MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

Kazakh National Research Technical University named after K.I. Satpayev

E. Turkebayev Project Management Institute

Research and Educational Center

Bayazova Mariyam Bakhytbekovna

Implementation of agile technology in organizations of Kazakhstan

MASTER THESIS

6M051700 – Innovation Management

Almaty 2020

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MASTER THESIS

For an academic degree of MSc

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ASSIGNMENT
for execution of master thesis

For student Bayazova Mariyam Bakhytbekovna
Thesis title: "Implementation of agile technology in organizations of Kazakhstan"
Approved by *Rector of University with order № 1197 dated "29" October 2018*
Date of submission of completed master thesis "__" _____ 2020
Initial data for master thesis: articles on the agile methodology implementation, the challenges and corresponding success factors
List of issues addressed in the diploma work:

a) provision of comprehensive literature overview on the agile technology, its characteristics along with upcoming challenges faced by organizations and the corresponding success factors that would result in successful technology implementation.

b) qualitative analysis on the subject of change resistance as a main barrier in terms of questionnaire and interviews, and using descriptive statistics, formation the results.

c) identification of whether the training and coaching would be a solution to overcome the resistance to change in organization from research data

List of graphic material: figures 1-23
Recommended literature:

1 A Guide to the Project Management Body of Knowledge (PMBOK® Guide)
2 Kim Dikert, Maria Paasivaara, Casper Lassenius, "Challenges and success factors for large-scale agile transformations: A systematic literature review". – The Journal of Systems and Software, 2016 (119). – p. 87–108
3 Version, One (2019), "The 14th Annual "State of Agile" Survey."

SCHEDULE

Of master thesis preparation

Issues addressed	Timeline	Remark
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Signatures

Of consultants and normative controller for a completed master's thesis with an indication of the sections of work related to them

Section	Consultant	Date	Signature
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Student received assignment for execution _____M.B. Bayazova

Date "____" _____20___

АНДАТПА

Тірі жүйелер ретінде қарастыруға болатын үдемелі ұйымдар дамып, қоршаған ортаға тез және динамикалық өзгеріске бейімделе алады, сондай-ақ жобаларды басқарудың дәстүрлі жүйесі бар ұйымға қарағанда жақсы нәтижелер бере алады. Бұл ұйымдар тұрақты, иерархиялық емес, қоршаған ортаның өзгеруіне ашық, клиенттерге бағдарланған және белгісіздік жағдайында үнемі дамып келеді. Бұл ұйымдарды Agile ұйымдары деп атайды. Қазіргі уақытта икемділікті дамыту, бизнестің құнын және, демек, іске асырылып жатқан жобалардың сапасын арттыру үшін әртүрлі салалардағы көптеген ұйымдар Agile технологияны немесе оның артефактілерін қолданады. Қазақстандағы қазіргі макро орта бұл ұйымдарды қажет етеді. Agile әдістемесін енгізу барысында қазақстандық ұйымдар пайдаланатын білім алшақтықтары бар. Бейімделу процесінде кейбір проблемалар пайда болады және оларды факторлардың категорияларының біріне жатқызуға болады: технологиялық, техникалық, адами, ұйымдастырушылық. Нәтижесінде, Agile бағдарламасын сәтті жүзеге асыруға әкелетін белгілі бір жетістік факторлары бар. Бұл жұмыстың мақсаты «Өзгеріске қарсы тұру» деп аталатын Agile әдістемені жүзеге асырудағы кедергілердің бірін зерттеу және өзгеріске қарсы тұруды жеңудің ықтимал шешімі ретінде тренинг мен коучингті зерттеу.

Бұл магистрлік диссертация келесі негізгі бөлімдерден тұрады: Кіріспе, әдебиетке шолу, зерттеу әдісі, мәліметтерді жинау және талдау, қорытынды.

Түйінді сөздер: Agile әдіснамасы, Agile проблемалар, Agile Қазақстанда, өзгеруге қарсылық, Agile тренинг және коучинг.

ABSTRACT

Flexible organizations, that could be viewed as living systems, develop and could adopt to the environment with rapid and dynamic changes, provide better performance in comparison with organizations of traditional project management. These organizations are stable, non-hierarchical, open to environmental changes, customer oriented, they are constantly evolving and include uncertainty. These organizations are called Agile organizations. Nowadays, higher number of organizations from different industries adopt the agile technology or its artefacts with the objective of maturing thier flexibility, increasing the business value and consequently the quality of the conducted projects. Current macro environment in Kazakhstan requires these organizations. It appears to be a gap in the knowledge Kazakhstani organizations go through in the process of adoption agile methods. During agile methodology implementation some challenges arise on the way; they are referred to one of the categories: process challenges, technical challenges, people-related challenges, organizational challenges. Subsequently, there are particular success factors that provide successful implementation of Agile methodology. The master dissertation aims to study one of the barriers to agile implementation called change resistance and the possibility of training and coaching as a method to solve it.

This master dissertation consists of the following main section to read: Introduction, Literature review, Research methodology, Data collection and analysis, Conclusion.

Keywords: Agile methodology, challenges in Agile, Agile in Kazakhstan, resistance to change, training & coaching in Agile.

АННОТАЦИЯ

Гибкие организации, которые можно рассматривать как живые системы, развиваются и могут адаптироваться к среде с быстрыми и динамичными изменениями, показывать высокие результаты по сравнению с организациями традиционного управления проектами. Эти организации стабильны, не иерархичны, открыты для изменений окружающей среды, ориентированы на клиента, они постоянно развиваются в неопределенности. Эти организации называются Agile-организациями. В настоящее время все больше организаций из разных отраслей применяют гибкую технологию или ее артефакты с целью развития своей гибкости, увеличения стоимости бизнеса и, следовательно, качества реализуемых проектов. Текущая макросреда в Казахстане требует этих организаций. Существует пробел в знаниях, которые казахстанские организации используют в процессе внедрения Agile методологии. В процессе внедрения Agile методик возникают некоторые проблемы; их можно отнести к одной из категорий: процессные, технические, кадровые, организационные. Соответственно, есть определенные факторы успеха, которые обеспечивают успешное внедрение методологии Agile. Магистерская диссертация направлена на изучение одного из препятствий на пути внедрения Agile методик, называемого сопротивлением изменениям, и изучение тренинга и коучинга как возможного решения для преодоления сопротивления изменениям.

Данная магистерская диссертация состоит из следующих основных разделов: Введение, Обзор литературы, Методология исследования, Сбор и анализ данных, Заключение.

Ключевые слова: Методология Agile, проблемы in Agile, Agile в Казахстане, сопротивление переменам, тренинг и коучинг в Agile.

CONTENT

INTRODUCTION

Master thesis title

Agile methodology becomes main alternative for companies that want to improve the performance [1]. There is a global shift in the paradigm of managerial thinking from the way of following heavy and sometimes long strategy to situational-tactical way of behavior [2]. Developing a long and solid plan may never end. In the process of its creation, there will be such a number of changes, the recording and reflection of which will take very long period for the company that brings the society to the necessity of introduction of agile technology in the project management.

The necessity of agile technologies' application in Kazakhstan arises in the era of the dynamic and changing world with the corresponding requirement to projects hold the proper management and demonstrate high performance simultaneously [3]. Agile technology allows companies not only to adopt for current conditions, but also to focus on working with people and perception of change as an inevitable and really good thing, not an insoluble problem [4]. All of the above leads to the need to develop the application of agile technologies in the organizations of the Republic of Kazakhstan (RoK) at higher levels.

Agile technology in project management generally operates with follow-up requirements of customers, provision of feedback in the stages [5], team satisfactions [6], and very efficient control of the process. Flexible organization with agile mind and agile project management of work will allow successfully maneuvering in the real modern world. The definition of agile project management is given as an iterative development methodology [7], which values human communication and feedback, adapting to changes, and producing working and high results instead of comprehensive documentation. The methodology is well defined around the world, is implemented in many organizations worldwide, especial in software development. Nowadays, higher number of organizations from different industries adopt the technology or its artefacts with the aim of maturing their flexibility, increasing the business value and consequently the quality of the projects.

Organizations around the world nevertheless of their maturity face discrepant types of challenges during the agile methodology and techniques implementation, as it is common feature for all process improvement activities [8]. The challenges differ from organization to organization due to the existence of enormous factors, which impact the process, and these factors are mainly related to the type and structure of organization, the industry, the people mindset and culture of employees and etc. Significant number of research studies has been carried out for not only the process of agile methodology implementation, but also for the identification of the challenges and corresponding success factors. As a result, throughout the technology adoption process it is essentially important to overcome the barriers for the organization in order to obtain high quality transition [9]. In turn, it will lead to the high-performance results of the company and allow to state that agile technology has been successfully adopted in the organization.

The main obstacles in the way tom agile technology implementation have been identified in many research studies, from which the research study of K. Dikert et al. [1] deserves special attention and was used by author as foundation basis for master thesis. The main of the barriers that have mentioned the most in research work, referenced Chapter 2, are described as resistance to change, agile techniques and methodology are difficult to introduce, non-development functions integrations, requirements engineering challenges [1].

From the board spectrum of the research topics on the subject of the challenges to agile technology implementation the area "Resistance to change" has been taken by the author for conduction of the scientific research. As has been reported in the 14th annual state of agile report carried out in October-December 2019 among 40 000 agile practitioners, developers, consultants, managers and executive, the factor General Organization Resistance to Change heads top 5 list of the challenges that are experienced during adoption & scaling agile methodology & techniques [10].

This master thesis aims to define the research on resistance to change in Kazakhstan as main barrier on the way to agile technology implementation. The master dissertation also studies the extent to which the training and coaching could solve the problem.

Research relevance

The relevance of the research is defined by the several factors of the dynamic surrounding environment where flexible adaptive processes going ahead instead of commonly used traditional processes with the strict and long plan [11]. The requirement for improvement of organization efficiency for aligned continuous introduction of new technologies, new processes, new methodologies with the following digitalization acceleration of information is one of the key factors that strives the management of organization to introduce agile methodology of project management [12]. It has been reported that the top reasons for implementing agile techniques are the ability to manage changing priorities, business alignment, increased team productivity and product or service delivery speed [10].But along with the technology it is essential to pay significant attention to the human capital which is one of the area that needs to be approached thoroughly in the organizations because the efficiency of organization constitutes the efficiency of the integrated teams that in their turn consist of several individual human beings with different mindset, motivation and skills.

Whereas the agile technology in the project management is widely studied by foreign researchers [13], some aspects are missing. As observed in many research studies, usually the human capital factor is underestimated in comparison with other factors such as technological, environmental, financial and etc. [1, 14, 15]. 48% of respondents in 2019 Annual Survey highlighted that resistance to change is an obstacle for successful agile implementation and subsequent scaling [10].

Research goal and objectives

The goal of this master thesis is to determine the extent at which the change resistance will be the real barrier on the way of agile technology implementation, and could this barrier be overcome by the means of training and coaching in

organizations. Furthermore, on the basis of findings, a practical contribution will be made by means of recommendations that will be provided in Chapter 4. The expected observations and findings may discover additional gap or gaps for further research.

Despite the fact that significant efforts have been made by foreign researchers in the area of the challenges and success factors for agile technology, the factor named change resistance is one of the key areas to impact the process and organization. The research goal has been divided for research objectives in order to obtain the structured and well-defined research framework:

Research Objective 1: Provide comprehensive literature overview on the agile methodology, its characteristics along with upcoming challenges faced by organizations and the corresponding success factors that would result in successful methodology implementation.

Research Objective 2: Conduct the research and analysis on the subject of change resistance as a main barrier in terms of questionnaire and interviews, and using descriptive statistics, to form the results and reveal main outcomes from it.

Research Objective 3: Define whether the training and coaching would be a solution to overcome the resistance to change in organization from data.

The object and subject of the research

The object of the master dissertation would be organizations of the Republic of Kazakhstan presented by different industries, mainly Oil & Gas and IT, where agile techniques are used.

Subject of research is the agile methodology itself and the factors that have been identified to be the challenges on the way to technology implementation.

Literature review

The study conducted by Kim Dikert, Maria Paasivaara, Casper Lassenius [1] identified the 52 research articles and papers including 42 cases that consider the issue of implementation agile technology in terms of the challenges to be overcame and the critical success factors that are required for it. The authors made the thorough systematic review of the papers and consolidated the challenges and success factors into the structured tables with the case studies identified, and the factors have been categorized accordingly. The authors came to conclusion that there are several gaps that need to be studied further and one of the gaps is the thorough survey on the challenges and success factors for agile technology implementation, namely resistance to change.

Research questions

Formulated research questions from the information above could be described as follows:

RQ1: Is the change resistance one of the main barriers to agile technology implementation?

RQ2: Would the training and coaching be a solution to overcome change resistance?

Research methodology

For the basis the qualitative approach has been taken where author develops theory base from the data applying a range of surveys and interviews. The author delivers a validated questionnaire with subsequent interviews. The qualitative approach is suitable for this master thesis since the data collection and data analysis is non-numerical. The thesis intends to understand what the reality in APM of RoK, where interviews were carried out. The approach allows to interpret different experiences rather than quantifying numerical data, Figure 1 is theoretical framework. The precise description is given in the beginning of the second chapter.

The results of the research will be represented through graphs and some descriptive data that will be depicted in Chapter 2.

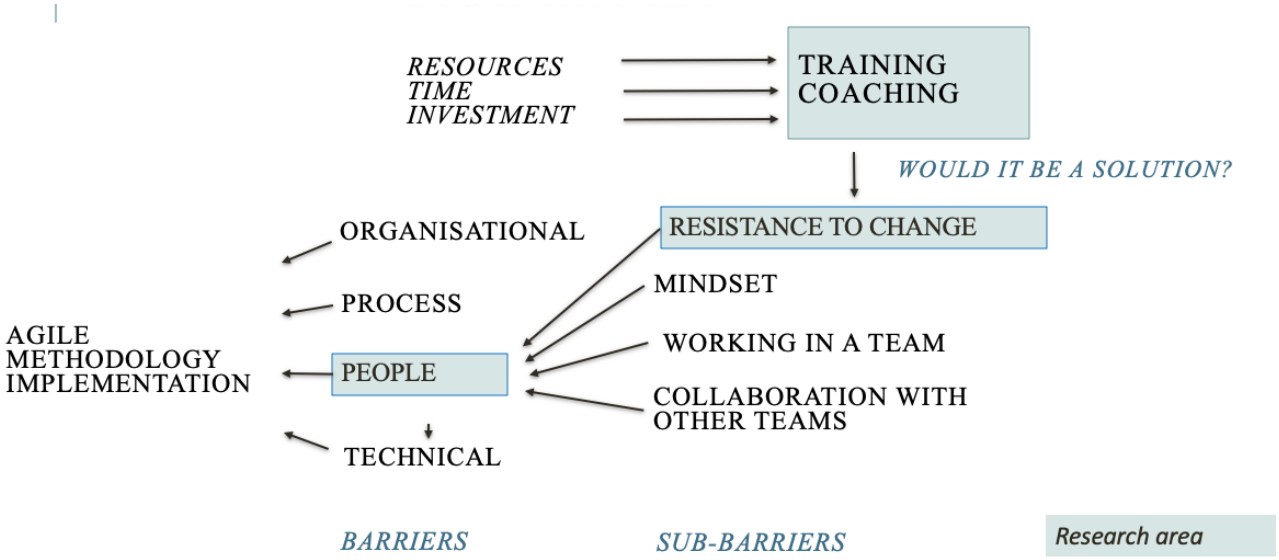

Figure 1 – Theoretical framework.
Note – Created by author

Research scope

In order to maintain the defined scope, the master thesis is delimited to research among specialists in the Republic of Kazakhstan. In addition, the research work is also restricted to some professionals in industries shown in Chapter 4. Therefore, the research will be restricted in regards of in-depth perspectives from experts living in Kazakhstan. Furthermore, due to limitations in terms of time, 20 weeks, the number of conducted interviews would be limited.

Research novelty, theoretical and practical output

The novelty of the research is dictated by the relevance of the research with an application to Kazakhstani reality. Whereas researchers Nathan et al. has studied the methodology with regards to human capital management, the subject of the barriers to agile technology implementation and development is not studied on sufficient level by Kazakhstani researchers [16], the study on the critical barriers is defined only on general level and not studied in the country. The change resistance that will be the subject of the research study as will be seen in the following chapters

plays profound role in the willingness to adopt the new technology in general, not only the agile project management technology.

Disposition

Introduction section is about research study that includes background information, research problem, research goal and objectives, research relevance, research questions, research scope.

Chapter one demonstrates a literature review that includes definitions of Agile Project Management, agile concepts and artefacts, extracts of previous studies regarding agile implementation and challenges during the process, and success factors as well.

Chapter three represents research design and approach that were used by the author to collect data for the research and depicts the outcomes received through semi-structured interviews. This chapter is fundamental for data analysis and is also classified into two sections, interviews and questionnaire results.

Chapter on conclusion presents the discussion of results and conclusions, limitations for this research work and finally, recommendations for further research studies.

The following chapters are list of terms and definitions for reader's convenience, list of references used in master thesis for the check to antiplagiarism, appendices.

1 Literature review

1.1 Agile technology

With the purpose of transferring the research study of master dissertation into the perspective, a thorough literature review has been carried out. Based on the online scientific directories as Scopus, Science Direct, IEEE Xplore and etc. the 204 research articles and studies have been selected by author for the literature review with the following keywords as Agile Methodology, Challenges in Agile, Agile in Kazakhstan, Resistance to Change, Training & Coaching in Agile. Among this number of the literature, fifty-one were identified to be the basis for the literature review in master dissertation.

The first section of this chapter provides an overview of referenced literature on the concept of agile methodology of project management in general, the methodology description, the history for the reader to understand the foundation of the master thesis.

The second section describes the model for implementation of the agile methodology in project management that has been proposed by researchers in their previous studies and based mainly on the data from PMBOK (A Guide to the Project Management Body of Knowledge).

The third section expounds the barriers in the implementation of agile technology that are mentioned in scientific articles of foreign researchers. This chapter will give the structured information about the challenges in systematic way for the convenience of perception by the reader.

The fourth section depicts the corresponding success factors that play profound role in the implementation of the agile techniques and methodology. These success factors are identified not necessarily to be a solution for the challenges in second chapter.

The last sections of literature review provide detailed description of the main topics of master thesis: resistance to change, training, coaching and also some data on agile project management in Kazakhstan.

"Agile" definition

The term "agile" means the ability of organization to adopt easily and quickly in intelligent way to the changes of business environment, as has been stated in the oxford dictionary [17]. This definition applies not only to the business environment, but to the other industries as well, as it is general term. According to A. Stare [13], in one of the interviews taken by authors from the Agile Manifesto authors, the term "agile" is mainly refers to the recognition of the feedback and its application further during the transformation process.

Agile project management (APM) is also descried as an iterative method of managing the activities in information technology, engineering, product & service development and another projects. APM requires the work to be done in small iterations with completion of tasks on single each stage in the cycle. This allows to achieve a high value through implementing feedback from the previous stage with

product or services that fully meets the customer or organization expectation with minimal costs and at required time periods [18].

Agile values and principles

There are 4 foundation value propositions in the agile technology stated in Agile Manifesto from 2011 that are common for the all projects and industries [19]. The overall philosophy of agile stands on the following values which are the key ones:

1. Individuals and interactions should be over processes and tools;
2. Working software should be over comprehensive documentation;
3. Customer collaboration should be over contract negotiation;
4. Responding to change should be over following a plan.

In addition, there are 12 principles of agile technology and development that derive from the key values of Agile Manifesto [20]:

1. Satisfaction of the customer through continuous project or product delivery which means that it is more satisfactory for the customers to receive results of the process, services, products at some time intervals continuously rather than wait for the long periods between the product or process delivery;
2. Accommodate requirements for the change throughout the development process, which means to try to avoid delays during the process when a requirement requests change;
3. Frequent delivery of working product or process, which means to deliver the result of the process on the regular basis;
4. In case when business team and technical team are aligned, the results are of higher quality;
5. It is necessary to trust, motivate and support the people involved in the project because intrinsically motivated people and teams formed perform better than teams, which are less intrinsically motivated and happy accordingly;
6. Management should support face-to-face interactions and promote it due to the fact that physical communication brings people to better results in place rather than virtual communication. Synchronous communication provides responsiveness to change as information could not get stuck somewhere;
7. Working product or service is the primary progress measure;
8. Agile processes would support a consistent pace of development which means that teams could establish their own speed at which they can deliver working product;
9. In order to increase the agility, it is necessary to pay higher attention to the design and technical details because the right technical skills ensure the constant and continuous improvement of the product and the service;
10. Simplicity sometimes is enough for the accomplishment of the job at the right time;

11. Self-organizing teams would encourage to outperformance during the process because team members who possess power of decision making, self-organized, motivated, would communicate efficiently with other team members which will result in the delivery of high-quality product;
12. Reflection on the regular basis on the subject of being more effective is required because self-improvement and advancing skills and techniques will encourage team members work efficiently and provide higher performance accordingly.

Agile methods or agile methodology of the project management in business environment also could be adopted to the engineering companies as well, due to the fact that according to Noruwana and Tanner [21], agile is also could be addressed in the organizations and business units where very rapid changes for requirements of the systems take place. In many cases organizations apply the agile methodology of project management in different ways, as it requires by the structure of the company or organization.

It is rarely possible to adopt the technology in the exact way as it stated in the literature. The exclusion could be the IT industry, especially software engineering industry, for which the Agile Manifesto has been written so far in 2001 and the agile methodology is designed for. As a result, the shift of the agile methodology and associated with it the thinking way from the virtual environment to the physical environment in alike industries will be still challenging for the organizations and their management [13]. The implementation of the agile methodology is mainly dictated by the industry of the company, the company size and the nature of the projects [1].

Agile approach in project management

The agile technology in the project management differs from the traditional model. Traditional model and its methodologies possess characteristics such as a predictive approach, orientation on comprehensive documentation, process orientation and deadlines. Earlier, traditional methodologies were accepted worldwide and seemed that they work well in projects, but later on, after dynamic changes in business needs, businesses and software development teams have realized that there were practical deficiencies in these methodologies [22].

Before going to the specific characteristics that companies possess after introducing the agile technology versus being traditional organization it is important to note that the methodology mainly implies to the execution phase of the project lifecycle as was mentioned by A. Stare [13]. Consequently, the project lifecycle does not change and remains being consisting of 4 stages: project initiation, project planning, project execution and the project closeout.

The specifics of the agile approach have been divided to four main aspects [13], that derive from the values described in the beginning of the chapter. In terms of these four specific categories of the agile technology it is convenient to reader to understand the differentiation between the agile technology in project management and traditional approach. They are highlighted below.

Agile requirements and subsequent specifications

The specifications and the requirements to the project are specified by project team members and the client or customer in collaboration. They should be determined on general scale and updated at the start of every iteration (see 2. Project schedule) in comparison with detailed documentation with specifications at the beginning of the project in traditional technology. Consequently, the requirements to the project could be updated, changed during the project, mainly at the start of the iteration, upon the request from clients or proposal form project team members.

Project Schedule

In the agile technology, the execution of the project is mainly incremental, and the project consists of short iterations to allow teams to quickly adopt the current situation. According to A. Stare [13], the iteration length does not exceed 8 weeks. The schedule of the project is extremely rough at the start and specified at higher level during the project allowing the project teams to correctly adopt the information and data available at that point.

Teamwork is essential

The success of the project, of the product and the effectiveness of project execution greatly depends on the team. Teamwork is essential, and in the agile technology attention should be payed to empowering the team members and enhancing the communication between them and other business areas for the project success. The regular communication in terms of conducting lessons learned, provision of feedback, knowledge sharing, certainly improves the performance of the team as a key factor to the performance results of the project.

In addition, one of the significant factors that has been identified by A. Sohi et al. [23]. to influence the execution of the project is the determination of the project execution by self-organized team, where the accent is done to self-organization.

Collaboration with the client

The last but not least important feature of the agile technology is the high level of collaboration with the client whereas the traditional model usually does not allow clients to intervene the project execution. Moreover, client or customer could provide the proposal of the changes to the project and participate in the evaluation process along with project team members that results in higher value.

For the convenience and solid understanding of the advantages that APM has, the following could be demonstrated as follows [24]:

- reduction of the cost through elimination of costly changes and done rework;
- management scope and cost of product & service development improvement;
- resource saving through elimination of activities in planning phase;
- higher level of customer satisfaction by introducing continuous involvement of stakeholders, customers, client during project development;
- higher level of creativity and innovation through provision of autonomy and freedom to team members;
- improved visibility of individual performance through regular sprints, product/service backlogs, incremental performance assessments;

- empowerment of team members and subsequently the team.

Methods in agile technology

There are different methods that underlay in agile technology of project management, which are:

- crystal methodologies;
- dynamic software development method (DSDM);
- feature-driven design;
- kanban;
- lean software development;
- scrum;
- extreme programming [25].

The core values and fundamental principles of Agile Manifesto lie in the basis of all techniques described.

The most popular and widely adopted agile method is Scrum, which was developed by Sutherland and Schwaber [26]. Scrum methodology is characterized by sequenced steps towards high quality product and services. The lifecycle of scrum project consists of the planning, retrospective, execution, including revision of the sprint, daily meetings as depicted on Figure 2. It also includes "*product backlog grooming*", focused on the artifacts production which is supported by the product and sprint backlog respectively [27].

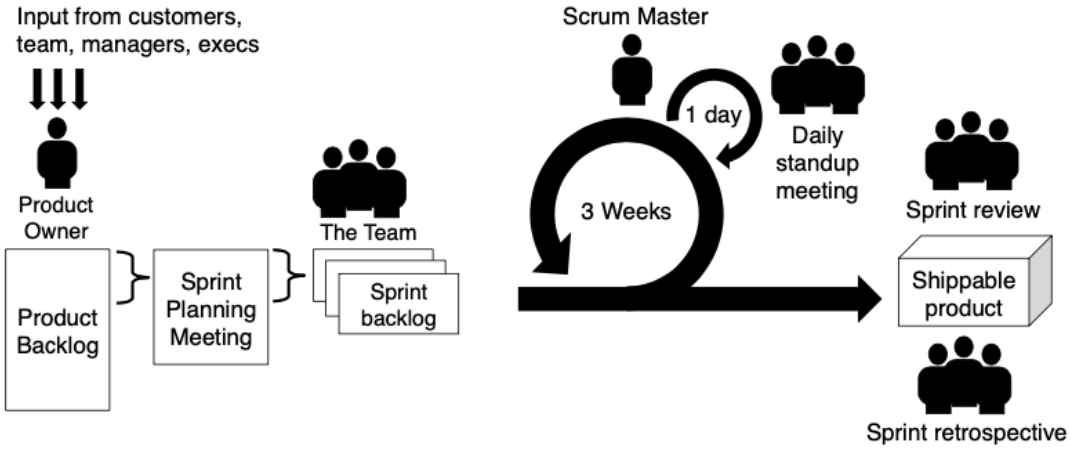

Figure 2 – Scrum framework.
Note – retrieved from source [26]

One of the most widespread methods, Extreme Programming is generally characterized by increments and highest level of communication along with constant feedback. XP consists of twelve practices: "*the planning game, small releases, metaphor, simple design, testing process, refactoring process, pair programming, collective ownership, continuous integration, 40-h week, on-site customers, and coding standards*" [25].

DSDM divides projects in three phases: pre-project phase, project lifecycle phase, and post project phase. There are 9 principles in DSDM: involvement of the

user, project team empowerment, the frequent delivery, addressing the current needs of business, incremental and iterative development, allowing for the reversing changes, the high-level scope to be fixed before start of project, the testing process throughout the lifecycle, and efficient communication [25].

Kanban is a system for bottlenecks identification and managing work through the process. Kanban visualizes actual work and workflow through that process. methodology is all about the Collaboration, the Control, the Cultivation and the Competence [28].

Lean mainly consists of 7 principles: elimination of the waste, amplify learning, the late decision, fast product/service delivery, team empowerment, building the integrity, and whole picture [25].

Feature driven development methodology is based on emphasis on initial object model, work division into features, and features' iterative design. An iteration of each feature in its turn consists of two phases: design phase and development phase [25].

Crystal methodology focuses mainly on communication in small teams that developing product/service that is not life critical. Crystal methodology has 7 characteristics: the frequent delivery, communication, reflective improvement, the personal safety, focus, access to expert users, and requirements for the technical environment [25].

To conclude, agile methodology is based on 4 values, 12 principles and agile practices, that are represented by different techniques as Scrum, Kanban, DSDM, XP, Lean. Agile organizations are differentiated by its requirements, scheduling, importance of teamwork, importance of collaboration with clients.

1.2 Agile technology implementation

There are a lot of models have been proposed for transition to agile, but there is a little recommendation given for deciding which of the model suits particular projects. The Figure 3 reveals some categorization of transition models made by Rashina Hoda and James Noble [29] for reader's information.

TALC model

Another interesting model for describing the process of agile implementation is given by A. Mahanti [30]. According to A. Mahanti, the adoption of new technology in the company or organization could be depicted by the TALC Model. The TALC Model is Technology Adoption Lifecycle model by Moore, that represents the bell curve consisting of five phases. The technology according to this model should pass these phases during the lifecycle and they are:

1. Innovators;
2. Early adopters;
3. Early majority;
4. Late majority;
5. Laggards [30].

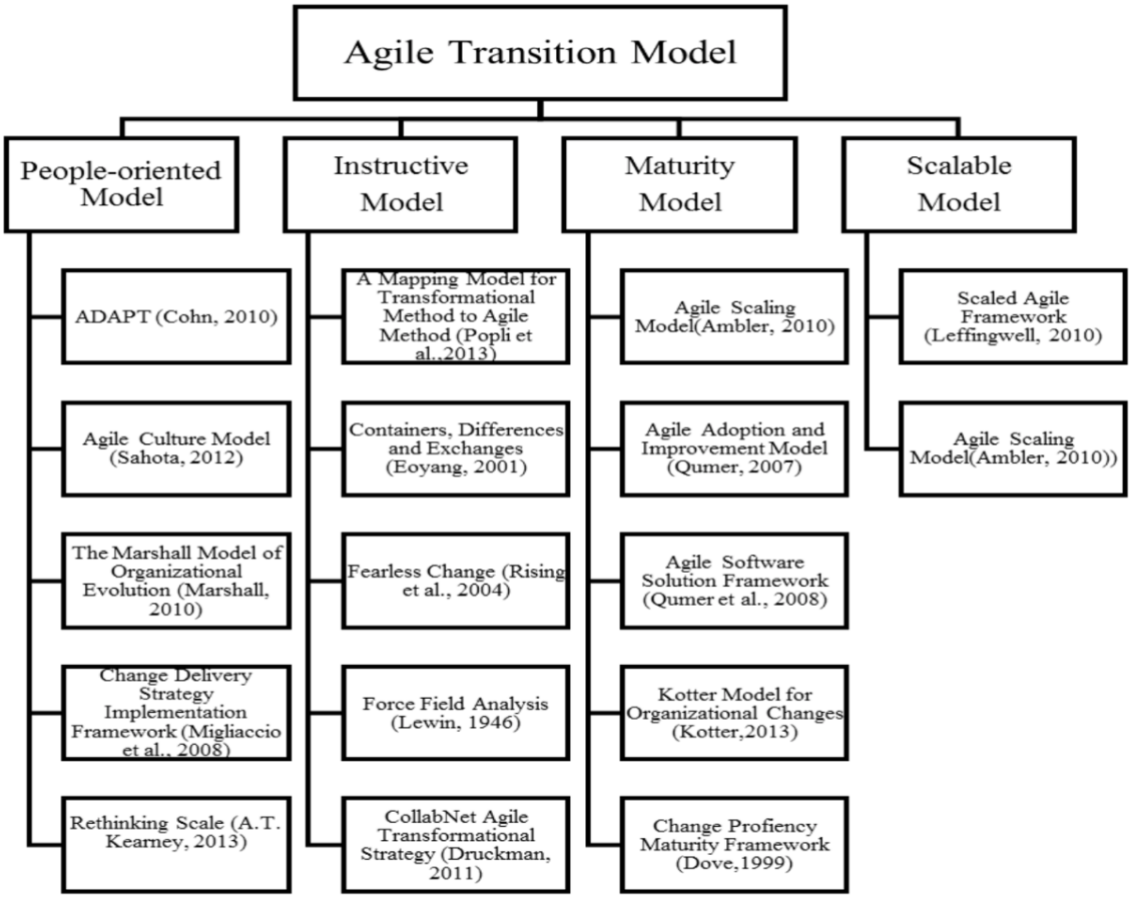

Figure 3 – Agile transition models.
Note – retrieved from source [29]

The first category represents “Innovators”, who in general like the new technology and will be the main foundation for the technology entry in the industry. Approval from this category of people would be critical for being on the rail for the technology in lifecycle. The second category represents “Early Adopters”, who hold the optimistic view on the technology. This category would try to implement the technology with acknowledging the associated risk in order to receive advantage over the other organizations. They would try to gain the higher level of the share in the market. The third category represents “Early Majority”, people who are more like to adapt the technology after the testing it because they are very likely to be pragmatic to the technology, but if it works, they would apply it with the aim of uplifting business values and improvement of related processes. The fourth category represents “Late Majority”, people who hold more conservative view on the new technology in general terms and are not willing to introduce innovative solutions because they are used to the traditional process that are steady and continuous. The last category represents “Laggards”, people which are not willing to change the mindset at all and are more likely to reject the new direction of the project management.

There is a significant gap between the “early majority” and the “early adopter”, which need to be overcame as stated by A. Mahanti [30]. It is called

"chasm", and it is the result of difference between neighboring second and third groups. This chasm leads to necessity of advanced business strategy application. According to the study, the agile technology is believed to located in early adopters' phase, where not all of the majority is willing to risk for it. The TALC model reveals the vulnerability of the technology to be implemented in wide scale and to stand on the same level as traditional waterfall model.

Agile methodology implementation method – proposal

From the concrete ways proposed by researchers in different research studies, the most valuable, simple and convenient method for the author, could be described as follows. A.Rasnacis, S. Berzisa [31] propose their method for the implementation of the agile technology of the project management with corresponding data on the evaluation of the method in the industry that presented as an IT case study .

The researchers follow the implementation process described in PMI Practice guide, that is the agile technology of the project management consisting of at least 4 steps:

- identification of the appropriate methodology;
- identification of the enterprise specific requirements;
- adaptation of the methodology;
- implementation of the methodology.

It means that prior to the implementation of the agile technology it is recommended to go through some preparation activities. According to authors [31], the method is based on the following steps as depicted in Figure 4:

- preparation of enterprise/organization/company for agile technology implementation;
- analysis and selection;
- adaptation;
- implementation.

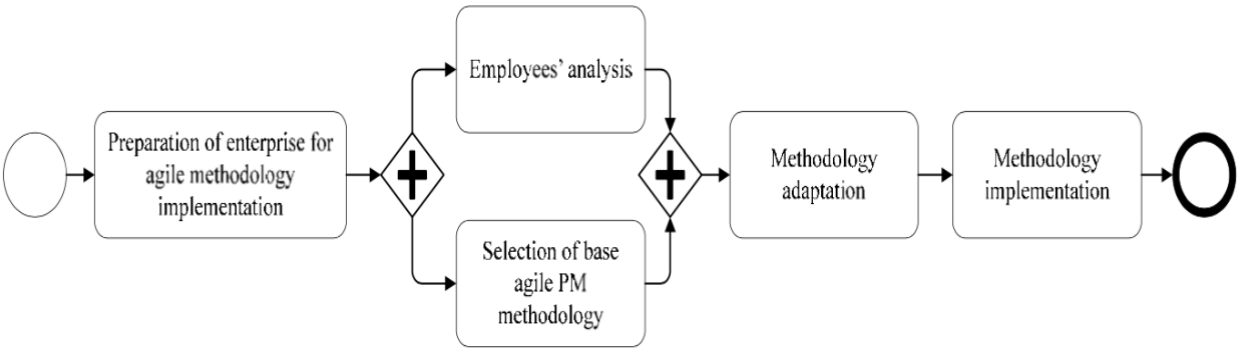

Figure 4 – The overview of the implementation method.
Note – retrieved from source [31]

The preparation phase includes the preparation to change in physical and psychological terms. The methodology implementation should be endorsed by employers, who need to be persuaded about the business value that will agile

technology bring with it, and how the performance of the company could be increased as per new technology introduction.

The second phase includes two parallel processes that could be described as employees' analysis step and the selection of base agile technology in project management. The employees' analysis phase could be based either on sociometric method or on motivation method and generally consist of the following:

- preparation;
- collection of necessary information and data;
- data analysis.

The agile methodology selection phase basically represents the selection of methods and tools of agile technology that are currently known in the project management world. In order to not creating the tools, methods, processes from the start, it is more convenient to choose the ones from the industry and project management according to the characteristics of the organization, including the project specifics and project team specifics.

Due to the fact that before the technology implementation the conflicts and misunderstandings could arise, the authors [31] have studied it and taken into account in the development of the adaptation phase. Authors highlight the necessity of analysis of the following elements:

- process;
- roles;
- artefacts;
- practices.

The agile methodology adaptation phase on the example of roles could be carried out in one of the three ways of it:

- reorganization of the existing traditional roles and responsibilities to agile ones;
- addition of agile roles to existing traditional roles;
- adaptation of agile roles to the traditional roles.

The implementation phase should follow the model which should be applied according to the organization characteristics and here another plan is required for successful result of the phase. One of the proposed models is PDCA (Plan-Do-Check-Act) model which is believed by authors to improve the quality of the phase.

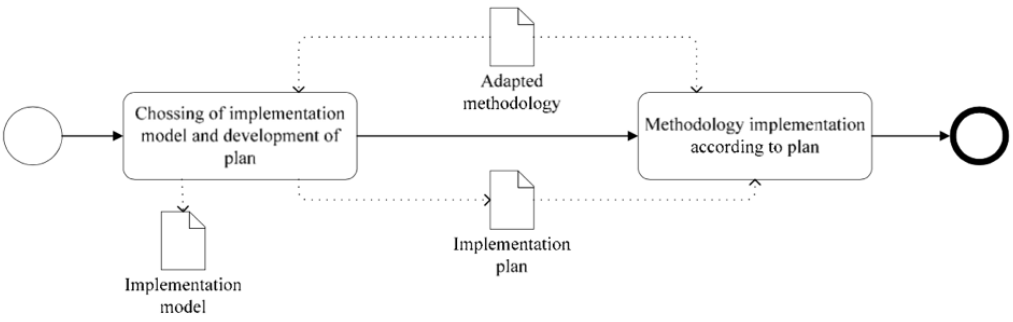

Figure 5 – The implementation phases.
Note – retrieved from source [31]

However, for the implementation of agile methodology and fitting it to specific organization, particular procedures are required, and they are up to organization's management decision [32].

To conclude, different models for the agile methodology implementation have been proposed and it is up to organization to choose the one. Most of them consist of the main steps as preparation, methodology selection, adaptation and implementation.

1.3 Challenges for AM implementation

Introducing the new project management methodology is a challenging task for the organization and it will result in obstacles that should be overcame in order to provide successful transition or transformation from traditional model to agile model. As stated before, the transfer of the agile methodology from the virtual environment to management in the company, oriented on the physical communications, is quite challenging in terms of the thinking way transfer.

This part of the chapter will provide the categorization of the challenges on the way to agile technology implementation first, then will provide description of real barriers.

According to B.Boehm et al. [33], three categories of obstacles for the implementation of agile methodology were identified at Annual Research Review of USC-CSE in 2004. These categories represent the non- problems, the problems in term of size/scope and the real barriers. This classification merely explains the activities need to be done in order to overcome them. The fact, that in majority of cases, the misperception of the agile technology of project management takes place, explains the requirement to categorization of the challenges.

Most common non problems that would arise are identified as:

- systems of quality assurance;
- quantitative management;
- some inadequacy for defects management;
- the automatic testing effectiveness to system integration;
- refactoring is basically rework;
- misperception of agile methodology to be non-responsible;
- misperception that projects, which are agile, are unmanaged [33].

These barriers are mainly related to the perception that lives in organization. This misperception usually results from misunderstanding of the terms, processes, philosophy. It is easier to eliminate or to bring to the minimum level of these barriers to the organization because proper management and provision of the high quality of the process could solve them.

The second category includes the barriers that depends on the scope of agile technology and the size of organization. The ones could arise for small organizations and not for large organizations and the others would be vice versa. It depends on the

industry and specific features of the company. Most common problems, which would be applied for the projects in terms of size or scope:

- business values focus in agile, whereas activities focus in traditional PM;
- sign-off requirements for stakeholders/customers/clients;
- quality assurance of the process;
- risk management;
- documentation of planning;
- support of project lifecycle;
- the process standards;
- incremental design [33].

The last category includes more significant issues than represent real barriers in the adoption of agile methodology in the organizations. This category includes the following, and not limited to:

- loading of the resources;
- customer access is required;
- documentation;
- nonfunctional and formal requirements separately;
- design reviews are assessed to be critical;
- contractual issues;
- regulatory affairs;
- interface with other disciplines & Integration with other methodologies;
- predictability;
- system interface control;
- skills and responsibilities;
- maturity assessments;
- cost estimation [33].

Among this classification that has been highlighted for the master dissertation to be the basic structure, the authors K.Dikert et al. [1], T.Chao et al. [34] based on conducted by their own literature review, expound the structures of the challenges and success factors, which will be depicted below.

According to T.Chao et al. [34], the failure and success factors could be classified in the same way, and they revealed that there is no formal study on the *"Critical Success Factor"* approach for agile technology implementation. The approach implies the measurement of the performance of organization that allows identify the factors that impact the performance. The classification is also applied to the challenges and for the following chapter on the success factors in the agile technology implementation, will be provided here:

1. Organizational;
2. People;
3. Technical;
4. Process.

K.Dikert et al. [1] expounds the categorization of the 35 challenges based on the literature search of the papers regarding the transformation to the agile technology in large-scale organization. This classification provides the exhaustive

information on the researches that have been carried out and the transformations that have been documented. According to the authors, the 35 challenges are categorized in 9 categories of the challenges:

1. Change resistance;
2. The lack of investment;
3. Agile techniques are difficult to implement;
4. Coordination obstacles in multi-team environment;
5. Different directions emerge in the multi-team environment;
6. Hierarchal management & organizational boundaries;
7. The requirement engineering challenges;
8. Quality assurance challenges;
9. Integrating the non-development functions.

As it can be seen from data above, the categories of the challenges by K. Dikert et al. and B. Boehm et al., clearly fit in the basic rough structure for the failure and success factors described in the study of T.Chao et al. [34].

Organisational

[33] Loading of the resources; design reviews are critical; maturity assessments; [1] hierarchal management & organizational boundaries.

As identified in study, the organizational boundaries and the hierarchal management in the organization become obstacle on the way to transition to the agile mindset [1].

One of the unclear roles in agile technology is the role of middle managers because the self-organization in the methodology clearly defines the roles of team members and high-level managers. This uncertainty led to the resistance from the managers to change the mindset. Another problem, that has been revealed is the location of outside of team or project when transitioning to agile due to the lack of necessity of the management role. The solution here was designation of new role in agile team for the old traditional role.

The other problem revealed in the studies referenced by K.Dikert et. Al [1], is the keeping the traditional work mode after adopting agile methodology by management. Moreover, in some organizations because of bureaucracy, two methodologies, agile and waterfall, have been in work in organizations. It resulted in the production of two templates for one document.

The managers followed predefined plans and do not rely on the schedule because it was not documented. Here it is important to notice, that necessity of excess documentation development had also created obstacles. The mix of the roles in agile has also been reported, mainly the roles of project manager and scrum master. The requirement for reorganization is major challenge in the transition to agile methodology.

The transformation from traditional waterfall model to Agile methodology would be successful upon change of management style from *"command and control"* to the "*leadership and collaboration"* [35]. At that point, the organization will receive responsiveness to perceive the advantages of teamwork and cooperation.

People

[33] Interface with other disciplines; skills and responsibilities; customer access is required. [1] change resistance; coordination challenges in the multi-team environment; different directions emerge in multi-team environment.

Refer to section 2.5.1 for resistance to change as it will be studied deeper in this master dissertation.

One of the most significant transformation challenges was the difficulty in coordinating the work between several teams because nevertheless team was flexible, the surrounding environment was not [1]. K.Dikert et al. [1] also point out that some challenges were created by the high interdependence of the teams with the subsequent delays in the project.

The different geographical distribution of team members created obstacles for the daily meetings and communication when necessary [1]. The sharing of information was on low level in multisite environment [36].

The difference of agile methodology concept, the perception of the methodology and the formulation of mindset, is critical due to the fact that this difference will cause some friction within the organization. Another problem was team discouragement that was caused by high team micromanagement and lack of recognition from management. The team members lost interest in meetings and gave up [36].

Another people factor mentioned I research studies is trust between leader and team members as well as among team members. Inter-team coordination and communication has been pointed out by [37] as one of the challenges. In addition, team size has been highlighted as one of the key factors to the success [38].

Process

[33] The nonfunctional requirements; contractual issues; integration with other methodologies; system interface control; [1] agile techniques are difficult to implement; integrating the non-development functions in the transformation.

Whereas processes in traditional model are based on certain designed activities, agile methodology means the presence of the uncertain activities that are aimed to increase the efficiency and performance [39].

The incompleteness of the work at the end of increments, the lack of required documentation “due to agility” in some cases has created the problems in the agile technology of project management.

The focus on the tools, such as particular software and framework only, without understanding the philosophy behind is also challenging. This led to agile becoming like combination of mini versions of waterfall model. And it added on the workload. The poor customization by the reason of variances’ and deviations’ quantity in agile approach during the process is also identified to cause problems. Another side of the agile methodology application is the adaptation of particular practices, that is also part of customization, that led to deviation from agile and subsequent failure of gaining real change.

The process of transformation to agile technology caused the increased pressure on people in terms of time, change, workload that in their turn led to old fashioned way of working to revert back to the process.

The additional problems arise in the interface with other functions of organization. As has been mentioned in study of K. Dikert et. al [1], the non-development functions should also transform the mindset to agile one, and by the time the entire organization or company would not follow one *paradigm of agility*, the organization will not be able to gain advantage and benefits.

The pace of the service or product delivery which is incremental type for the agile technology of project management, causes the problems in terms of the interface with other function mentioned before and the shortage of the scope. The necessity to adjust to increased speed, to provide results at the end of each increment led to challenges faced by people in the organization. K.Dikert et.al [1] emphasize that the functions of organization as infrastructure, operations struggle to form the full picture of the process due to incremental work.

Technical

[33] Documentation; formal requirements; predictability; regulatory affairs; cost estimation [1] lack of investment; requirement engineering challenges; quality assurance challenges.

High workload to the employees during the transition process is critical challenge for agile technology because it is quite hard to adjust the workload for new methodology and facilitate the transformation process. Even though employees were urged about higher number of working hours and prepared for it, some of them who hold specific knowledge and expertise, were overloaded. In addition, there were the case when managers expound some pressure on the employees to deliver the product or service on time without workload consideration [1].

The agile technology does not include the management of high-level requirements which is essentially required for projects of large-scale, even though there is structured approach of requirements in place, used by Agile methodologies as Scrum. The existence of gap between short and long-term planning in agile methodology due to avoidance of the latter in agile, also adds to the challenges on the management of high-level requirements.

Another side of the challenges is necessity of refinement of requirements by agile team, after the requirements have been drawn up in the documents by several stakeholders of the project or development teams [1]. The relationship between Quality Assurance and the Engineering of requirement represents another technical problem and it is inadequate breakdown of high-level requirements that impedes QA process at the end of increments.

Companies should also take into account general tools which support iterative development [40]. The automated process of the results' testing was not available in implementation of agile which resulted in higher testing workload and late identification of defects in products, manual testing still be in practice, that is also obstacle [41].

One of the last technical obstacles observed in the study is the physical space in the office when changing to agile methodology. It differs from traditional waterfall model where people were distributed according to organizational structure

and specifics. This will cause requirement of additional time and efforts to access the single room for daily meetings [1].

To conclude, the categorization of challenges in agile methodology implementation plays profound role for the adoption; and they are mainly related to process, people, technical, organizational factors.

1.4 Success factors to AM implementation

The success factors for effective agile technology implementation are also identified to be presented at 5 categories. They could be categorized below.

1. Organizational factors:
- strong support from the management;
- commitment from the management;
- cooperative organizational culture which is not a hierarchal;
- facilities with agile-style environment for the work;
- the appropriate reward system.

2. People factors:
- high competence and motivation from team members;
- self-organizing teamwork, effective communication within a team;
- high-level relationship with customers;
- high competence from managers;
- appropriate training.

3. Process factors:
- following APM oriented project management, configuration processes being simple;
- daily meetings with strong focus on effective communication;
- customization.

4. Technical factors:
- simple, rigorous, well-defined activities & documentation;
- regular product/service delivery, while the most important comes first;
- correct integration testing, pilot tests.

5. Project factors:
- dynamic, multiple small independent teams;
- scope variability with some emergent requirements;
- risk analysis, cost evaluation done.

The success factors identified below allows organization to received success on project quality, scope, time, cost [34].

Organisational

The support from the management of organization has been identified as one of the critical organization success factors that would result in smooth agile adoption [1]. High and middle level managers' commitment to agile results in successful fitting in the schedule of the project and keeping the pace of the team by encouraging them and overruling any negative perceptions. It could be enhanced by the provision of training and coaching that described in the sections below [1].

The commitment of people comes out from the engagement of people in the change process. The strong commitment that comes not only from the management but from the employees will lead to the gaining the profound and continuous focus on the transformation process and allow to keep the agile practices working [1]. In addition, another factors that will add up to the success of agile technology implementation is the presence of leadership among the adopters' team that will be able to drive the whole process and motivate others [1].

People

People factors that play significant role on the successful agile methodology adoptions are training and coaching. These factors have been identified to be important due to the lack or low level of competence required for it. The section of 2.5.2 is intended to explore the role of training and coaching studied by researchers over the world.

Another success factor that is crucial is effective communication with the teams, within the teams, between management. It has been reported [1], that communication of the transformation of objectives on the regular basis allows to people get the clear message and be more confident during the transformation process. The positive communication of the success gained during previous transformation done and positive experience also adds up to the higher motivation in people for agile technology implementation [1].

Technical

Pilot project would be required in large organization that are intended to transform fully in agile project management [1]. It was reported in previous research studies that releasing of pilot project before organizational transformation helped the organization to obtain some level confidence of its success and get higher level of buy-in from employees, which has led to overcoming the resistance from conservative employees.

Moreover, the piloting the agile methodology adoption increased the level of methodology acceptance from the management after gaining the insights of successful pilots [1]. Managers after successful pilot projects provided higher level of engagement and committed to distribution of its requirement to adopt on larger scaler with confidence. The feedback received from the pilot project helped adopters to mistakes made during the pilot project.

Process

Customization of the methodology to company specifics is acknowledged as one of the important process success factors that brings one organization to better results, and other to worse results in case of its absence and ignorance. Method of following the strict rules taken from the books and guides has been proven as not successful. Instead, some organizations [1] customized it by applying the specific properties of agile and deviating some to company features, which led them to develop innovative solutions, to drive the real transformation that worked in practice. Meanwhile during the process, core agile principles have been followed. Another side of customization, that has been reported in the study [1], is the alignment within the organization.

The ability of organization to not complicate the process of agile transformation has been describe also as one of the success factors to being agile. Keeping the process simple while applying technology and modifying it to company specifics allowed the organizations to strongly focus on the agile adoption rather that complex structures and processes. This allowed to retain good working practices in agile and keeping the organization engaged in the process [1].

To conclude, the categorization of success factors in agile methodology implementation plays profound role for the adoption process; and they are mainly related to process, people, technical, organizational, project factors.

1.5 Research topics

1.5.1 Change resistance

Change resistance refers to the unwillingness of people to change not only before the acknowledgement of the change and the reasons behind but also after it. It is unwillingness to try something new.

Despite the flexibility of organization and the size, the resistance to new path and new methodology of working is inevitable. It occurs at different levels of organizations, including upper and middle management, development teams [42].

The results of the survey in 2012 revealed that general resistance to change takes 39% of challenges in an agile adoption [28]. At the same time, as it can be seen on Figure 6, 48% of respondents in 14th Survey highlighted that resistance to change is an obstacle for successful agile implementation and scaling [10].

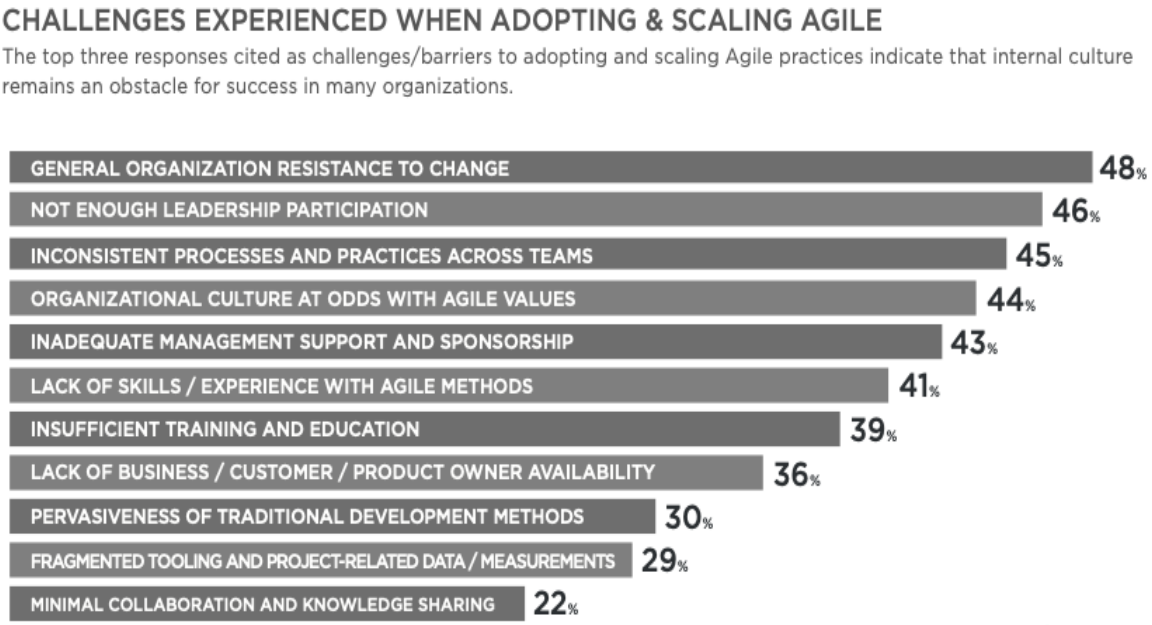

Figure 6 – Challenges experienced when adopting & scaling APM.
Note – retrieved from source [10]

The introduction of agile methodology means the establishment of new agile mindset of people along with new techniques [42]. There are some techniques and plans in place for the transformation to being agile and the external coaching would help for it [42].

One of the reasons of resistance to change is in new methodology. Teams are expected to be self-managed, but not everyone wants to solve new arising problems. For middle management, shift of responsibilities caused resistance to change from traditional practitioners because managers feared of decreasing the power and letting people to be free [43], because the teams are commonly self-organizing and co-located together for producing a high-quality products/service/software [44].

People concern mostly about their personal career path, some even fear to lose jobs [14]. Another reason is an increased level of transparency by the reason that people felt observed and did not willing to share their problems [36].

T. Gandomani et al. [14] in their study revealed that per the comments received from survey, "*naturally, people are accustomed to the status quo and this fact acts as a serious barrier to change*". This was addressed as one of main human factor affecting agile technology implementation [14].

To conclude, change resistance is important barrier in the way to Agile implementation, there are different reasons for it, which are new methodlogy itself, people mindset, concerns, fears.

1.5.2 Training and coaching

T. Gandomani et al. [44] in another research paper dedicated for study the effect of training brings out the citation from Agile Coach which clearly defines this requirement: ''*Training in Agile team should be done inside the teams. I have seen many persons that read a lot of books and went to many seminars, but I believe that without practical training, people cannot achieve the real purpose of training. Coaches should start transforming with many practical training activities. This is an effective way.*''

Training

Not sufficient level of competence of project managers, design team leads to requirement of rework, which cost a lot as has been identified in several studies [45]. The rework was represented by high amount of delays and not efficient personnel planning.

As stated above, the transition would not be successful without clear objectives and understanding of Agile values and principles. The management support is required, and the training is believed to be critical prerequisite for it [35].

Non-sufficient level of training provided by the management would result in difficulties in agile transformation and lower level of motivation and enthusiasm among employees, even though causing the failure of implementation process at all in some cases [1]. The training could be definitely described as "*direct investment in success*".

Training is planned systematic effort to improve knowledge, abilities and skills through learning experience with the aim of gaining effective performance in a range of activities [46]. The training materials depend on current competence level of team members and team. Inadequate training or lack of it led to inadequate expectations from Agile methodology, lack of collaboration, and resistance to change [35].

There are two types of trainings: on-the-job training (OJT) and off-the-job training.

The most common method of the development applied on all levels of organizations is OJT, where employees receive a pre-prepared course on the new regulations, procedures, or processes and they are expected to apply the knowledge later in the process of work. However, particular skills are gained more effectively when training takes place off the job.

The team of Yahoo company reported that training of people who understand the Agile principles is one of the keys to scaling the agile transformation effectively in a large organization [47].

The adequate customized training program would improve social skills of team members required in agile as well as improve business knowledge on Agile values and principles among developers [48]. Adequate training also helped team members to be positively inclined towards the agile and be enthusiastic to change [1].

Coaching

Due to the fact that agile practices are learned during the process, coaching is important factor in change. The lack of coaching could damage the transformation to agile if its techniques are not correctly applied.

K.Dikert et. al [1] emphasize the importance of providing coaching to teams in the real work environment because it is difficult to gain the successful change only by attending one-time training sessions. Another fact is that the scaling of the transition to agile is not sufficient due to the lack of coaching the real teams instead of members of pilot project for examples [1]. For the better buy-in to agile methodology is competitive to management of organizations ensure the proper Agile coaching and championing [48].

The coaches could identify and correct problems during the process and they would help to focus on understanding the agile principles instead of tools, software, techniques. The organization would benefit from using both internal and external coaches. External coaches will be able to provide objective view of the company and its performance whereas internal coaches know the specifics of the company and easy to access. In addition, mentoring is suggested (tacit knowledge transfer) to be very important in agile technology implementation [49].

The Yahoo company proved to successful implement Agile technology, and one of the factors was provision of proper coaching [47]. As stated in the report, Agile coach mentored the Scrum Master at sprint and supported team members to facilitate the retrospective for each other. When teams forgot things, coaches give the teams objective advice and support because teams needed to pursue continuous

improvement. The provision of adequate training materials, tracking tools and coaching program as well helped the organization to improve the processes quickly based on iterative feedback.

G.H. Rodríguez et. al [50] in their research study of the Agile Coaching effect on students' performance have reported that Agile Coaching helps to improve technical and non-technical skills apart from commitment to comfortable feeling during teamwork.

To conclude, training and coaching influence the agile transition at different levels and mainly help to increase motivation and enthusiasm. Their effect on people have been reported in several studies and needs to be studied further.

1.6 Agile in Kazakhstan

The agile methodology particularly in the human resources management has been implemented in some organization in Kazakhstan. These organizations are not of the oil and gas sector, but indeed it is very important to know that the best practices could be taken and studied for the implementation of the technology in the oil and gas sector.

The organizations such as national welfare Fund of Samruk-Kazyna, BI Group and Sberbank Kazakhstan has adopted the agile methodology in the project management [16].

2 Research methodology

2.1 Research design

Research process for the master dissertation compiled of the several stages and its overview is depicted in Figure 7. The research is qualitative and based on mixed approach where the researcher has relied on the theoretical assumptions from thorough literature review in the process of data collection and analysis. At the same time the assumptions have been verified or changed during the survey and interviews [51]. The mixed approach has been applied for the research, as the topic of the research belongs to known theory and it is studied by many researchers worldwide [1,3,4,9,15,48].

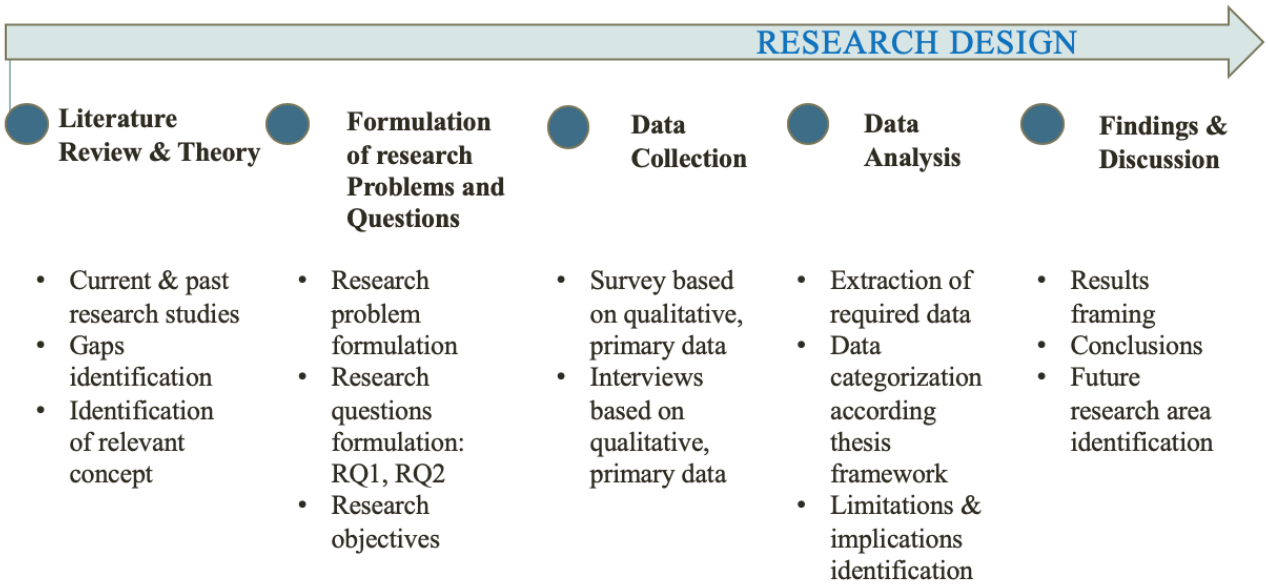

Figure 7 – Research process.
Note – compiled by author on the basis of Source [52]

Research design

The qualitative method is implemented when it is required to provide subjective interpretation of current microenvironment [52]. The qualitative method is preferable when studying the phenomenon on which there is low level of extensive knowledge about. On the other hand, quantitative method is experimental and very objective. Thus, quantitative analysis is more suitable for the cases where the dependence of one variable from another, or their relationship is required to be tested via specific analysis [52].

The qualitative method will be suitable for this master thesis because the overall procedure of collecting data and subsequent analysis is non-numerical. Moreover, qualitative method is suitable also due to the fact that the aim of the work is exploration of resistance to change, training and coaching. The qualitative method

allows author to understand the phenomenon and the experience of respondents [52]. Such kind of approach has been identified to be reasonable and corresponds the research aim.

Deployment of qualitative method provides better understanding of the challenges that influence Agile methodology implementation in terms of a variety of experiences and perceptions that is in place among any Agile methodology stakeholders. The dissertation intends to understand and describe Kazakhstani reality where survey and interviews are conducted.

The availability of the scientific resources, articles and surveys in the electronic directories [1-50] led the author to clearly identify the area of the research with determination of scope exclusions for this particular thesis. The thorough literature review was carried out for the supporting problem statement. On the basis of the area of the research, that has been identified as a gap presented in previous research articles, the research problem has been formulated [1]. The theoretical framework and literature review have been taken as a foundation of master thesis.

The research problem lies in the identification of the extent to which training and coaching could provide sufficient competency to adopters of agile technology to overcome the resistance to change implied by other employees in the organization. The research problem brings us to the determination of two main research questions than will be studied in this master dissertation:

RQ1. Is the change resistance will be one of the main barriers to agile technology implementation?

RQ2. Would the training and coaching be a solution to overcome change resistance?

The methodology described will be applied to the master thesis for answering the research questions.

The survey and interviews were conducted with the aim to understand the phenomenon “resistance to change”. A survey has been taken for study as it is consistent with the purpose and approach used in this research. Survey allows to answer the research questions as it provides the ability to understand, explore and explain change resistance phenomenon in the context of agile methodology implementation process. This led to required qualitative data collection, which have been analyzed by the author and compiled into empirical findings chapter. On the basis of this data, discussions with consequent conclusions have been provided, by this reaching the aim of the thesis.

Literature review & Theoretical framework

The initial search has been carried out using electronic databases for the relevant research articles and conference proceedings. The more recent studies provide a higher value for the master thesis; therefore, the best databases have been accessed for reference materials for these annotated references in the last chapter:

- Scopus;
- Science Direct – Elsevier;
- IEEE Xplore;
- ACM digital library;

- SpringerLink;
- Wiley Inter Science Journal Finder.

Since, the subscription is limited for several research articles found, the Google Scholar's advanced search allowed to get access to some of the papers. It was important to have at hand a search strategy in order to locate efficient relevant research before performing searches through mentioned search databases. Important part of an effective search strategy is in the phrases and key words given below:

- agile methodology;
- challenges in agile;
- agile in Kazakhstan;
- resistance to change;
- training & coaching in agile.

The primary research has been carried out before the identification of the research problem and research questions. The key words and phrases search matched about 600+ unique papers, from which 204 were available (refer to the lists depicted in Appendix C). The abstracts of the papers have been categorized into three categories: include, exclude, and uncertain. So, from the list 154 exclusions and 50 inclusions have been identified. Articles that were outside theme scope were excluded.

Survey

Research survey was conducted online for data collection. The survey aim was to analyze information from professionals who work in companies, which implemented Agile methodology and receive concrete data from the responses.

The questionnaire for survey was the tool used to answer the proposed research questions of master thesis. In order to provide the valid data, the questionnaire has been developed by author. In the process of questionnaire creation, the main issues have been covered and it has been divided into two parts. The intention is to receive transparent data and to completely align the questionnaire to the research aim.

The questionnaire consists of general questions and specific questions, that in sum gives 12 mandatory questions and 1 non-obligatory question. The low level has been dictated by the willingness of author to receive solid short answers instead of unwillingness to provide response. The questionnaire consists of 6 single-choice questions, 2 multiple-choice questions, 1 open-ended question, and 4 rating questions. Multiple-choice questions have been provided for better understanding the respondents and one open-ended question that was not mandatory and was put in the end of questionnaire asked the participants to record their ideas in their own words in the space provided. The rating questions have been provided through Likert scale, which ask the participant to rate each factor on a scale from 1 to 5.

The general part consists of 3 general questions that asks on the techniques of Agile methodology in place, the industry sector and the role of respondent in the company. Then, the specific part containing different type of questions starts. Here, the questions start from the questions about the having training and ends with the scale at which it helped to overcome barriers.

The survey has been distributed online using Google Questionnaire Form through different platforms and it has collected 74 responses from different industries among agile practitioners in Republic of Kazakhstan. The form is attached in Appendix A. The findings of the survey are discussed in the chapter below. The survey gathers information about the Agile transition, challenges and success factors. Before the release of a survey the small pilot survey was carried out in April with small group participants to get feedback on the questionnaire design and content. After that, the original questionnaire has been sent to respondents.

Interviews

A semi-structured approach has been chosen when interviewing the informants, because it provides a flexible interview process. There were mainly open-ended questions divided into three parts that were introduced to respondent in the certain sequence. It allows the informants to frame the answers relevantly their workplace context which in its turn allows to have deeper insight in comparison with structured interview. The goal is to gain reflections from informants about experiences and opinions related to thesis subject. In addition, it allowed to use informant information for guiding the interview and to keep an open mind on significant aspects of change from their experience. The interview guide and questions are attached in appendix B. Our interviews followed the two-phase approach: information regarding master thesis and signing of an interview agreement (consent form), the interview process.

Data collection

Because of COVID-19 outbreak that is happening during the research process, the author was not able to interview as many people as wanted to at first, but the agile practitioners have been contacted virtually. As face to face interviews were not available, some of the interviews were contacted through mobile phone and LinkedIn. The average interview duration was 40 minutes. Despite the fact that insightful data has been collected, the research scope seems not big enough.

The interviews were represented as embedded cases which offered heterogeneous samples of data, because people possess different roles and different functional areas that allowed to receive different experiences and variation in the data collected. Qualitative data have been collected through 3 semi-structured interviews.

Data analysis

Data analysis has been carried out after the receiving the survey data and interpreting the interview data.

The survey data analysis is based on the questionnaire results. The questionnaire data have been interpreted accordingly. Step-by-step interpreting data in Chapter 3 is seemed to be the best way. It allows to discuss and make conclusion on each aspect of the data received. Because of some limitations of questionnaire, the were mathematical operations with the data received for increasing the validity of the research data.

The interview results have been interpreted in common way and then they have been coded, and the results have been demonstrated in the next chapter. The

coding process is required for the grouping of several identical segments of the answers in one category and deriving the common themes [51]. The coding has been done in two main steps and has been described in the chapter 3.

Thus, on the basis of results from two sides, the conceptual diagram development has been carried out. On the basis of the diagram, the conclusion has been made after some discussions.

2.2 Research credibility

The research credibility could be measured through the identification of the research validity and reliability. For higher credibility the high values for validity and reliability are required. These two terms could be represented through the triangulation.

For the data validity the process of collected data triangulation has been carried out. The triangulation can be defined as the collection of data on the certain phenomenon with the use of various methods, usually 3. So, it allows to provide the three important things for research that has been highlighted by K. Moldashev [51], which are:

a) internal validity – the degree by which the results demonstrate the reality;

b) external validity – the possibility of results' application in the future;

c) reliability – the possibility of reaching the similar results in repeated study.

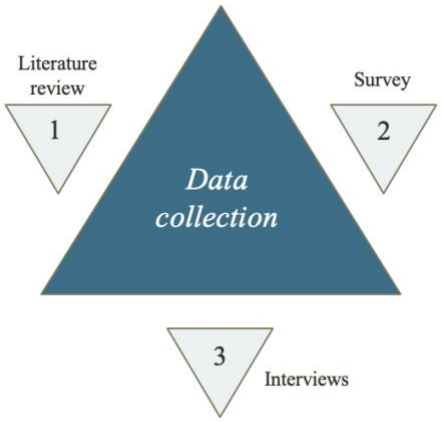

Figure 9 – Data triangularity.
Note – compiled by author on the basis of Source [51]

This research credibility has been based on the following:

1. The literature review has been carried out on the basis of the most relevant research studies; the references have been made through the text in required manner;

2. The survey data is appropriate and relevant for the study, the target sample is 74 people; the repeated answers are not allowed, the access to questionnaire is private;
3. The interviews have been conducted by the author herself, the interviewees signed the consent form and provided real data and information.

In conclusion, the master thesis is believed to fulfill the research credibility requirements.

3 Data collection and analysis

3.1 Questionnaire results

This section of master thesis contains all the results received from April 2020 till now. The data has been collected and analyzed by the author in July 2020.

The target sample deployed has been proved to be appropriate and relevant to research study, due to the fact that many respondents use agile methodology, which resulted in 121 techniques from 74 respondents. The answers, as it will be seen in this chapter are reasonable and provide the validity for the research. The figures have been compiled on the basis of questionnaire data.

The questionnaire starts with the small introductory part with the definition of the research aim and the first question was "Which of the following agile techniques does your company apply (choose 1-2)?" Figure 9 depicts that 11 cases from 132, which is less than one tenth, apply any agile methodologies in their companies. Among professionals, the most common Agile methodologies are Kanban and Scrum with more than 52% and 47% respectively. Then, general agile techniques are deployed in their companies (35.1%), and less than the third goes to Lean methodology (23%). The respondents were allowed to select more than one technique.

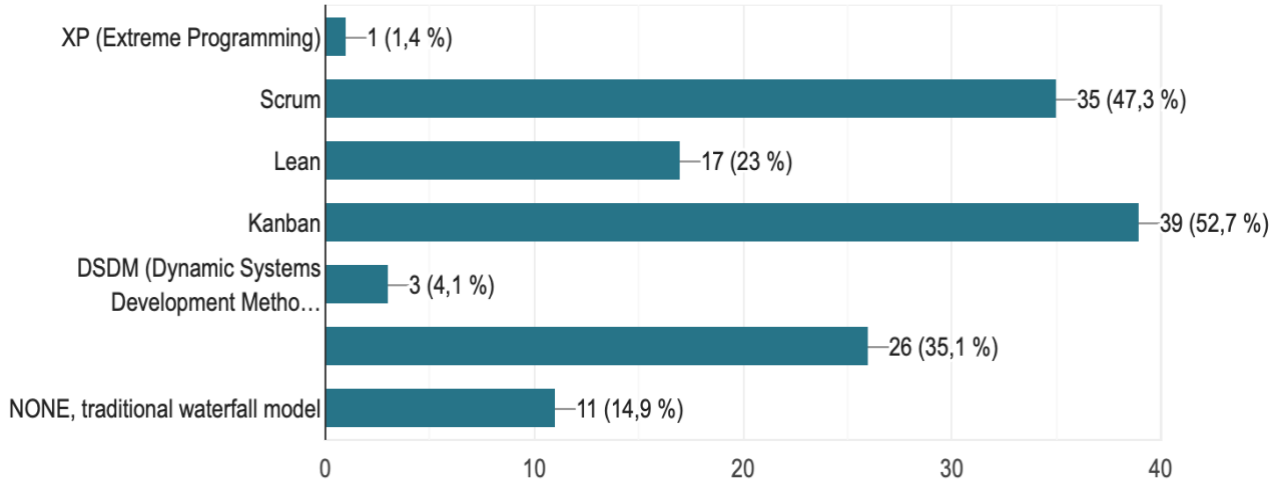

Figure 9 – Agile techniques.
Note – made by Google Forms on the basis of data collected, checked by Author

The figure reveals that the most widespread agile techniques in Kazakhstan are Kanban and Scrum, and they are widely applied in the companies, as 92% of respondents pointed the application of agile techniques. The other techniques are also applied, which allows to conclude that each organization customize own agile techniques according to its features.

The next question was “Please identify the industry, where you work”. Figure 10 depicts that half, that is 50%, of the professionals are employed in Oil, Gas and Energy sector. The other 13.5% are IT/telecommunication specialists, where agile techniques were originated from. The other industries also present, which allows to conclude of heterogeneous sample of respondents in Kazakhstan.

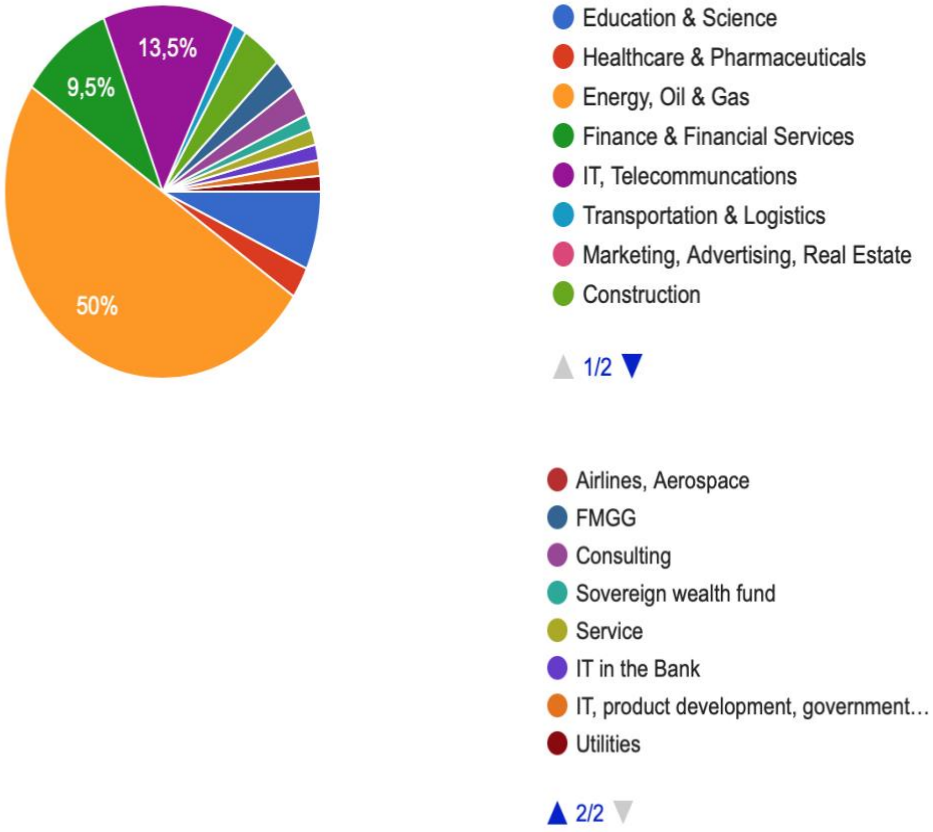

Figure 10 – Industries where respondents are employed.
Note – made by Google Forms on the basis of data collected, checked by Author

From the figure it can be seen, that companies that specialize in Oil and Gas sector widely use agile techniques, and the possible reason behind is high level of international companies’ presence in this industry. First, the structure and culture of such organizations allow to implement agile techniques. Secondly, the high number of projects requires flexible methodologies for managing projects. The percentage of IT/Telecommunications industry is explained by the high level of software and other IT products/services present currently in the Republic of Kazakhstan.

The last general question was about the role holding by the respondent in the company. Figure 11 shows that more than 2/3 of the surveyed professionals work for companies as employee.21,6% of respondents are middle level managers.

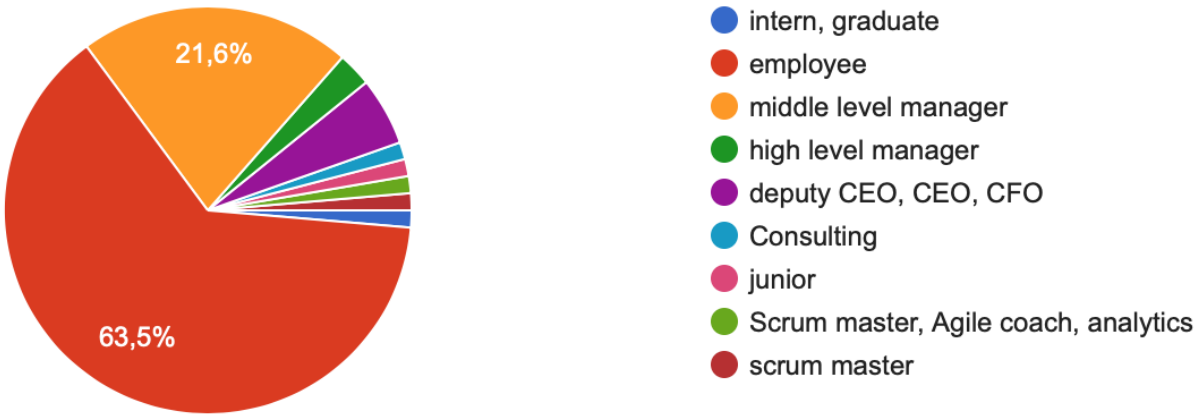

Figure 11 – Respondents' roles in the company.
Note – made by Google Forms on the basis of data collected, checked by Author

The high number of employees leads to the assumption that they have deal with Agile techniques in projects and possess functional knowledge. Therefore, their answers are credible. Moreover, from the respondents' scope, there are scrum masters, agile coaches and analytics, which immediately and directly participated in agile transition which increases research validity.

After introductory questions about the respondents there was a series of specific questions in the survey about the barriers to become agile and factors to help overcoming it. The next question was about having trainings (or coaching) prior the implementation of agile techniques in organizations: "Did you and your colleagues have trainings prior the implementation of agile techniques in your organization?" Close to 59.5% answered "yes", and 35.1% indicated that they did not have training prior implementation, reference made to Figure 12. The orange section, which show data for inapplicability, means the area for those, who still have traditional waterfall model in their organizations in fall into 11 responses above.

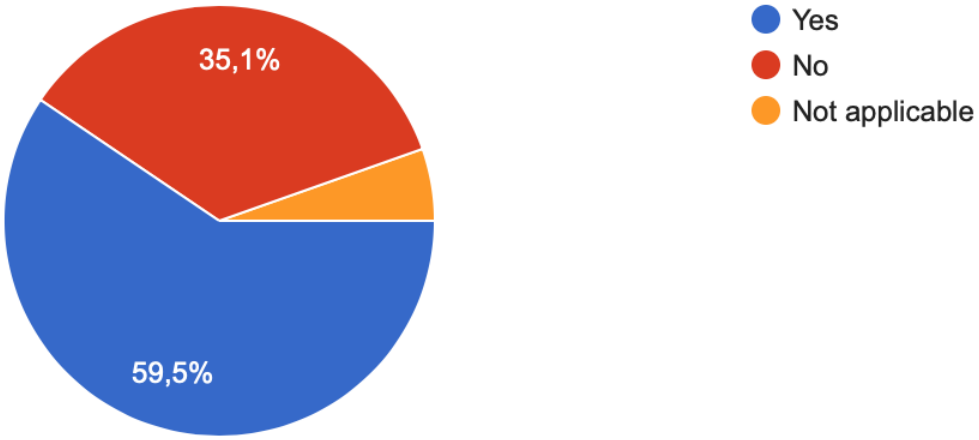

Figure 12 – Training and/or Coaching in Agile.
Note – made by Google Forms on the basis of data collected, checked by Author

The obtained data revealed the fact here that most companies provide trainings for their employees. The trainings are one of the must have tools for the introduction of new methodology. The percentage for those who had not training is still meaningful, as it shows the gap in the knowledge of employees in these organizations.

The next question was "How successful was the introduction of agile technology after training? Please choose in a scale from 1 to 5 with 5 being the highest performance (80-100%)". As it can be seen on Figure 13, the results demonstrated that two thirds of respondents, that is 66,7% in total, agree with the assumption that training and/or coaching is able to improve the performance and the implementation process significantly.

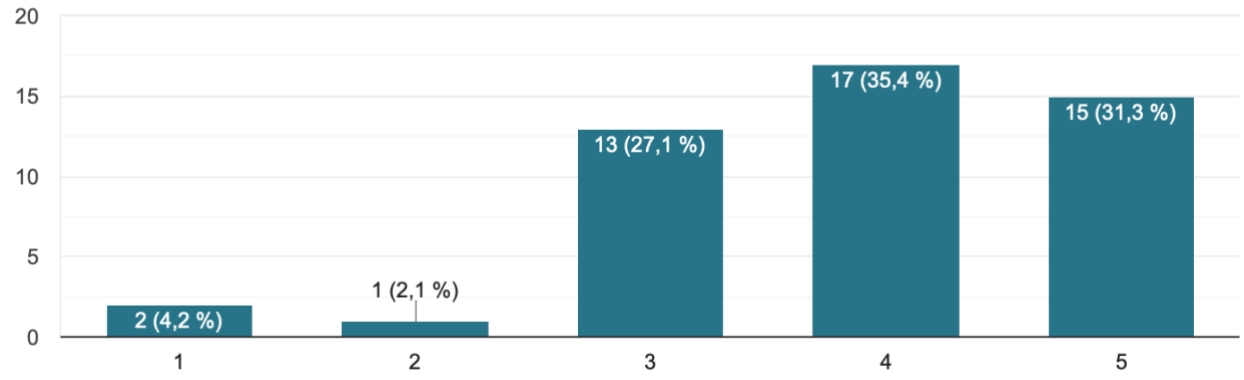

Figure 13 – Success level of agile introduction after trainings.
Note – made by Google Forms on the basis of data collected, checked by Author

It should be noted, that the response number is low by the number of practitioners not having trainings prior implementation. The data indicates that in more than half of the cases the trainings are the tool to improve the new methodology implementation and its application in day to day job and tasks. In addition, more than 30% pointed out the relevance of the training in agile techniques implementation on the high level. It allows author to conclude that training plays profound role in implementation of agile methodology.

The survey included a multiple-choice question with the ability to respondent to choose more than one option: "Which of the following factors is the most important during Agile technology implementation (choose some)? See Figure 14 below for the percentages for each of the factors group. According to the results, it can be depicted that most of the survey respondents agreed that the people factors is the most common obstacle that companies face during an Agile implementation. 52 responses out of 142 chose the People factors. After that, 35 responses have been made to highlight organizational factors to be important (management, structure, etc). 28 and 27 responses have been made for Technical and Process barriers to be the main. The people related factors are:

- resistance to change;

- working in teams;
- collaboration with teams;

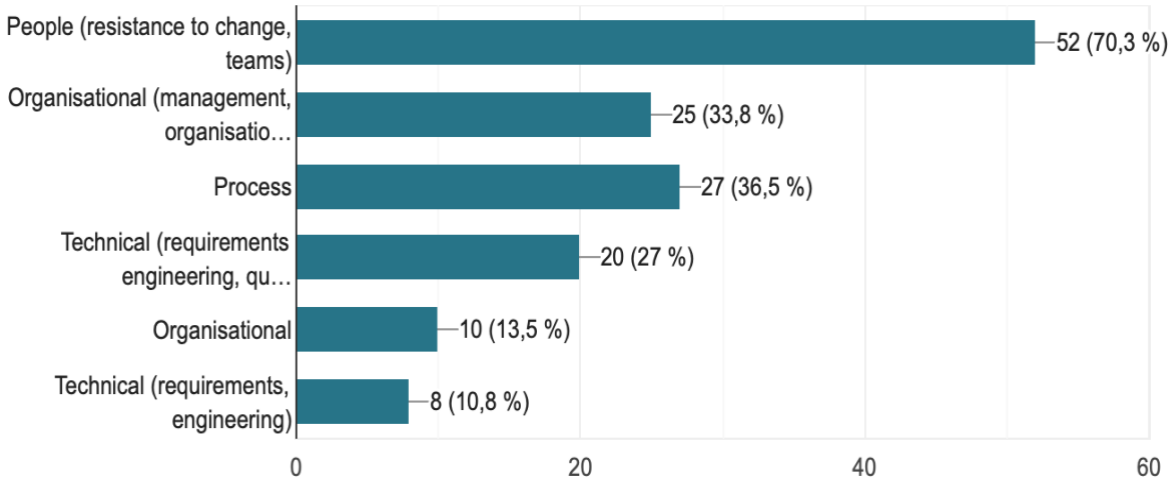

Figure 14 – Groups of challenges in agile implementation.
Note – made by Google Forms on the basis of data collected, checked by Author

The survey data proves the data received on global level [10], and people factors are the main barriers in agile methodology implementation. The human constituent of any change is underestimated, and it is still the barrier in agile techniques implementation.

The following questions was "Which of People factor mostly affected the process of Agile implementation?". 44.6% and 28.4% of responses were for "Mindset" and "Resistance to change". As has been revealed by K.Dikert et al. [1], the mindset lies in the resistance to change factor. There is very thin border between these two items, because *"Resistance to change"* generally comes not only from people of different mindsets, but also from the fear of the something new, that has been described in Literature review section. The question has been putted in the survey on this way due to the different perception of resistance to change. So, the results prove the fact, that deeper research needs to be conducted for identification of underlying reasons of resistance to change and it comes from psychology of human resources, as it has been indicated in Figure 15. This emerging phenomenon will be discussed in the next chapter. Here, the percentage of respondents that highlighted importance of working within a team (8,1%) and work between the teams (18,9%) identify the second roles of these factors in the way of agile implementation.

The following question was "How People factor Resistance to Change affects/affected the process of Agile implementation? Please choose in a scale from 1 to 5 with 5 being the strongest." And the data received coincide with the previous answers, as 67,6% of respondents as can be seen on Figure 16 agreed that it plays profound role in new methodology implementation. 29,7% of respondents indicated that it affected in scale 3/5.

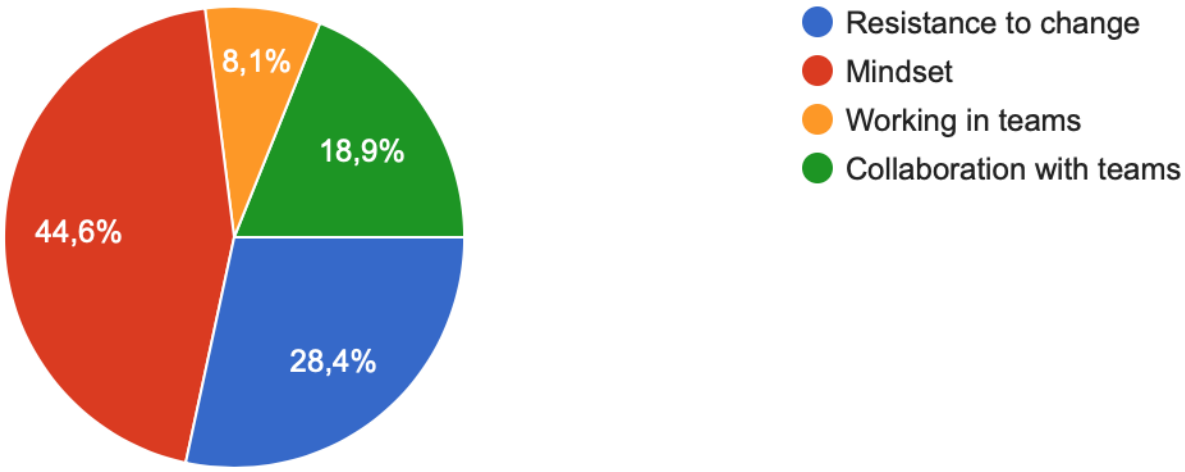

Figure 15 – People factors.
Note – made by Google Forms on the basis of data collected, checked by Author

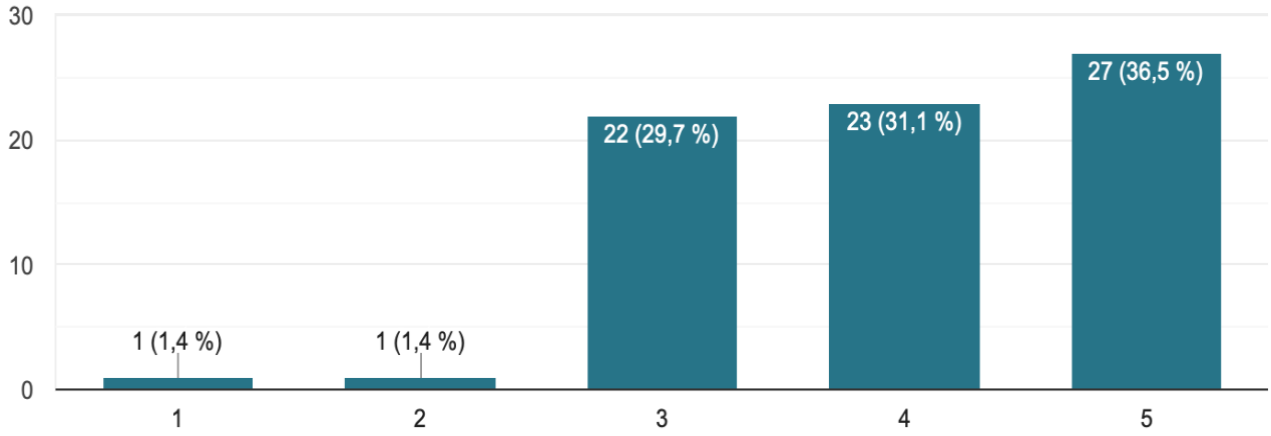

Figure 16 – Effect of change resistance on the Agile implementation.
Note – made by Google Forms on the basis of data collected, checked by Author

From the diagram, it can be concluded here that change resistance definitely affects the implementation of agile techniques. It affects in the process by changing the path and could create the barriers on the way.

One of the most significant questions of the survey was “From success factors of Agile methodology implementation, which category is the most important for overcoming the resistance to change?” The training and coaching were identified to be as the one of the main success factors in overcoming resistance to change, counting 51,4% of respondents, reference is made to Figure 17.

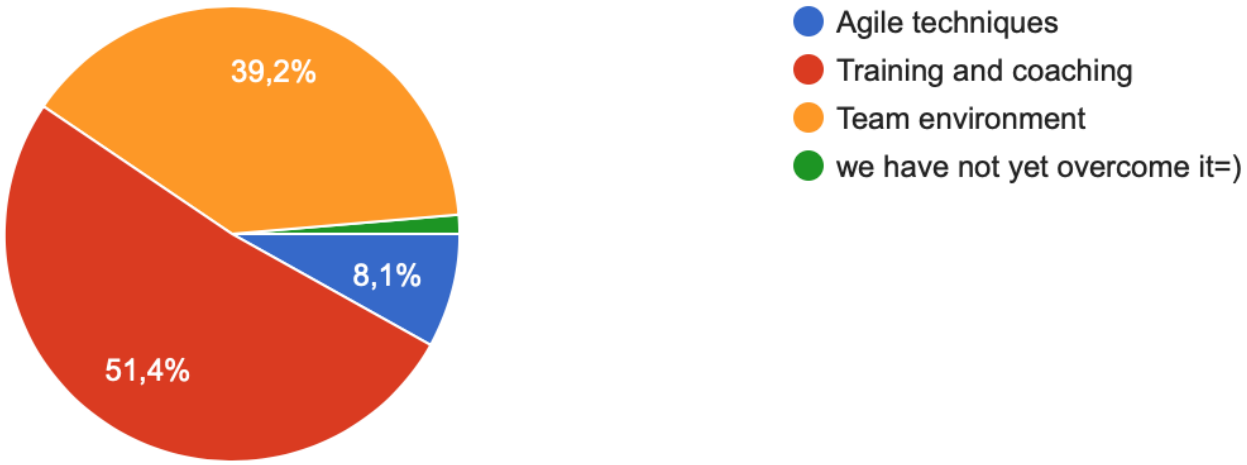

Figure 17 – Success factors.
Note – made by Google Forms on the basis of data collected, checked by Author

The training and coaching play profound role in overcoming the change resistance. Because it mainly comes from the people mindset. The training and coaching have been indicated as of higher importance than team environment, even though it is essential success factor during agile implementation.

For the question "How Training did help/helps to overcome people resistance against the change in the process of Agile implementation? Please choose in a scale from 1 to 5 with 5 being the strongest.", 58,1% and 21,6% of respondents indicated that training influences a lot the process of agile methodology implementation for scale 4/5 and scale 5/5, respectively, as depicted on Figure 18.

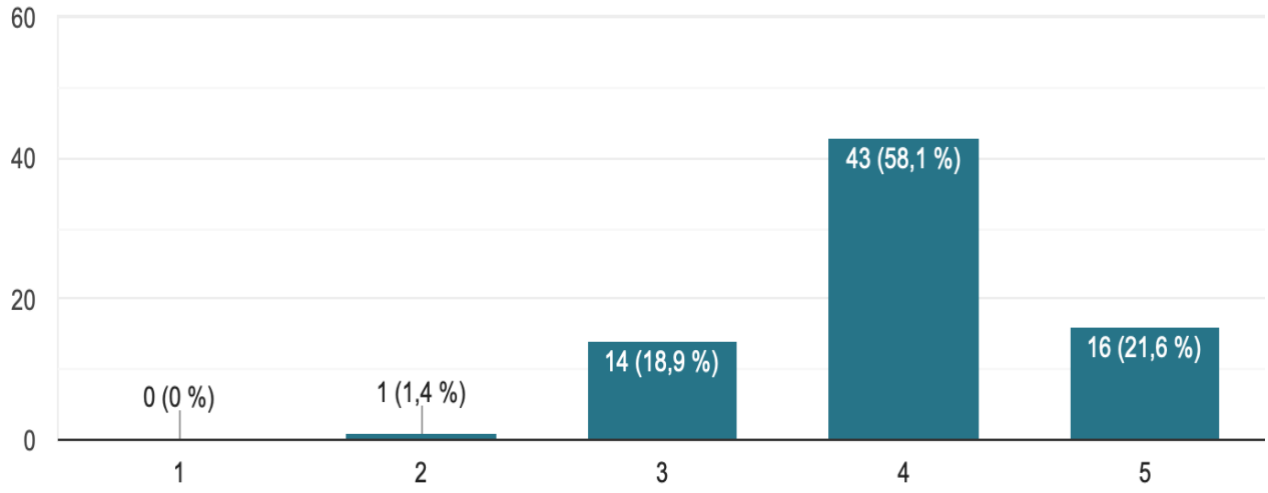

Figure 18 – Effect of training to overcoming people resistance against the change.
Note – made by Google Forms on the basis of data collected, checked by Author

Due to the Questionnaire limitations, there was not possible to differentiate the list of those who had trainings and those who didn't. Therefore, the review of the answers by the respondents, indicated that those who did not have trainings, answered mainly 4/5 and 5/5 scale. Thus, if this number (26) is extracted, 33 out of 74, that is 44.6%.

Figure 18 indicated that the training affects the overcoming change resistance. If the number 44.6% is taken as 4/5 scale, it means that training will certainly help to overcome the change resistance.

The following question was "How Coaching did help/helps to overcome people resistance against the change in the process of Agile implementation? Please choose in a scale from 1 to 5 with 5 being the strongest.". The reason for differentiating the training and coaching in the survey was the intention to see which one is more effective and friendly for practitioners. More than 80% of the respondents revealed the effect from coaching, from which half is strongly agree with the coaching requirement. From this number, again, if the 26 is extracted, then 47.3% of respondents agreed on the high effect from coaching.

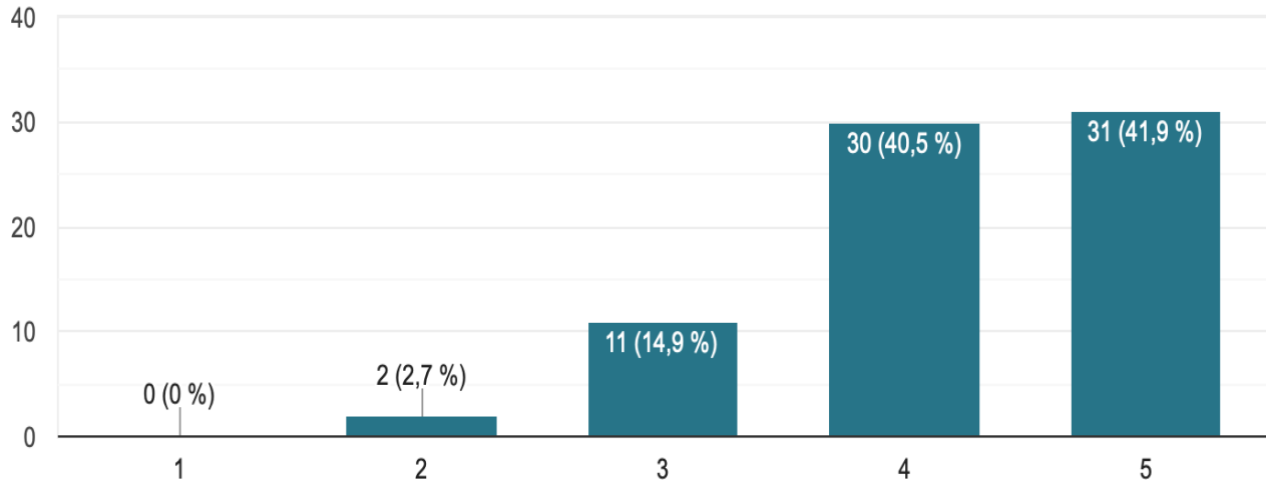

Figure 19 – Effect of coaching to overcoming people resistance against the change.
Note – made by Google Forms on the basis of data collected, checked by Author

The survey revealed that coaching along with training plays important role in overcoming the change resistance. Almost the same number (47.3%) of respondents indicated its application in agile methodology implementation. This means that with the provision of training and coaching the organization is able to overcome one of the main barriers called "Resistance to change". The questionnaire results prove the assumption, that training and coaching is one of the solutions to successful agile techniques implementation.

At the end of the questionnaire, there author provided an option for participants to write on the voluntary basis additional comments. There were 25 comments submitted. Of these, some comments have been highlighted below. These comments were very interesting due to the additional knowledge provided for the

comprehension. The comments by the respondents helped to determine if this research has addressed the relevant topics and issues. The feedbacks emphasized some important issues to overcome the barriers on the way to Agile implementation.

The general comments on the agile methodology implementation refers to the requirement of company's rules and procedures for clear introduction as has been stated: *"Implementation of new methodologies addressing improvements of workflow processes shall be done* ***by introducing company rules and procedures*** *where the expected new workflow will be clearly described with following expectations of outcome results, iterations, peer reviews etc."* Another comment has been made for the implementing the methodology at early beginning: *"****Agile methodology must be used at the beginning****, when we only started to plan the strategy. If it is going to be implemented after the works started it will be hard to change people's habit."*

One of the agile practitioners gave technical solution for the any problems in the team, by stating that *"If we find any issues in our processes (delays in delivering projects, communication issues, etc) we do* ***organize post mortem meetings, to find out the root cause*** *in our problems and processes. Also we have bi-weekly retrospective meetings where everyone can share 3 things: what went well?(positive); what can be improved?(negative); what can we try? All the responses are anonymous, at the end of the meetings we vote on actionable items and choose top 3 of them and assign among us. This helps to solve any issues in the team."* Additionally, one comment emphasized starting Agile introduction with a pilot project: *"Start for experimental group"*. Another general comment was: *"People sitting in comfort zone and not interested/demotivated on company/team benefit. So giving* ***them freedom by delegating making decision*** *may motivate them to start using this opportunity Agility."*

High level of attention has also been put on the support requirement from management: *"In our organisation we are strongly belive that* ***leaders should be a role models in a certain situation****, which will create trust atmosphere, and create a proper scene for agile development"*.

The change resistance is also associated with the culture and mindset of people. So, one of the respondents said that *"When the problem is associated with a culture, it is* ***hard to change the mindset of people****. In my opinion the best option is to show results. That might give them the ability to change"*. Other comments were: *"Change in corporate culture", "Practice growth mindset"*. According to these comments, understanding the mindset is critical for a successful Agile implementation.

The requirement for training and coaching for overcoming change resistance has been highlighted several times. So, one of the respondents said, that *"Training is a must."* Another respondent has board decision for the problem solution, commenting that *"Training and coaching is certainly good. The main thing is to make it* ***clear to each team member that flexibility is the key to success****. And a team, friendly,* ***trusting atmosphere*** *will lead to achieving the best results."* In addition,

one commented that *"**Mostly a training can clear an issue of resistance**, but early spotting of business value for all of team members can be useful too."*

Trust has been outlined by two respondents in different terms. One commented that *"Trust is the main thing. **Team should trust coach and companies' management**, cuz when they see managers have changed by the help of Agile it leads to good results for team change."* One respondent highlighted also the persistence requirement: *"Huge management support, both top-down as well as bottom-up approach should be used to introduce changes**. Relentless persistence and patience** to overcome initial problems. Do not give up too quickly, it will required some time. **Fail-tolerant environment and high trust** should be provided from C-level executives. Kazien culture should be introduced and adhered to continuously improve and go one step at a time."* But still, as it is also people factor, it is assumed, that for the formation of solid foundation to trust, the training and coaching would be required. As indicated in chapters earlier, coaching would help a lot in establishing the trust between team members and leaders/ management.

One of the most interesting comments has been made regarding the changing people first: *"In the company where I work**, resistance to change is still a huge problem**, and I would say one may try to hire a lot of middle to **top managers with a different mindset**, and these people will collectively form the 'right' culture for the agile transformation. but there has to be many, and they have to have high positions. otherwise, the current system will simply absorb all of the efforts and they will result in little to none effect."*

The survey answered to the research questions and provided valuable information on the current situation in organizations of Kazakhstan. It proved that the change resistance is one of the main barriers in agile implementation. The people factor overweighs other factors in the methodology implementation and allows to positively answer on the first research question. The change resistance and people mindset are the core of the people factor and this is a real obstacle in the way of becoming agile. The change resistance comes from employees, managers and could also come from the clients. This is very important, when it goes to the client's side, because if the change resistance within the company could be overcame through training and coaching, it is impossible to carry out this with all customers of product/service. The managerial resistance of change comes from not willingness to have the same duties level as for employees, uncomfortable working style. The leaders in the agile methodology implementation should demonstrate high competence. There is a close relationship between people mindset and resistance to change. The mindset has been highlighted to be one of the core underlying reasons in people psychology.

The questionnaire provided the information regarding the adequacy of training and coaching to solve the resistance to change. It has been revealed that the effect of training and coaching for the overcoming this barrier is very high in the industry, half of the employees and managers agree with this statement. Moreover, even those who have not training during the agile methodology implementation in their companies believe that tracing and coaching will definitely solve this question.

In conclusion, it comes to the statement that the resistance to change is one of the most important Agile barriers. However, it will definitely depend on context of particular organisation. The synthesis and analysis of the information gathered during literature review and the conducted survey, the findings and the chapter for conclusion will revisit the research questions made and provide summarised recommendations.

3.2 Interview results

Respondent 1

Respondent 1 is a project manager on Oil & Gas Company and manages a program of small capital projects for the implementation of specialized equipment. He has multi-functional team and a number of contracting organizations under the supervision. In view of the large amount of work in the project program, he uses Agile practices for the successful implementation of the program. At the moment of interview, he is certified as Professional Scrum Master I. He has 3 years of experience as a project manager and uses Agile approach all the time. During this period, one program of projects was completed, and one is in progress.

For the techniques that he applies are Kanban boards, Lean approach when purchasing material and 6 Sigma to constantly improve working methods. He also uses some principles from the Scrum approach, for example Planning, slightly modified Sprint forms, Retrospectives, etc.

The main difficulty of implementation Agile by his opinion was *"the lack of understanding of the value that Agile brings and the development of adapted procedures for project management*". This forms resistance to change. And he agreed with the statement "that resistance to change is one of the main barriers in adapting Agile practices in an organization," but this is due to the low prevalence of culture and understanding of Agile values in his opinion.

As he said, "*the strongest resistance comes from the staff, who are used to working according to the "waterfall" approach, when everything is planned for years to come"*. For example, the management does not understand why to break the scope of work into Use Cases and step by step to design, then build systems on a large facility. He pointed out that the emergence of change resistance occurs periodically, mainly depends on the attraction of new stakeholders to the project.

For the overcoming resistance to change he had several meetings to clarify the Agile approach and values. In essence, this problem is the result of not actively spreading the values of the approach.

He had not ability to have training because of the contract type when he came to the company and definitely strongly recommends providing training so that organizations spread Agile values beyond the IT segment, which will indirectly reduce implementation resistance.

From interview 1 it can be stated that change resistance is real barrier in agile techniques implementation despite of periodic occurrence. The change resistance

among the employees is believed to come from the mindset of people and the culture. This is also related to incomplete understanding of the values that Agile methodology brings. It has been highlighted that training and/or coaching definitely will help to overcome the change resistance.

Respondent 2

Respondent 2 is the architect in IT company, and has been engaged in software design, web application based on microservice architecture. So, as he possesses leadership position, he participates in the selection of engineers, task setting, team motivation. The company consists of 100 people, where horizontal management hierarchy takes place. He has 8 years of experience, and 6 of them he is practicing agile techniques which are mainly represented by Scrum and Kanban methodologies. He took part in different government projects and mobile operators' projects, projects related to payment system.

The resistance to change has been pointed out as an obstacle, it comes not only from team members in the beginning, but also from customers. He stated that the resistance to change from team members has been overcame, as IT industry is increasingly following agile methodologies, but the big resistance they found from the customer side. The reason is that in Scrum, sprints are tedious, and not every customer agrees to work in sprints as they are used to accepting work at the very end, when it's too late to change anything. *"They do not like many meetings. It is conventionally difficult for the team to gather for rallies. Poker planning is not always adequate."*

Respondent said that this is real barrier for customers, and it led to the following: *"The team will need to redo the functionality again, as wishes customer are volatile (which is the basis of agile)" The client asks for one thing, then another, the implementation time is delayed. In the end, you can get absolutely other product."*

For the overcoming resistance to change he pointed out that nowadays IT market itself has already grown and it seems to be ready for such changes. He stated that it was really difficult in the beginning. In start-up it is quite different, since the owner product is a member of your own team, in this case it remains only bring the fruits of agile management.

As he has experience with recruiting engineers due to managerial positions, he recommends some trainings for sure. Because earlier he had to learn from other people on the live basis, and then tried to hire team members, who have already adopted western experience and previous training. In current times they try to hire already trained people, because the external training is very expensive. They had internal trainings in the form of knowledge sharing.

He also said that because it all starts from the head, management needs to master this methodology by themselves, since the results of the initial sprints can show deplorable result, they must be prepared for it. It's time for the team to take and realize all the delights of the methodology.

From the second interview it can be concluded that there is a significant change resistance from the customer side whereas employee and manager's change

resistance is solvable issue in RoK IT industry. Due to high financial expenses required for the external training and coaching sessions, medium companies hire already trained engineers, but training and coaching is still required for better performance.

Respondent 3

Respondent 3 is project manager in Oil & Gas Industry with 3 year of experience in Agile methodology, including the implementation process of Scrum. His company has the department for software development which works with 4.0 Industrialization process and Internet of Things, Smart City.

He participated in the pilot project for Scrum implementation. There were 3-day intensive course on Scrum previously. The methodology introduction consisted of 7 people and was very expensive. So, the trainer from the training came a week after in the form of a mentor, participated in scrum sprints, pointed out problems and shortcomings, made recommendations for the team.

In addition, he added that during the sprint, some tasks were not specified, that they had to be specified during the sprint, unforeseen tasks were included. The subject area was not clear, the specialists were not cross-functional, the specialized guys were very good in comparison with the weak guys.

The change resistance came from the customers and managers mainly and was not big problem for employees, as has been pointed out by respondent. Because in Scrum and agile methodology team members are equal, and managers are used to historically formed hierarchical structure, it is uncomfortable to work with methodology, because they have to work and report every single day. As a result, team members conducted only those tasks that they knew, and they did not want to learn something new.

As a solution every week they spent 30 minutes in some kind of educational program in an informal environment at the workplace, share knowledge and some practical tips. Customer resistance to change, and in addition, sometimes there is no clear understanding of what the customer wants, he/she is not ready to participate in pilot projects, their competence in their industry, they want to work with giants. For the solution, the training and coaching will definitely help, but the cost is very high, as has been highlighted by Respondent 3.

To conclude, from the interview 3 it can be seen that the emerging customer resistance to change plays profound role in the methodology application. And it also influences the project performance, sometimes goes even the projects availability in terms of new orders. The training could help to overcome it, but the high cost has been pointed out.

3.3 Coding of interview

The coding is the process of breaking down the components of data, comparing, conceptualizing and categorizing data [51]. Within the framework the list of key concepts that describe data is formulated and then extracted from the text

of the response. The coding has been carried out to interview responses due to high context of the "free-style" required data. It starts by analysis of text line-by-line, then the labeling the phenomena is carried out. Afterwards, grouping up received labels should be done and it will be basis for categorization of data. During this process the it is important to group the data in the right way, so that in the end of the coding the whole list of interconnected concepts can be depicted on single diagram [51].

According to coding process from each interview 4-5 data segments with key phenomena have been extracted. The data segments from 1 interview have been extracted as follows and depicted on Figure 20. These segments have been labeled as:

- mindset (from "low prevalence of culture and understanding Agile values");
- high change resistance (from "resistance from the staff");
- training to reduce change resistance (from "strongly recommend providing training", "reduce implementation resistance").

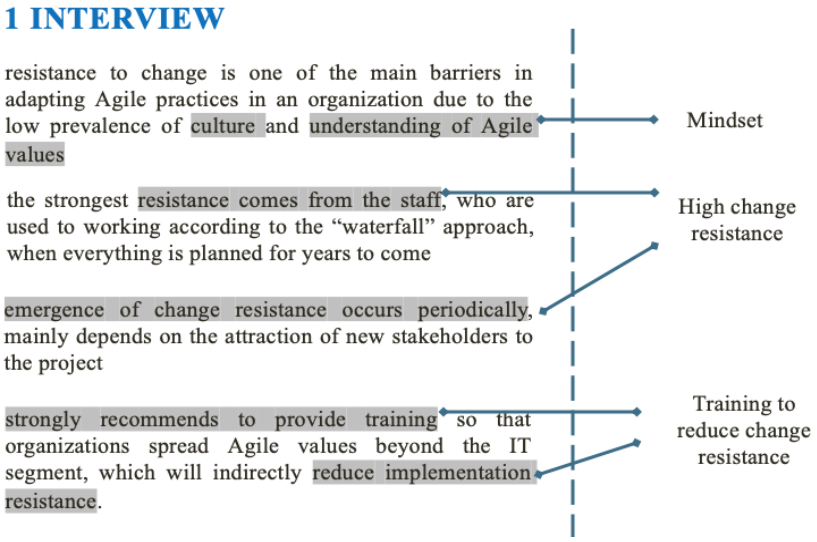

Figure 20 – Coding of 1 interview.
Note – made by Author

The same procedure has been applied to the data from Interview 2 and Interview 3, as has been demonstrated on Figures 21 and 22 accordingly.

After that the grouping of the labels has been carried out. For the provision of the whole picture and convenience of reader, the grouping includes the data received from survey. Here, the key phrases have been extracted and putted in the same manner as for interviews. The conclusions will be made from the coding process, and it depicted in Figure 23. The survey results have demonstrated the following labels:

- high resistance to change is in place;

- there is high influence of mindset to change resistance;
- training and coaching will help in overcoming the resistance to change;
- understanding the values of Agile is important;
- the culture plays a role in change resistance;
- the managers' resistance to change.

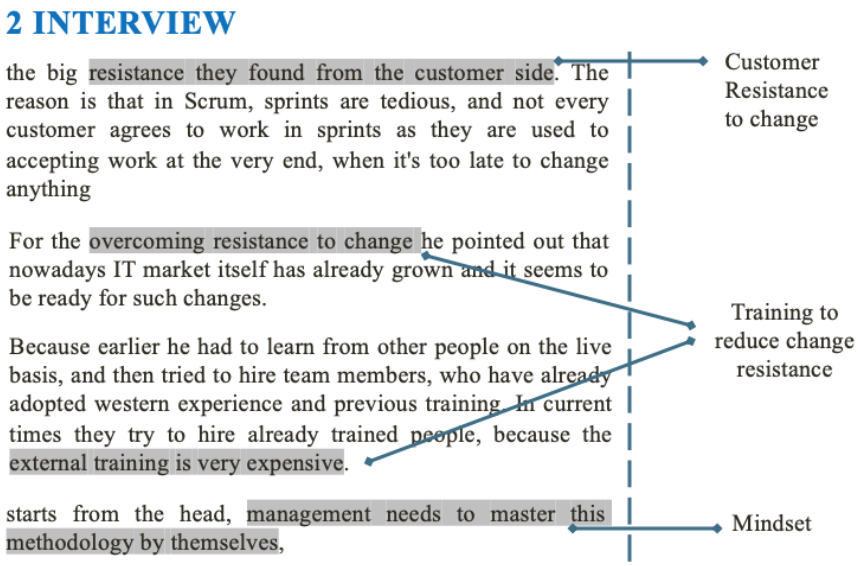

Figure 21– Coding of 2 interview.
Note – made by Author

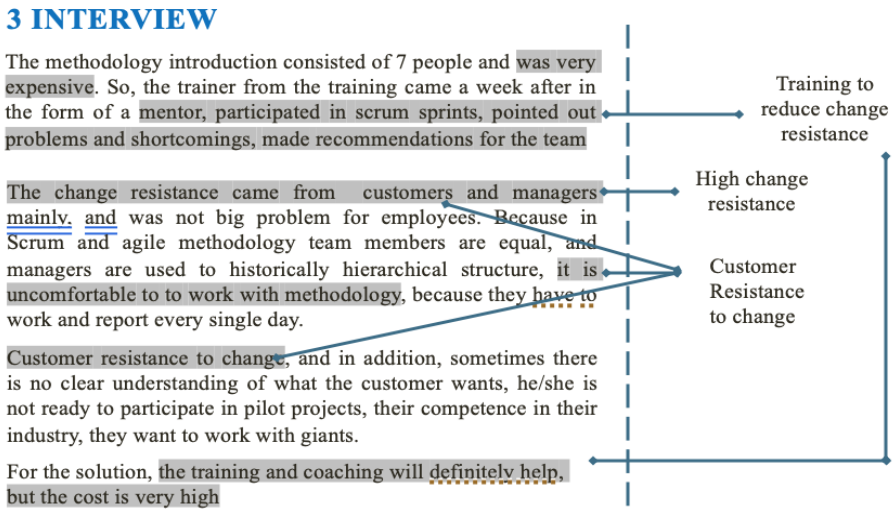

Figure 22– Coding of 3 interview.
Note – made by Author

In conclusion, the consolidation of the survey data and interview coding data reveals that there is high change resistance in the implementation of Agile methodology in the organizations of Kazakhstan. This resistance to change is mainly comes from the people mindset and culture. They form the right understanding or

incomplete understanding of the values that Agile methodology brings to the project management of the organization. And here, resistance to change also could come from the managers side and it seems that also plays profound role. Whereas in IT industry the resistance to change originated from employees and managers is being to be overcame, there is no clear answer on the same situation in other industries. At the same time, the resistance to change from Customers/ Clients is emerging and will take place in current reality.

Training and coaching will be able to solve the change resistance. But again, the component "trust" is very important.

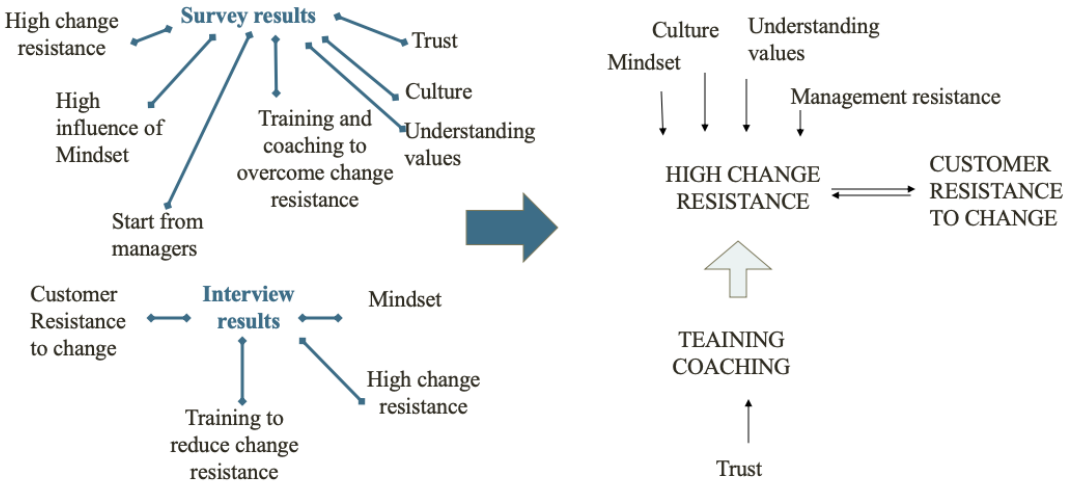

Figure 23 – Research result
Note – made by Author

3.4 Limitations and implications

First of all, the time constraint led to limited number of interviews. Most of potential interviewers had time constraints due to high distance workload. When having a broader timespan, it would be possible to conduct more interviews and with the representatives of all key industries in RoK. It would also allow to obtain a comparison between industries for definition of clear future research area. Subsequently, some bias might have resulted in the process of collecting data. The collected data and research outcome might be bias due to the field of expertise of interviewed people.

Secondly, the limitation is method for sampling in the research. Here the most convenient sample has been applied. The participants of the survey are mainly from the narrow area and are specialized in agile methodologies. However, there are so many employees who would provide powerful feedback on the topic of the study.

Thirdly, the responses reported in the results present self-reported data, which is practical case for many research studies. The respondents' answers are subjective,

and these replies do not depend on the financial and other quantitative characteristic performance data that is integral part of the project success.

Also, some data was restricted due to the confidentiality of the organization which will eventually affect empirical findings. In addition, since research was carried out in Kazakhstan on English, language barrier has been faced as well. All the interviews were conducted in Russian because of preference from respondents, therefore data translation may have caused some bias.

In conclusion to this section, since the study was conducted in Almaty, RoK, the results might be only applicable to Kazakhstani companies and not to other companies located in discrepant countries. Thus, findings from the research might be incapable to be generalized.

CONCLUSION

1. The aim of the master thesis was to identify the extent to which resistance to change influence agile implementation in the organization. In the master dissertation, a survey and interviews were conducted. The external interviews were conducted with 3 respondents, that have been reached out and have time, out of 6. Each of 2 questions stated in section 2 of Chapter 1 will be presented below followed by an answer with the aim of demonstrating the findings from the author's research.

RQ1: Is the change resistance one of the main barriers to agile technology implementation?

The empirical findings from the survey revealed that change resistance is still one of the main barriers in the way to Agile implementation. The change resistance from the stakeholders are mainly dictated by unwillingness to change current position, to learn something new. But here it should be noted that the change resistance is becoming issue of less importance with the widespread agile techniques' application in IT industry and questionable for other industries. Another emerging trend that has been identified as per interviews, is the change resistance from the customer/ client, which is really big obstacle, due to the inability to persist it in common ways that are form organization employees. There is significant "distance" between employee, e.g. service/product provider, and the customer. There is no possibility to easily overcome resistance to change of every customer.

Furthermore, based on the survey results it has been concluded that the change resistance coincides very close with the mindset of people. Although the empirical findings indicated that the change resistance comes after barriers in mindset, it proved the significance of the change resistance in agile methodology implementation. This is due to the fact that people are human beings and have feelings; and the mindset related to emotional and intellectual condition of every single person.

Hence the answer to research question is "Yes, the change resistance coming from human being nature and his mindset, could still be defined as ONE OF THE main barriers in the way to agile methodology implementation".

RQ2: Would the training and coaching be a solution to overcome change resistance?

Based on the thorough literature and empirical findings from the survey it was found that training and coaching would definitely be solution to overcome the change resistance. But, as has been identified per interviews, some organization still do not have enough financial conditions to provide proper trainings and coaching for every team that would work with agile methodologies.

2. In this research study, resistance to change emerged as one of the main barriers in the transition from traditional PM to an Agile. Significant change in the way of working, team culture, deliverables is required not only in area of product/service development but also in other areas within the organization. In author's belief, the research contributed to the theory and practice of implementation of Agile methodology for the following:

- change resistance is still issue, but now it less coming from the employees and more is coming from the customers – the potential future owners of product/service.
- the term “mindset” has been identified to tie with the change resistance.
- the training and coaching definitely will help to overcome the change resistance. But this process is not only strategical and organization, but also is emotional process. This requires further research, and the term “trust” has been introduced in this master thesis. The “trust” ties with the coaching and training and will play profound role in overcoming barriers in the agile methodology implementation.

Future Research

The research carried out by author enabled a simple and solid overview regarding importance of resistance to change in the way of agile methodology implementation in Kazakhstan. However, several aspects have not been studied due to limitations in terms of time frame and scope of respondents. Nonetheless, these limitations are the basis of implications for future research studies.

So, one of the recommendations is to study the relationship between the change resistance and mindset. The systematic review is required. In addition to this, due to different area, future studies could investigate how in the best way to perform training and coaching. Finally, it became evident from interviews, that have been carried out by author, that trust is really important thing in working with people during agile methodology implementation.

LIST OF ABBREVIATIONS

AM – Agile methodology
DSDM – Dynamic Systems Development method
RoK – Republic of Kazakhstan
XP – Extreme Programming

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APPENDIX A

Google Questionnaire Basis

Agile Methodology

Agile project management is an iterative development methodology, which values human communication and feedback, adapting to change, and producing working results instead of comprehensive documentation. The Agile technology of project management is based on 4 core values: individuals and interactions, working software, customer collaboration, responding to change. The aim of questionnaire is to study the extent to which resistance by people to change is one of the main barriers in agile implementation and would training and coaching solve it.

1. Which of the following agile techniques does your company apply (choose 1-2): *

- [ ] XP (Extreme Programming)
- [ ] Scrum
- [ ] Lean
- [ ] Kanban
- [ ] DSDM (Dynamic Systems Development Method)
- [ ] Some general agile techniques and other methodologies
- [ ] NONE, traditional waterfall model

Please identify the industry sector, where you work *

- ○ Education & Science
- ○ Healthcare & Pharmaceuticals
- ○ Energy, Oil & Gas
- ○ Finance & Financial Services
- ○ IT, Telecommuncations
- ○ Transportation & Logistics
- ○ Marketing, Advertising, Real Estate
- ○ Construction
- ○ Airlines, Aerospace
- ○ FMGG
- ○ Другое...

Please identify the current role you hold in your company *

- ○ intern, graduate
- ○ employee
- ○ middle level manager
- ○ high level manager
- ○ deputy CEO, CEO, CFO
- ○ Другое...

Did you and your colleagues have trainings prior the implementation of agile techniques in your organization *

- ○ Yes
- ○ No
- ○ Not applicable

How successful was the introduction of agile technology after trainings? Please choose in a scale from 1 to 5 with 5 being the highest performance (80-100%)

1	2	3	4	5
○	○	○	○	○

Which of the following factors you believe is the most important during Agile technology implementation (choose some)? *

- ☐ People (resistance to change, teams)
- ☐ Organisational (management, organisational boundaries)
- ☐ Process
- ☐ Technical (requirements engineering, quality assurance)

From success factors of Agile methodology implementation, which category was the most important for overcoming the resistance to change? *

- ○ Agile techniques
- ○ Training and coaching
- ○ Team environment
- ○ Другое...

How Training did help to overcome people resistance against the change in the process of Agile implementation? Please choose in a scale from 1 to 5 with 5 being the strongest. *

1	2	3	4	5
○	○	○	○	○

Which of People factor mostly affected the process of Agile implementation? *

- ○ Resistance to change
- ○ Mindset
- ○ Working in teams
- ○ Collaboration with teams

How People factor Resistance to Change affected the process of Agile implementation? Please choose in a scale from 1 to 5 with 5 being the strongest. *

1	2	3	4	5
○	○	○	○	○

How Coaching did help to overcome people resistance against the change in the process of Agile implementation? Please choose in a scale from 1 to 5 with 5 being the strongest. *

1	2	3	4	5
○	○	○	○	○

Do you have any suggestions of measures that would solve the problem of change resistance, other than Training and Coaching? Or has your company applied other measures?

Развернутый ответ

APPENDIX B

English version

1) ***Consent form***

I agree to participate in research study on voluntary basis: Yes/No
I agree that my participation will contribute to the purpose of this master thesis, which objective is to reveal if resistance to change is one of the main marries and whether training and coaching will solve it: Yes/No
I acknowledge that information provided from my side for this study will be treated confidentially: Yes/No
I agree that the results of the study will be set out and my identity will be anonymous: Yes/No

2) Interview questions

Part A – General Info

1. Could you please introduce yourself?
2. Please, describe your current role (and interconnection with Agile Project Management/ APM)
3. How many years of experience do you have? And how many years do you work with Agile techniques?
4. Which Agile methodologies/techniques do you use in your company? (Scrum/Kanban/Lean/etc.) In which big projects did you work?

Part B – Resistance to change

5. Which challenges did you face in implementation agile techniques in your company? Which ones you find are the hardest to overcome?
6. Do you think that resistance to change is one of the MAIN BARRIERS in adopting agile techniques in organization? Why? Could you provide some examples?
7. How often did you face a problem of resistance to changes during agile implementation in your company?
8. How did you overcome it? Why it is different from other factors as technical, process, organizational?

Part C – Training and coaching – will they help to overcome resistance to change?

9. Have you offered/been offered training and/or coaching in APM prior the implementation?

10. If no, specify why and please specify, would you recommend organizations to provide training and coaching for overcoming resistance and better results?

11. If yes, could you provide some details?
12. How much did the training/coaching that you were given in company help you to overcome resistance to change?
13. If yes, in what ways do you think the training policy could be developed?

Do you think, that there is something important you want to add that I have not asked you about?

Russian version

1) Форма согласия

Я согласен участвовать в исследовании на добровольной основе: Да / Нет
Я согласен с тем, что мое участие будет способствовать выполнению этой магистерской диссертации, цель которой состоит в том, чтобы выявить, является ли сопротивление переменам одним из главных барьеров и решит ли это тренинг и коучинг: да / нет
Я признаю, что информация, предоставленная моей стороной для этого исследования, будет рассматриваться конфиденциально: Да / Нет
Я согласен, что результаты исследования будут изложены, и моя личность будет анонимной: Да / Нет

2) Вопросы интервью

Часть А - Общая информация

1. Не могли бы вы представиться рассказать о себе?
2. Пожалуйста, опишите вашу текущую позицию (а также взаимосвязь с Agile Project Management / APM на текущей позиции)?
3. Сколько лет опыта у вас есть? И сколько лет вы работаете с Agile техниками?
4. Какие гибкие методологии / методы вы используете в своей компании? (Scrum / Канбан / Lean/ и т.д.). В каких крупных проектах вы участвовали?

Часть В - Сопротивление переменам

5. С какими проблемами вы столкнулись при внедрении Agile методик в вашей компании? Какие из них вы находите, что труднее всего преодолеть?
6. Считаете ли вы, что сопротивление изменениям является одним из ОСНОВНЫХ БАРЬЕРОВ в адаптации Agile методик в организации? Почему? Не могли бы вы привести несколько примеров?
7. Как часто вы сталкивались с проблемой сопротивления изменениям во время адаптации/внедрения Agile методик в организации?

8. Как вы преодолели это? Почему он отличается от других факторов таких как технические, технологические, организационные?

Часть С - Тренинг/коучинг - помогут ли они преодолеть сопротивление переменам?

9. Вы имели возможность пройти тренинг/коучинг в АРМ до внедрения в организацию?

10. Если нет, укажите, почему, и, пожалуйста, укажите, порекомендуете ли Вы организациям предоставлять работникам тренинг/коучинг для преодоления сопротивления и достижения лучших результатов?

11. Если да, не могли бы вы предоставить некоторые детали?
12. Насколько тренинг/коучинг, который вы проходили в компании, помог вам преодолеть сопротивление переменам?
13. Если да, как, по вашему мнению, можно улучшить политику обучения?

Хотите ли Вы добавить что-то важное, о чем я вас не спросла в интервью?

APPENDIX C

The research articles from the step 1 of literature review

- A_Conceptual_Model_for_Agile_Practices_Adoption.pdf
- 2084-1-3727-1-10-20190711.pdf
- Agile_Development_Methodologies_Are_they.pdf
- Collaborative_Knowledge_Acquisition_for.pdf
- A_study_to_support_agile_methods_more_ef.pdf
- 1-s2.0-S2405896318313442-main.pdf
- 005 K Critical success factors for projects in the petroleum industry
- 007 K integrated model
- Bjarnason A Case Study on Benefits and Side...in Large-Scale Requirements Engineering.pdf
- Sinapathi Sustained Agile Usage A Systematic Literature Review.pdf
- Federoff-Courage2009_Chapter_SuccessfulUserExperienceInAnAg
- Dyngsoir Research Challenges in Large-Scale Agile Software Development.pdf
- Beck embracing change
- Berger The_utility_of_rapid_application_develop
- boehm get ready to agile with care
- Cloke Get_your_agile_freak_on_agile_adoption_a
- cohn Introduc...g An Agile Process to an Organization.docx
- cruzesRecommended Steps for Thematic Synthesis in Software Engineering
- dyngsoyr What is large in large-scale? a tax- onomy of scale for agile software development.
- dyngsoyr Towards+principles+of+large-scale+agile+development_postprint
- elshamy Extreme Programming and Agile Pro...4, Springer, 2006)(ISBN 3540350942)(240s)
- fitzgerald Agile-at-Intel-EJIS1
- freudenberg top 10 burning q
- Large Scale Agile fry Transformation in an On-Demand World
- Hamed, A., Abushama, H., 2013. Popular agil...software development- review and analysis.
- highsmithAgile_Software_Development_The_Business
- hodgkins Agile Program Management- Lesso...the VeriSign Managed Security Services Team
- jalali Global software engineering and agile practices- a systematic review
- WilliamsAndCockburn_AgileSoftwareDevelopment_ItsAboutFeedbackAndChange
- petersen_2010_transitioning_to_agile

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1-s2.0-S2405896316305237-main.pdf	24 марта 2020
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