How Human Aspects Impress Agile Software Development Transition and Adoption

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Abstract

Many software companies are interested in using Agile methods in their software projects. Contrary to traditional software development methods, Agile methods are people oriented. This fact shows the significant role of individuals in these methods. Increasing prevalence of Agile methods forces software companies to consider people related factors as critical issues in adoption and transition to Agile methods and practices. This article focused on human aspects of Agile transformation process by conducting a Grounded Theory study involving 32 Agile experts. The main contribution of this article is identification and classification of diverse human aspects of Agile transformation process. Analyzing collected data showed that human aspects of Agile transformation process can be classified in several categories. While some of them are impediments to change, some others act as change accelerators. At the same time people's perceptions about change process and incentive factors can shape and form human aspects during the Agile transformation process. Each of these categories encompasses its own factors which have negative or positive effect on change process.

Keywords: Agile software development, Agile methods, Agile transformation, Agile transition, human aspects, Grounded Theory

1. Introduction

Agile methodologies as reaction to traditional methods offer different values to software industry. Indeed, by defining different development approach, they have focused on different achievements, such as higher quality, faster delivery, embracing change, light weight documentation and so forth [1].

The main issue is that for moving to Agile, all of the development practitioners should be involved in the process which is called Agile transformation/transition process (ATP) and it makes this process problematic and difficult. Furthermore, transformation process needs extensive changes in all aspects of organization [2].

Changing development method from traditional to Agile methods needs extensive changes in people's mindsets and their behaviors [1, 3]. It means that people play a critical role in ATP, and can act both as drivers and hindrances of Agile transition and adoption. Several studies have been carried out on the role of the people in moving to Agile [3-10]. Some of them have explained how people's resistance against change impresses transformation [8, 9]. Some others have focused on cultural challenges and issues [9, 10]. At the same time, people's reactions to their new roles were discussed by some other studies [11]. Since all parties from developers to top management and even customers impress Agile transition, there are many parameters that should be considered in such studies. Conducting a Grounded

Theory (GT) study showed that "human aspects of Agile transformation process" is one of the primary emerged categories. This article takes a look at this concept using GT perspective and explains how people may affect adoption and transition to Agile methods.

The rest of this article is organized subsequently as: Section 2 provides a concise background; Section 3 explains research methodology; Section 4 shows the results of the study. Afterward, a detail discussion is provided followed by addressing limitations of the study in the next section and finally Section 7 provides conclusion and future works.

2. Background

By creating and signing "Agile manifesto", Agile methods were introduced as replacements of traditional methods [12]. During the past few years, several Agile methods have been proposed, including XP, Scrum, Feature Driven Development (FDD), Crystal Family, Test Driven Development (TDD), Dynamic System Development Methodology (DSDM), *etc*. Although these methods have different practices, they stress on the same values.

Leaving traditional methods and moving to Agile methods is not an overnight process and needs much efforts and lasting enough time. Indeed, two simultaneously tasks should be done for moving to Agile; "forgetting the traditional mindsets and behaviors" and "adopting Agile practices". Both of these tasks are people centric and it makes them hard. This is because we mentioned that Agile transformation process is not easy and fast.

There are many challenges during Agile transition. Because of the people-centered nature of this process, most of the transformation challenges are about people [13]. Human aspects of ATP are reported as major obstacles in Agile adoption [14]. Cultural problems also have negative effects on transformation process [5, 15].

Traditional mindset of software practitioners is also one of the main hindrances of this process [9, 13, 16]. Command and control mindset causes people resist against the change [9]. Most often, people cannot forget their previous roles and so, adapting to the new role gets so hard [1, 3, 11]. People's collaboration and commitment are also critical prerequisites of transformation process, but achieving these factors, is not easy and people, particularly those with traditional mindsets, are not interested in cooperation with each other in a collaborative environment [11, 17]. Top and middle management also act as barriers of ATP, mostly because of their mindsets and lack of knowledge about Agile values and principles [5, 9, 18].

Despite of the above negative effects, there are many reports on positive effects of people on ATP too. Top management and people commitment are critical drivers of transformation process [19]. Furthermore, Agile champions in Agile teams, by facilitating transformation challenges and motivating others, make transformation easier [4]. Also, Agile coaches and mentors play a critical role in helping people to accept the changes [20].

Following the research methodology, the findings of this study and further discussions about them, will be provided in next sections.

3. Research Methodology

This study was conducted based on the Grounded Theory as a qualitative research method [21]. It is suitable for studying actions in a substantive environments from the points of view of the actors involved [22]. Such method is helpful for answering questions like "What is going on in an area?" [23]. This research stated with a general area of interest rather than specific research questions to prevent proposing preconceived hypothesis or idea [22, 24]. However, key concerns and problems are emerged in the initial steps of data analysis [22, 25].

3.1. Data Collection

Data collection was started at early stages of the study and was stopped by reaching data saturation, which is the situation that further data are not adding to the findings [22]. At the first step, it was called for volunteers whom had at least one Agile transformation experience. Then, it was conducted semi-structured interviews with all of the volunteers. Interviews were conducted through on-line media since all of the participants were living out of the country. Of 32 Agile experts attended to this study, some of them had published several books and articles on the area under study. Table 1 demonstrates demography of the participants. They were from 13 different countries and had enough experience in their jobs. Their roles varied from Agile Developer, Agile Coach, Project Manager, Scrum Manager and so forth. All interviews were voice recorded and transcribed with interviewees' consent. In this article, participants are addressed by their number, P1 to P32 and their role, if necessary.

Table 1. Demography of the Participants (SM=Scrum Master, AC=Agile Coach, CON=Consultant, DEV= Agile Developer, QA= Quality Assurance PM= Project Manager)

No.	SD exp. (Yrs)	Agile exp. (Yrs)	Position	Country	Methods	Company size	Transition Duration (month)
P1	14	8	HDD	Finland	XP, Scrum, Kanban	70+	12+, ongoing
P2	25	15	AC	USA	Scrum, Kanban	65+	12+
P3	7	7	PM	USA	XP, Scrum, Kanban	500+	6+,ongoing
P4	10	2	PM	Bulgaria	XP, Scrum, Kanban	200+	6+, ongoing
P5	10	2	PM	Iran	Scrum, Kanban	150+	12+, ongoing
P6	11	8	CON	Australia	Scrum, Kanban, FDD	1000+	12-15
P7	6	2	DEV	Greek	Scrum	20+	12+, ongoing
P8	10	5	PM	Germany	Scrum, Kanban	50+	8+, ongoing
P9	20	10	HDD	Spain	Scrum	200+	24
P10	20	3	SM	Spain	Scrum, Kanban	200+	24+,ongoing
P11	10	4	AC	India	XP, Scrum, Kanban	50+	+6,ongoing
P12	16	2	HDD	USA	Scrum, Kanban	1600+	6+,ongoing
P13	14	6	AC	Finland	Scrum, Kanban	20+	3-30
P14	15	3	MGT	Iran	Scrum, Kanban	50+	12
P15	10	2	CON	Indonesia	Scrum	200+	3+, ongoing
P16	21	10	PM	USA	Kanban	65+	12
P17	19	5	PM	Sweden	Scrum, Kanban	50+	24+, ongoing
P18	8	2	DEV	Sweden	Scrum	40+	24
P19	13	6	PM	India	Scrum	200+	USA:18, India:24
P20	11	3	HDD	USA	Scrum, Kanban	1200+	6+, ongoing
P21	16	7	SM	USA	XP, Scrum	250	18
P22	11	5	AC	France	Scrum, Kanban	2000+	12+, ongoing
P23	16	8	AC	USA	XP, Scrum, Kanban	200+	6-24
P24	15	7	SM	USA	Scrum, XP	40+	6+, ongoing
P25	8	4	DEV	USA	Scrum, XP	300+	15+
P26	13	6	AC	India	Scrum, XP	50+	12+
P27	14	5	SM	USA	Scrum, Kanban	40+	6+, ongoing
P28	15	6	AC	Germany	Scrum, Kanban	50+	15+
P29	10	1	PM	Norway	Scrum	40+	12+
P30	35	1	DEV	USA	Scrum	100+	6+, ongoing
P31	17	4	QA	USA	Scrum	50+	12
P32	25	2	AC	USA	Scrum, Scrumban	200+	12, ongoing

3.2. Data Analysis

Data analysis, called data coding, started when some data were collected [25]. In this study, data analysis was supported by NVIVO software package which is suitable for handling qualitative researches generally, and GT studies particularly [26-28]. Data analysis was started by line-by-line reviewing transcribed data and finding key points within the data [29] and assigning an open code to each key point [21]. Then, immediately discovered code, was compared to the previous emerged codes in the same and previous interviews through constant comparison method [21, 25]. This process assisted the researchers to find out higher level of abstraction called concepts [21]. Iterative using of constant comparison technique helped to discover categories [21].

Conducting open coding fractured all the data, so, the next steps focused on putting fractured data together. At first, connections between categories were founded through Axial coding, which was used to demonstrate relationships between categories, sub-categories and their properties [23, 30]. This process led to emerging the primary concern of the participants, called core category. Then, by selective coding, data analysis was continued focusing on "only those variables that relate to the core variable in sufficiently significant ways as to produce a parsimonious theory"[29]. The main aim of this process was refining and integrating the theory [23]. The emerged core category was "iterative Agile transformation process", which "human aspects of Agile transition" was one of its related categories. Figure 1 shows the multi-level data analysis carried out in this study.

During data analysis, the researchers used theoretical memoing to add some more related data (but not in interviews). "Memos are the theorizing write-up of ideas about substantive codes and their theoretically coded relationships as they emerge during coding, collecting and analyzing data, and during memoing" [22]. Memos assisted the researchers to develop ideas about the concepts and the categories and to discover relationships between them [22, 23].
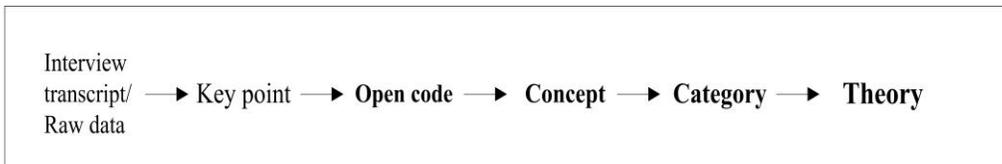
Interview transcript/ Raw data ⟶ Key point ⟶ **Open code** ⟶ **Concept** ⟶ **Category** ⟶ **Theory**

Figure 1. Multi-level Data Analysis

3.3. Theory Generation

The last step of data analysis was theory generation which called "theoretical coding" [21]. There are several different views on this process. While, Glaser has stressed on induction or emerging theory [25], Strauss has emphasized on validation criteria and systematic approach [23]. On the other hand, Charmaz, emphasizes on the role and effect of researchers on theory building [31]. This study followed Glaser's approach for theory building.

The main theory is iterative Agile transformation process where covers all related categories and properties of this process. It includes Preparation activities and prerequisites, Managing and Challenge handling, Transformation Facilitators, Iterative Transition Framework, Continuous Assessment and etc. These categories and their own sub-categories and properties are discussed in different articles.

"Human aspects" as one of the related categories of iterative Agile transformation process (the core category) is discussed in this article. Limited space of the article doesn't let the authors to provide all interviewee's quotations, key points, concepts, codes and properties and only those that have clarified emerged concepts are explained.

4. The Results: Human Aspects of Agile Transition and Adoption

This study showed that people and their mindsets and behaviors strongly affect all transformation related activities as is depicted in Figure 1. In the following subsections all related categories and subcategories are explained.
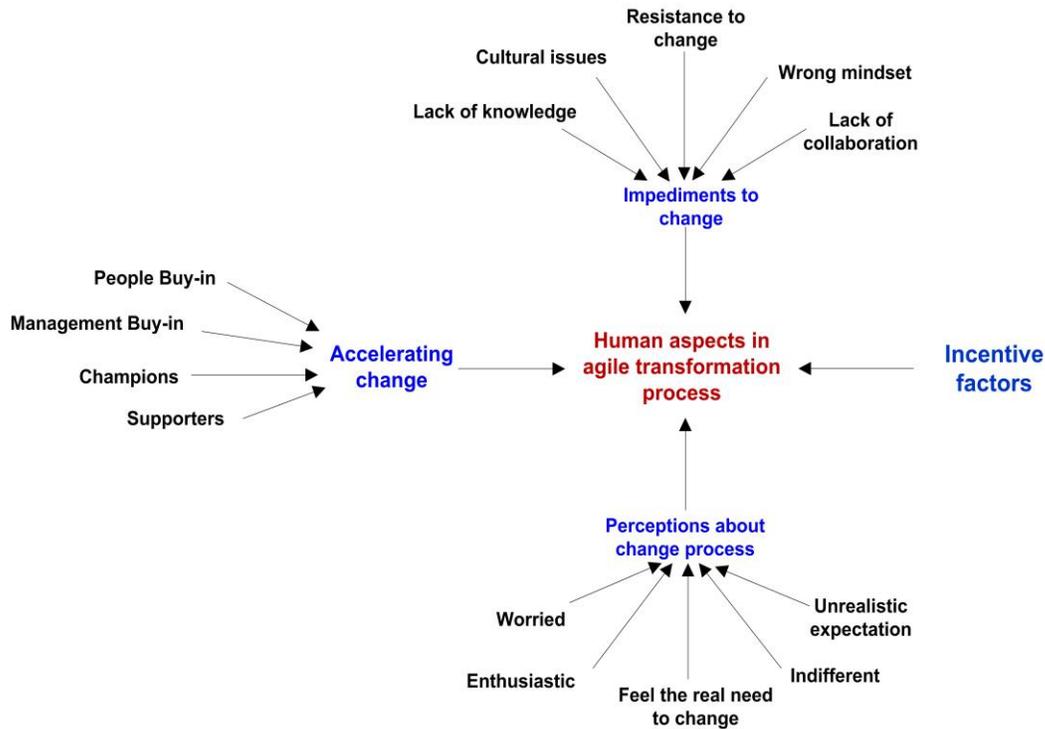

Figure 1. Emergence of the Theory of Human Aspects of Agile Transition and Adoption

4.1. Impediments to Change

Human aspects were major hindrances to change process in the software companies. It seemed that the participants mainly complained about this challenge and warned others about it.

4.1.1. Resistance to Change

Naturally, people are accustomed to the status quo and this fact acts as a serious barrier to change. The participants addressed this issue a major human challenge during ATP.

"Resistance to change in some teams & CEOs was the major challenge we faced with during the process. Most of them 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.

Sometimes this challenge is because of their concerns about their jobs. In this case, afraid of losing job was seen as an obstacle to change 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.

This issue was addressed by almost all the participants and was emphasized by some of them. (P9, P11, P13, P15, P20, P27, P32)

4.1.2. Cultural Issues

People's culture was another challenge that had made change more difficult. This issue was addressed by most of the participants as one of the critical challenges during ATP.

"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.

Sometimes, this issue returned to organizational culture rather than people's culture, as the participants declared.

"I have been faced with many cultural problems. These problems aren't only related to people, most of the times, they return to organizational culture and behaviors. 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.

Cultural problems, regardless of the people or organizational culture, were emphasized by almost all the participants unless P12 and P18.

4.1.3. Lack of Collaboration

The participants addressed lack of collaboration as a critical challenge during ATP.

"Demand collaboration in Agile methods makes some problems in many cases. People addicted to do their own work in their 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 stressed on the role of teams rather than individuals and declared that collaboration is necessary for organizing an Agile team. They addressed it as a major issue.

"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 pattern and people is not used to take 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 other emphasized on nature of distributed teams which leads to this issue. (p16, P25)

4.1.4. Wrong Mindset

Having the wrong mindset about change and Agile methods and values can act as a major hindrance during ATP. Some of the participants declared that this phenomenon leads to many problems in Agile transition and adoption.

"The number one and huge cultural problem is pretty much everyone having the wrong mindset. Managers think command & control which is excellent for managing work that is about execution [but] is unsuitable for design & 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 challenge also was seen as a common problem for managers too.

"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." P16, Project Manager.

"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..." P1, Project Manager.

Furthermore, some other respondents addressed this issue and emphasized on its effect on Agile transition. (P5, P12, P13, P14, P15, P17, P18, P21, P31)

4.1.5. Lack of Knowledge

Lack of deep and enough knowledge was reported as one of the causes of negative effects of the involved people on ATP.

"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 shortcoming also was seen in the stakeholders' roles generally, and the customers particularly. Thus, sometimes weak collaboration and involvement of customers during ATP was because of their insufficient knowledge.

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

"Generally, customer information is not deep on Agile. They have not concern for development process… so, they have no sense about Agile and their roles and it affects transformation." P2, Agile Coach.

Lack of knowledge and its consequences and effects on ATP, were addressed several times by lots of other respondents. (P5, P7, P9, P10, P11, P15, P17, P18, P21, P28)

4.2. Accelerating Change

Despite of aforementioned negative effects of people on transformation process, several evidences were seen about positive effects of human factors on ATP. It means that people can push transformation forward to achieving its goals and facilitating change process. Following subsections explain these positive aspects.

4.2.1. People buy-in

People buy-in was addressed as one of the facilitators that make Agile transformation easier than expected and conversely, lack of it, makes Agile transformation more difficult and longer.

"People commitment to change increases the chance of successful transformation and decreases the cost of change. It is the most powerful catalyst for changing approach." P14, Top Manager.

"People buy-in helps them to be positive about change, thus, the migration will be easier. Without getting buy-in, there will be little chance to change people's mindsets of processes." P8, Project Manager.

People buy-in was also addressed as a facilitator which can help Agile team to overcome transition challenges. In this case, fewer efforts are needed to being Agile.

"Get people buy-in, before going Agile. It can help you to overcome most of the people-related challenges. In this process people can be both facilitators and hindrances…" P2, Agile Coach.

Almost all of the other Agile coaches also talked about this factor in their interviews.

4.2.2. Management Buy-in

Management commitment and support also like people buy-in was emphasized by some of the participants.

"I can count several items for successful migration to Agile… the next one is management buy-in that is extremely important factor, especially for challenging with senior traditional practitioners…" P2, Agile Coach.

Role of managers, especially those who had enough authority, affect transformation process. It was mentioned as one of the facilitators of ATP.

"Our top management helped our team in all steps. He was very knowledgeable and open minded. I think that such manager can lead teams to being Agile easy and fast." P9, Head of Development Dept.

This factor was also addressed as a necessary prerequisite of ATP.

"Most important prerequisites are intentions and commitment from CEOs. Managers help people in change process by supporting them and reducing hindrances and handling challenges." P10, Scrum Master.

On the other hand, some of the participants discussed about the risk of the lack of management commitment before and during ATP

*"... If management is not agreeing with change, don't do it. We were faced with this challenge and our project failed. We expected that management could facilitate this process and support others…"*P18, Agile developer.

Positive personality and supportive morale, as necessary characteristics of the managers, were mentioned by other participants. (P1, P5, P7, P8, P15, P19, P20)

4.2.3. Champions

Agile champions by adjusting Agile practices to suit environment and support other members play a critical role in ATP as the respondents declared.

"I always try to identify the "champion" who will drive the internal change. Champions expand or even break the borders that Agile practices face in their environment. They also try to find the better ways of working with the others around them. They really help organizations in transformation process." P6, Agile Coach.

They also stressed that champions can facilitate transformation process and motivate other people to adopt themselves with changed processes and activities.

"In transition process, champions play a critical role. I totally agree with the idea that having at least to champions on the teams during Agile transformation gets people to herald its adoption. In my opinion, changes with more champions come to fruition easier. I believe that any successful Agile transformation has a champion, even he would not be known with that name." P23, Agile Coach.

"Companies should hire an expert; they should have their own champion. Champions can reduce side effects of change, lead and inspire the change and lead people to next level." P16, Project Manager.

The senior participants put more emphasis on the role of champions in ATP. This factor also was addressed by other participants. (P2, P7, P8, P9, P25)

4.2.4. Supporters

Supporters, regardless of their roles, were addressed as those who support Agile teams and help them in change process. As the participants declared, such people not only motivate others, but also help them to overcome their problems during transformation process.

"Some people have more influence and authority in company; they can be good supporter for others. Such people affect migration process by impressing other members." P19, Project Manager.

The Participants declared that supporters can be found in all roles and responsibilities, even a junior developer can be a supporter.

"Managers can be the best supporters, especially middle managers. If managers have enough commitment to change, and support other members, this is the best motivation. Lucky team members have supportive managers." P15, Agile Consultant.

"As a developer, if you have a problem with tasks and requirements then scrum role product owner is your best supporter. If you have technical problem may your peer is the best. If serious problems are in process itself, coach is the best supporter… all members need supporter in doing their jobs, but during the migration supporters are necessary…" P13, Agile Coach.

"Managers and coaches are best supporters in transformation process. They can support people in Agile transformation well." P23, Agile Coach.

Regardless of the roles, almost all the participants mentioned about role of supporters during ATP.

4.3. People's Perceptions about Change Process

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

4.3.1. Enthusiasm for Change

Enthusiasm for change was addressed as one of the major reasons for change in Agile teams. 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 read about it and I felt that it could solve most of our problems. I was really interested in it." P4, Project Manager.

This factor helped people to overcome transformation challenges and problems. In this case, people could accept change with less effort and in an easy manner.

"Fortunately we had minimum problem with developers. Do you know why? They were really enthusiastic for changing their ways. They were more interested in Agile than managers. This made our transition easier than expected." P17, Project Manager.

Enthusiasm of team members was mentioned by most of the respondents as a human aspect that had impressed their transformation process.

4.3.2. Worried About Change

This case was reported by some of the participants as another perception of people about changing their development methodologies.

"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." P5, Project Manager.

"We didn't know more detail about Scrum and XP; I heard something about their methods, 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.

However, some of the participants addressed this factor as people's perception before starting transformation; some other mentioned that people were worried as well as enthusiastic. (P1, P11, P13)

4.3.3. Indifferent to Change

While some people were enthusiastic or worried about change, as was reported by the participants, some others were indifferent to change process.

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

It seemed that lack of knowledge and motivation was hidden reason of this human aspect during the change process.

"I faced with some people that were indifferent to change and I say 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 indifference, need more time to change themselves and find their ways. Coaches must pay attention to those people." P26, Agile Coach.

This issue was addressed mainly by some of the project managers. (P3, P4, P17, P19)

4.3.4. Feeling the Real Need for Change

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

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

Feeling real need for changing development process and being enthusiastic and realistic about the change make people stronger to change themselves.

"Fortunately, in our company almost all teams felt that our previous methods need be changed and they embraced Agile methods." P24, Scrum Master.

Some of the respondents also discussed the importance of sensing real reasons for going Agile before starting transformation since they believed that it impresses the whole of Agile transition and can shape perceptions of people and help them in changing themselves. (P3, P5, P6, P18, P19, P21, P23, P26)

4.3.5. Unrealistic Expectation About Agile

The last perception that the participants addressed it was unrealistic expectations about Agile methods and their effects on development process.

"People should be realistic and have correct perception about changes achievable values. Some of my colleagues had wrong expectation 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. ...That was because their expectation from Agile methods, Agile values and related items were completely wrong." P16, Project Manager.

Sometimes, wrong expectations caused problems and challenges during ATP and got 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 unreal expectations, so, Agile coaches need lots of effort to change their Agile wrong mindsets; I mean that it causes new issues." P11, Agile Coach.

Some other participants also mentioned about this issue and other aspects of it and also addressed effective training and coaching as the strategies that were useful for correcting this wrong mindset. (P1, P6, P8, P12, P13)

4.4. Incentive Factors

The Study discovered that people, especially those who had not enough deep knowledge about Agile methods and values, should be motivated and encouraged for going Agile. Providing incentives makes people positive about the change.

"All members can understand values, achieving Agile is achieving value. The important issue is that organizations should motivate them for being Agile. Encouraging people helps managers to handle migration process faster and easier." P2, Agile Coach.

Providing incentives also was reported as a critical factor that affects other stakeholders, like customers.

"Customer involvement in our transformation process was insufficient. Fortunately, by motivating them and offering some incentives, their collaboration got better…" P3, Project Manager.

Providing incentives during the transformation process generally, and in early stages particularly, addressed as a helpful factor for pushing people in Agile transition.

"Maybe at first stages nothing could be done for encouraging opponents. You should have some ceremonies for showing your progress, even for small progress." P4, Project Manager.

Totally, providing incentives and motivations were addressed as one of the facilitators of ATP that has significant effect and influence on people mindsets and their reactions to change. (P5, P7, P8, P10, P11, P12, P19, P27)

5. Discussion and Related Works

The above findings showed the general outline of human aspects of Agile transition and transformation as depicted in Figure 2.

Human aspects in Agile methodologies and Agile transformation are studied previously in several studies from different perspectives. Fortunately, most of the

emerged categories of this study are supported by other researches that have been done by different research methodologies and different perspectives.
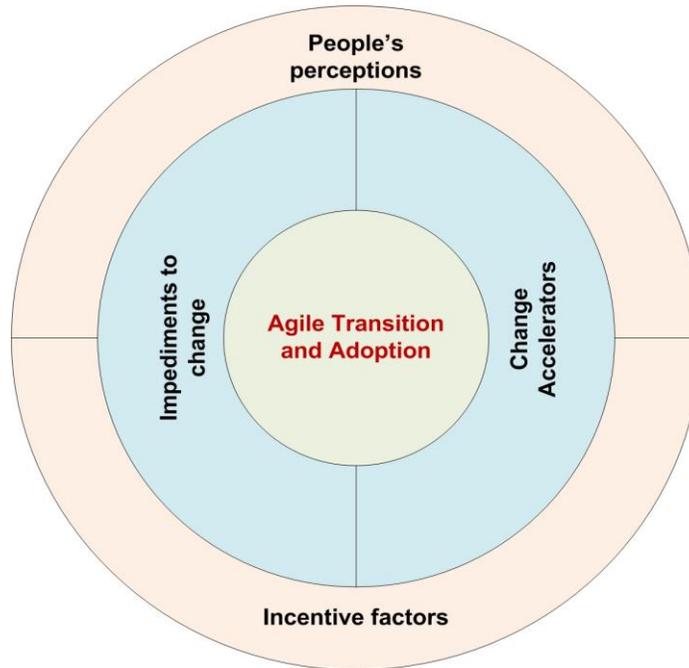

Figure 2. The General Outline of Human Aspects of Agile Transition and Adoption

5.1. Impediments to Change

Agile manifesto has emphasized on individuals and interaction as one of the Agile values [12]. It reflects the importance role of people in these methodologies compared to traditional methodologies. Conboy *et al.*, explained that increasing prevalence of Agile methods and growing pressure to adopt to these methods lead organizations to focus on people related issues carefully [4]. They believe that at the first step all potential people related challenges that may occur during ATP, should be studied.

Nerur *et al.*, in one of the early studies, categorized all challenges of moving to Agile in four categories in which "people related issues" was one of them [9]. This study also discovered that people can act as a major impedance to change. Several reasons for this human reaction to change were discovered which the most important reasons were discussed in the section 4.1 of this article. Among them, it seemed that cultural problems are more critical than the others since they were addressed by almost all of the participants. In several studies people and organizational culture are discussed [5, 9, 14]. Cockburn *et al.*, by describing role of the people in moving to Agile methods mentioned that people's culture strongly influences transformation process [3]. Problem with organizational culture was addressed by Nerur *et al.*, [9]. Dorairaj *et al.*, discovered that lack of understanding causes lack of trust in distributed teams and affects Agile transition and adoption in distributed teams [7]. Chan *et al.*, pointed out organizational culture as one of the potential determinants of Agile acceptance [16]. Tolfo *et al.*, discussed on different levels of organizational culture and found out that there are several obstacles and facilitators in lower levels of organizational culture [14]. Cultural issues of ATP also were studied in some other researches [5, 17, 32].

Resistance to change was reported as another barrier during ATP. This challenge was addressed previously by some other studies [9, 16, 33]. However, resistance to change is not seen only in Agile methods, but, since nature of Agile methods is people-centered, this factor is more critical in these methods [4]. Cohn mentioned that changing people's mindset and adapting new approach is not easy and fast [33]. Also, in some of case studies, people resistance was reported explained during the transformation process [18, 19, 34].

Having wrong mindset was another issue that was discovered by this study as one of the negative human aspects in ATP. Nerur et al. addressed traditional mindset as one of most important obstacles to changing development approach [9]. Having the wrong mindset causes people show negative and unexpected reaction to change. For instance, Sureshchandra *et al.*, explained that some of the people like project managers, cannot forget their traditional roles and act as a barrier in moving to Agile [11]. Furthermore, sometimes managers cannot relinquish their previous authority and this makes Agile transition hard. In this case "command and control" mindset is a critical challenge [9].

Lack of knowledge was one of the reasons that people play a negative role in transformation as the participants addressed in this study. Landim *et al.*, addressed lack of knowledge as one of the reasons of failing in Agile and suggested several recommendations to achieving adequate knowledge in Agile contexts [35]. Both Agile practices and Agile values should be understood by all Agile teams in order to do their responsibilities in transformation process carefully. Lack of knowledge mostly causes by inadequate and dysfunctional training. Bergin et al. stressed on learning Agile values and principles besides of Agile practices to improve knowledge of Agile practitioners [36]. Asnawi *et al.*, showed that low perception from Agile user towards Agile methodologies is a barrier of getting everyone in Agile teams to take responsibilities [37]. Some other studies also mentioned about role of training and improving team member's knowledge in moving to Agile [4, 17, 38, 39].

This study also discovered that lack of collaboration is another cause for impediment to change in ATP. Due to the people oriented nature of Agile methods, collaboration and interaction play a critical role in Agile transition and adoption. Moe et al. discussed on lack of collaboration in shared-decision making as one of the Agile practices [40]. Mishra et al. studied impacts of physical ambiance on collaboration, communication and coordination in Agile software development [41]. Kusumasari et al. by emphasizing on role of the collaboration in Agile methodologies defined a collaboration model for these methods [42]. Furthermore, this factor was mentioned as one of the customers' issues in transformation process by many studies [1, 32, 43, 44].

5.2. Accelerating Change

Despite of the above negative human aspects, several positive aspects were discovered by this study too. These aspects as explained in section 4.2 help Agile teams to accelerate change process. People and management buy-in, Agile champions and supporters of the process, were the most important factors that were used to facilitate and speed up transformation process, as the participants addressed. Of these factors, people and management buy-in were more critical as discovered in data analysis process. All of these factors support by several related studies. Conby *et al.*, by describing importance role of the people emphasized that people interest is the most important factor that causes processes change well [4]. Tolfo *et al.*, in their study, by focusing on the human aspects, addressed people commitment as a critical factor in changing process [14]. Sureshchandra *et al.*, discovered that unhappy people interrupt

transformation process [11]. Misra *et al.*, as mentioned previously, focused on the role of customer commitment in transformation process [44]. While several other studies emphasized on motivating people to change [1, 5, 45, 46], management commitment and buy-in was stressed by others. Nerur *et al.*, pointed out that lack of management commitment is a serious risk to moving to Agile [9]. Hoda *et al.*, focused on the role of the management support on self-organizing team [47]. Chow *et al.*, discovered that management commitment is one of the most critical issues in Agile projects [48]. Furthermore, other studies discussed about importance of this factor [17, 19, 49, 50].

This study also discovered that champions and supporters by motivating other people affect transformation process strongly. Hoda et al. described the role of the champions in Agile teams and their effects on other team members [51]. Senapathi *et al.*, pointed out that role of the champions and top management in usage and adoption of Agile practices[52]. Kum *et al.*, in a research on Test Driven Development (TDD) addressed 'Agile champion' as one of the success factors [53]. Furthermore, some people or roles by supporting other people impress transformation process. Top management, Coaches and mentors, champions and even motivated individuals can be supporters of the other team members. Pikkarainen *et al.*, addressed top management and continuous support as critical factors during the change process [19]. Chow *et al.*, also mentioned about the role of managers as supporters of other people [48]. Monteiro *et al.*, explained the role of support in making people positive and persuading them to participate in Agile practices [54]. Poppendieck explained the role of leaders and coaches in helping and supporting team members and believed that their role is more important than the role of the managers in this regard [55]. Hoda *et al.*, also stressed the role of coaches and mentors in supporting people in self-organizing team [51]. Lack of such roles makes transformation more difficult, as reported by some other studies [11, 17, 18].

5.3. Perceptions about Change

People's perception was another emerged category in this study. This research showed that people have different perceptions and mindsets about the change process. While some people were enthusiastic or worried about change, some others were indifferent. Also, some of the people had unrealistic expectation about transformation process, Agile and its values. At the same time, feeling real needs for Agile acted as a factor for shaping people's perceptions about change process. Begel *et al.*, 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 [56]. Conboy *et al.*, also pointed out people's perceptions as barriers to Agile methods usage and adoption [4]. Patel, et al, studied people's perceptions of agility and showed that majority of their studies participants perceive Agile values and principles as important factors that can help Agile teams to adapt to Agile practices [57]. Lalsing *et al.*, discovered that "shared perceptions and objectives to achieve organizational goals" which was called team climate, affects team performance in Agile software development [58]. O'Connor explained that Agile coaches sometimes should correct people unrealistic expectations during ATP [59].

5.4. Incentive and Motivation Factors

The last finding of this study was importance of role of the incentive factors in ATP. Providing appropriate motivations and incentives makes positive atmosphere and

encourages people in change process [60]. Due to the people-intensive nature of ATP, incentive factors impress it strongly. Conboy *et al.*, showed that lack of motivations and incentives causes many problems in using and adapting to Agile software methods [4]. Ganesh *et al.*, discovered that during ATP, providing slow motivation is necessary and supportive for participants [49]. Chan *et al.*, explained how motivation-related factors should be considered for using software development and Agile methods [16]. Melo *et al.*, showed that motivators in Agile teams are slightly different from other teams [61]. O'Connor explained that project managers should create right incentives for enhancing team productivity during ATP [59].

6. Limitations

Finding of the study are grounded in the data, because all codes, concepts, categories and properties were collected directly from real environments [22]. 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. But, it claims that its findings describe and characterize the area under study [62].

7. Conclusion and Future Works

Conducting a GT study involving 32 Agile experts from 13 different countries showed how human aspects of ATP impress Agile transition and adoption. This study discovered that people behaviors can be impediments to moving to Agile as well as facilitators. People's wrong mindset, resistance to change, lack of enough knowledge, lack of adequate collaboration and cultural problems play negative roles in moving to Agile. At the same time, some other human factors have positive effects on transformation process. People and management buy-in, Agile champions and supporters are important factors that speed up the change process.

Another important factor was perceptions of people about the change. This study showed that people most often are enthusiastic, worried or indifferent about the change. Furthermore, sometimes people have unrealistic expectations about Agile and its values. Wrong and unrealistic expectations have negative effects on change process. Finally, feeling the real need for change and providing appropriate incentives and motivations play important role during the transformation process.

Due to the people-centered nature of Agile transformation process, awareness of human aspects of this process and potential challenges is a critical and necessary prerequisites before starting this process.

Future studies can focus on the emerged aspects of this study. For instance, one study can be done on how people related barriers can be reduced before transformation process. Another study can be done on enhancing positive human aspects of change process. Also, role of incentives, supporters and other positive factors can be studied in quantitative studies.

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