Agile Methods Acceptance Model: Understanding Factors for Implementing Agile Methods in Pakistan

Y. A. SOLANGI, Z. A. SOLANGI*, A. MAITLO, S. CHANDIO**, A. SHAH***

Department of Computer Science, Shah Abdul Latif University Khairpur, Pakistan

Abstract: Agile software development methods can deliver quality software yet it perceived that adoption and acceptance of agile methods by the consumers has been lower in Pakistan. However, this research study proposes an extended model of technology acceptance to understand the perception of the potential software practitioner teams towards adoption and acceptance of agile methods in software development. The theoretical research framework in this study incorporates determinants such as productivity, awareness of agile methods, and customer collaboration along with latent factors perceived ease of use and perceived usefulness. It is intended that the systematic research framework of integrated factors would be supportive enough to adopt agile software development solutions in software industry of Pakistan.

1. INTRODUCTION

One of the fundamental apparatuses that designers require so as to achieve their undertaking is an all-around characterized building process depicted by a software product improvement strategy. A software product advancement technique is a lot of exercises and practices, and additionally jobs and standards of conduct, got from a lot of expert points, which are completed in a sensible and determined request. A product development strategy may address the innovative angles, as well as the workplace and the expert needs and requirements. As needs be, agile designing methods are looked into in this paper from the three points of view: The Human viewpoint, which incorporates intellectual and social perspectives, and alludes to learning, and relational (colleagues, clients, the board members). The Organizational viewpoint, which incorporates administrative and social perspectives, and alludes to the workspace and issues that stretch out past the group. The Technological viewpoint, which incorporates hands-on and specialized perspectives of the actual development, and alludes to how-to-do and actual code-related matters (Navigation and Route, 2008). Agile methods has affected how software advancement is directed and how development is sorted out in little, medium-sized and substantial companies (Sharp and Robinson, 2010). Agile methods advancement is an observational or nonlinear process where short input circles are important to accomplish an alluring, foreseeable result (Ericksson and Sörlund, 2005). Further underline the significance of lightweight procedures in coordinated improvement, characterizing agile development as to"strip away as much of the heaviness, commonly associated with the traditional software-development methodologies, as possible to promote quick response to changing environments, changes in user requirements, accelerated project deadlines and the like." The concept of agility and leanness in software development, (Conboy, 2009) argues that agile methods must contribute to one of more of the following: creation of change, proaction in advance of change, reaction to change or learning from change. Agile software development approaches such as Extreme Programming, Crystal methods, Lean Development, Scrum, Adaptive Software Development (ASD), and others view change from a perspective that mirrors today's turbulent business and technology environment. Agile methods emphasizes excellence in the planning and designing. These strategies are occasionally mistaken for informal or unreliable coding on the grounds that the plan is done on a continuous premise, in littler pieces, rather than at the same time and in advance. Respectively agile technique tends to quality in confident behavior (Jim, *et al.,*2001). Though the use of agile techniques is extensive in variety of various business environments, yet there is still no obvious understanding of what are the central parts of agile strategies. Some case, these are straight forwardness and quickness (Abrahamsson, *et al.,* 2010) while others propose them to be coordinated effort, synchronization of management and communication.

2. PROBLEM STATEMENT

Both the people and organizational structure are the key factors in agile software development(Iivari and Huisman, 2007). People and community attain close interaction by developer in agile software development methods. However, different communities and regions may have different behaviors in agile software development. Therefore, this research study intends to

++Correspondence Email*: yasir_solangi@yahoo.com, zulfs@hotmail.com, abdullah.maitlo@salu.edu.pk, sm.chandio@usindh.edu.pk, asadullah@iium.edu.my*
*Jubail Technical Institute, Colleges and Institute Sector Royal Commission for Jubail, Saudi Arabia
**Institute of Mathematics and Computer Science, University of Sindh, Pakistan

investigate social factors for successful adoption of Agile in the context Pakistan, and to develop and test research framework for acceptance of agile software development methods.

Objectives and Significance of Study: (expected contribution)

The research study focuses the objectives to identify the social factors and behavior of software developers in acceptance of agile methods in software development. People, community and technical infrastructure are the key areas to investigate for successful adoption of agile. It is expected to fill the research gap with conclusive evidence of this study finding. More, the research study intends to contribute the knowledge for practitioners to recognize and observe the key factors for successful acceptance of agile methods to their software organization and people (Riaz, 2018). This study would help to minimize the software development issues raised in the software development industries in Pakistan.

3.   THEORETICAL BACKGROUND

Several research studies have concluded with inclusive evidence in understanding occurrences of technology acceptance and usage by adopting Technology Acceptance Model (TAM) theory(Davis, 1989) **(Fig. 1).** Therefore, researchers in social sciences extensively utilize TAM as basic theory to determine the early adoption and usage of technology and unveil diversified findings in diverse contexts (Solangi *et al.,* 2018). However, TAM remains of the generally practical theory in information technology acceptance. TAM is succeeding version of Theory of Reasoned Action (TRA) which was suggested to understand the human behavior in the given perspective(Fishbein and Ajzen, 1975). More, explicitly TAM information system theory employs two latent variables perceived usefulness (PU) and perceived ease of use (PEU) in measuring the pledge of human behavior towards acceptance and use of the innovation in any area of study. Based on usefulness and ease-of-use characteristics of any innovation both latent factors of the information system theory assist to measure the attitude of either acceptance or denial of any innovation in various domains. Perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance" and perceived ease of use is "the degree to which a person believes that using a particular system (technology) would be free of efforts" (Davis, 1989) .
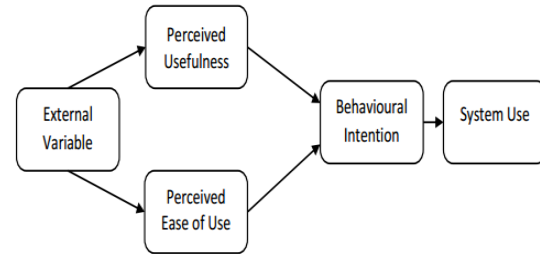

Fig.1 Technology Acceptance Model Source: (Davis, 1989)

Proposed Research Framework Hypotheses

Technology acceptance theory is applied as foundation theory in the proposed research framework **(Fig. 2)** because of its simplicity, parsimony and robustness (Raza *et al.,* 2018; Solangi, *et al.,* 2017). Proposed research framework consists of context specific factors along with latent factors of the TAM theory to understand the software development teams' intention to accept and adopt the agile development methods. Following are the factors hypothesized to test the research framework.
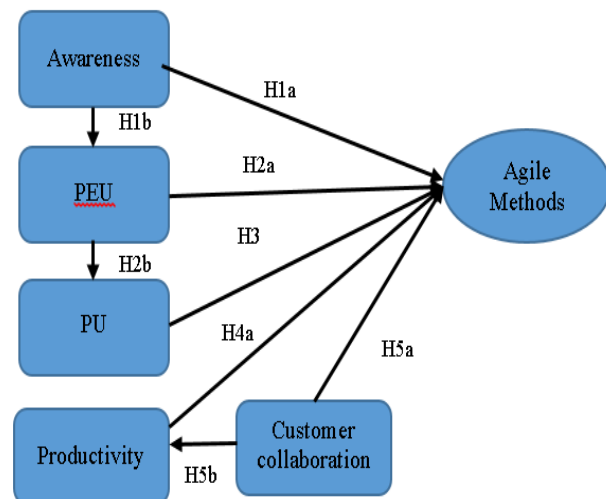

Fig. 2 Proposed Research framework

Awareness:

It is important for the software practitioner to be aware of agile methods, and methodology of implementation to understand the benefits and understanding of orrcurance of quality problems in the software development (Conboy, *et al.,* 2011; Lalsing, *et al.,* 2012). Specific to agile software development team, it is important to have them knowledge, good communication, behavior and experience to practice agile methods implementation properly (Gandomani,

et al., 2014). The awareness factor is chosen to investigate and understand the awareness of the software developers about the agile methods in Pakistan. There are several states of agile methods to be investigated under awareness factor such as perception about the agile methods, organizational structure, and even language used. Hence, there it is an important factor to investigate for the implementation of agile practices in the context of Pakistan. Following are the hypotheses to be investigated about the awareness.

H1a Awareness will have significant effect on agile methods acceptance

H1b Awareness will have significant effect on perceived ease of use of agile methods

Perceived ease of use (PEU):

Perceived ease of use is "the degree to which an individual believes that using a particular information technology system would be free of effort" (Solangi, *et al.,* 2018). More, it is "an application **perceived** to be easier to **use** than another is more likely to be accepted by **use**rs" (Davis, 1989). This factor is hypothesized as:

H2a PEU will have significant effect on agile methods acceptance
H2b PEU will have significant effect on perceived usefulness of agile methods

Perceived usefulness (PU):

Perceived usefulness is "one of the independent constructs in the Technology Acceptance Model (TAM). It is the degree to which a person believes that using a particular system would enhance his/her job performance" (Davis, 1989). "It is one of the two key variables in the technology acceptance model. **PU** directly influences both attitude toward systems use and behavioral intention to use the system" (Solangi *et al.,* 2018). This factor is hypothesized as:

H3 Perceived usefulness will have significant effect on agile methods acceptance

Productivity

Typically, productivity states the job, accomplished in a precise time. According to survey, (One, 2016)the main reason to accept agile software development is higher productivity. "In agile entirely the project can be overseen frequently to release working software with a preference to the shorter time" (Asnawi and Wills, 2014). Therefore, it is productive and the software practitioners may achieve the customers' satisfaction through early and uninterrupted delivery of software. More, productivity factor may support to investigate overall timeliness, autonomy, efficiency, quality, effectiveness, and success of the software projects

(Melo, *et al.,* 2013; Ramírez and Nembhard, 2004). Productivity is hypothesized as following:

H4 Productivity will have significant effect on agile methods acceptance

Customer collaboration:

One of the principles of the agile manifesto is to build software projects by involving the motivated customers, provide them the infrastructure, support, and resources and trust them to get the task achieved. Customer collaboration promotes the perception of team building and people involvement to increase the productivity (Ramírez and Nembhard, 2004). Team building can help to negotiate the requirement, planning, re-planning, improves level of communication and cooperation (Liu, 2017). More, collaboration enables knowledge propagation obligation, supportiveness, and trust. It is hypothesized as following:

H5a Customer collaboration will have significant effect on agile methods acceptance
H5b Customer collaboration will have significant effect on productivity of agile methods

4.   CONCLUSION

The research study intended to reveal the understanding about the perception and current adoption level of the agile methods in software industry of Pakistan. In this regard, the research study aimed to identify the factors that support the operative employment of agile methods in Pakistan. The research study designed and developed an integrated research framework based on TAM theory with three external factors and two indigenous factors to measure the adoption and acceptance of agile methods by the potential practitioners in software industry of Pakistan. The research study designed eight hypotheses to verify the casual relation between the exogenous and endogenous dependent variable. It is expected that the proposed research framework would be confirmed by survey data.

REFERENCES:

Abrahamsson, P., N. Oza, and M. T. Siponen, (2010). Agile software development methods: a comparative review. In Agile software development31–59. Springer.

Asnawi, A. L., and G. B. Wills, (2014). An Empirical Study : Understanding Factors and Barriers for Implementing Agile An Empirical Study : Understanding Factors and Barriers for Implementing Agile Methods in Malaysia.

Conboy, K. (2009). Agility from first principles: Reconstructing the concept of agility in information

systems development. Information Systems Research, 20(3), 329–354.

Conboy, K.., S. X.Coyle,Wang, and M. Pikkarainen, (2011). People over process: key people challenges in agile development.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319–340. http://doi.org/10.2307/249008

Ericksson, H. and T. Sörlund, (2005). Cutting, tool system and mechanism for accurately positioning a cutting edge. Google Patents.

Fishbein, M. and I. Ajzen, (1975). Belief, attitude, intention and behavior: An introduction to theory and research.

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

Iivari, J., and M. Huisman, (2007). The relationship between organizational culture and the deployment of systems development methodologies. Mis Quarterly, 35–58.

Jim H. and A. Cockburn. (2001). Agile software development: The business of innovation. Computer, 120–127. Retrieved from http://m.adaptivesd.com/articles/cross_oct02.pdf

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

Liu, D. (2017). An empirical study of Agile planning critical success factors.

Melo, C. D. O., D. S. Cruzes, F. Kon, and R. Conradi, (2013). Interpretative case studies on agile team productivity and Information and Software Technology, 55(2), 412–427.

Navigation, S. and N. S. Route, (2008). Agile Software Engineering. Springer International Publishing. http://doi.org/10.1007/978-1-84800-199-2

One, V. (2016). 11th annual state of agile survey. Technical report, Version One.

Ramírez, Y. W. and D. A. Nembhard (2004). Measuring knowledge worker productivity: A taxonomy. Journal of Intellectual Capital, 5(4), 602–628.

Raza, A., S. M. Chandio, N. I. Ali, Z. Solangi, A. Shah, and S. F. Ahmed, (2018). Analysis determinants of social media acceptance in higher educational institutes of Pakistan. International Journal of Engineering and Technology, 7(2–5), 32. http://doi.org/10.14419/ijet.v7i2.5.10050

Riaz, M. N. (2018). Success Factors Affecting Implementation of Agile Software Development Methodologies in Software Industry of Pakistan : An Empirical Study, 9(7), 94–98.

Sharp, H. and H. Robinson, (2010). Three 'C's of agile practice: Collaboration, co-ordination and communication. Agile Software Development: Current Research and Future Directions. http://doi.org/10.1007/978-3-642-12575-1_4

Solangi, Y. A., Z. Solangi, A. Raza,S. A. Aziz, and M. Syarqawy, (2018). Social Commerce in e-business of Pakistan : Opportunities , Challenges and Solutions. In International Conference for Information and Communication Technology for the Muslim World ICT4M 2018. IEEE.

Solangi, Z. A., F. Al Shahrani, and S. M. Pandhiani, (2018). Factors affecting successful implementation of elearning: Study of colleges and institutes sector RCJ Saudi Arabia. International Journal of Emerging Technologies in Learning, 13(6), 223–230. http://doi.org/10.3991/ijet.v13i06.8537

Solangi, Z. A., M. A. Aziz, and A. Shah, (2017). Reliability And Validity Of A Questionnaire For Empirical Analysis of Factors Influencing Iot-Based Smart Healthcare, 29(6), 1201–1206.