond to the research question about knowledge management aspects, issues and challenges of the Agile transformation process as an organizational change arising from the introduction of new Agile project management methodology in the context of organizational learning theory. The research results showed that the introduction of new project management methodologies resulted in organizational changes in technology, methodology, processes, strategy and organizational culture. The key pre-condition and facilitator of an Agile transformation process is an effective knowledge management strongly focused on continuous training, coaching and mentoring while developing learning organizational culture in the same time.

A literature review and a quantitative analysis of multiple case studies of companies implementing new project management methodology were applied as research methods. The basic limitation of the research study analysis is the source of multiple case studies. Primarily, they were based on documents accessible through the Internet repositories which contained only a limited number of details valuable from the research perspective. It might be beneficial to repeat the same or similar multiple case studies analysis as a future research opportunity to compare obtained results.

The structure of the paper is as follows: chapter two is theoretical underpinnings, chapter three presents methodology approach, chapter four is empirical research results and finally chapter five contains result discussion and summary conclusions. What is more, chapter two is review of the existing literature divided into two subchapters presenting knowledge management aspects of an Agile transformation and organizational learning theory and organizational changes.

2. Theoretical underpinnings

2.1 Knowledge management aspects of an Agile transformation

Contemporary large-sized, high-tech project organizations deliver advanced products and business services to the marketplace through unique, innovative, complex and creative IT and ICT software development projects and programs utilizing enormous resources of constantly varying knowledge, both explicit and tacit (Paasivaara & Lassenius, 2014; Cegarra-Navarro et al., 2016). The rapidly changing and unpredictable marketplace as well as constantly increasing importance knowledge-based and human-related work force many IT and ICT enterprises to explore new approaches in project and programs management in order to overtake their competitors (Gandomani & Nafchi, 2015; 2016; Cegarra-Navarro et al., 2016). IT and ICT enterprises have introduced Agile methodologies in project teams as a more efficient and tailored work organization methods. An Agile transformation process denotes transition from traditional project methodologies to Agile project methodologies and requires changes of all organizational levels (Gandomani & Nafchi, 2015; 2016). The transition process deployment is a complex, long and evolutionary due to the scalability issue requiring synchronization of all these changes among diverse organizational units in a large-sized company (Laanti et al., 2011; Dikert et al., 2016). Project team members, all management executives, and customers have to be open to learn a lot, engage, cooperate and make a significant effort to resolve many issues and overcome barriers and challenges within a long timeframe of an Agile transition process deployment (Gandomani & Nafchi, 2015; 2016; Dikert et al., 2016).

The transformation process is tightly connected with achieving the organizational agility feature (Sullivan et al., 2013). *Organizational agility as a feature means the ability to respond rapidly, proactively and intentionally to an unexpected changing demand whilst controlling the risk, efficiently adapt and innovate as well as shrinking the feedback loop* (Paterek, 2016, p. 2). Appelbaum et al. (2017) define organizational agility as a bridge to synchronize the speed of organizational learning and the speed of environmental change. It mediates the relationship between knowledge utilization and company performance (Cegarra-Navarro et al., 2016). Organizational agility as a feature facilitates the search, acquisition, retrieval, conversion and application of appropriate knowledge resources in development of high-quality services and products (Ibidem, 2016).

Together with knowledge application processes they are complementary ones and should occur at the same time (Ibidem, 2016). This feature enables organization with continuous learning and continuous improvements meeting customer expectations and gaining a competitive advantage (Denning, 2016). Agile as a mindset is much more important than project management methodology itself and only its full adoption mitigates the risk of unsuccessful transformation process (Denning, 2016, p. 13).

The cost of Agile transformation in terms of money, resources, disrupted working routines and quality of development may become significantly high, so there is a necessity to firmly address knowledge management aspects to mitigate the risk of an unsuccessful transition (Olszewska, 2016). There are a few essential knowledge management aspects of the transformation: organizational learning culture, continuous learning process, knowledge repositories, training sessions and workshops, community of practice and management support in terms of coaching and mentoring (see Table 1 for reference). Mayer et al. (2013) proposed to institutionalize a culture of organizational learning associated with single and double loop continuous learning process as antecedence of continuous transformation process. Organizational changes require expansion of the existing knowledge repositories and a strong collaboration to create, assimilate, disseminate, and effectively apply knowledge about transformations (Kotnour, 2001). Executive management in large-sized organizations should establish groups of Agile experts with common interest and deep knowledge of the domain as community of practice that ensure smooth transition and decrease risk of transition failure (Paasivaara & Lassenius, 2014).

Although the transformation process encounters a lot of issues, barriers and challenges, there are some facilitators possible to apply in order to avoid an unsuccessful transition. Table 1 presents Agile transformation issues, challenges and facilitators from knowledge management perspective.

Table 1: Knowledge management issues, challenges and facilitators of an Agile transformation process

Knowledge management issues and challenges	Knowledge management facilitators
<ul style="list-style-type: none"> ▪ Lack of knowledge (Gandomani & Nafchi, 2016) ▪ Lack of training and coaching (Dikert et al., 2016) ▪ Lack of guidance from literature (Dikert et al., 2016) ▪ Inadequate and dysfunctional training (Gandomani et al., 2015; Gandomani & Nafchi, 2015) ▪ Organizational culture is not supporting learning environment (Dikert et al., 2016; Gregory et al., 2016) ▪ Knowledge sharing processes are not enough effective (Gregory et al., 2016) 	<ul style="list-style-type: none"> ▪ Initial training and workshops (Gandomani & Nafchi, 2015; Cha et al., 2015) ▪ Training and coaching (Kotnour, 2001; Cha et al., 2015; Gandomani & Nafchi, 2015; Dikert et al., 2016) ▪ Appropriate coaching and mentoring (Gandomani & Nafchi, 2015) ▪ Agile Champions as change supporters (Gandomani & Nafchi, 2015) ▪ Change agent (Sullivan et al., 2013; Dikert et al., 2016) ▪ Continuous learning (Mayer et al., 2013; Appelbaum et al., 2017) ▪ Learning organizational culture (Clanon, 1999; Mayer et al., 2013) ▪ Community of practice (Clanon, 1999; Paasivaara & Lassenius, 2014; Dikert et al., 2016)

Source: made by the author

Clanon (1999) proposed a number of principles in his learning model of organizational transformation that support the learning culture in contemporary enterprises: a drive to learn, learning is social, learning communities, aligning with nature, cross-organizational collaboration, subsidiary, inclusiveness and shared responsibility. Dikert et al. (2016) underlined practical recommendations in training and coaching area as, for example: training on new Agile methods, coaching teams by experience, hiring change supporters, hiring experienced people from outside of the company, establish community of practice environment and educate all staff including senior management executive. By employing talented people, experts, change agents, Agile coaches or champions, the leadership team can significantly empower the whole organization transformation as a complex process of organizational development (Sullivan et al., 2013).

2.2 Organizational learning theory and organizational changes

Organizational learning theory refers to the cognitive actions about the learning processes of and within organizations (Easterby-Smith & Lyles, 2011, p. 3). In turn, a learning organization is somewhat an ideal type of

enterprise working efficiently due to the ability to learn effectively (Ibidem, 2011). Organizational knowledge is a value of learning from the theoretical perspective and knowledge management is a value from the practical perspective. Easterby-Smith & Lyles (2011) have provided comprehensive literature review related to these concepts. Organizational development and changes are among the interesting sources of learning. As a mutual relation, organizational learning is a one of key enabler of strategic changes (Ibidem, 2011).

The process of organizational transformation as a strategic change brings up a number of aspects in terms of organizational learning. Clanon (1999) presented thinking and quality of interaction among people participating in changes on the top of the organization's structure and practice. Cha et al. (2015) mentioned intentional actions, common learning practices, training, teamwork, continuous experimentations, workshops for sharing knowledge and experiences as learning factors required by IT-enabled transformation capabilities. The organizational learning theory might serve as a good framework for continuous transformation exploiting learning process to develop learning organizational culture (Mayer, 2013). Change agents, learning workplace, transformation team or engaged stakeholders are influencing learning and development within transformation process (Sullivan et al., 2013).

Brandi & Iannone (2015) stressed the informal practice perspective of organizational learning as a constant evolution through social and cultural interactions to support innovative learning technologies. They pointed to learning through participation in communities of practice as the key aspect of an informal learning process (Ibidem, 2015). A community of practice is a group of people learning by common work assignments as well as social practice and interaction over some period of time to develop a shared identity, language, artefacts, norms, and values (Shipton & DeFillippi, 2011). They share experiences through imitation, observation, narration, and storytelling (Ibidem, 2011).

Organizational learning in a project based enterprises is a much more dynamic and knowledge intensive process than it is in other companies. It is a part of everyday learning through project team's collaboration, experiments, problem solving, problem absorption or lessons learned from issues and failures (Koskinen, 2012). Learning by experience inside a collaborative group of people or among different project teams is a fundamental organizational learning enabler of a successful company transformation (Critten, 2016).

The organizational learning process is necessary to continuously introduce innovations and to keep pace of enterprise development. Organizational culture is the key determinant of both learning and technical innovation (Sanz-Valle et al., 2011). A flexible adhocracy culture is much more supporting organizational learning than hierarchy culture (Ibidem, 2011), especially for project organizations with many collaborating and interacting project teams. Transformational leadership has also a considerably positive impact on learning and knowledge management effectiveness (Imran et al., 2016).

3. Methodology

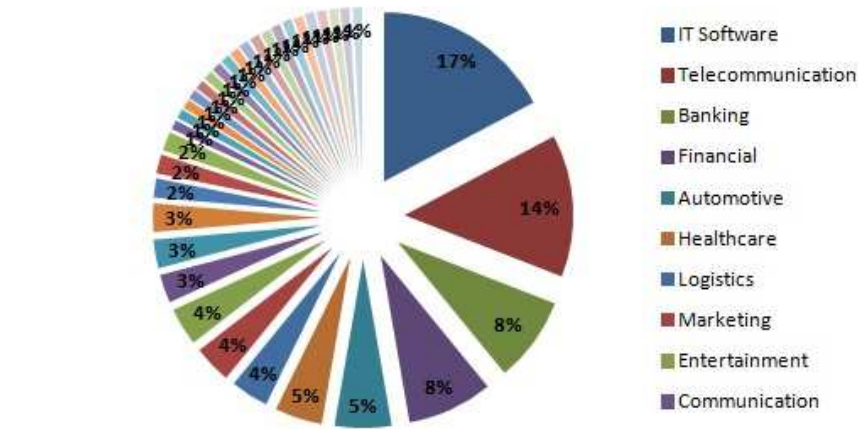
The primary goal of the empirical research presented in this paper is to show knowledge management aspects, issues and challenges of the Agile transformation process as an organizational change due to the introduction of new Agile project management methodology in the context of organizational learning theory. The research population is specified as large-sized companies deploying or transitioning to new Agile project management methodology in order to deliver advanced business services and products to their customers through complex, innovative and unique projects and programs. The main research focus was on IT and ICT projects which are intensively knowledge-demanding.

The main purpose of the illustrative and explanatory multiple case studies (Struminska-Kutra & Koladkiewicz, 2012, pp. 14-16; Kozarkiewicz, 2012, p. 202; Czakon, 2015, p. 201) and the following quantitative analysis used as a research method was to find answers to the following research questions about:

- The comprehensive aspects of the knowledge management within an Agile transformation process in terms of its pre-conditions and facilitators.
- The issues and challenges of the knowledge management preventing a successful Agile transformation process and potential actions to deal with it.

The triangulation method (Luczewski & Bednarz-Luczewska, 2012, pp. 182-183; Kozarkiewicz, 2012, pp. 202-203; Stanczyk, 2015, p. 248) was used to enrich and authenticate the final empirical research results. 107 different enterprise case studies were collected through exploration of the existing Internet repositories. They were written by multiple authors and consultants (informant's triangulation) assigned to 12 different groups (source's triangulation). Standardized and unstructured interviews with an experienced Agile coach led to generating 2 case studies and author's own observation led to formulation of the last examined case study. The multiple quantitative analysis of case studies resulted in 9 single-valued variables and 9 multi-valued variables examined for each interpreted case study.

The Internet source of multiple case studies is the primary constraint of the presented research study analysis. Most of the consultant’s descriptions refer to success stories or contain some positive marketing details about Agile transformation process instead of the crucial information about the real issues, obstacles, dark sides and challenges. Interviews with the Agile coach and author’s own observation mitigate this issue in part. Moreover, author’s experience and project management background allow for a down-to-the point interpretation of the description and its context. At the same time, the possible diverse qualitative interpretations by other researchers could be an interesting starting point for the future research studies leading to valuable comparisons and conclusions.

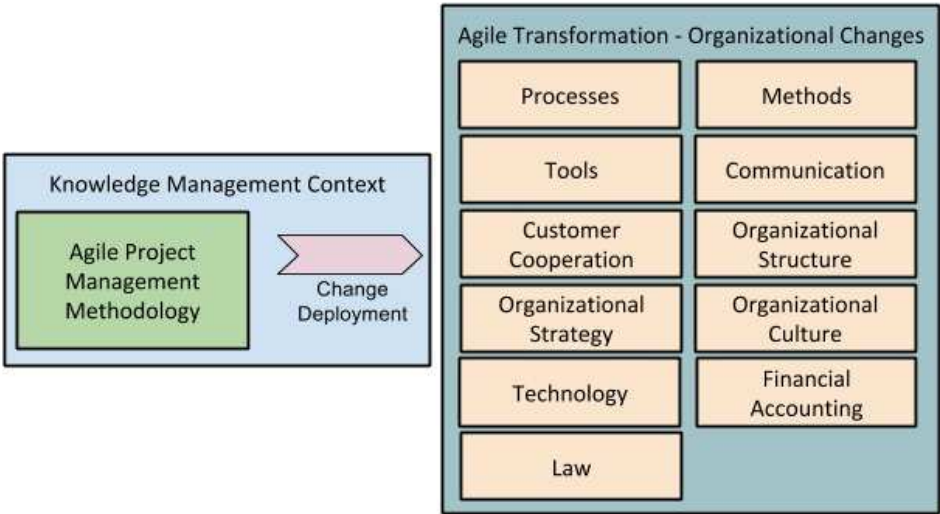


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Figure 1: Industry area

The Agile transformation process was primarily conducted in large-sized enterprises of the IT software and telecommunication industries (31%), focusing on IT and ICT project management application (Figure 1).

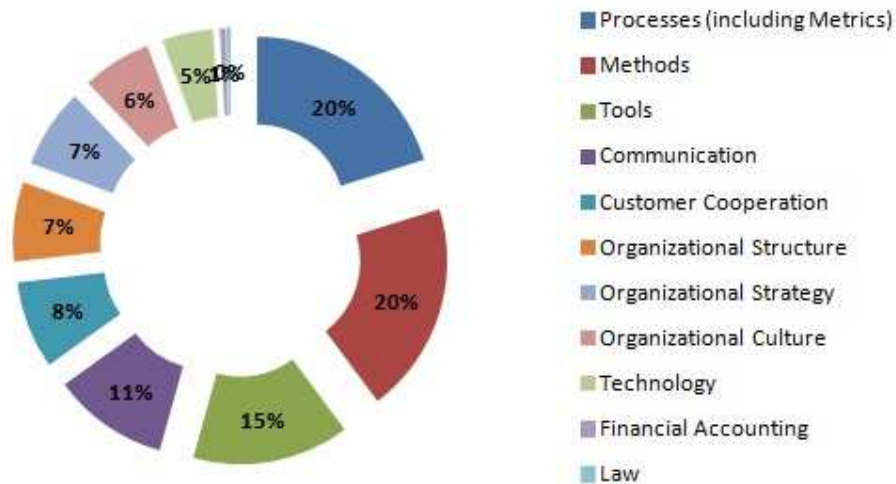
4. Results



Source: made by the author

Figure 2: Knowledge management context of an Agile transformation process

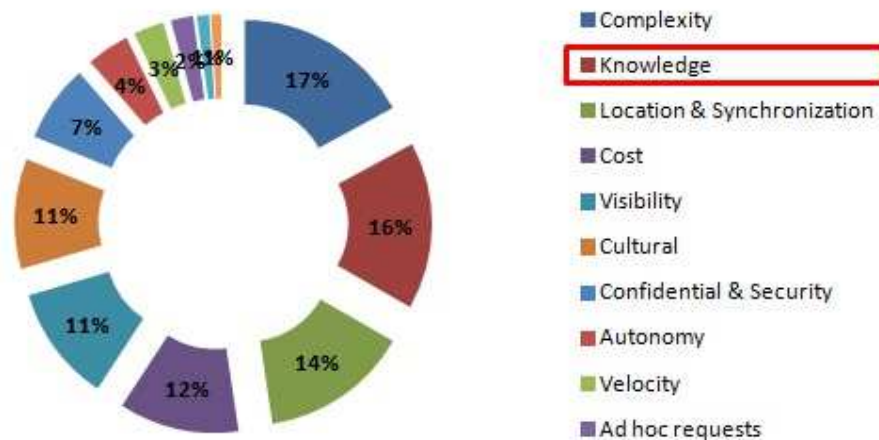
The main empirical research result showed how the introduction of a new Agile project management methodology impacted the entire organization and resulted in number of organizational changes coupled with the synergy of all these changes (Figure 2).



Source: made by the author

Figure 3: Organizational changes introduced by Agile transformation process (weighted)

Transition to the new project management methodology was a source of integral organizational changes in processes, methods, tools, communication, customer cooperation, organizational structure, organizational strategy, organizational culture, technology, financial accounting and law (Figure 3).



Source: made by the author

Figure 4: Main Agile transformation issues and challenges (weighted)

The key pre-condition and facilitator of an Agile transformation process is the knowledge management aspect and its context to organizational change deployment (Figure 2 & 4). Project organizations and their senior executives need to address numerous knowledge management pre-requisites and challenges related to these organizational changes in order to ensure a successful deployment of the transition process. *Weighted* charts (Figure 3, 4 & 7) present the percentage values of factors which is the quotient of occurrence of a factor to all occurrences counted for all factors.

The effective knowledge management together with a complexity of Agile project methodology deployment in large-sized enterprise were identified as two major issues and challenges within the overall Agile transformation process (Figure 4). The knowledge management aspect of the Agile transformation process is the primary focus of this paper and it will be discussed further in more detail.

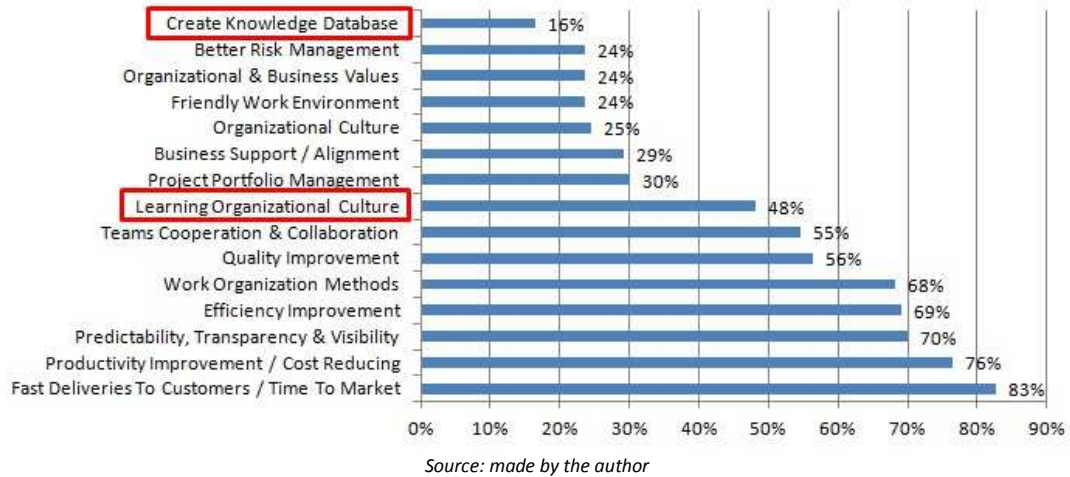


Figure 5: Long-term goals of an Agile transformation process

The essential long-term goals of an Agile transformation process revealed in the presented research study are: reduction of the time-to-market, a higher overall project efficiency and productivity, a growing predictability of customer deliveries and increasing transparency of project planning (Figure 5). Creating knowledge repository and developing learning organizational culture were identified as important intermediate knowledge management goals of an Agile transformation process (Figure 5). The learning organizational culture was antecedent of effective knowledge management and successful Agile transformation process.

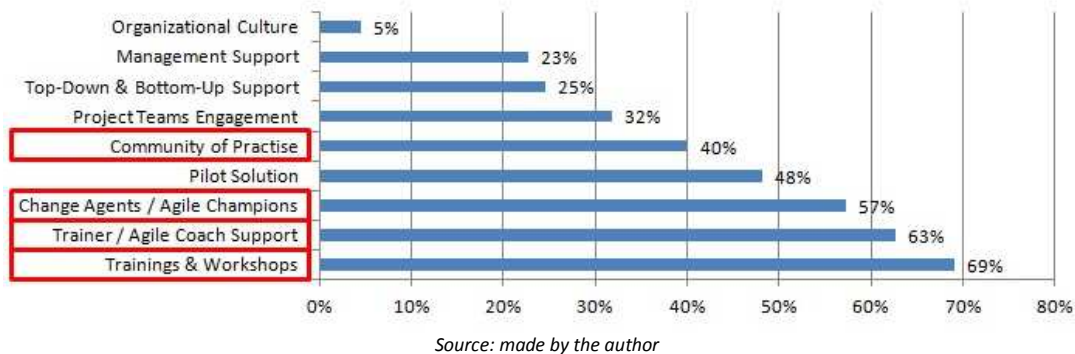
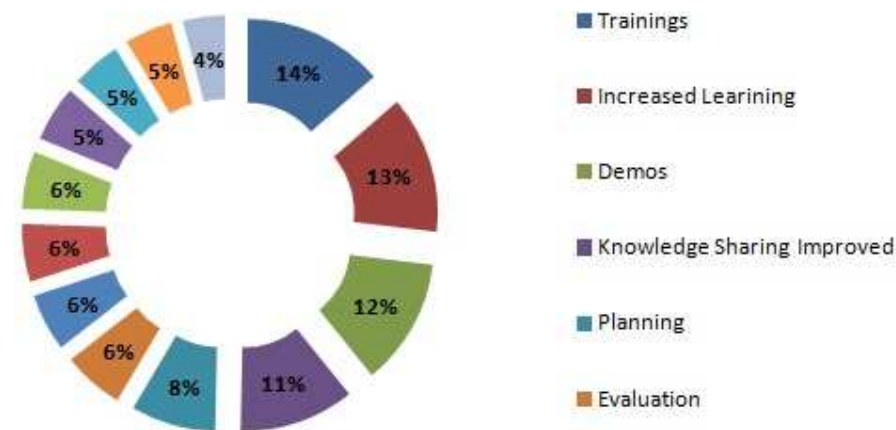


Figure 6: Facilitators of an Agile transformation process

The top 5 facilitators of an Agile transformation process (Figure 6) were strongly related to the knowledge management context. Both the theoretical Agile background in terms of appropriate training/workshops as well as a practical support from Agile coaches and champions were mandatory pre-conditions required to be maintained as continuous practices in the process deployment. The research results revealed the important role of change agents and a community of practice as a practical source of knowledge (Figure 6).

While comprehensive and professional training was identified as a necessary pre-condition of the Agile transformation process, the effectiveness of knowledge management was one of serious obstacles showed in non-supporting conditions of this process. It occurred in 53% of the interpreted case studies – 6th out of 14, all identified non-supporting factors. The learning organizational culture (Figure 5) can serve as a facilitator as well as become a serious obstacle or the root cause of an unsuccessful Agile deployment. When comparing results of research analysing the organizational culture as a supporting factor (5%) and as a non-supporting factor (19%), the research identified a significant challenge in developing it as it should be appropriate.

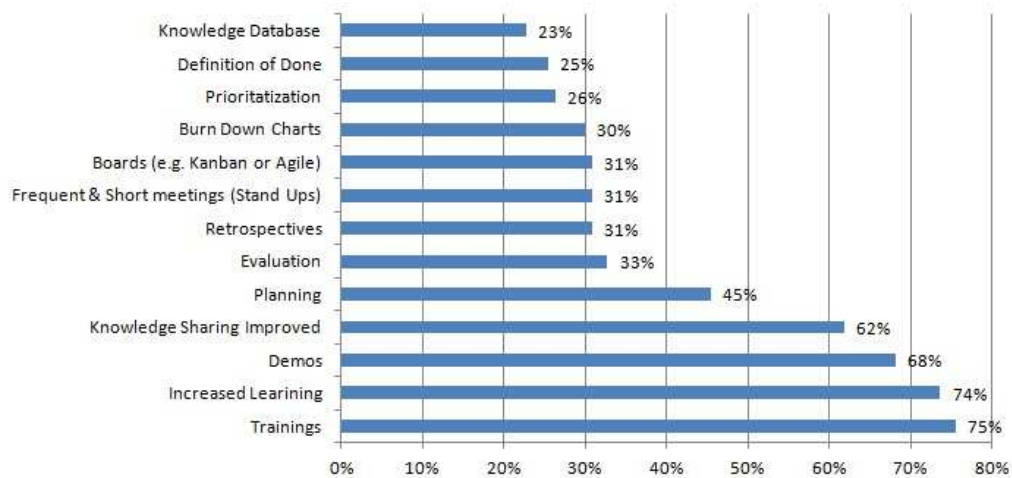
Figure 7 presents weighted research results for actions that need to be taken or actions recommended in an Agile transformation process from the knowledge management perspective. Appropriate training (14%) and increased learning (13%) activity showed major demands in terms of knowledge management support and these results were fully complementary with the previous results for long-term goals (Figure 5) as well as deployment facilitators (Figure 6).



Source: made by the author

Figure 7: Knowledge management activities in an Agile transformation process (weighted)

Very important knowledge repositories were: pilot deployment solution and customer's feedback, e.g. demo presentations (12%). Improvement of the overall knowledge sharing is yet another important activity that has to be taken in closely collaborating, multidisciplinary teams. In particular, inter-teams knowledge sharing was an issue observed in large-sized enterprises as a part of a project management scalability issue (40% occurrences). An effective knowledge-sharing is closely related to the development of a learning organizational culture, which is the key requirement for the knowledge management context of an Agile transformation process.



Source: made by the author

Figure 8: Knowledge management actions within an Agile transformation process

Figure 8 presents knowledge management activities in an Agile transformation process from another (non-weighted) perspective. As shown, the training and enhanced learning activities were very important in at least 75% of the case studies. Additionally, it was suggested to classify quite many Agile-specific activities and *artefacts* to knowledge management actions, e.g.: planning, retrospectives, stand-ups, prioritization, planning boards, burn-down charts and definition of done.

Based on the details of the case studies, some additional knowledge management aspects were identified:

- In-depth education of all stakeholders was required to proceed with planned organizational changes.
- Agile project management implementation allowed for new learning and development.
- Managers have changed their mindset and behaviour from command and control to coaching and mentoring, being responsible for engaging with staff and driving the cultural change.

- Established change agents, community of practice and continuous education – Agile is complex to deploy though it may seem simple.
- Management leadership team active support is a must through the entire process deployment.

5. Discussion and conclusions

The empirical research results presented in the paper as well as in the literature research review confirmed that an effective knowledge management is the key predecessor and facilitator of an Agile transformation process. Issues, challenges and facilitators presented in author's research study (Figure 5-7) revealed a couple of knowledge management aspects which need to be addressed, including: a learning organizational culture, training and workshops, coaching and mentoring, Agile coaches and experts, community of practice, change agents and supporting teams. Similar aspects were also raised by other research studies in the context of a successful Agile transformation deployment (Laanti et al., 2011; Cegarra-Navarro et al., 2016; Dikert et al., 2016; Gregory et al., 2016). Potential actions mitigating knowledge management issues (Figure 8) were concentrated on the appropriate training and on intensified learning activities. An inadequate and dysfunctional training and lack of training were the key Agile transformation impediments identified by Gandomani & Nafchi (2015; 2016). Denning (2016) and Appelbaum et al. (2017) literature research reviews disclosed several potential actions potentially mitigating transformation failures. Figure 6 as well as other papers (Clanon, 1999; Paasivaara & Lassenius, 2014; Dikert et al., 2016) highlighted the importance of a community of practice as an informal knowledge body empowering transition process deployment.

Research results indicated that a learning organizational culture and a continuous learning process are mandatory and need to be supported by a management executive prior to any Agile transformation deployment. This finding has had strong advocacy in organizational learning theory what was confirmed by review of other research studies (Clanon, 1999; Sanz-Valle et al., 2011; Mayer, 2013; Cha et al., 2015; Imran et al., 2016), especially in project-based companies (Koskinen, 2012).

The effective knowledge management is an antecedent of a successful Agile transformation process deployment in large-sized companies. The primary pre-conditions and facilitators of knowledge management include: continuous training and workshops, coaching and mentoring, Agile coaches and experts' support, a community of practice, change agents, a supporting executive team and learning organizational culture. The knowledge management issues and challenges impeding a successful transition process are related to: invalid or inadequate training, insufficient coaching and mentoring, Agile training limited to project teams without including its management and executives, lack of knowledge repositories and supporting tools, missing knowledge-sharing practises and problem with development of a learning organizational culture. Appropriate training and increased learning activities are the major activities mitigating issues related to the risk of failures in the Agile transformation process. Agile-specific activities and *artefacts* such as planning, retrospectives, stand-ups, prioritization, planning boards, burn-down charts and a definition of done are equipped with knowledge-sharing properties and embedded in it by default.

The Agile project management deployment might be a trigger to the whole company development understood as an organizational learning process leading enterprises to better position in a competitive business environment. The executive management and project team leaders play a very important role as they have to change their mindset and behaviour from command and control to the coaching and mentoring role as well as to continuously drive development of learning organizational culture. Agile coaches, champions, change agents and community of practice are knowledge sources comprised with practitioners and enthusiasts that may decrease the complexity of deployment and mitigate the risk of a transition failure. The support of the entire management leadership team is necessary through and after the deployment process. The major Agile transformation challenge is to introduce a continuous learning process as a part of the learning organizational culture and it is an interesting and great opportunity for the future research studies.

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