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Agile transition and adoption human-related challenges and issues: A Grounded Theory approach

Taghi Javdani Gandomani[*], Mina Ziaei Nafchi

Computer Engineering Department, Boroujen Branch, Islamic Azad University, Boroujen, Islamic Republic of Iran

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ABSTRACT

Agile methods in software development have been introduced to cope with the inherent problems of the traditional methods. The increasing prevalence of using these methods reflects their important role in the future of software development. However, leaving traditional approach and adapting to Agile approach has been a central attention of the researchers. Indeed, Agile transition needs enough time and effort and most often is subject to several challenges and barriers, mainly because of its people-centric nature. Human-related challenges in several studies have been reported as the major transition challenges. However, exploring the primary origins and reasons of these challenges has received less effort in a large-scale research study. A Grounded Theory in context of Agile software development has been conducted involving 49 Agile practitioners across the 13 different countries. This study identified different aspects of human-related challenges throughout Agile transition process. The results of this study show that the root of the emerged issues is the people's perceptions about Agile transition. The main purpose of this paper is to describe the origins and reasons of these challenges and issues in order to help software companies and development teams. Considering the findings may help them to facilitate Agile transition process with less cost, time and effort and to get better results by considering these potential challenges.

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1. Introduction

Waterfall model and its successor methods, known as disciplined or traditional methods, have been used by software companies as the primary software development process for many years. These methods have been well-documented over the past four decades and software companies have really adapted to them. Software companies, however, are suffering from inherent problems of traditional methods including heavy and useless documentation, late release, no change in requirements, customer dissatisfaction, and so forth (Cohen, Lindvall, & Costa, 2004).

Agile methods have been introduced to overcome the traditional methods challenges (Boehm, 2002). Agile principles as explained in Agile manifesto mostly have focused on new values that motivate software companies to employ Agile methods instead of traditional methods (Beck et al., 2001). One of the important characteristics of the Agile approach in software development is giving priority to people, their roles, and interactions rather than processes and tools (Conboy, Coyle, Wang, & Pikkarainen, 2011). Due to this feature, people and their roles, responsibilities, and behaviors are the main roots of the differences between Agile and disciplined methods. Because of this feature, leaving traditional methods and moving to Agile methods, Agile transition/transformation (ATP), is not an easy process as expected (Gandomani, Zulzalil, Ghani, & Sultan, 2013).

ATP is considered as an organizational mutation, mainly because the scope of the required changes covers all the organizational behaviors as well as involved people's roles and responsibilities. This is a reason why ATP is not easy and needs enough time and effort. Also, this situation leads to lots of human-related challenges and barriers. Although, some of these challenges and problems have been reported mainly in the articles describing the journeys of Agile migration (Gandomani, Zulzalil, Ghani, Sultan, & Nafchi, 2013), human-related challenges have not been studied in detail in a large-scale research study. Indeed, literature review shows that it seems that there is no research study which directly has focused on ATP as a comprehensive change process in context of software development. It also showed that there are only a few studies

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* Corresponding author.
E-mail addresses: tjavdani@yahoo.com, t_javdani@azad.ac.ir (T. Javdani Gandomani).

which their focus is on finding human-specific challenges and issues. Focusing this gap, the current study started by focusing on the ATP, as a whole change process, mainly to reveal its various aspects and dimensions, in which, human-related challenges and issue is one of them. Indeed, this paper explains the human-related transition challenges and issues, as a part of a large-scale research study on ATP. The presented challenges and issues are enough grounded in real data and are described in detail in the next sections.

The rest of this paper is organized as follows: Section 2 presents a concise background on the transition challenges generally, and human-related challenges particularly. Section 3 explains the employed research methodology. Section 4 presents the findings, followed by a detail discussion in Section 5. Section 6 explains the research limitation. Finally, the last section concludes the paper and gives directions for future work.

2. Background

Human-related challenges in ATP strongly influence the transition (Nerur, Mahapatra, & Mangalaraj, 2005). Actually, human-intensive nature of Agile methods, reflects the critical role of the people in Agile approach (Pikkarainen, Salo, Kuusela, & Abrahamsson, 2012).

So far, many studies have been conducted regarding to the ATP to focus on the journey of Agile transition, the required changes, success factors of the transition, and the transition challenges and problems (Deak, Stålhane, & Sindre, 2016; Dingsøyr, Nerur, Balijepally, & Moe, 2012). Although a few studies have been carried out regarding the challenges that software companies may be faced with during the transition, several studies have reported various challenges while describing the Agile migration in specific case studies (Chang, Messina, & Modigliani, 2016; Conboy et al., 2011; Pikkarainen et al., 2012; Srinivasan & Lundqvist, 2010). Based on these studies, most of the ATP challenges are related to the involved people including team members, managers, and customers. For instance

Most often, people have been strongly adapted to traditional methods, hence, leaving those methods and adapting to new roles and responsibilities could be difficult and challenging (Gandomani, Zulzalil, Abdul Ghani, Sultan, & Sharif, 2014; Nerur et al., 2005). Since most of the changes should be on the people behaviors, attitudes, and mindsets, they may resist against the change (Cockburn & Highsmith, 2001; Lalsing, Kishnah, & Pudaruth, 2012). This issue has been reported in almost all of the ATP case studies.

People collaboration as a serious requirement of Agile software development, can be an important challenge in real environments, as reported by several studies (Gregory, Barroca, Taylor, Salah, & Sharp, 2015; Moe, Aurum, & Dybå, 2012; Nishijima & Dos Santos, 2013; Stray, Lindsjorn, & Sjoberg, 2013). Some other issues have been addressed regarding people communication, involvement, and commitment to the change process (Nerur et al., 2005; Sikka, Dhir, & Hooda, 2016). Some other studies addressed cultural issues, especially in distributed/multi-sites Agile software companies, as serious hindrances for successful and smooth ATP (Alzoubi, Gill, & Al-Ani, 2016; Rothman & Hastie, 2013; Tolfo, Wazlawick, Ferreira, & Forcellini, 2011).

Since the employed research methodology recommends conducting a minor literature review prior to the beginning of the study (Glaser, 1978), detail discussion in light of extensive literature review will be provided after describing the findings of the study. Therefore, this section, providing only initial insights for potential readers, has been kept intentionally concise and short.

3. Research methodology

Grounded Theory (GT) was employed as the most appropriate research methodology for conducting this research study. GT was developed initially by Glaser and Strauss, two American sociologists (Glaser & Strauss, 1967). They defined it as a systematic approach to discover main concern of people involved the context under study (Glaser, 1978). GT is the most suitable for answering the questions like *"what's going on in an area?"* by generating a formal or substantive theory (Corbin & Strauss, 2008). Indeed, the outcome of GT is an *"inductively derived grounded theory about a phenomenon"* (Corbin & Strauss, 2008).

3.1. Why GT?

The primary reasons for choosing GT as the research methodology were: 1) Agile software development offers a people-intensive approach, and GT is best fitted for studying people related issues. 2) GT is an advisable method for studying a phenomenon that is not studied in deep, and ATP as whole process was not studied entirely and most of the its related studies had focused on only some particular aspects of the transition only (Dingsøyr et al., 2012; Sikka et al., 2016), so, employing GT to study ATP was the best choice. 3) GT is suitable when researchers have no hypothesis up-front and are looking for a theory grounded in data (Parry, 1998), exactly what the authors were looking for. 4) Several GT studies in Agile context had led to great findings and excellent substantive theories in the recent years (Baskerville, Pries-Heje, & Madsen, 2011; Coleman & O'Connor, 2007; Hoda, Noble, & Marshall, 2011a).

Although this method usually has been employed in social research studies, it is also useful for wide range of research studies in context of software engineering in general and in Agile context in particular (Gandomani, Zulzalil, Ghani, Sultan, & Sharif, 2013; Hoda, Noble, & Marshall, 2010).

A GT begins with a general area of interest rather than with specific research questions (Parry, 1998). Formulating specific and detailed questions and focusing on them before inception of a qualitative study like GT, may lead to preconceived ideas or hypothesis of the research phenomenon (Glaser, 1998; Moghaddam, 2006). This, however, does not denote that there is no specific problem for the research, but rather the main concern of the involved people will emerge at early stages of the GT (Glaser, 1992, 1998). Hence, this research study was started with a general area of interest, ATP.

3.2. GT procedure and steps

GT defines several steps to systematically develop a grounded theory. Fig. 1 a shows the general outline of GT procedures and steps, and Fig. 1 b shows the artifacts of each step.

3.3. Data collection

Unlike the other research methodologies, GT requires minimum literature review up-front and should start with data collection. Through theoretical sampling, GT researcher jointly collects, codes, and analyzed the data and also decides what data to collect next and where to find them in order to build the theory as it emerges (Glaser, 1978). For this research study, several semi-structured interviews with the participants have been conducted. For more concentrating on the conversation during the interview, the interviews were voice recorded with the consent from the participants. Also, since all the participants were overseas, interviews have been done through on-line media such as Skype, Oovoo, etc.
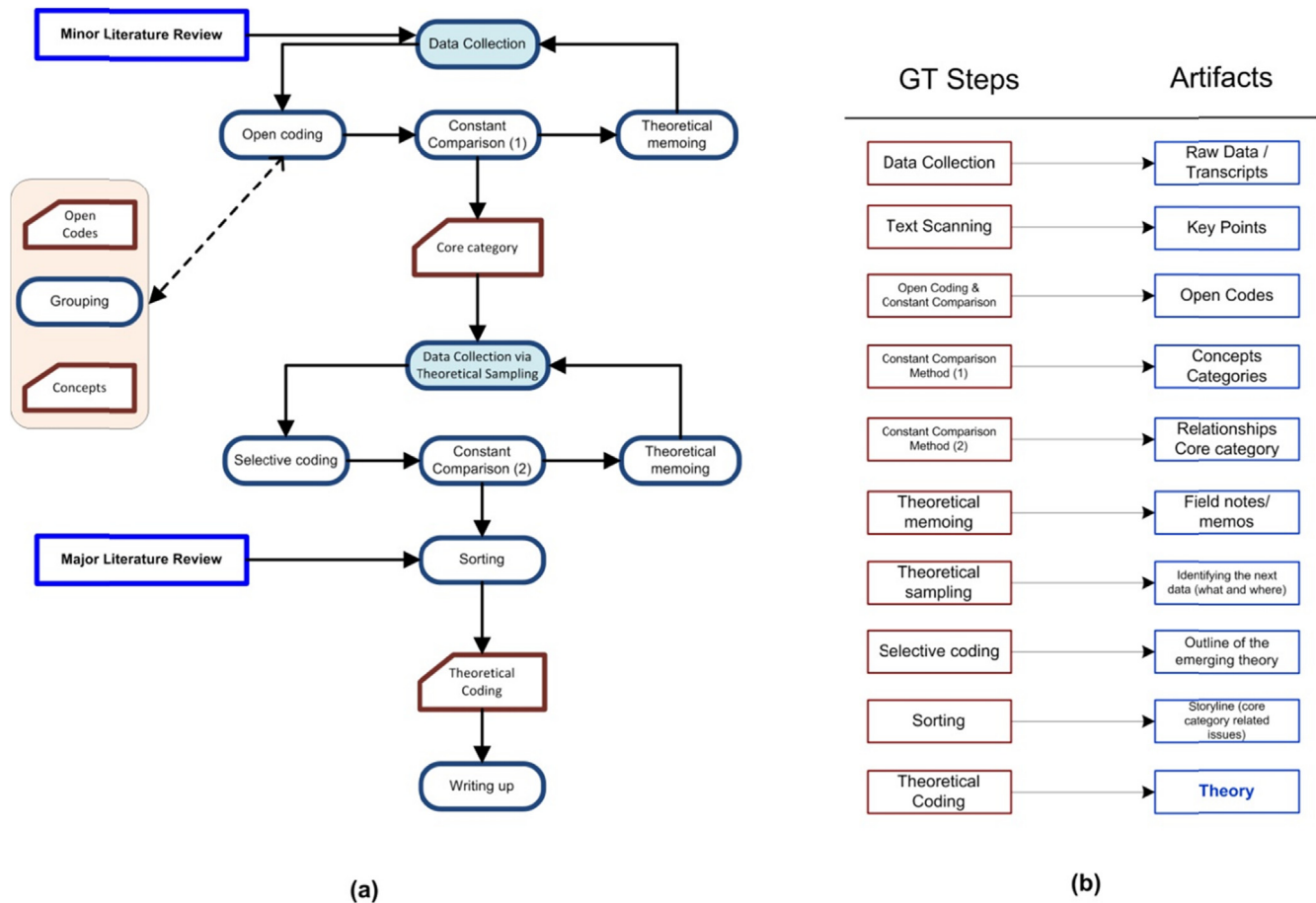
Fig. 1. (a) GT life cycle adopted from (Hoda et al., 2011a) and (b) its steps and artifacts.

The initial questions covered the participants' background, roles, and responsibilities. The next questions were about their experiences in the field of Agile transition and obstacles, challenges, and problems faced by them throughout the transition, and strategies adopted to deal with the challenges. Several concerns emerged by analyzing the initial interviews. Hence, the next questions were formulated relevant to the emerged concerns and were focused in the next interviews. Using this mechanism-theoretical sampling-data collection was continued until theoretical saturation whereby no more ideas or concepts emerged from the data (Glaser & Strauss, 1967). In this study, the interviews with the last participants emerged no new concepts; therefore, data collection was stopped.

3.4. Research context

This study was carried out by using the opinions of forty nine (49) Agile practitioners from 13 different countries who voluntarily attended to this study. A primary requirement for attending this study was having experience in at least one Agile transformation project. In order to collect data from various perspectives, different roles were selected to attend in the study. Table 1 depicts a brief demography of the participants. Most of the participants were from USA and Europe and a few from Asia and Australia. Most of the participants were using XP, Scrum, and lean in their companies. Also, since half of the participants were Agile coaches or consultants, it was a great opportunity to use their experiences in this study. Furthermore, Agile transformation was ongoing in almost

half of the companies, denoted that this study can receive fresh data on Agile transformation. More information about the participants have been provided in Gandomani and Nafchi (2015) and Gandomani, Zulzalil, Ghani, Sultan, and Parizi (2015).

3.5. Data analysis

Data analysis, as a multi-level process in GT, starts once some data is collected. Open coding or substantive coding is the first step of the data analysis (Glaser, 1978). In this study, each interview was transcribed at first in order to use for more than one time during data analysis procedure. Each transcript was reviewed line by line or sentence by sentence to extract *key points*. Then, each key point was assigned with an *open code*. Using constant comparison technique, the newly assigned code was compared with the previous open codes in the same and previous transcripts (Glaser & Strauss, 1967). This technique assisted to check whether the newly assigned code was created previously or not. Also, it helped the researchers to identify the existing concepts (Glaser, 1978). Iterative using of constant comparison led to emerging *categories*, a higher level of data abstraction, each encompassed several related concepts (Glaser, 1978). For instance, Fig. 2 illustrates how the category "impediments to Agile transition" emerged from underlying concepts.

After analyzing each interview for clarifying viewpoints of the respondents, supplementary data was collected in form of *memos* (Glaser, 1998). This process helped the researchers to enrich the emergent codes, concepts and categories as well as the

Table 1
Detailed demographic of the participants (AC: Agile Coach, PM: Project Manager, SM: Scrum Master, DEV: Developer, HDD: Head of Development Dept, CON: Consultant, QA: Quality Assurance).

| P#	SD exp. (years)	Agile exp. (years)	Agile position	Agile methods	Country	P#	SD exp. (years)	Agile exp. (years)	Agile position	Agile methods	Country
P1	14	8	HDD	XP, Scrum, Kanban	Finland	P26	13	6	AC	Scrum, XP	India
P2	25	15	AC	Scrum, Kanban	USA	P27	14	5	SM	Scrum, Kanban	USA
P3	7	7	PM	XP, Scrum, Kanban	USA	P28	15	6	AC	Scrum, Kanban	Germany
P4	10	3	PM	XP, Scrum, Kanban	Bulgaria	P29	10	2	PM	Scrum	Norway
P5	10	2	PM	Scrum, Kanban	Iran	P30	35	3	DEV	Scrum	USA
P6	11	8	CON	Scrum, Kanban, FDD	Australia	P31	17	4	QA	Scrum	USA
P7	6	3	DEV	Scrum	Greek	P32	25	5	AC	Scrum, Scrumban	USA
P8	10	5	PM	Scrum, Kanban	Germany	P33	41	3	MGR	Scrum, Kanban	USA
P9	20	10	HDD	Scrum	Spain	P34	7	3	QA	Scrum, Kanban	USA
P10	20	3	SM	Scrum, Kanban	Spain	P35	20	8	HDD	Scrum, XP	USA
P11	10	4	AC, SM	XP, Scrum, Kanban	India	P36	17	7	MGR	Scrum, Scrumban	USA
P12	16	3	HDD	Scrum, Kanban	USA	P37	13	1	HDD	Scrum	USA
P13	14	6	AC, CON	Scrum, Kanban	Finland	P38	7	2	PM	Scrum	USA
P14	15	3	MGR	Scrum, Kanban	Iran	P39	35	10	AC	XP, Scrum, Kanban	USA
P15	10	6	CON	Scrum	Indonesia	P40	30	15	AC	Scrum, Kanban	USA
P16	21	10	PM	Kanban	USA	P41	11	4	PM	Scrum, Kanban	India
P17	19	5	PM	Scrum, Kanban	Sweden	P42	14	4	DEV	Scrum	Spain
P18	8	3	DEV	Scrum	Sweden	P43	18	6	AC	Scrum, XP	USA
P19	13	6	PM	Scrum	India	P44	17	5	SM	Scrum, Kanban	Norway
P20	11	3	HDD, PM	Scrum, Kanban	USA	P45	11	6	PM	Scrum	USA
P21	16	7	SM	XP, Scrum	USA	P46	14	3	PM	Scrum, XP	USA
P22	11	5	AC	Scrum, Kanban	France	P47	11	2	DEV	Scrum	USA
P23	16	8	AC	XP, Scrum, Kanban	USA	P48	22	8	AC	Scrum, Kanban	Spain
P24	15	7	SM	Scrum, XP	USA	P49	17	6	SM	Scrum	USA
P25	8	4	DEV	Scrum, XP	USA						
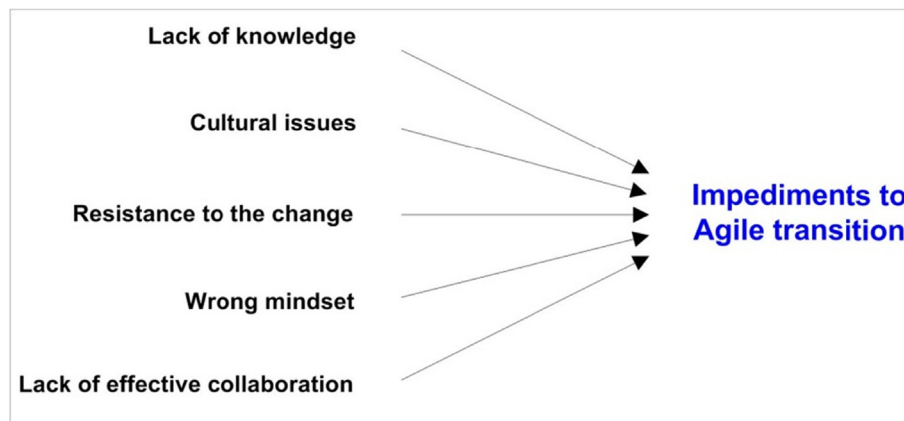
Fig. 2. Emergence of category impediments to Agile transition from underlying concepts.

relationships between them (Glaser, 1978). Glaser (1978) emphasizes on *"the theorizing write-up of ideas about substantive codes and their theoretically coded relationships as they emerge during coding, collecting and analyzing data"*. Once theoretical saturation was reached, sorting the theoretical memos according to the conceptual ideation of the memos was started. Theoretical sorting of memos is an *"essential step"* for formulating the theory. In fact, it helps to *"put the fractured data back together"* (Glaser, 1978). Theoretical coding or theory building was the last step of data analysis in which the researchers looked for finding the relationships between core category which accounts for most of the variation of data, and other categories. Glaser (1992) emphasizes on induction or emerging theory without forcing and suggests several theoretical coding families to assist the GT researchers to develop substantive theory.

In this study, *"Agile transition and adoption process"* was the core category and *"Agile transition human-related challenges"* was one of its related categories. The next sections solely focus on this category and describe the emergent concepts in detail.

More details about the adopted research methodology, its

procedure, coding style, data analysis, core category and its related categories can be found at the latest publications of the authors (Gandomani & Nafchi, 2015; Gandomani, Zulzalil, Ghani, Sultan, & Parizi, 2014).

4. Findings: human-related challenges and issues

Conducting multi-level data analysis led to emergence of category of *"Agile transition human-related challenges"*. Fig. 3 shows the emergence of this theory and its properties from underlying concepts. Data analysis also showed that human-related challenges play a significant negative in moving to Agile. The rationale behind this fact is the important role of people in Agile methods compared with the traditional disciplined/traditional methods. Since, GT papers often include quotes from interviews to highlight certain points (Dorairaj, Noble, & Malik, 2012a, 2012b; Hoda, Noble, & Marshall, 2011b; Martin, Biddle, & Noble, 2009), the next parts also include a few quotes to support the findings.
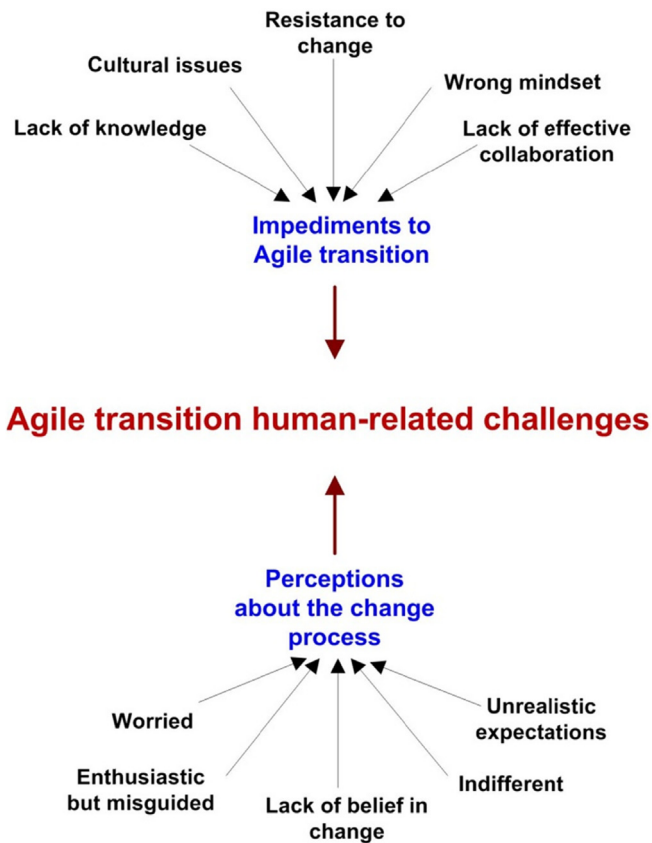
Fig. 3. Emergence of the category Agile transition human-related challenges from underlying concepts.

4.1. Impediments to Agile transition

Like every change, software practitioners who are adapted to their current development process, act as impediments to change development process from traditional to Agile. Data analysis showed five major reasons for this challenge including lack of knowledge, cultural issues, wrong mindset, lack of collaboration, and resistance to the change.

4.1.1. Lack of knowledge

Lack of sufficient knowledge about Agile, its principles, and its values was addressed as a significant impediment to Agile transition.

"Common challenges tend to be around education and understanding. Lack of deep understanding of Agile approach, makes people reaction unpredictable and often ineffective." P6, Agile Consultant.

"People are my main problem [in transformation]. They need to be coached and trained, but most of them resist against changes. In most of the times, their knowledge is not enough about Agile, I mean that they don't feel the reality of Agile and its values. Thus, they may follow their incorrect or wrong approach." P23, Agile Coach.

This problem is not only seen among the team members, but also among the other stakeholders such as managers and customers.

"The big issue was lack of buy-in from customers and stakeholders; low morale, misunderstanding. These items suffered transformation process." P6, Agile Consultant.

"Generally, customers' information is not deep on Agile. They have no concern for development process... so, they have no sense about Agile, their roles ... in transformation." P2, Agile Coach.

Besides the negative effects of this problem on Agile transition, it leads to other adverse consequences that they are also harmful for success of the transition. Low collaboration, wrong mindset, unrealistic expectations, etc. are some of its adverse consequences that some of them are described in this article.

4.1.2. Cultural issues

Data analysis showed that cultural issues are also significant challenges that make the transition harder than expected.

"We had many problems in some Agile practices that their origins were cultural issues. Trust to each other, collaboration, collective ownership and many other practices were and are hard to be adopted. In many cases people preferred their own benefits rather than team's benefit." P5, Project Manager.

"Some of the failures for the Agile transformation were due to culture. The culture of [Company name] is more on Control and Competences, Scrum is more on Cooperation and Cultivation. That's why we have also decided to use Kanban and to focus more on doing Agile than being Agile. We think that the first step is doing and being will follow. We can't do a culture assessment of the team because of the unions. It could be forbidden by the [his country] law." P22, Agile Coach.

This challenge sometime arises from organizational culture rather than people's culture. In this case, focusing on organizational behaviors and improving them would be the only solution.

"I have been faced with many cultural problems. These problems aren't only related to people, most often, they return to organizational culture and behavior. Organizations usually dictate their own culture to people. I mean that sometimes, the real problem isn't people's culture; it's organizational culture." P23, Agile Coach.

"I don't know it is cultural problem or no, but I think that being self-organized team is completely depending on the culture of each company. Success in some practices has direct relation with organizational culture and people's habits. I believe that cultural issues affect human aspects in organizations." P4, Project Manager.

This challenge was addressed by almost all the research participants. They believed that cultural issues need to be considered as a significant impediment to change.

4.1.3. Resistance to the change

People usually are accustomed to everyday behaviors in routine life and Agile transition is subject to this challenge too.

"Resistance to change in some teams and CEOs was the major challenge we faced with during the process. Most of them [people] are accustomed to their current roles and activities and naturally resist change." P10, Scrum Master.

"I should mention about the people resistance against change. Some managers did not accept decreasing their power and let people to be free." P19, Project Manager.

As the participants explained, like other organizational changes, this challenge is mostly due to the involved people's concerns about their jobs and afraid of losing their roles in development process.

"Very often, people's concern about their role and personal career is common issue. Sometimes, it is an organizational reporting structure but as it often is, it is always a people's problem." P2, Agile Coach.

Due to the critical role of the people in Agile methods, this challenge may make the transition frustrating and time-consuming.

4.1.4. Wrong mindset

This issue was seen as another human-related challenge during Agile transition. This challenge, which can be seen regarding all stakeholders, mainly arises from perceptions and beliefs about the development process, required roles and responsibilities, and their fear of change.

"The number one and huge cultural problem is pretty much everyone having the wrong mindset. Managers think command and control which is excellent for managing work that is about execution [but] is unsuitable for design and development. Customers expect to purchase new product design, development work with fixed price, fixed scope contracts. Legislators assume the same. So basically all parties related to software product development mostly get it completely and hopelessly wrong." P1, Head of Development Department.

"... Some others preferred to have a leader that controls them, they afraid for going wrong. This attitude is contradictory to Agile approach." P19, Project Manager.

This issue is more critical in association with managers and those who have more authority in the company or team.

"In my last two transformations, I faced with managers who asked me impossible stuffs. They were not aware of the real change and its circumstances. Generally, some of managers are not interested in relinquishing their power." P13, Agile Coach.

"I think that our problems were in two categories: First, the main challenge was to get the founder, owner and inventor of the company to relinquish control and learn how to delegate?" P19, Project Manager.

This challenge was referred to as *"hard to diagnose"* (P28) and *"real but hidden problem"* (P22) too. It seemed that this problem is a common issue among the ATP practitioners.

4.1.5. Lack of effective collaboration

Lack of collaboration was the last impeding factor which was discovered within data analysis process.

Since effective collaboration and involvement is necessary for success of ATP, this issue strongly makes the transition hard and difficult.

"Demand collaboration in Agile methods makes some problems in many cases... People accustomed to do their work in their own ways; it was hard to change it, even for enthusiastic people." P17, Project Manager.

"Many people have problem in collaboration and communication. They have not enough confidence to participate in group works and
group decision making. In this case communication is not good." P11, Agile Coach.

The participants by stressing on 'team work', emphasized on effective collaboration as a key factor in organizing Agile teams. Hence, lack of effective collaboration results in difficulty in setting up a cross-functional team.

"Agile means that the team is responsible for its work [rather than individuals] and how this work is done. In Spain hierarchical structures are still the usual patterns and people are not used to make decisions on their own. I mean that collaboration is weak in many cases." P9, Head of Development Department.

Some of the respondents addressed this issue in people's culture and their organizational habits (P11, P19, P24) and some others emphasized on the nature of distributed teams which leads to this issue. (P16, P25).

4.2. People's perceptions about the change process

This study discovered that people's reactions to the change mainly come from their perceptions about it. Also, their behaviors during Agile transition depend on their perceptions and sensations. The participants addressed several perceptions and feelings in Agile teams, before and during Agile transition as follows.

4.2.1. Worried about the transition

This perception was addressed as a common perception among the members involved in the transition.

"Honestly, I was enthusiastic as well as worried. You know, after seven years developing software using waterfall-based tools and methods, I was worried about our future development strategy. We were really adapted to those methods." P5, Project Manager.

"We didn't know more detail about Scrum and XP; I heard something about their practices, but not in deep. Always I worried about adapting to new methodology. You know, I worried about people judging me, I should have a pair. I had lots of concerns about Agile practices..." P25, Agile Developer.

Some of the participants by explaining their experiences emphasized that people were worried as well as enthusiastic. (P1, P11, P13).

4.2.2. Enthusiastic but misguided

Enthusiasm for Agile was reported as both accelerator and impediment factor in ATP. It was addressed as one of the major reasons leading to inception of ATP. This factor along with the problems of traditional methodologies had motivated many people to change their development methods.

"I think that most of people were enthusiastic about change. They got tired and they were interested in change." P17, Project Manager.

"I was enthusiastic about migrating to Agile... I had read about it and I believed that it can solve most of our problems. I was really interested in it." P4, Project Manager.

Enthusiasm of team members was addressed by most of the respondents as a human aspect that had impressed their transformation process. Some of the participants emphasized that high enthusiasm for Agile transition can lead to unrealistic expectations

about Agile and its values.

"I saw many people who were so eager to Agile, but due to their enthusiasm found unrealistic expectations..." P17, Project Manager.

"The problem I was finding (and yes this did really happen) was that some enthusiastic but misguided members believed that going Agile will solve all of their problems. To me, working with such people is harder than opponents." P28, Agile Coach.

Getting tired of the problems with traditional methods and lack of knowledge about Agile can make enthusiastic people misguided.

"We have critical problems with over-enthusiastic and misguided team members. Even now, after six months, we still need to deal with these persons..." P43, Agile Coach.

Despite of the mentioned positive effects, this dimension of enthusiasm had an adverse effect on Agile transition. (P31, P30, P41).

4.2.3. Lack of belief in the change

The participants emphasized that feeling need for Agile adoption impresses people during transformation process.

"Feeling need for change is a key in the transition process. It can affect all aspects of moving to Agile, since it's about people's behaviors and responsibilities." P4, Project Manager.

Sometimes involved members have no feelings for employing Agile methods in their projects, therefore, there is no enthusiasm for Agile transformation. This makes the transition harder than expected.

"In a successful [software] company, CEO had hired me to help them to move to Agile as a part-time coach. Though they had some problems, they had not feelings for change... After two months struggling with them, I left the company." P28, Agile Coach.

Feeling the need for employing Agile methods makes people strong in Agile transition and the lack of it, represents a real risk for long-term success in the transition.

"When technical members have no feeling to change their development process and managers have no feeling to focus on Agile values, the transition process will fail." P32, Agile Coach.

Some of the respondents also discussed the importance of sensing real reasons for 'going Agile' before starting the transition since they believed that it impresses the whole of Agile transition and can shape perceptions of people and help them in changing themselves.

4.2.4. Indifferent to the change

The participants explained that while some people were worried or enthusiastic about Agile transition, some others were indifferent to the change process.

"As a manager, I was enthusiastic. But I saw that some of my staffs were indifferent [to change], I think that they were those who had minimum interaction with customers (and so, problems).They had little information about Agile values and its business advantages." P14, Senior Manager.

Lack of knowledge and lack of enough motivation were hidden reasons of this human perception during the change process.

"I faced with some people that were indifferent to change. I believe that what caused them to become indifferent to transformation was lack of knowledge about this process." P22, Agile Coach.

*"People, who had no motivation to being Agile, I mean those who are indifferent to change, need more time to change themselves and find their ways. Coaches must pay attention to those people."*P26, Agile Coach.

This issue was mainly addressed by some of the project managers. They explained when there is no clear reason for starting the change process; some people are really indifferent to the transition.

4.2.5. Unrealistic expectations

Unrealistic expectations about Agile methods and their roles in software development process was the last people's perception addressed by the participants.

"People should be realistic and have correct perception about changes achievable values. Some of my colleagues had wrong expectations at the beginning and it made a lot of problems for whole of the team." P7, Agile Developer.

"In my last two transformations, I faced with managers that asked me impossible stuffs... their expectations from Agile methods, Agile values and related items were completely wrong." P16, Project Manager.

Sometimes, wrong expectations may lead to other challenges and problems during Agile transition and may get Agile teams in trouble.

"I should mention that having wrong expectations about Agile is a major risk in transformation process. Sometime people's enthusiasm leads them to unrealistic expectations, so, Agile coaches need more effort to change their Agile wrong mindsets..." P11, Agile Coach.

Some other participants also mentioned about this issue and its consequences. They addressed effective training, and full-time on-site coaching as the most effective solutions that are useful to overcome this challenge.

5. Discussion

As Glaser and Strauss (Glaser & Strauss, 1967) recommended, after identifying the findings of a GT study, it is necessary to evaluate the findings against the existing literature and to judge the findings in light of the literature. Though some of the impediments explored in this study seem to be general human-related barriers in any change process, it is the first time that a change process, i.e. ATP, has been well empirically studied through a large scale study in software practitioners which known as knowledge workers. Furthermore, several new and different human-related impediments and hindrances have been identified in this study. Moreover, this study classified and structured the explored challenges and barriers, and revealed their origins and roots as well.

Agile manifesto emphasizes on the role of individuals on the software development process comparing to the disciplined methodologies. It clearly emphasizes that focusing on people has more priority compared to the process (Beck et al., 2001). In a Case Study research, Conboy et al. (2011) discussed that increasing use of

Agile approach in software companies and pressure to transition to Agile methods have lead to more focus on people-related challenges carefully. They argued that due to the critical role of the people in the transition, the first step should be studying people-related challenges. In one of the initial studies, Agile migration challenges were classified into four major categories, so that, *"people-related issues"* was one of them (Nerur et al., 2005). However, in that study, there was no detail discussion on the classification and explaining the origins of the challenges.

In general, Agile transition human-related challenges and problems have not been studied directly in the previous studies and most often, they have been discussed when the researchers were describing the journey of Agile transition. However, the findings of the current study are supported by the previous studies. The findings of the current study revealed several impediments to ATP, as explained in the previous section. In the following sub-sections, the findings of the previous studies have been discussed in order to find out whether there is a link between them and the findings of the current study.

5.1. Impediments to Agile transition

The current study addressed Lack of knowledge as a significant challenge faced by software companies during the transition. Landim, Albuquerque, and Macedo (2010) addressed this issue as a significant reason of the transition failure and have recommended several strategies to achieve sufficient knowledge in context of Agile software development. They emphasized on understanding of Agile practices as well as Agile values by all the people involved in the transition. Also, Bergin and Grossman (2006) emphasized on learning of Agile principles and values besides of methods and practices to improve Agile practitioners' knowledge. Asnawi, Gravell, and Wills (2012a) showed that low perception from Agile user towards Agile methodologies is a barrier of getting everyone in Agile teams to take responsibilities. Furthermore, some other researchers, by addressing lack of knowledge as a transition challenges, emphasized on the critical role of training in improving the team members' knowledge as a success key of the transition (Conboy et al., 2011; Lingard & Barkataki, 2011; Srinivasan & Lundqvist, 2010; Wang, Conboy, & Pikkarainen, 2012). Cultural issues were identified as another human-related challenge in Agile transition. Role of the people and organizational culture in Agile transition have been discussed in several research studies (Iivari & Iivari, 2011; Nerur et al., 2005; Tolfo et al., 2011). Cockburn and Highsmith (2001) focused on the role of the people's culture in the transition and explained how this issue can be an impediment to successful migration to Agile. Also, organizational culture was addressed as a critical barrier to acceptance of Agile roles and responsibilities by Nerur et al. (2005). Dorairaj et al. (2012a, 2012b) by focusing on lack of understanding argued that lack of trust as a cultural issue affects Agile transformation. They discussed the role of this issue particularly in distributed teams. Also, organizational culture was pointed out by Chan and Thong (2009) as one the potential determinants of Agile acceptance. Moreover, Tolfo et al. [31] explained different levels of organizational culture and identified several obstacles in lower levels of organizational culture regarding to Agile adoption. Cultural issues and their effects on Agile migration also were studied in some other research studies (Asnawi, Gravell, & Wills, 2012b; Iivari & Iivari, 2011; Srinivasan & Lundqvist, 2010).

This study also showed that resistance to the change was another barrier of Agile transition. Although this challenge is a common problem in any change process, people-intensive nature of Agile methods makes this issue more critical in Agile transition (Conboy et al., 2011). This issue was emphasized by other studies too (Chan & Thong, 2009; Cohn & Ford, 2003; Nerur et al., 2005).

Cohn and Ford (2003) argued that since Agile migration needs to change people's mindset, they naturally resist to the transition. This challenge was also reported as a significant problem that software companies are faced with during Agile transition and adoption (Hajjdiab & Taleb, 2011a, 2011b; Laanti, Salo, & Abrahamsson, 2011; Pikkarainen et al., 2012).

Another finding of this study was addressing the wrong mindset about the transition. Traditional mindset about software development and its required activities, roles, and responsibilities was addressed previously as an important barrier to Agile adoption (Nerur et al., 2005). This problem causes people show unexpected and most often negative reaction to the required changes. For example, Sureshchandra and Shrinivasavadhani (2008) argued that some of the team members like software project managers cannot forget their previous traditional roles and positions, and unconsciously act as a barrier to Agile transformation. Furthermore, most often senior and middle managers cannot relinquish their previous authority and believe in *"command and control"* in project management that makes the transition harder than expected (Nerur et al., 2005).

Finally, the current study identified lack of effective collaboration as an Agile transition human-related challenge. Since Agile methods are people-extensive, effective collaboration plays a critical role in Agile transition. Moe et al. (2012) have studied lack of collaboration in 'shared-decision making' as one of the Agile adoption requirement and described the challenges software companies may face because of this problem. Mishra, Mishra, and Ostrovska (2012) by addressing lack of collaboration as an Agile transition challenge, showed the impacts of physical ambiance on improvement of communication, coordination, and collaboration in Agile transition. Furthermore, this issue has been mentioned as one the customers related challenge in Agile transition process by several studies (Cohen et al., 2004; Hoda et al., 2011b; Misra, Kumar, & Kumar, 2009).

5.2. People's perceptions about Agile transition

People's perception was another emerged category in associated with the transition challenges. The current study showed that people have different perceptions and mindsets about the change process.

While some people were enthusiastic or worried about the change, some others were indifferent. Also, some of the people had unrealistic expectation about transformation process, Agile and its values. At the same time, lack of belief in the change acted as a barrier to shape people's perceptions about the change process. Conboy et al. (2011) also pointed out people's perceptions as barriers to Agile methods usage and adoption. Patel, Lycett, Macredie, and De Cesare (2006) studied people's perceptions of agility and showed that majority of their research study participants perceive Agile values and principles as important factors that can help Agile teams to adapt to Agile practices. However, they discussed that team members sometimes are subject to unrealistic expectations. Begel and Nagappan (2007) at Microsoft showed that while people were interested in using Agile practices to improve communication and increase design flexibility, they worried about scaling Agile in larger projects, participating in too many meetings and the coordinating Agile and non-Agile teams. Lalsing et al. (2012) discovered that "shared perceptions and objectives to achieve organizational goals" which was called team climate, affects team performance in Agile software development. O'Connor (2011) by addressing some of the wrong perceptions about Agile approach, explained that Agile coaches sometimes should correct people unrealistic expectations during Agile transition. Other studies also have mentioned to the various people's perceptions of Agile transition and most of

them have focused on the negative perceptions (Esfahani, 2012; Hajjdiab & Taleb, 2011a, 2011b; Srinivasan & Lundqvist, 2010).

6. Research limitations

Since all the codes, concepts, categories and their properties were collected directly from the real environments, all the findings of the current study are enough grounded in the substantive data (Glaser, 1998).

Nevertheless, this article does not claim that its findings are universal, because its access to appropriate resources was limited to those participants that voluntarily had attended to this research. However, it claims that its findings describe and characterize the area under study (Adolph & Kruchten, 2008), but the inherent limitation of GT is that the emerged theory is only grounded in the particular contexts investigated in the research (Adolph & Kruchten, 2008).

A common risk for a study like the current research study is ascertaining authenticity of the participants (James & Bushe, 2006). It is really difficult to ensure weather online identity presented to the researchers is that of the invited alias or participant of another one using somebody else ID (James & Bushe, 2006). However, the best strategy to mitigate this risk is using iterative discussions and asking different questions about the emerging concepts, as applied in this study.

7. Conclusion and future work

Conducting a Grounded Theory involving 49 Agile experts from 13 countries showed that ATP is subject to various challenges and barriers. Due to the people-centric nature of Agile methods and Agile transition process, human-related challenges are the most critical ones during the transition.

However, the literature provides some general impediments of ATP, this study showed human-related challenges most often act as the most important impediments to the change. The results showed the human-related challenges and issues are classified in the two main categories; *impediments to Agile transition* and *perceptions about the change process*. Lack of knowledge, cultural issues, resistance to change, wrong mindset, and lack of effective collaboration were the most important human-related impediments to ATP, as explored in this study. Furthermore, data analysis showed various negative people's perceptions about Agile transition including worried about the transition, enthusiastic but misguided, lack of belief in the change, indifferent to the change, and unrealistic expectations that have negative impacts on Agile transition and adoption. This study also revealed the common origins of the impediments to ATP.

This study, however, cannot identify to what extent the emergent impediments may affect Agile transition. Conducting a quantitative research study can be helpful to answer this question. The authors also suggest conducting a research study to find the supporting strategies to mitigate the ATP human-related challenges and to limit their adverse effects on the transition. Furthermore, software researchers are advised to examine to what extent awareness of the emerged impediments and challenges can facilitate the ATP, as well as, mitigate its required time and cost.

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