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Agile Transition Model Based on Human Factors

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Abstract— **this paper presents the use of an agile transition model based on human factor in agile environment. The model consists of four agile environment attributes; Individual, Skill, Culture and Team. From the study, only a small number of organizations are successful in adapting agile within a short period while the complete transition may take 2-3 years. Organization takes time to complete the transition due to the challenges faced during the transition. The purpose of the model is to effectively transfer from traditional non-agile to agile. Details given are the process of agile environment attributes were derived and the differences between existing agile transition model are also addressed. The newly proposed agile transition model were discussed and compared with the existing agile transition model. Based on the comparison, most of the existing model covers two or three of the agile environment attributes where the newly proposed agile transition model is to direct all the agile environment attributes. Therefore, it is crucial to cover all of the four attributes since these four attributes are negatively affecting agile transition.**

Keywords-component; Agile Transition, Agile Adoption, Agile Model, Agile Transformation

I. INTRODUCTION

Presently Agile method is widely applied in software organizations. Although abundance studies on agile is available, the study on comprehensive guidance towards agile transition is lacking. The main findings also shown that there is still a need for investigating agile adoption models and strategies [1, 2, 3]. A recent study by [4] stresses the need for investigation of agile transition models as the data in current literature is not enough to conclude the findings.

Besides the lack of proper guidelines to adopt agile, need of urgent transition is also mentioned by the white paper indicate the need for quick agile transition as a number of organizations are in need of urgent transition, where delay can offer a business edge to competitors [5]. According to [6] when an organization makes a transition towards an agile organization and the necessary changes happen at a too slow rate eventually organizational gravity will pull the organization back into where it was before the transition attempt.

In spite of the agile adoption and transformation success stories of individual organizations, it is rather complicated to get an exact and a representative depiction of agile adoption, as result intensive review is needed. According to (Ghani, 2016), organizations will take a long time as a journey to transit which normally 2-3 years to truly adopt agile where an intensive employment are taken to adopt agile [7]. This time period is quite long infeasible in a competitive market.

According to a recent survey conducted by an agile management software manufacturer, the “inability to change organizational culture” as considered a barrier to agile adoption by over half the participants [15]. Even after going agile, 24% of the companies

admitted their agile projects failed because the "company philosophy or culture was at odds with core agile values". Hence, for the challenges in Agile Transition part, the focus is on the human factor. According to the results of the same survey, if a proper model for agile adoption is not in place, agile adoption is very difficult. In fact, the third biggest barrier to adopting Agile-Scrum according to 35% of survey participants was "trying to fit agile elements into a non-agile model."

There are ample of existing agile transition that have been proposed. However as stated, lack of proper guideline on how to use the models are lacking. In addition, none of these models covers the four attributes identified from the literature review: Culture, Individual, skills and Team. Some of the models cover only two attributes and some of them cover three attributes. These details will be covered in section IV. Therefore, in order to effectively transfer from non-agile to agile, an agile transition model that covers all of these four agile environment attributes is proposed in this research.

This paper is divided into four main sections. Section II presents the existing agile transition model (ATM) and explain the classification of ATM. Section III presents the data collection method in this study and last but not least section IV presents the properties of newly proposed ATM where the main components of newly proposed ATM and how it is developed is explained.

II. RELATED WORKS

A lot of different agile transition models and models have been introduced, but little guidance exists to aid practitioners in deciding which methodology suits which project best [8]. Correspondingly, organizations tend to cherry-pick the simpler practices or even redefine the practices to suit them [9]. These actions result in choosing the irrelevant model for the project which lead to the agile transition failure [10].

A literature review was conducted to identify the agile adoption models, guidelines, approaches or models available. A total of 16 ATM was discovered. Most of the models are found from the chapter of the book [11]. The author provided a summary of existing ATM. Some of the ATM is found from Digital libraries such as IEEE, ACM and GoogleScholar. In order to search for related papers with ATM, keywords "agile transition", "agile adoption" and "agile transition model" are key in.

Based on the finding of ATM, the models are categorized into four categories; People-oriented Model, Instructive Model, Maturity Model and Scalable Model. These four categories are derived from the aim and properties of each model. Firstly, the aim and properties of existing ATM are studied where then classifies accordingly to People-oriented Model, Instructive Model, Maturity Model and Scalable Model. Therefore, in order to classify the existing ATM, research questions are created as below:

What are the criteria to classify the existing agile transition models?

Hence, Table 1 below shows the explanation of each category of classification.

Table 1 Category and Criteria of Classification of ATM

Category	Criteria
People-Oriented	Focus on giving awareness of the current situation and provide a better understanding of agile concept.
Instructive	Convey basic instruction or step-by-step guidelines of adopting and transform into agile for better understanding.
Maturity	Classifies levels of maturity in the adoption of practices by an organization, and shows areas of interest that the organization should address in order to improve.
Scalable	Represent the characteristics of a large organization or enterprise

In order to prevent any confusion, the main purpose of the categorization is to identify ATM that has a property that is related to human factors. For this categorization, the focus will be more on the people-oriented model since human factors are selected as the main focus for this research. The human factors explored in section two will be mapped to the properties of selected ATM model in people-oriented category so that relevant solution identified. Hence, Figure 1 below present the classification of ATM:

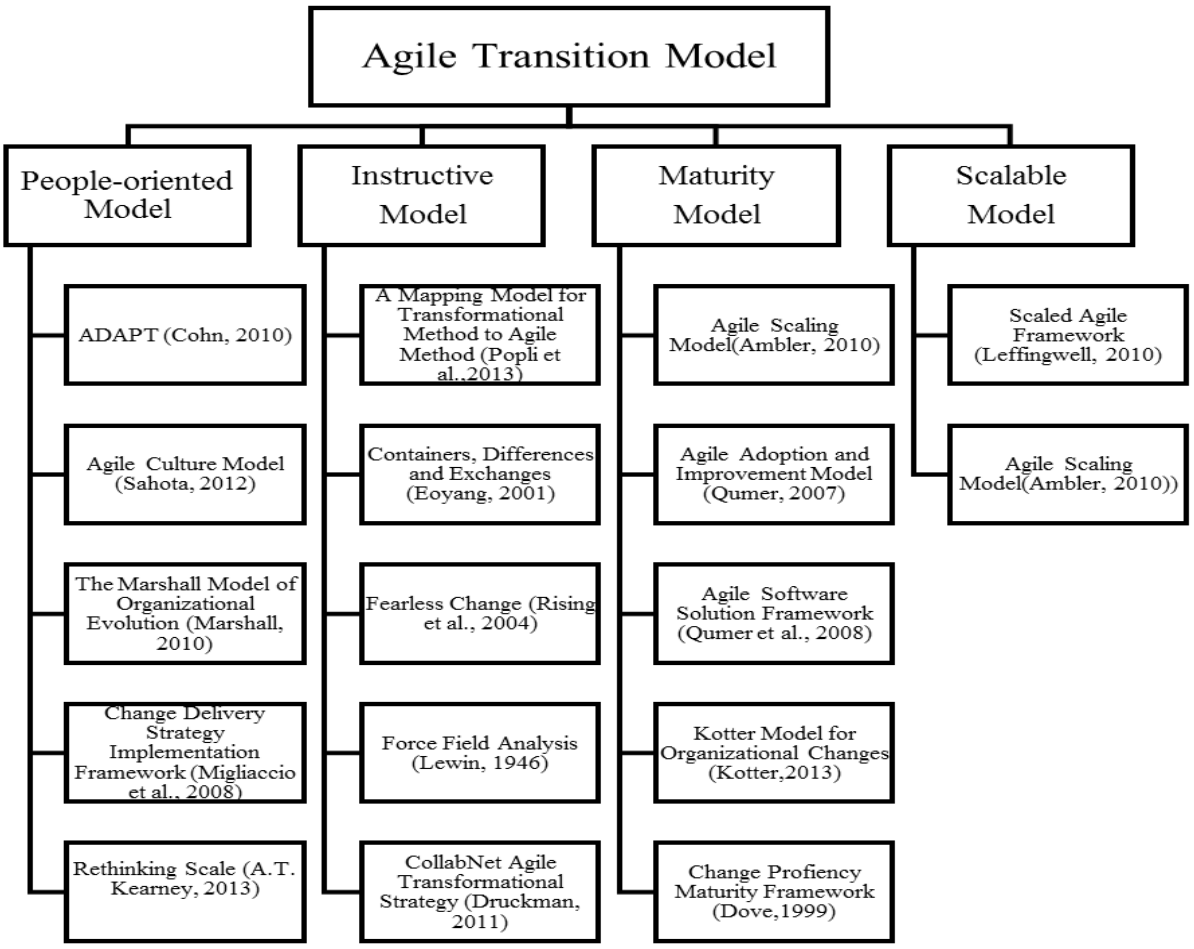

Figure 1 Classification of Agile Transition Models

In this classification of agile transition models, there are five ATM fall under people-oriented, instructive and maturity model whereas only two ATM are scalable models. However, there is one model that fit into two categories; Agile Scaling Model. Agile Scaling Model fits into Maturity Model and Scalable Model considers the model focus on continuous improvement and it is also suitable to be applied in large or enterprise organization. Therefore, in section IV, the properties of each people-oriented model will be analyzed and compared to the newly proposed ATM.

III. DATA COLLECTION METHOD

This section presents the methods used to gather the data. Data analysis is conducted to identify the challenges and issues in agile transition. The findings from the different data collection methods are used to identify human factor that is not mentioned in the literature review to validate human factors mentioned in existing study. Therefore, case studies and survey are conducted to collect data.

A. Case Study

A case study was conducted in undergraduate class, Application Development (AD). The purpose of the case study to investigate the issues arise during agile transition. The case study began by introducing agile to the class members. A total of 32 students were involved in the case study.

Before the project started, students were divided into 6 groups. Each group consists of 4-6 students. They were given a task to develop a website and they will implement agile throughout the project. At the beginning of the course, none of the students know about Agile. Therefore, agile is introduced in class. A presentation on the benefits of Agile is presented. The current issues in the software industry and the reason they should start using Agile is explained. Agile practices were also explained.

Each of groups were given a pilot project to develop a website. The purpose of this process is to provide a clear understanding of implementing Agile and turn the awareness into desire to change to Agile. Agile practices were implemented in the project; Pair programming.

In every week iteration, the performances of each group are recorded. Observation was carried out to identify if they could adapt with agile practices such work as a team and complete the task given in each iteration. Responds to the changing requirements was also observed. The requirements their project was requested to change in the middle of the project in order to know if they could respond to change quickly.

From the case study, some of the challenges identified are mentioned in existing study and some of them are not mentioned. The results of the case study are presented in Section IV.

B. Survey

A survey entitle “A View of Reality: Human Factors in Agile” was conducted in this research. The survey consists of ten questions based on human factors in Agile. The purpose of the questionnaire is to obtain Agile practitioner opinion and suggestion considering it is believed “A view of the theory is beneficial if it corresponding to reality.”.

There is a total A total of 20 questionnaires were distributed among agile practitioners in an event in Kuala Lumpur and 14 valid questionnaires were discovered. The findings of the questionnaire will be presented in section IV.

IV. THE PROPOSED AGILE TRANSITION MODEL

This section explains how an agile transition model is developed. The main components of the agile transition model is Individual, Team, Skills and Culture. These components are named as agile environment attributes. The reason agile environment attributes are used as the components of the model is these attributes are mentioned in the literature review and practically occurring in case study and survey. Undeniably, these attributes affect agile transition in the real world. Therefore, focus is needed for these attributes.

Figure 2 shows the process of how the agile environment attributes is derived.

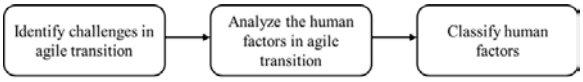

Figure 2 Process of Agile Environment Attributes Derived

A. Identify Challenges in Agile Transition

Considering most of the time humans contribute a hindrance in agile transition (Tolfo, 2011), this subsection presents the challenges in agile transition based on human factor related to agile manifesto. There are four agile manifesto that has been introduced. However, the focus of this study is only on:

1. Individual and interaction
2. Customer collaboration.

Half of agile manifesto which is “Individual and interaction” and “Customer collaboration” deal with human factors (Gupta et al., 2010). Therefore, these two agile manifesto is selected in this study because of the strong relation with people and behavior.

The purpose of identifying the issues in agile transition is to find the pattern of the challenges. The pattern identified will show which of the identified factor are critical and less critical in agile transition. It’s true that different project has different challenges. However, in terms of human factors, it has been seen that the reoccurring issues or behaviors

are almost the same. Therefore, in order to tackle this issue, broader study of human behavior in agile transition is required.

Therefore, in this study, we identify challenges from three different methods; literature review, survey and case study. Human factors identified from this method will be included in the agile transition model as Table 2 presents the challenges identified and how we analyzed the human factors from the challenges. These processes are applied to all human factors we have identified from the challenges.

Table 2 Human Factors related with Agile Manifesto

Factors / Agile Manifesto	Individual And Interactions		Customer Collaboration	
	Who	Problems	Who	Problems
Resistance	Project manager	Some managers refuse decreasing their power and let people be free [12].	Customer	Customers harbor skepticism about Agile methods and pose resistance to involvement [13].
Collaboration	Individual	People are too passionate with their work but didn't feel like collaborating [14].	Customer	Absence of customer reps providing feedback on developed features [13].

B. Analyze the Human Factors in Agile Transition

1) Literature Review

Based on the challenges in agile transition identified from the selected papers, human identified are analyzed and presented in Table 3 below. To guarantee the validity of the results, the search was conducted on the studies published during 2010-2014.

Table 3 Summary of Contribution on Human Factors from Selected Papers on Agile Transition in 2010 - 2014

Author, Year	HUMAN FACTORS																						
	Control	Power	Hierarchy	Practices	Understanding	Expectation	Adapt	Resistance	Passion	Fear	Expert	Emotional	Outshine	Self-centered	Communication	Estimation	Leadership	Decision Making	Time Management	Trust	Collaboration	Age	Integrate	Transparency
O'Connor, 2010				√	√	√	√		√		√					√					√			
Hoda, 2010								√													√			
Esfahani, 2010				√							√				√		√				√			
O'Connor, 2011				√		√					√					√							√	
Hoda, 2011								√													√			
Lalsing, 2012				√						√					√					√				
Gandomani, 2013		√																						

Sutharshan, 2013			√					√				√						√	√	√	√			√
Kozak, 2013	√	√						√	√	√	√		√	√	√		√				√	√	√	√
Gandomani, 2014	√				√	√		√	√	√				√							√			
Tanner, 2014					√																√			
Bannink, 2014		√																			√			

Based on Table 2, none of the study comprehensively covers human factors in agile transition. The human factors covered from each study are based on specific case studies, they conducted or human factors they selected to investigate. Therefore, the newly proposed agile transition comprehensively covers these human factors. In addition, new human identified from case studies and survey will be included in the agile transition model. The sections below explains on new human factors discovered from the case study and survey.

2) Case Study

A case study was conducted at the Undergraduate level course. The purpose of the case study is firstly, to implement existing agile transition model, ADAPT in order to identify the effectiveness and the limitations of the model. Next, the purpose of the case study is to investigate the issues arise during Agile transition. The case study began by introducing Agile to the class members. Therefore, during the transition we identified one new human factors that are not mentioned in the literature review. Table 4 below shows the human factors identified from the case study.

Table 4 Comparison of Human Factors from Case Study with Literature Review

Human Factors identified from Case Study	Mentioned in Literature Review
Inequality	No
Communication [32,33]	Yes
Trust [14,33]	Yes
Passion [12,34,37]	Yes
Decision Making [14]	Yes
Time Management [14]	Yes

Based on Table 4, we identified inequality as a new human factors from the case study. Inequality in knowledge is discovered as a new factor since it is not mentioned in the literature review Therefore, inequality will be included as a human factor in the newly proposed model because inequality does negatively affect the transition.

3) Survey

A survey entitled "A View of Reality: Human Factors in Agile" was conducted in this research. The purpose of the questionnaire is to obtain agile practitioner opinion and suggestion on Agile transition considering it is believed "A view of the theory is beneficial if it corresponding to reality." A total of 20 questionnaires were distributed among agile practitioners in an event at Kuala Lumpur and 14 valid questionnaires were discovered.

The questionnaire consists of three closed-ended questions and four open-ended questions. There were seven (7) questions asked about the positive attributes in agile environment. The questions asked in the survey are as follows:

1) "Good moods motivate good performance". Do you agree with this statement?
2) Do you have any suggestion(s) to maintain team in a good mood?
3) What is your opinion on being transparent about skill deficiencies with team (is it good or not)?
4) If your team members do not give 100% commitment, what are your thoughts on the strategies to overcome the issue?
5) Does customer/product owner gives 100% collaboration?
6) If NO, Why? (From qestion no. 5)
7) If the manager does not allow team to make decision, does agile still works fine?

The findings of the questionnaire will are presented in Table 5.

Table 5 Comparison of Human Factors from Survey with Literature Review

Human Factors identified from Survey	Mentioned in Literature Review
Aim	No
Practices [32,33,37,38]	Yes
Communication [32,33]	Yes
Self-Centered [12,34]	Yes
Time Management [14]	Yes
Trust [14,33]	Yes

Control [12,34]	Yes
Transparency [14,34]	Yes
Passion [12,34,37]	Yes

Based on Table 5, we identified aim as a new human factors from the survey. Different aim from stakeholders and development team is not mentioned in the literature review Therefore, aim will be included as a human factor in the newly proposed model because different aim does negatively affect the transition.

C. Classify Human Factors

Human factors identified from literature review, case study and survey are then classified into four attributes: Individual, Team, Skills, and Culture. Individual, Team, Skills and Culture are presented as agile environment attributes. The purpose of the classification is to give a clearer view on what attributes should be considered in agile environment.

1) Culture: The factors that from the culture of organization. How they works, the practices they used and the structure of the organization before adopting agile.
2) Individual: The factors that influence the challenges from the individual itself.
3) Team: The factors that influence the challenges from the team.
4) Skills: Agile skills that the development team needed in agile environment.

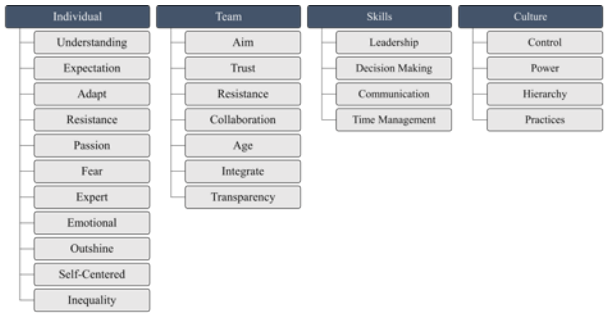

Figure 3 Classification of Human Factor on Agile Environment Attribute

Figure 3 shows the classification of human factor on agile environment attribute. Based on the figure, individual has the highest number of human factors identified followed by team, skills and culture. These shown that most of the challenges identified in agile transition are from individual itself.

V. THE PROPOSED AGILE TRANSITION MODEL

Based on the literature review and data analysis, the agile transition model is planned to have four components. The reason agile environment attributes are used as the components of the model is these attributes are mentioned in the literature review and practically occurring in case study and survey. Undeniably, these attributes affect agile transition in the real world. Therefore, focus is needed for these attributes.

As stated, the four components of this model consist of agile environment attributes: individual, team, culture, and skills. Each of components consists of human factors discovered from previous study. Therefore, the model is illustrated as below in Figure 4.

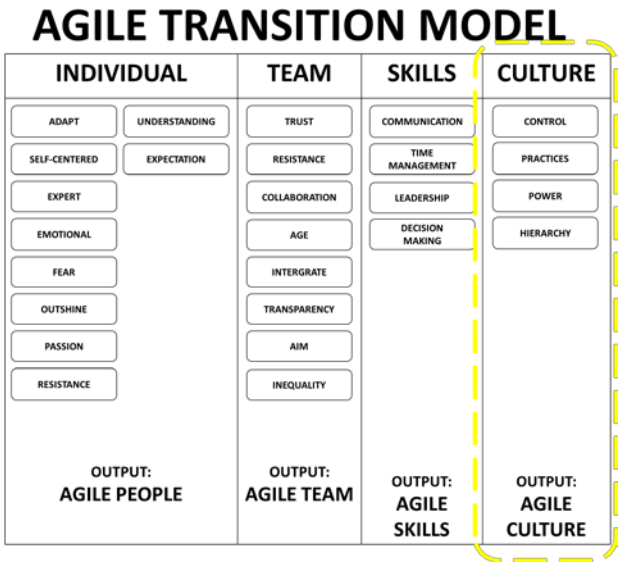

Figure 4 Agile Transition Model Based on Human Factors

The newly proposed ATM consist of four components. These four components are named as agile environment attributes. These attributes are derive from human factors identified in the literature review, case study and survey. Each attribute is explained in Section III. These attributes are important in agile environment, therefore it must be an important component of the model. However, there is one optional component, Culture. Culture is an optional for this model because not every organization, company or even a small team owns a culture. Culture takes time to build and develop. However, based on based on what we have

discovered from literature review, challenges from culture does affects agile transition. Therefore, culture is an optional attribute whereas it can be implemented for company or teams that is mature enough to have their own culture.

VI. DISCUSSION

In this section, the properties of each People-oriented model are presented. These five models are compared to the newly proposed model. The purpose of the comparison is to show what are the agile environment attribute each of the model discovered. Therefore, there are five existing models under this category. The models are ADAPT, Agile Culture Model, The Marshall Model of Organizational Evolution, Change Delivery Strategy Implementation Model and Rethinking Scale. Table 6 shows the properties of each ATM. The properties of the models are summarized in Table 6 as below:

Table 6 Comparison of People-oriented Models and Models between Newly Proposed Agile Transition Model based on Agile Environment Attributes

Agile Transition Models	**Individual**	**Team**	**Skills**	**Culture**
ADAPT (Cohn, 2010)	√	X	X	√
Agile Culture Model (Sahota, 2012)	X	X	X	√
The Marshall Model of Organizational Evolution (Marshall, 2010)	√	√	X	√
Change Delivery Strategy Implementation Model (Migliaccio, 2010)	√	√	X	X
Rethinking Scale (Kearney, 2013)	√	√	X	√
Agile Transition Model Based on Human Factors	**√**	**√**	**√**	**√**

Based on the classification in Figure 1, people-oriented model discusses about the people's mindset and the organizational culture they follow. Changing people mindset onto something is not an easy task. However, with a right approach and proper planning, developing a new mindset is possible. Consequently, some of the ATM is categorized into a people-oriented model. People-oriented model is focused on giving awareness on the current situation and provide a better understanding on agile concept.

However, comparison of people-oriented model in Table 6 shown none of the models covers the four attributes identified from the literature review: Culture, Individual, skills and Team. ADAPT (Chohn, 2010) only covers Individual and culture. Agile Culture Model (Sahota, 2012) focus more on the culture, The Marshall Model of Organizational Evolution (Marshall, 2010) focus on individual, culture and team changes, Change Delivery Strategy Implementation Model (Migliaccio, 2010) focuses only on individual and team. Last but not least Rethinking Scale (Kearney, 2013) which also did not cover one of agile environment attributes, Skills. As a conclusion, most of the existing agile transition models and models do not cover skills.

Therefore, agile transition model based on human factor is developed to comprehensively cover all the important attributes in agile environment so that transition from non-agile to agile are effective.

VII. CONCLUSION

In this paper, we have presented an agile transition model based on human factors that compressively covers human factors identified during agile transition. We have identified the human factors that negatively caused agile transition to fail or delay. Based on the factors identified: (1) agile environment attributes are derived, (2) main components of the model are identified. Last but not least, we have explained the process of the development of the model.

Therefore, to validate the effectiveness of the newly proposed ATM, a case study for undergraduate class will be conducted. Based on this case study, we will validate each factor in newly proposed agile transition model. Since the case study is conducted in undergraduate class, some of the factors are inconvenient to be validated in the class. Therefore, we will conduct a survey to those who have experience in agile to validate the factors. Hence, the result from the case study and survey will be used to improve this model in the near future.

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REFERENCES

[1] Rohunen, A., Rodriguez, P., Kuvaja, P., Krzanik, L., & Markkula, J. (2010). Approaches to agile adoption in large settings: a comparison of the results from a literature analysis and an industrial inventory. In Product-focused software process improvement (pp. 77-91). Springer Berlin Heidelberg.

[2] G. Mikulėnas, R. Butleris and L. Nemuraitė, "An Approach For The Metamodel Of The Model For A Partial Agile Method Adaptation", Information Technology And Control, vol. 40, no. 1, 2011.

[3] Ayed, H., Vanderose, B., & Habra, N. (2014, June). Supported approach for agile methods adaptation: An adoption study. In Proceedings of the 1st International Workshop on Rapid Continuous Software Engineering (pp. 36-41). ACM.

[4] Cestari Silva, C., & Goldman, A. (2014, July). Agile Methods Adoption on Software Development: A Pilot Review. In Agile Conference (AGILE), 2014(pp. 64-65). IEEE.

[5] Pyxis. Winning conditions to start your Agile transition, 2014.

[6] P. Rijken, "Organisational Inertia - A Predictor For Successful Agile Transformations? (Part 1)" Available: *http://blog.xebia.com/organisational-inertia-a-predictor-for-successful-agile-transformations-part-1/*

[7] A. Qumer and B. Henderson-Sellers, "A model to support the evaluation, adoption and improvement of agile methods in practice", Journal of Systems and Software, vol. 81, no. 11, pp. 1899-1919, 2008.

[8] van Dijk, R. W. (2011, June). Determining the Suitability of Agile Methods for a Software Project. In 15th Twente Student Conference on IT.

[9] Collier, K. Ten Mistakes to Avoid In an Agile BI Transformation. 2013; Available from: https://tdwi.org/~/media/947D124FCEEC476AB1590741F6BD836B.pdf

[10] Chow, T., & Cao, D. B. (2008). A survey study of critical success factors in agile software projects. Journal of Systems and Software, 81(6), 961-971.

[11] Ghani, I., Jawawi, D. A., Niknejad, N., Khan, M., & Jeong, S. R. (2016). A Survey of Agile Transition Models. Emerging Innovations in Agile Software Development, 141.

[12] Gandomani, T. J., Zulzalil, H., Ghani, A. A., Sultan, A. B. M., & Sharif, K. Y. (2014). How human aspects impress Agile software development transition and adoption. International Journal of Software Engineering and its Applications, 8(1), 129-148.

[13] Hoda, R., Noble, J., & Marshall, S. (2010). Agile undercover: when customers don't collaborate. In Agile Processes in Software Engineering and Extreme Programming (pp. 73-87). Springer Berlin Heidelberg.

[14] Sutharshan, A. (2013). Human factors and cultural influences in implementing agile philosophy and agility in global software development.

[15] Version, One. "The 8th Annual "State of Agile" Survey." (2013).

[16] Ghani, Imran, ed (2016). Emerging Innovations in Agile Software Development (pp. 161). IGI Global.

[17] Cohn, M. (2010). Succeeding with agile: software development using Scrum. Pearson Education.

[18] Sahota, M. (2012). An Agile Adoption and Transformation Survival Guide. Lulu. com.

[19] Marshall, B. The Marshall Model of Organisational Evolution (Dreyfus for the Organisation). 2010.

[20] Migliaccio, G. C., Gibson, G. E., & O'Connor, J. T. (2008). Changing project delivery strategy an implementation.

[21] A.T. Kearney., Fit Transformation™: Making Your Company Strong, Agile, 2013; Available from: https://www.atkearney.com/documents/10192/3169716/Fit+Transformation.pdf/77ecfc6b-f2bd-4bf0-ac90-f5d6bf22e0db

[22] Popli, R., & Chauhan, N. (2013). A MAPPING MODEL FOR TRANSFORMING TRADITIONAL SOFTWARE DEVELOPMENT METHODS TO AGILE METHODOLOGY. International Journal of Software Engineering & Applications, 4(4), 53.

[23] Eoyang, G. H. (2004). Conditions for self-organizing in human systems.Futurics, 28(3/4), 10.

[24] Rising, L., & Manns, M. L. (2004). Fearless change: patterns for introducing new ideas. Pearson Education.

[25] Lewin, K. (1946). Force field analysis. The 1973 Annual Handbook for Group Facilitators, 111-13.

[26] Druckman, A. Agile Transformation Strategy. White Paper, 2011.

[27] Ambler, S. (2010). The agile maturity model (AMM). Dr. Dobbs Journal, April,1.

[28] Qumer, A., Henderson-sellers, B., & Mcbride, T. (2007). Agile adoption and improvement model.

[29] Kotter, J.P., Leading Change, With a New Preface by the Author. 2013: Harvard Business Press.

[30] Dove, R. (1999). Knowledge management, response ability, and the agile enterprise. Journal of knowledge management, 3(1), 18-35.

[31] Leffingwell, D. (2010). Agile software requirements: lean requirements practices for teams, programs, and the enterprise. Addison-Wesley Professional.

[32] Esfahani, H. C., Cabot, J., & Eric, S. K. (2010, May). Adopting Agile Methods: Can Goal-Oriented Social Modeling Help?. In RCIS (pp. 223-234).

[33] Lalsing, V., Kishnah, S., & Pudaruth, S. (2012). People factors in agile software development and project management. International Journal of Software Engineering & Applications, 3(1), 117.

[34] Kozak, Y. (2013). Barriers Against Better Team Performance in Agile Software Projects. Chalmers University of Technology, Sweden.

[35] Tanner, Maureen, and Ulrich von Willingh. "Factors leading to the succ ess and failure of agile projects implemented in traditionally waterfall environments." Human Capital without Borders: Knowledge and Learning for the Quality of Life. Portoroz, Slovenia: Make Learn (2014).

[36] Bannink, S. (2014). Challenges in the Transition fromFkozak Waterfall to Scrum–a Case study at Port Base. In 20th Twente Student Conference on Information Technology.

[37] O'Connor, C. P. (2010, October). Letters from the edge of an agile transition. In Proceedings of the ACM international conference companion on Object oriented programming systems languages and applications companion (pp. 79-84). ACM.

[38] O'Connor, C. P. (2011, August). Anatomy and physiology of an Agile Transition. In Agile Conference (AGILE), 2011 (pp. 302-306). IEEE.