Motivators and Demotivators of Agile Software Development: Elicitation and Analysis

Shahbaz Ahmed Khan Ghayyur
Department of Computer Sciences And Software Engineering, International Islamic University, Islamabad, Pakistan

Adnan Naseem
Department of Computer Sciences, Comsats Institute of Information Technology, Islamabad, Pakistan

Salman Ahmed
Department of Computer Sciences, International Islamic University, Islamabad, Pakistan

Abdul Razzaq
Department of Computer Sciences, International Islamic University, Islamabad, Pakistan

***Abstract*—Motivators and demotivators are key factors in software productivity. Both are also critical to the success of Agile software development. Literature reports very diverse and multidimensional critical factors affecting the quality of Agile software development, thus, there is a need to extract and map required factors systematically for wider implications. The classification of anticipated factors and sub-factors is also desired to simplify their identification and definition. The reported research focuses on the systematic mapping of motivators and demotivators in Agile software development. A systematic mapping literature study has been performed to shed light on scattered critical factors for software engineers, affecting productivity and understanding of Agile viewpoints. Additionally, this study categorizes the extracted motivators as organization, people and technical. Whereas, the sub-factors' categorization has been concentrated, which contributes to the motivators at grass root level. This research alleviates the problems of identification, definition and classification of the critical factors in agile software development for both practitioners and researchers.**

Keywords—Agile methodology; systematic mapping; motivators; demotivators; Agile teams; Agile software development

I. Introduction

A. Motivators and Demotivators in ASD

Agile Software Development (ASD) is a method that contains a set of values and principles according to which applications and solutions developed by the joint efforts of self-organized teams [1]. Motivators play a vital role in software development and there is a need of motivators factor for the practitioners of ASD to improve their technical productivity The motivators of agile teams has increase the software quality, that will help in achieving business goals [1]. Less literature review have been focused in conducting studies on motivators and demotivators of software development [2]. McHugh et al. [3] analyzes effect of motivators and demotivators on three agile practices. This research will set a common platform that breaks the shuttle research barrier in motivators and demotivators factors of ASD.

The incomplete and inconsistent requirement can lead to software failure, these failures usually occur in the development phase of the life cycle [6]. Effective management is necessary in the project because of effective team work can be reduce the cost of the project up to 70% of its total cost [7]. ASD practices become popular among researchers as these give respect to individuals which can create an organization factor and individual can perform better in an environment [8]. ASD is associated with a cluster of methodologies, for example, Scrum and XP (Extreme Programming) are associated with iteration on small intervals [9]. These methodologies are also known as 'light weight' methodologies because these are distinct from the traditional approaches [10]. As it is written in the Agile Manifesto [8] that "Self-organizing teams encourage great architectures, requirements, and designs" that is why agile allows requirements change during iteration that will help in collaboration with the users and the agile teams which gives autonomy in self-organizing and cross-functional. As there are multiple methods present in ASD, ones's can adopt the respective method according to their need [11]. ASD can adopt any agile methodology without having fear, these approaches can select according to organization environment [12]. The agile practices may be based on technical aspect, e.g. (Continuous Integration, Test-first Programming), Based on Planning e.g. (Daily Meeting, Planning Iteration) or it can be based on agile environment e.g. (distributed team, self organizing teams) [13].

B. Need of Systematic Mapping

Even though the motivators and demotivators revealed important discussion in the software industry and practitioners have been treated in the last decades [14], scholastic researchers have not kept such pace. Recently, literature has start investigating motivators and demotivators of software engineers, however, there is a lot of research in this area that needs to be address [15]. The motivators of this mapping study has been done due to the lack of existing literature regarding the research performed for motivators and demotivators of software development. This study have encounter few studies on motivators and demotivators of software engineers, however, did not find specific mapping study on motivator and

demotivator of ASD [16]. The data presented is scattered form that is why it is necessary to integrate such literature in the form of mapping study. As written in the agile manifesto, each member has a great influence on agile teams and individual member has a role in his team [17]. ASD provides their team confidence of doing work and these teams are self managing, self organizing and contain individual motivators. there is a need to provide such motivators according to the environment and to support that will help in doing work [18]. A survey by Cockburn and Highsmith [19] indicates that the rewarding factor produces enthusiasm in agile teams which makes an ASD project for high performance. The literature is filled with related studies to different types of software development methodologies that deals with stress, and relationship of an employee to an organization, these factors has a strong relation to social-psychological problems such as attitude which has a strong impact on project success. ASD usually focuses on management and engineering perspective, and it has a strong concern about the management and development of software and to evaluate all the hurdles associated with agile project.

As motivators and demotivators are itself challenges, the objective of this study is to explore how pervious study has support of motivators and demotivators in ASD. Secondly, our study will follow the characterization on three factors i.e., organization, people and technical factors. To achieve the aforementioned objectives of the studythe research questions are proposed The research questions are closely linked and correlated to the study of the allocation of the available document and quantified publications. New motivators and demotivators are also incorporated in the study that is not being explored yet and identified in the published research.

The remainder of this document is structured as follows: Section II explains the background knowledge regarding motivators and demotivators. Section III explains the method of research, which is followed in this study. Section IV illustrates the results within the literature exists in motivators and demotivators, categorization and subcategorization factors. A discussion of these results follows in Section V, then finally close and all the results of the in Section VI.

II. Background Knowledge

This section focuses on a detailed literature review varies in terms of motivators and demotivators in agile software development.

De O et al. [2] briefly describes the motivational factors in agile teams. He models the motivator factors in agile teams using the model named MOCC (model of software engineers motivation). To proof his work, he has done a case study by which he describes the motivational factors with the technical aspect. Highsmith and Cockburn [3] is considered an important member of agile legislations. This research paper is purely written on the problem facing on traditional software and their solution gave in the form of agile manifesto. Akhtar et al. [4] has done a case study related to scrum adoption and their barrier in Pakistan. Based on their finding they give suggestion which they elaborate mandatory for the improvement in the software industry. Hassan et al describe their purpose of choosing scrum because of mostly used in global software development [5]. Author claims that scrum is newly implemented in Pakistan and needs a lot of improvement. This research uses qualitative technique/method and based on it give some mandatory improvements. Wagener [6] inspect the critical factors in agile software development. In the first section author briefly describe each method of agile software development. The portion which is related to our work are a categorization phase of agile factors.

Wagener divides the factors in four important groups named as (i) People, (ii) Process, (iii) and Technical, (iv) Organizational. Chow and Cao [7] done a survey study by which they find have find the most important factors which effect the project most. They done survey on 109 agile projects from different 25 countries around the world and then analyzed this data with the help of regression analysis. Baddoo and Hall [8] describe motivators of developers, project managers and senior managers in domain of Software Process Improvement(SPI). They describe many motivators factors of above all 3 groups and find that most common motivator factor is ‘rewarding’. Asghar and Usman [9] presented motivator and demotivators factors of Pakistan software industry. To evaluate data Systematic literature is done and based on these literatures review a case study has been done. Based on result of case study an extension of Pakistan industry in MOCC is proposed. They find the motivation in the study of hosted 5D’s Model which has done a survey of Pakistan in which they ranked culture of Pakistan as the biggest demotivators factors.

III. Research Method

A. Systematic Mapping Study

Systematic allocation study has reduced the biasness of literature with string order of methodological steps to literature search. Peterson et al considered a well defined and evaluated review protocols to extract, analyze and document result [10]. This study also follow the process in [10] which include three step review including planning, conducting and documenting. This review is completed by an evaluation of outcome of each step’s outcome. Furthermore, the categoriation and sub-categorization of motivators and demotivators is also considered.

B. Planning of Mapping

This mapping study is used to explore the background literature knowledge regarding motivators and demotivator in ASD. There exists different methods that record the motivators and demotivators of ASD, however, these are in dispersed form. There exists a gap to record motivators and demotivators in the field of ASD, collectively. This Knowledge helps us to explore more what type of motivators and demotivators exist in ASD and provide a guideline to implement motivators and demotivators model in software industry which literature review lacks.

C. Research Questions

To achieve the objectives of the research, following research questions are considered as shown in Table I.

TABLE I. RESEARCH QUESTIONS ON MOTIVATION

No.	Research Question	Motivators
1	What are motivators and demotivators exist in the Organization , People and Technical factors?	This question will elaborate the categorization of motivators and demotivators in the Organization, People and Technical factors
2	What are subcategories of motivators and demotivators?	This question aims to provide sub-categorization of motivators and demotivators.

D. Search Strings

Following are the technical keywords concate to make search strings for searching purpose which are useful for findings the studies:

((({MOTIVAT} OR {DEMOTIV*} OR {DE-MOTIV*}) OR {SDLC}) OR {AGILE*} AND {SOFTWARE*} AND year >= 2000 AND year =< 2017)*

E. Search Engine

The term of 'motivators and demotivators in software' keyword and 'motivators and demotivators in software' that found in article journals, conferences and rest are excluded. Our selected research papers are published between 2000 and 2017. All research papers are selected from seven libraries, i.e. (IEEEXplore, ACM DL, ScienceDirect, ResearchGate, Google Scholar, Scopus, Springer).

F. Extraction

One of the important segments of the current research was the extraction of desired studies related to the research objectives. The extraction process starts with the injection of search strings provided in the sub-section D. The extracted motivators and demotivators are presented in the following Tables II and III.

1) Motivators extract from literature review

The number of frequencies of motivators is visualized by treemap. Following diagram depicts the different frequency range of motivator factors reported with respect to literature. Range of reported frequency is highlighted in different color, i.e frequency of identify with the task is 25, whereas, supportive role of management in examine study is 20 and the frequency range of career path is 19. Along with, frequency of development needs address, a variety of work, rewards and incentive and autonomy were 20,19,17 and 16 respectively. Moreover, frequency of technically challenging work and sense of belonging is 15, feedback is 13 and job security is 12. The frequency of trust is 10, whereas frequency of work balance, making a contribution and sense of belongings is 9 and better working environment frequency is 8. Finally, the least frequency report of motivators reported contains equity as 5, eliminate politics as 4, successful company experience as 3, well define coding standards, sufficient resources, self organizing teams and project ownership as 2 and right amount of documentation is referred only once.

TABLE II. MOTIVATORS FOUND FROM LITERATURE

Sr. No	Motivatorsal Factors	No. of Existing Studies
1	Rewards and Incentive	[9][11]
2	Management Supportive role	[11] [12] [13] [4] [6] [14] [15] [9] [16]
3	Well defined coding standard	[6]
4	Career path	[15] [9] [16]
5	Better working environment	[7]
6	Variety of work	[17] [15] [9] [16]
7	Technically challenging work	[15] [9]
8	Successful company experience	[15] [16]
9	Trust	[17] [15] [9] [16]
10	Identify with the task	[15]
11	Sufficient resources	[15] [9] [16]
12	Development needs addressed	[15]
13	Feedback	[17] [3] [8] [15] [9] [16]
14	Recognition	[17] [15] [16] [18]
15	Autonomy	[4] [8] [15] [9] [16]
16	Work balance	[18][19]
17	Management contribution	[6] [14] [15] [9]
18	Sense of Responsibility	[15] [16]
19	Sense of belonging	[17] [15] [16] [11]
20	Equity	[15] [9]
21	Job security	[15] [9] [16]
22	Self-organizing teams	[20]
23	Eliminate Politics	[8]
24	Project ownership	[4] [8]
25	Right amount of documentation	[6] [8]

TABLE III. DEMOTIVATORS FROM LITERATURE

Sr. No	Demotivators factors	No. of existing studies
1	Communication barrier	[4][15] [16] [11]
2	Lack of relationship opportunities	[6] [7] [15] [9]
3	Unrealistic goals	[15] [9] [16]
4	Injustice in promotions	[15]
5	Poor quality software	[15] [16]
6	Political environment	[8]
7	Uncompetitive pay	[15] [9] [16]
8	Unsupportive management	[9]
9	Lack of influence	[15] [9] [16]
10	Unfair reward system	[15] [9] [16]
11	Non-interesting work	[9]
12	Inequity/personal preferences	[9] [16]
13	Risk	[4] [15] [9] [16]
14	Stress/pressure	[9]

2) Common demotivators factors extracted from literature review

Some common motivators and demotivators extracted from literature are shown in Fig. 1 and 2.

Following diagram depicts the different frequency range of demotivators factors reported with respect to literature. Range of reported frequency is highlighted in different color, i.e. frequency of unsupportive management is highest as it is reported in the literature 8 times, whereas, uncompetitive pay and stress/pressure in examining study is 7. Along with, unrealistic goals and communication barrier is 6, injustice in the promotion is 5 and lack of relationship opportunity, lack of influence and inequity/personal perferences is 4. Moreover, the frequency unfair award system, the political environment and poor quality software is 3, non interesting work and risk is 3.

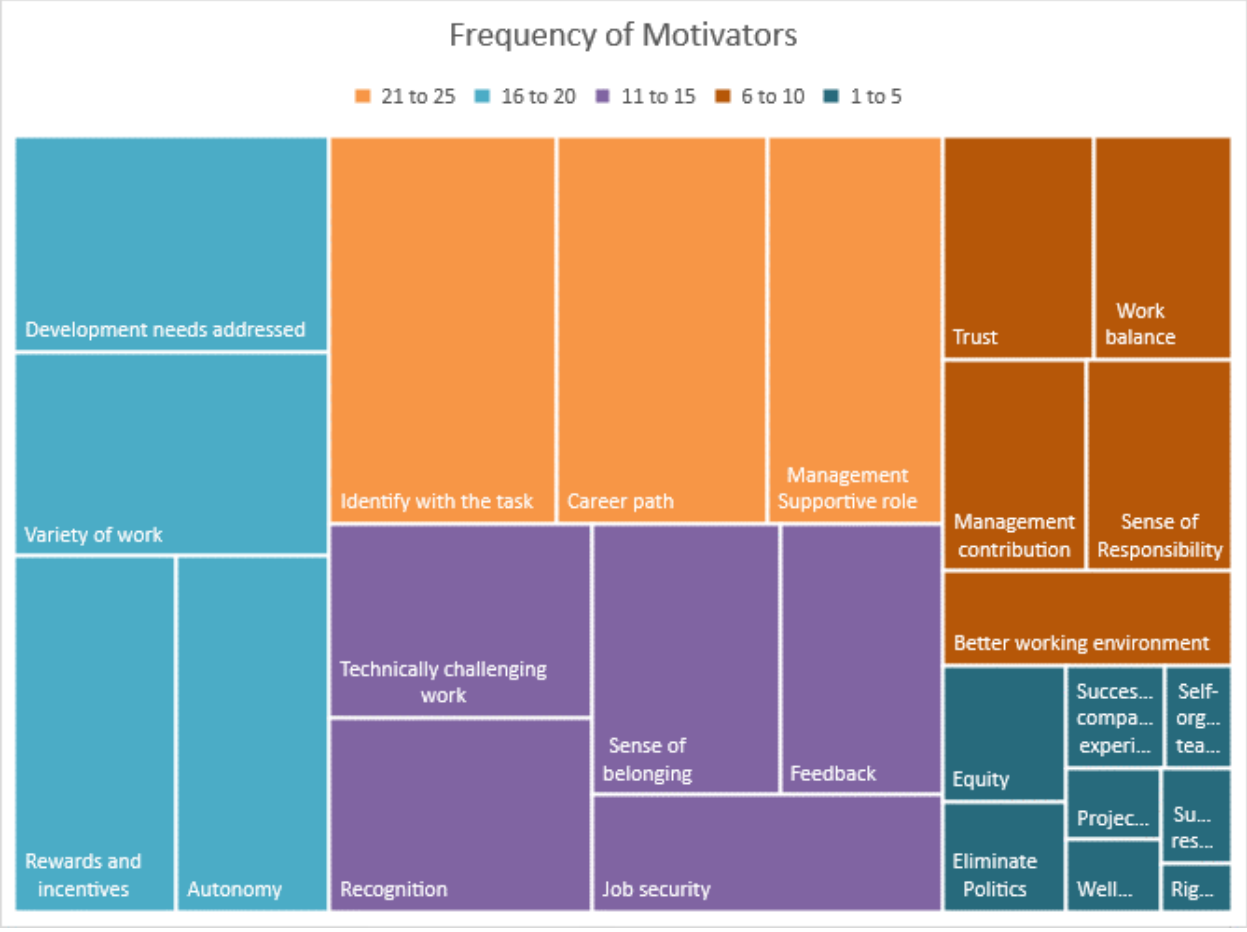

Fig. 1. Extracted motivators.

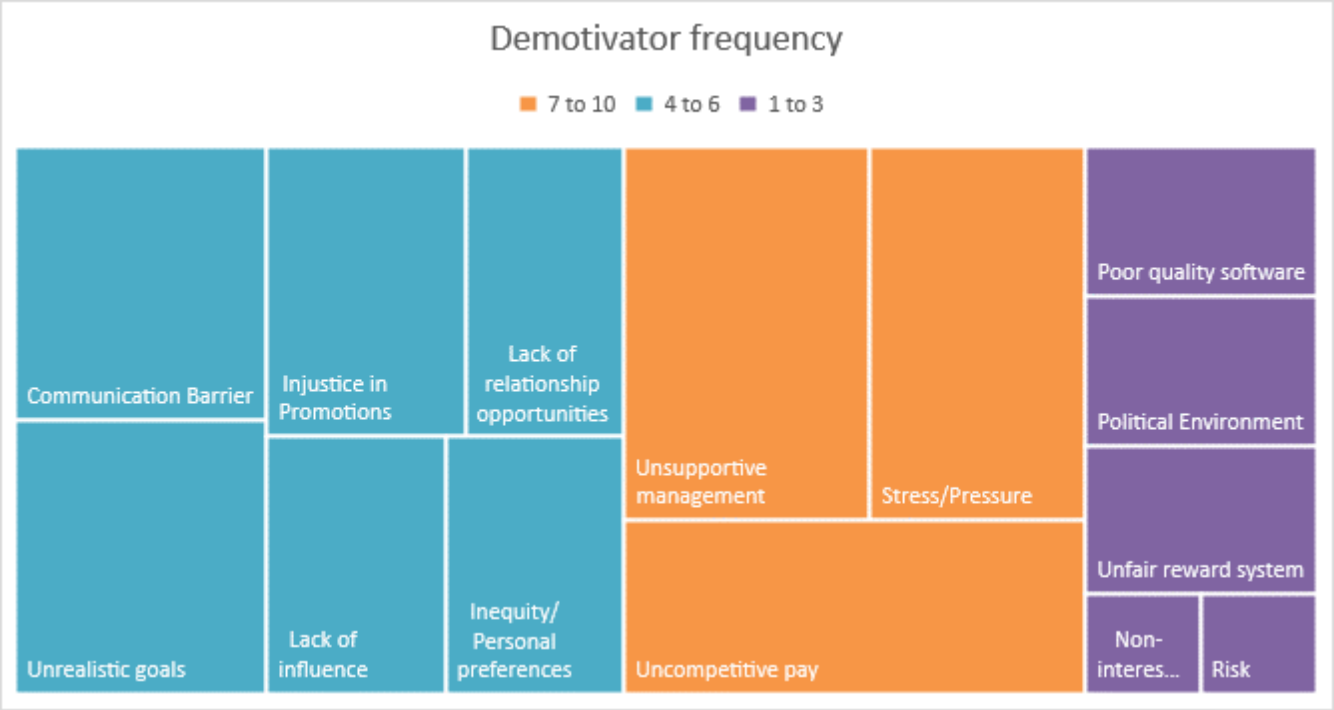

Fig. 2. Extracted demotivators.

G. Selection of Primary Study

Before selecting any study, all the studies were checked and select the relevant to the research questions. Papers were included after reading the title, abstract and if there was any confusion and not clear about the paper, then the complete paper review were considered and applied the inclusion and exclusion criteria.

1) Inclusion criteria

The following points are strictly followed while selecting the paper as inclusion criteria:

- Studies had been published in journals, conferences, and workshops.
- Studies must be written in English.
- Studies must be accessible electronically.
- Collected studies must be published after 2000.
- Research papers will be included which are based on the expert opinion.
- Research papers related to the topic, will be included as weak evidence which do not provide evidence.

2) Exclusion criteria

The following points are strictly followed while considering the exclusion criteria:

- Non-peer reviewed studies (tutorials, slides, editorials, posters, keynotes) are excluded.
- Peer reviewed, but not published in journals, or conferences are not considered (e.g. Book, and blog articles).
- Publications not in English
- Electronically non-accessible.

H. Conducting Mapping Study

Research paper which is published in different conferences or journals that would be a complete version, based on the studies discussed in the article, will be included. Selected primary studies are 48 as show in Table IV. However, further, for the evaluation of these studies, this study has included the studies that are most appropriate to the topic.

IV. Motivators in (RQ1)

In order to answer the research question 1, motivators and demotivators are classified as these factors: Organizationorganization factors, people factors and technical factors (Table V). Although, other previous quality attributes have been discussed in this mapping study, however, the current study has found out different few more.

TABLE IV. SCRUTINY OF THE PAPER

Digital Library	Studies	Title Scrutiny	Abstract Scrutiny	Selected	References
IEEE explorer	1054	92	50	38	[16]-[17], [21]–[52], [2]
ACM Digital Library	463	45	25	15	[1],[2], [9], [13], [17], [18], [68]–[74][67], [68],[69]
Science Direct	40	15	10	6	[9][70]–[74],[75]
Research Gate	65	9	6	4	[6] [19] [20][76]
Scopus	30	19	11	6	[7], [16], [77]–[80]
Springer	270	51	40	2	[81][69]
Google Scholar	300	90	54	14	[33], [48], [82]–[94]
Others	200	60	30	13	[5] [15][17] [20] [95], [96][97]- [98]
Total	**2422**	**381**	**226**	**98**	

TABLE V. CLASSIFICATION OF ORGANIZATION, PEOPLE, AND TECHNICAL FACTORS

	Organization Factor			
General Factors	**Motivators**	**References**	**De-Motivators**	**References**
Client Based	Customer Satisfaction Customer Collaboration Customer Commitment	[75][76] [68]	Ambiguous Requirement Size And Nature Of Change Deadlines	[13], [14]
Decision Time	Prioritize Work Product Completion Business Satisfaction Communication Agility	[2], [9]	Early Decision Making	[75][76]
Team Distribution	Centralized Team Successful Communication	[69], [70]	Culture Political Situation Lower Productivity Due To Local Conflicts Less Face To Face Communication	[14], [70]
Team Size	Small Size(Rapid Communication)	[75][76]	Large Size (Frequent, Informal And Rapid Communication) Coordinating And Managing	[15], [74]
General Culture	Dynamic And Fast Changing Adopted Environment Supporting Decision	[2], [72]	Informal Communication Trusting People Requirement Changing Environment Fast Feedback Methodology, Tool Or Process	[75][76]
Planning And Control	Internalized Plans Qualitative Control	[2], [70]	Nature Of Organization Planning	[2], [70], [74]
	People Factors			
General Factors	**Motivators**	**References**	**De-Motivators**	**References**
Capability	Expert Level Experience Good Interpersonal Communication Skills	[1], [9], [72], [74]	Less Domain Experience	[69]
Personal Features	Honesty Collaborative Attitude Responsibility	[68]	Critical Communication	[84]
	Work With Others		Requirement Change Without Discussion	
Communication And Negotiation	Synchronous, Communication Rapid Communication	[85], [86]	Time Zones Culture	[46]
Society Culture	Individual Interactions Personal Characteristic	[85]	Local Culture Geographical Situation	[87], [91]
Training And Learning	Continuous Learning Agility Mentoring And Professionalism Tacit Knowledge Sharing Personal Characteristic	[75] [76]	Language Barrier	[87]

	Technical Factor			
General Factors	**Motivators**	**References**	**De-Motivators**	**References**
Personal Characteristics	Initiation	[37], [44], [48]	Change	[75], [77], [79] [85], [91] [88]
	Direction To Work		Work Balance Life	
	Intensity		Location	
	Persistence		Job Satisfaction	
Intrinsic	Task Identification	[84], [88], [94] [85]	Producing Quality Work	
	Career Path		Software Maintenance	
	Variety Of Work Recognition Of Work Done Development Needs Address			
	Technically Challenge Work			
	Autonomy		Benefits Linked To Performance	
	Making Contribution			
	Responsibility		Teamwork	
	Equity			
	Trust		Scope For Increased Pay	
	Employer			
	Participation		Reward And Incentive	
Extrinsic	Productivity	[87], [88], [92], [54], [75] [76]	Flexibility In Work	
	Adherence To		Times Caring	
	Low Absentees		Managing Employer Work	
	Better Work Project		High Quality	
	Good Management			
	Sense Of Belonging			
	Feedback			
	Job Security			
	Good Work Life Balance			
	Appropriate Working Condition			
	Successful Company			
	Sufficient Resources			
General Factors	Senior Management Support	[44]-[49], [53]-[67]		
	Team Building			
	Clear Goals			
	Personal Interest			
	Know Purpose Of Task			
	Capability To Fix Problem			
	Software			
	Development			
	Project Initiation			
	Feasibility Study			
	High Quality			
	Good Job Work Done			
	Good Teamwork			
	Variety Of Work			
	Feeling Of Progress/ Work Done			
	Training			
	Development			
	Assessment			
	Lack Of Bureaucracy			
	Technically Challenge Work			
	Team Building			
	Good Communication			
	Encouraging			
	Feedback			
	Eliminate Waste			
	Employee Participation			
	Experiment (Try Something New)			
	Autonomous Testing Writing			
	Test Case Automatically			
	Budget			

V. Sub-Categrization of Motivators and Demotivators (RQ2)

Current section tries to answer the research question 2. This study has further divided the motivators and demotivators into sub categories, i.e. (i) Organizationorganization factors like Customer Satisfaction, Customer collaboration, and prioritize work, (ii) people factors like honesty, collaborative attitude, responsibility, and technical factors like initiation, direction to work, intensity have been discussed in this mapping study. Tables II and III represent the mappings of motivators and demotivators from exist literature. Beecham et al. [70] did a systematic literature review on motivators and demotivators on software engineer which is further enhanced by [44]. This domain still demands a lot of work as this has direct concern over employee satisfaction.

VI. Threat to Validity

We discuss threats to the validity of this work in the different mapping study steps.

A. Risk Identification of Primary Studies

A challenge was to determine the scope of our study, as motivators and demotivators covers multiple computer and society, including software development, information systems and other computer terms. This geometry uses different terminology for the same concepts. All tires and avoid distortion of competition, we've searched for motivators and demotivators terms in different contexts. While this bias falls reporting requirements, increases the search effort. To identify relevant studies and offers a selection of un-biased, a test protocol was developed.

B. Threats for the Selection and Consistency of Extraction of Data

Formulation of research questions has helped in the selection of studies of relevance, just as a frame of reference model and characterization in research methodology. We, however, contained magazine contributions and thesis here (so together as an assessment has taken place) any trends and activities.

C. Threats to Data Fusion and Results

The credibility of the threat is mitigated by having as much as possible in accordance with the Protocol on the control of a single standard description, and, if these are different from the steps and externally assessed.

VII. Discussion

This research has extracted the motivators and demotivators of ASD. For this purpose, a systematic mapping study on existing literature of motivators and demotivators is performed that help to categorize them in terms of individual focus and to obtain an understanding of key research concerns. To address the individual factors, motivators and demotivators are classified into three factors, organization, people and technical. By Literature, respective motivator and demotivator factors are evaluated which is classified according to organization, people and technical. Oorganization factors are: client based, decision time, team distribution, team size, general culture and planning and control. Likewise, people factors are classified in capability, personal feature, communication and negotiation, society, culture, training and learning. Whereas, Technical factors are sub classified as personal characteristics, intrinsic, extrinsic and other general factors. All these factors classifications were considered with respect to motivators and demotivators and all data has been mapped with existing literature.

Along with these categorizations, a sub categorization is also being performed that will contribute further in future research. These classifications are being done for the following factors, i.e. variety of work, a sense of belonging, employee participation, recognition and clear identification with tasks. The sub factors helped in a clearer understanding of the motivators and demotivators at technical grass root level. The detailed discussion of these subcategorization is briefly described hereafter.

A. Classification of Factors into Sub Factors

The classification of some motivating factors into sub factors is performed by which their identification and definition become easier.

1) Variety of work: People require the area of work that can boost their capability and enhance their skills. Literature usually prefer the area that can overcome their limitations in future. Variety of work can be classified as personal and market needs. In personal needs, practitioners usually want to follow their personal preference to work while in market needs, and have to follow the trend of market by which multiply their worth.

2) Sense of belonging: Software engineers have assigned different tasks which have divided per interval. These tasks demand a sense of belonging from practitioners. This sense of belonging can be divide into intrinsic and extrinsic factors. Intrinsic belonging has contain self doing of work, whereas,extrinsic belonging may contain supportive role of management.

3) Employee participation: In an organization employee participation is compulsory to get the maximum result of the project. Employee participation has classified as individual and team wise. Individual participation is like owning a problem and try to solve it by individual force, however, as a team each member participation is necessary.

4) Recognition: The credit of work should be given to the employee. By given the due recognition of work motivate them to work better for the future work. This recognition can be classified as by giving rewards and incentives or by giving the due credit.

5) Clear Identification with Task: Understanding project requires the clarity of doing work. By clearing understanding, productivity of the system can be increased. It also provides ownership of the project. Identify with the task can be classified by clear goals and stick with the plans.

Our contribution in this research is to classify the motivators and demotivators into three factors. Organization, people and technical factors. Secondly, further classification of

factors into sub factors and give detail description of these sub factors is also being done. The other implication has been found in literature, is lack of the motivators and demotivators models of Agile software development because due to change of method of adopting in software development there is a need of motivators and demotivators model In ASD. Extensively, more work is needed to perform and gauge the motivators and demotivators of other Agile methods.

VIII. Conclusion

This mapping study briefly viewed for the given studies on motivators and demotivators of ASD and the relevant challenges regarding motivators and demotivators. Literature has discussed in detail about motivators and demotivators of ASD. The Plan behind to write this systematic mapping is to produce the results that how it will be shown in this study and the major keyword to support to find the literature related to motivators and demotivators. Research flow diagram is showing the flow of the research and depicts how the paper is being selected. The first research question addresses the different challenges in motivators and demotivators regarding software Development.These challenges are also described in the literature review, however, open issues does not describe in the literature review. The second question is to find the existing motivators of agile software development. These factors are found on the basis of three factors, i.e. people, organization and technical.

IX. Future Work

Currently the extracted material is based on the existing literature found in motivators and demotivators of agile software development. There is need for performing the empirical analysis of motivators and demotivators especially in South Asian region as there is less work is being there.

Further plans include proposed a motivational model for practitioners of agile by which guidelines for software firms will propose to increase their productivity.we will consider Comparison of proposed method to similar methods, using a framework in future.

References

[1] Cockburn, A. and Highsmith, J., 2001. Agile software development, the people factor. Computer, 34(11), pp.131-133.

[2] Melo, C.D.O., Santana, C. and Kon, F., 2012, September. Developers motivation in agile teams. In Software Engineering and Advanced Applications (SEAA), 2012 38th EUROMICRO Conference on (pp. 376-383). IEEE.

[3] Highsmith, J. and Cockburn, A., 2001. Agile software development: The business of innovation. Computer, 34(9), pp.120-127.

[4] Akhtar, M.J., Ahsan, A. and Sadiq, W.Z., 2010, October. Scrum adoption, acceptance and implementation (a case study of barriers in Pakistan's IT industry and mandatory improvements). In Industrial Engineering and Engineering Management (IE&EM), 2010 IEEE 17Th International Conference on (pp. 458-461). IEEE..

[5] Colleen Frye, "Agile by the numbers: Survey finds more adoption, but age-old problems." [Online]. Available: http://searchsoftwarequality.techtarget.com/news/1372395/Agile-by-the-numbers-Survey-finds-more-adoption-but-age-old-problems. [Accessed: 24-Jul-2017].

[6] Wagener, R.P., 2012. Investigating critical success factors in agile systems development projects (Doctoral dissertation, North-West University)..

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

[8] Baddoo, N. and Hall, T., 2002. Motivators of Software Process Improvement: an analysis of practitioners' views. Journal of Systems and Software, 62(2), pp.85-96.

[9] Asghar, I. and Usman, M., 2013, December. Motivational and de-Motivational factors for software engineers: an empirical investigation. In Frontiers of Information Technology (FIT), 2013 11th International Conference on (pp. 66-71). IEEE.

[10] Petersen, K., Feldt, R., Mujtaba, S. and Mattsson, M., 2008, June. Systematic Mapping Studies in Software Engineering. In EASE (Vol. 8, pp. 68-77).

[11] Beecham, S., Sharp, H., Baddoo, N., Hall, T. and Robinson, H., 2007, August. Does the XP environment meet the motivational needs of the software developer? An empirical study. In Agile Conference (AGILE), 2007 (pp. 37-49). IEEE.

[12] Law, A. and Charron, R., 2005, May. Effects of agile practices on social factors. In ACM SIGSOFT Software Engineering Notes (Vol. 30, No. 4, pp. 1-5). ACM.

[13] Murru, O., Deias, R. and Mugheddue, G., 2003. Assessing XP at a European Internet company. IEEE software, 20(3), pp.37-43.

[14] Huisman, M. and Iivari, J., 2003. Systems development methodology use in South Africa. AMCIS 2003 Proceedings, p.129.

[15] Beecham, S., Baddoo, N., Hall, T., Robinson, H. and Sharp, H., 2006. Protocol for a systematic literature review of motivation in software engineering. University of Hertfordshire.

[16] França, A.C.C., Gouveia, T.B., Santos, P.C., Santana, C.A. and da Silva, F.Q., 2011, April. Motivation in software engineering: A systematic review update. In Evaluation & Assessment in Software Engineering (EASE 2011), 15th Annual Conference on (pp. 154-163). IET.

[17] McHugh, O., Conboy, K. and Lang, M., 2010. Motivating Agile teams: A case study of teams in Ireland and Sweden. In International Research Workshop on IT Project Management.

[18] Asproni, G., 2004. Motivation, teamwork, and agile development. Agile Times, 4(1), pp.8-15.

[19] Poole, C. and Huisman, J.W., 2001. Using extreme programming in a maintenance environment. IEEE Software, 18(6), pp.42-50.

[20] Martin Fowler, "Writing The Agile Manifesto." [Online]. Available: https://martinfowler.com/articles/agileStory.html. [Accessed: 30-May-2017].

[21] Moodley, F., Van Belle, J.P. and Hasteer, N., 2017, January. Crowdsourced software development: Exploring the motivational and inhibiting factors of the South African crowd. In Cloud Computing, Data Science & Engineering-Confluence, 2017 7th International Conference on (pp. 656-661). IEEE.

[22] França, A.C.C., de Araújo, A.C. and da Silva, F.Q., 2013, May. Motivation of software engineers: A qualitative case study of a research and development organisation. In Cooperative and Human Aspects of Software Engineering (CHASE), 2013 6th International Workshop on (pp. 9-16). IEEE.

[23] Buffardi, K., 2016, August. Localized open source software projects: Exploring realism and motivation. In Computer Science & Education (ICCSE), 2016 11th International Conference on (pp. 382-387). IEEE.

[24] de Farias, I., de Sá Leitão, N.G. and de Moura, H.P., 2017, June. An empirical study of motivational factors for distributed software development teams. In Information Systems and Technologies (CISTI), 2017 12th Iberian Conference on (pp. 1-6). IEEE.

[25] César, A., França, C., de LC Felix, A. and da Silva, F.Q.B., 2012. Towards an explanatory theory of motivation in software engineering: A qualitative case study of a government organization.

[26] Masood, Z., Hoda, R. and Blincoe, K., 2017, May. Motivation for self-assignment: factors Agile software developers consider. In Proceedings of the 10th International Workshop on Cooperative and Human Aspects of Software Engineering(pp. 92-93). IEEE Press.

[27] Balasubramaniam, S., Lewis, G.A., Simanta, S. and Smith, D.B., 2008. Situated software: concepts, motivation, technology, and the future. IEEE software, 25(6).

[28] Gardazi, S.U., Khan, H., Gardazi, S.F. and Shahid, A.A., 2009, October. Motivation in Software architecture and software project management. In Emerging Technologies, 2009. ICET 2009. International Conference on (pp. 403-409). IEEE.

[29] Alali, A. and Sillito, J., 2013, May. Motivations for collaboration in software design decision making. In Cooperative and Human Aspects of Software Engineering (CHASE), 2013 6th International Workshop on (pp. 129-132). IEEE.

[30] Dieste, O., Fonseca, C.E.R., Raura, G. and Rodríguez, P., 2017, May. Professionals are not Superman: failures beyond motivation in software experiments. In Proceedings of the 5th International Workshop on Conducting Empirical Studies in Industry (pp. 27-32). IEEE Press.

[31] Chen, P.C., Chern, C.C. and Chen, C.Y., 2012, December. Software project team characteristics and team performance: Team motivation as a moderator. In Software Engineering Conference (APSEC), 2012 19th Asia-Pacific (Vol. 1, pp. 565-570). IEEE.

[32] Sach, R., Sharp, H. and Petre, M., 2011, September. Software engineers' perceptions of factors in motivation: The work, people, obstacles. In Empirical Software Engineering and Measurement (ESEM), 2011 International Symposium on (pp. 368-371). IEEE.

[33] Chintakovid, T., 2007, September. Factors Affecting End Users' Intrinsic Motivation to Use Software. In Visual Languages and Human-Centric Computing, 2007. VL/HCC 2007. IEEE Symposium on (pp. 252-253). IEEE.

[34] Santos, R.E. and Da Silva, F.Q., 2013, October. Motivation to perform systematic reviews and their impact on software engineering practice. In Empirical Software Engineering and Measurement, 2013 ACM/IEEE International Symposium on(pp. 292-295). IEEE.

[35] Shahri, A., Hosseini, M., Almaliki, M., Phalp, K., Taylor, J. and Ali, R., 2016, June. Engineering software-based motivation: a persona-based approach. In Research Challenges in Information Science (RCIS), 2016 IEEE Tenth International Conference on (pp. 1-12). IEEE.

[36] Franca, A.C.C. and da Silva, F.Q., 2009, October. An empirical study on software engineers motivational factors. In Empirical Software Engineering and Measurement, 2009. ESEM 2009. 3rd International Symposium on (pp. 405-409). IEEE.

[37] Figas, P., Hagel, G. and Bartel, A., 2013, March. The furtherance of motivation in the context of teaching software engineering. In Global Engineering Education Conference (EDUCON), 2013 IEEE (pp. 1299-1304). IEEE.

[38] Osman, R. and Dias-Neto, A.C., 2014, July. Motivating by examples: An empirical study of teaching an introductory software engineering course in Brazil. In Computer Software and Applications Conference (COMPSAC), 2014 IEEE 38th Annual (pp. 245-250). IEEE..

[39] Sauer, C., Jeffery, D.R., Land, L. and Yetton, P., 2000. The effectiveness of software development technical reviews: A behaviorally motivated program of research. IEEE Transactions on Software Engineering, 26(1), pp.1-14.

[40] Limayem, M., Khalifa, M. and Chin, W.W., 2004. Factors motivating software piracy: a longitudinal study. IEEE transactions on engineering management, 51(4), pp.414-425.

[41] Ye, Y. and Kishida, K., 2003, May. Toward an understanding of the motivation Open Source Software developers. In Proceedings of the 25th international conference on software engineering (pp. 419-429). IEEE Computer Society.

[42] Mostefai, M.A. and Ahmed-Nacer, M., 2012, November. Return on Experience About Implementing Knowledge Management Systems in Software Engineering: Motivations, Opportunities and Challenges. In Advanced Information Systems for Enterprises (IWAISE), 2012 Second International Workshop on (pp. 9-14). IEEE.

[43] Riehle, D., 2007. The economic motivation of open source software: Stakeholder perspectives. Computer, 40(4).

[44] A. C. C. Franca, T. B. Gouveia, P. C. F. Santos, C. A. Santana, and F. Q. B. da Silva, "Motivation in software engineering: a systematic review update," in 15th Annual Conference on Evaluation & Assessment in Software Engineering (EASE 2011), 2011, pp. 154–163.

[45] França, A.C.C., Gouveia, T.B., Santos, P.C., Santana, C.A. and da Silva, F.Q., 2011, April. Motivation in software engineering: A systematic review update. In Evaluation & Assessment in Software Engineering (EASE 2011), 15th Annual Conference on (pp. 154-163). IET.

[46] Misirli, A.T., Verner, J., Markkula, J. and Oivo, M., 2014, May. A survey on project factors that motivate Finnish software engineers. In Research Challenges in Information Science (RCIS), 2014 IEEE Eighth International Conference on (pp. 1-9). IEEE.

[47] I. Asghar and M. Usman, "Motivational and De-motivational Factors for Software Engineers: An Empirical Investigation," in 2013 11th International Conference on Frontiers of Information Technology, 2013, pp. 66–71.

[48] Rehman, M., Mahmood, A.K., Salleh, R. and Amin, A., 2011, September. Motivation in software engineering & personal characteristics of software engineers. In National Postgraduate Conference (NPC), 2011 (pp. 1-5). IEEE.

[49] Beecham, S., Sharp, H., Baddoo, N., Hall, T. and Robinson, H., 2007, August. Does the XP environment meet the motivational needs of the software developer? An empirical study. In Agile Conference (AGILE), 2007 (pp. 37-49). IEEE.

[50] Ratcliffe, M., Woodbury, J. and Thomas, L., 2002. Improving motivation and performance through personal development in large introductory software engineering courses. In Software Engineering Education and Training, 2002.(CSEE&T 2002). Proceedings. 15th Conference on (pp. 108-115). IEEE.

[51] Franca, A.C.C., Carneiro, D.E. and da Silva, F.Q., 2012, September. Towards an explanatory theory of motivation in software engineering: A qualitative case study of a small software company. In Software Engineering (SBES), 2012 26th Brazilian Symposium on (pp. 61-70). IEEE.

[52] Port, D., Rachal, C. and Liu, J., 2013, May. Motivating and orienting novice students to value introductory software engineering. In Software Engineering Education and Training (CSEE&T), 2013 IEEE 26th Conference on (pp. 99-108). IEEE.

[53] LaToza, T.D. and van der Hoek, A., 2016. Crowdsourcing in software engineering: Models, motivations, and challenges. IEEE software, 33(1), pp.74-80.

[54] Sharp, H. and Hall, T., 2009, May. An initial investigation of software practitioners' motivation. In Proceedings of the 2009 ICSE Workshop on Cooperative and Human Aspects on Software Engineering (pp. 84-91). IEEE Computer Society.

[55] Layman, L., Williams, L. and Cunningham, L., 2006. Motivations and measurements in an agile case study. Journal of Systems Architecture, 52(11), pp.654-667.

[56] Staples, M. and Niazi, M., 2010, June. Two case studies on small enterprise motivation and readiness for CMMI. In Proceedings of the 11th International Conference on Product Focused Software (pp. 63-66). ACM.

[57] Woit, D. and Bell, K., 2014, June. Do XP customer-developer interactions impact motivation? findings from an industrial case study. In Proceedings of the 7th International Workshop on Cooperative and Human Aspects of Software Engineering(pp. 79-86). ACM.

[58] de Farias Junior, I., Júnior, N.L. and de Moura, H.P., 2017, May. An evaluation of motivational factors for distributed development teams. In Proceedings of the Joint 5th International Workshop on Software Engineering for Systems-of-Systems and 11th Workshop on Distributed Software Development, Software Ecosystems and Systems-of-Systems(pp. 78-79). IEEE Press.

[59] Sharp, H., Hall, T., Baddoo, N. and Beecham, S., 2007, September. Exploring motivational differences between software developers and project managers. In Proceedings of the the 6th joint meeting of the European software engineering conference and the ACM SIGSOFT symposium on The foundations of software engineering (pp. 501-504). ACM.

[60] Sharp, H. and Hall, T., 2009, May. An initial investigation of software practitioners' motivation. In Proceedings of the 2009 ICSE Workshop on Cooperative and Human Aspects on Software Engineering (pp. 84-91). IEEE Computer Society.

[61] França, A.C.C. and da Silva, F.Q., 2010, May. Designing motivation strategies for software engineering teams: an empirical study. In

Proceedings of the 2010 ICSE Workshop on Cooperative and Human Aspects of Software Engineering(pp. 84-91). ACM.

[62] Hilton, M., Nelson, N., Tunnell, T., Marinov, D. and Dig, D., 2017, August. Trade-offs in continuous integration: assurance, security, and flexibility. In Proceedings of the 2017 11th Joint Meeting on Foundations of Software Engineering (pp. 197-207). ACM.

[63] Noll, J., Beecham, S., Razzak, A., Richardson, B., Barcomb, A. and Richardson, I., 2017, February. Motivation and Autonomy in Global Software Development. In International Workshop on Global Sourcing of Information Technology and Business Processes (pp. 19-38). Springer, Cham.

[64] Rong, G., 2014, May. Are we ready for software process selection, tailoring, and composition?. In Proceedings of the 2014 International Conference on Software and System Process (pp. 185-186). ACM.

[65] Law, A. and Charron, R., 2005, May. Effects of agile practices on social factors. In ACM SIGSOFT Software Engineering Notes (Vol. 30, No. 4, pp. 1-5). ACM.

[66] Dzvonyar, D., Krusche, S., Alkadhi, R. and Bruegge, B., 2016, May. Context-aware user feedback in continuous software evolution. In Proceedings of the International Workshop on Continuous Software Evolution and Delivery (pp. 12-18). ACM.

[67] Franca, A.C.C., de Lucena, E.F., da Silva, F.Q.B. and Moura, H., 2008, June. A Qualitative research on software projects team building. In International Conference on Information Systems and Technology Management (Vol. 5, No. 2008).

[68] Lindvall, M., Basili, V., Boehm, B., Costa, P., Dangle, K., Shull, F., Tesoriero, R., Williams, L. and Zelkowitz, M., 2002. Empirical findings in agile methods. Extreme Programming and Agile Methods—XP/Agile Universe 2002, pp.81-92.

[69] Whitworth, E. and Biddle, R., 2007, June. Motivation and cohesion in agile teams. In International Conference on Extreme Programming and Agile Processes in Software Engineering (pp. 62-69). Springer, Berlin, Heidelberg.

[70] Sharp, H., Baddoo, N., Beecham, S., Hall, T. and Robinson, H., 2009. Models of motivation in software engineering. Information and software technology, 51(1), pp.219-233.

[71] Bitzer, J., Schrettl, W. and Schröder, P.J., 2007. Intrinsic motivation in open source software development. Journal of Comparative Economics, 35(1), pp.160-169.

[72] Khoo, H.M., Chua, C.E.H. and Robey, D., 2011. How organizations motivate users to participate in support upgrades of customized packaged software. Information & Management, 48(8), pp.328-335.

[73] Sanyal, M.K. and Biswas, S.B., 2014. Employee motivation from performance appraisal implications: Test of a theory in the software industry in West Bengal (India). Procedia Economics and Finance, 11, pp.182-196.

[74] Deak, A., Stålhane, T. and Sindre, G., 2016. Challenges and strategies for motivating software testing personnel. Information and Software Technology, 73, pp.1-15.

[75] Raza, M.M., Minhas, N.M., Khan, H.U. and Asghar, I., Impact of Stress on Software Engineers Knowledge Sharing and Creativity [A Pakistani Perspective].

[76] Ge, X., Paige, R.F., Polack, F.A., Chivers, H. and Brooke, P.J., 2006, July. Agile development of secure web applications. In Proceedings of the 6th international conference on Web engineering (pp. 305-312). ACM.

[77] Da SiLVA, F.Q., Santos, A.L., Soares, S., França, A.C.C., Monteiro, C.V. and Maciel, F.F., 2011. Six years of systematic literature reviews in software engineering: An updated tertiary study. Information and Software Technology, 53(9), pp.899-913.

[78] Nelson, A.C. and LeRouge, C., 2001, April. Self esteem: moderator between role stress fit and satisfaction and commitment?. In proceedings of the 2001 ACM SIGCPR conference on computer personnel research (pp. 74-77). ACM.

[79] McMahon, P.E., 2004. Bridging agile and traditional development methods: a project management perspective. CrossTalk: The Journal of Defense Software Engineering (May 2004).

[80] Ilyas, M. and Khan, S.U., 2015, June. Software integration in global software development: Success factors for GSD vendors. In Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD), 2015 16th IEEE/ACIS International Conference on (pp. 1-6). IEEE.

[81] Tessem, B. and Maurer, F., 2007. Job satisfaction and motivation in a large agile team. Agile Processes in Software Engineering and Extreme Programming, pp.54-61.

[82] Beecham, S., Baddoo, N., Hall, T., Robinson, H. and Sharp, H., 2008. Motivation in Software Engineering: A systematic literature review. Information and software technology, 50(9), pp.860-878.

[83] Kim, S., Hwang, S. and Song, S., 2009. An Empirical Analysis on the Effects of Agile practices on Motivation and Work Performance of Software Developers pp.529-544..

[84] Kuusinen, K., Petrie, H., Fagerholm, F. and Mikkonen, T., 2016, May. Flow, intrinsic motivation, and developer experience in software engineering. In International Conference on Agile Software Development (pp. 104-117). Springer International Publishing.

[85] França, A.C.C. and da Silva, F.Q., 2012. Towards Understanding Motivation in Software Engineering.

[86] Asan, E. and Bilgen, S., 2012, July. Agile Collaborative Systems Engineering – Motivation for a Novel Approach to Systems Engineering. In INCOSE International Symposium(Vol. 22, No. 1, pp. 1746-1760).

[87] O'Regan, G., 2011. Motivation for Software Process Improvement. In Introduction to Software Process Improvement (pp. 1-12). Springer London.

[88] Wu, C.G., 2007. An empirical analysis of open source software developers' motivation using expectancy-valence theory. University of Colorado at Denver.

[89] Trittmann, R., Stelzer, D., Hierholzer, A. and Mellis, W., 2002. Managing Motivation in Software Development—A Case Study at SAP AG. In Successful Management by Motivation(pp. 251-273). Springer Berlin Heidelberg.

[90] McHugh, O., Conboy, K. and Lang, M., 2010. Motivating Agile teams: A case study of teams in Ireland and Sweden. In International Research Workshop on IT Project Management.

[91] Fernando, A. and Ranasinghe, G., 2010. The Impact of Job Design and Motivation on Employees Productivity as Applicable in the context of Sri Lankan Software Engineers: A HR Perspective. In The International Conference on Business & Information. University of Kelaniya, Sri Lanka.

[92] França, A.C.C., de Araújo, A.C. and da Silva, F.Q., 2013, May. Motivation of software engineers: A qualitative case study of a research and development organisation. In Cooperative and Human Aspects of Software Engineering (CHASE), 2013 6th International Workshop on (pp. 9-16). IEEE.

[93] Jansson, T., 2013. Motivation theory in research on agile project management: A systematic literature review.

[94] Nithyanandan, D.V., 2010. Work Value as Motivation among software professionals. Management Prudence, 1(1), p.23.

[95] Humphrey, W. and Over, J., 2002. The Personal Software Process (PSP) Tutorial. In Software Engineering Workshop-Tutorial Notes, 2002. Proceedings. 27th Annual NASA Goddard (pp. 39-92). IEEE.

[96] Elssamadisy, A., 2007. Patterns of Agile Practice Adoption. Lulu. com.

[97] Beck, K., Beedle, M., Van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R. and Kern, J., 2001. Manifesto for agile software development.

[98] Ali, M.A., 2012. Survey on the state of agile practices implementation in Pakistan. International Journal of Information and Communication Technology Research, 2(4).