Impact of Agile Methodologies on Project Management

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Abstract*. This study examined the impact of Agile Methodology on job complexity and the impact of job complexity on individual motivation and creativity. To measure the impact we performed a study of teams following agile methodologies and conducted a survey to measure the above stated variables. Results showed that self-organizing teams have a positive impact on job complexity which in turn improves the employee motivation. Process agility did not have a significant impact on job complexity. Results imply organizations should focus on promoting self-organizing teams to improve job satisfaction and hence employee motivation.*

In an era where software spending is back on front foot, a lot of emphasis is laid on project execution than any other factor. A lot of money is already at stake in software projects all around the world, with more in pipeline (Wilcox, 2011). In order to have a competitive advantage over others, software firms should not only quickly respond to change but also quickly innovate and be ahead of the game. Today's Information Technology manager is expected to contribute significantly to the bottom-line even with trifling IT budgets. To have substantial cost advantage, software firms should develop features that customers will surely use. According to Larman (2004), 45% of software features were never used by the customer as it failed to meet the user requirement. Agile software methodologies specially focus on meeting changing customer needs by having a cost advantage (Beck and Andres, 2005; Schwaber and Beedle, 2002). The need for rapid delivery and flexibility, with no compromise on quality has put agile techniques in the limelight (Agile Project Management, 2003). Agile software methodologies are different in structure from the traditional methods by emphasising on lean processes and rapid implementation rather than heavy documentation and upfront planning (Nerur and Balijepally, 2007).

Process Agility

With most of the design on-the-fly and no heavy documentation, agile methodologies develop and deliver fully functional software in short, incremental iterations (Lee and Xia, 2010). Agile development teams quickly adapt to change, meet requirements from new customers and proceed, with less overhead (Constantine, 2002). According to Agile Manifesto, agile methodologies lay more emphasis on individuals and interactions than on processes and tools. Working software is preferred to heavy weight documentation. Customer collaboration is valued more than contract negotiation. It believes in responding to change rather than following a plan. Self-organized teams, close collaboration between developers and end users, simplicity, face-to-face communication and continuous adaptation are some powerful concepts of Agile (Agile Alliance 2001).

In 2003, Ambler stated that, "Agility is about working together effectively, breaking down barriers to communication and focussing on value-added activities that lead to successful development. It's about working side by side, not handling off documents. It's about managers actively managing projects instead of writing status reports that gloss over what's really happening. It's about developers and stakeholders working together to develop

realistic plans, not creating complex Microsoft Project schedules that few people actually read."

Self-Organization

It is a feature of agile teams that provide autonomy to their team members to organize themselves in a way that completes tasks in the most optimal way (Vidgen and Wang, 2009). The decisions are made without the intervention of an external entity that doesn't have as much details as that of the team members. Managers do not assign tasks to team members. Each member in the team decides his work for the iteration. This way the team operates productively without high level supervision.

Impact of Agile on Job Complexity, Motivation and Individual creativity

The three physiological states (experienced meaningfulness of work, experienced responsibility of the outcome of the work, and knowledge of the results of the work activities) have an effect on the performance of an individual (Hackman and Oldham, 1979). A constant motivating factor is a positive experience an individual gains through performing (responsibility) a task that he values (meaningfulness) and also learns (knowledge of results) in the process (Hackman and Lawler, 1971; Hackman and Oldham, 1979). It has been empirically demonstrated that self-generated motivation is highest when all three of the physiological states are present (Hackman and Oldham, 1979). Skill variety, task identity and task significance were found to contribute towards the meaningfulness experienced at work. It was also found that autonomy contributed towards the responsibility assumed by an individual whereas feedback was instrumental in making the individual aware of the results of his activities. The overall potential of a job to self-motivate an individual internally was found to be highest when all the following were true:

a) The job is high on at least providing skill variety, task identity and task significance.

b) The job provides an individual a sense of autonomy

c) The individual is provided feedback on his or her work (Hackman and Oldham, 1979)

Agile processes focus extensively on each of the above physiological states. Agile methodologies such as scrum allow an individual to choose a task as per his or her wish. This ensures that the individuals would choose a task which would provide them with maximum learning opportunities. Agile methodologies lay stress on self-organizing teams in contrast to traditional methodologies, where hierarchy is the norm (Agile Alliance, 2001). This in turn provides a sense of autonomy to the individual performing the task. Feedback and communication are key elements of an evolutionary development process (Boehm and Turner, 2004; Highsmith, 2002, 2004), thus guiding the efforts of the individuals. This provides individuals a sense of what works and what does not and contributes to continuous learning and behaviour adaptation. It can thus be seen that there seems to be a relationship between job complexity and process agility.

A close model studying the effect of agile software methodologies on job satisfaction was proposed by M. Jaworski (2009) in the paper 'Job satisfaction with agile software development methodologies'. The paper distinguishes the five core practices of agile software development and provides a framework for determining the influence of these practices on job satisfaction. It builds on previous studies on more general analyses of job satisfaction among agile software developers. It provides empirical evidence that close collaboration with customers, reliance on self-organizing teams, frequent face-to-face

interactions, and continuous testing are significant job satisfiers. It however does not study the relationship between job complexity and motivation or individual creativity.

Mauer and Tessem (2007) also examined the impact of agile methodologies on job satisfaction. It was concluded that large agile teams are able to empower task identity, task significance, skill variety, feedback and autonomy. As a consequence, software developers' motivation and job satisfaction are increased. They argued that the concept can be extended to smaller agile teams such as scrum teams. However, there is no empirical evidence for the same.

In this paper we propose to fill this void by studying the impact of agile processes and self-organization on job complexity and the impact of job complexity on individual motivation and creativity. This paper would aid a manager to boost the motivation and creative abilities of his team through agile processes so as to stay competitive.

RESEARCH MODEL AND HYPOTHESIS

Figure 1 shows our research model. The constructs of the research model are process agility, self-organization, job complexity, motivation and individual creativity. Hypothesis 1 posits that process agility will be positively associated with job complexity. Hypothesis 2 posits that self-organization will be positively associated with job complexity. Hypothesis 3 and 4 posit a relationship between job complexity, motivation and individual creativity.

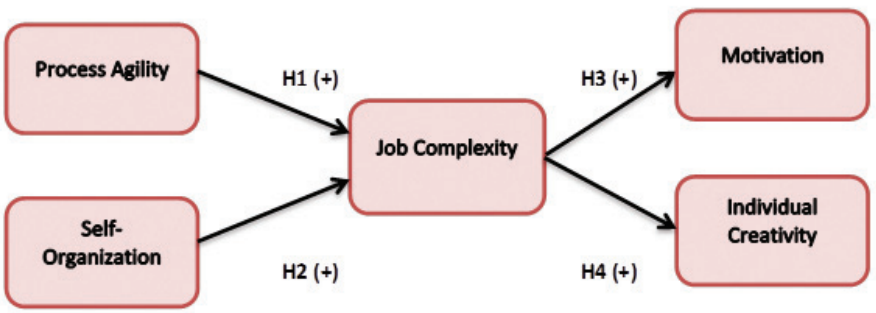


Figure 1. Research Model

According to Agile Manifesto, agile methodologies value people over processes. Agile development recognizes the value of team members' competencies in bringing agility to development processes (Nerur and Balijepally 2007). Agile development emphasizes the importance of autonomous, self-organized, self-disciplined teams for being able to rapidly adapt to changes (Highsmith 2004; Nerur and Balijepally 2007; Sharp and Robinson 2004). Agile developers are empowered to choose their roles and are also given the liberty to work with interchangeable roles. Close collaboration, timely end user feedback, extensive exchange of knowledge enhances the competence of agile developers. Retrospectives at the end of each development cycle allow developers to learn from their successes and failures. Therefore agile developers are likely to perceive a higher degree of job complexity than those working on traditional projects. Hence we propose,

Hypothesis 1. Process agility will be positively associated with job complexity**.**

Hypothesis 2. Self-organization will be positively associated with job complexity.

Motivation-hygiene theory. Herzberg two-factor theory of satisfaction and motivation states that primary determinants of satisfaction are factors intrinsic to the work done (motivators) and dissatisfaction is caused due to 'hygiene factors' which are extrinsic to the work. The theory claims that a job will enhance motivation and satisfaction only to the degree to which the intrinsic factors contribute. 'Hygiene Factors' do not play a considerable role in motivating employees (Herzberg, Mausner, & Snyderman, 1959; Herzberg, 1966).Many researchers have been unable to empirically prove the two-factor theory stated above.

It has been empirically demonstrated that when an individual performs a task which he feels responsible for, contributes to his learning, and provides feedback; the individual would be self-motivated to perform the task to the best of his abilities (Hackman and Oldham, 1979). Agile processes focus on such physiological states of an individual by providing him complete autonomy on the task to be performed. Agile processes improve the overall competence in general by promoting responsiveness and flexibility through self-organizing teams whose members work together towards solving complex problems (Nerur and Balijepally, 2007). According to Deci & Ryan's self-determination theory (1985), higher autonomy and competence are positively associated with motivation. Agile processes promote healthy relationships within team members by ensuring communication is clear and concise (Agile Alliance, 2001). Further, they not only encourage developers to accept different roles but also empower them to make local decisions (Nerur and Balijepally, 2007). By subordinating processes to empowered people, agile methods facilitate creative problem-solving (e.g., Cockburn and Highsmith, 2001). All these factors in turn have a high impact on individual self-motivation and creativity. Therefore, we propose

Hypothesis 3. Job complexity is positively associated with motivation.

Hypothesis 4. Job complexity is positively associated with individual creativity.

Control Variables

The type of supervision (e.g., supportive, controlling, etc.) can either facilitate or impede individuals' ability to express their creativity at work (for example, see Oldham and Cummings, 1996). Likewise, cognitive styles of individuals can also have an influence on their ability to innovate (Miron-Spektor, Erez, and Naveh, 2011). Although Miron-Spektor et al. (2011) examined cognitive styles in the context of team innovation; these variables are likely to impact individual creativity as well. Given this backdrop, we use the following control variables in our study: Type of supervision and cognitive style of individual. We also use the dimensions of the project such as size of the project, cost of the project and duration of the project as control variables.

METHOD

We decided to use 'Survey' as a means to collect data to verify our hypotheses. This is because we need to have responses from people who are presently using Agile Methodologies. Other means of eliciting data would not fit our purpose. The variables and the measures that we will use to study them are as follows.

Process Agility

To measure process agility we used an already validated scale by Bonner (2008). Cronbach's α was 0.69. Process agility comprises two dimensions: Evolutionary development and process flexibility. Evolutionary development is concerned with delivering

working software in shorter development iterations while being receptive to changes in the course of development. This is accomplished by keeping the stakeholders updated about the developments at regular intervals and seeking their feedback about the working software. Process flexibility captures the adaptability capabilities present in agile teams. It is concerned with the flexibility of the team members to assume roles as per requirements and not being attached to a particular role while developing software.

Self-Organization

Self-organized teams may also have implications on job complexity. This component measures how much autonomy the members have in choosing their tasks. The choice of their tasks will influence their job complexity. We validated the scales for this construct and found the Cronbach's α to be 0.71.

Job Complexity

To measure job complexity we used a modified version (Oldham and Cummins, 1996), of the well-known and validated scale from Hackman and Oldham (1980). The Job Diagnostic Survey is used to access the challenge and complexity of employees' jobs. We validated the scale again and the Cronbach's α was 0.82. Fifteen items from the Job Diagnostic Survey (Hackman & Oldham, 1980) were used to assess the challenge and complexity of employees' jobs. Three items for each of five job characteristics (autonomy, skill variety, task identity, task feedback, and task significance) were averaged to form a summary index for that characteristic. The aim is to produce a Motivating Potential Score (MPS) for each job using the formula suggested by Hackman and Oldham (1980): MPS = (variety + identity + significance)/3 x autonomy x feedback.

Motivation

To measure motivation we used a Situational Motivational Scale (SIMS) developed and tested by Guay et al. (2000). The scale was used to assess an individual's motivation in relation to a specific activity. The questions measured four subscales (intrinsic motivation, autonomous (identified) regulation, controlled (introjected/external) regulation and amotivation). The scales were validated based on these subscales and Cronbach α was found to be 0.8. Weights assigned to intrinsic motivation, identified regulation, external regulation and amotivation are +2, +1,-1 and -2 respectively. Positive weights indicate a self-determined form of motivation while negative weights indicate non self-determined forms of motivation.

Sample

We chose IT firms which follow Agile methodologies for their project management as our target. Some of the companies that we approached for our empirical study are given below.

Nokia Siemens Network: It is one of the leading telecommunication network vendor companies in the world and has adopted Scrum process of Agile for various teams across the globe.

Paladion Networks: This Company is into the business of information security and has a team dedicated to developing security related products. The team follows Scrum for its product development.

Infosys Ltd. & **Tech Mahindra**: These companies have adopted Agile methodology only for selected teams to fulfil client requirements of develop-review-develop cycles.

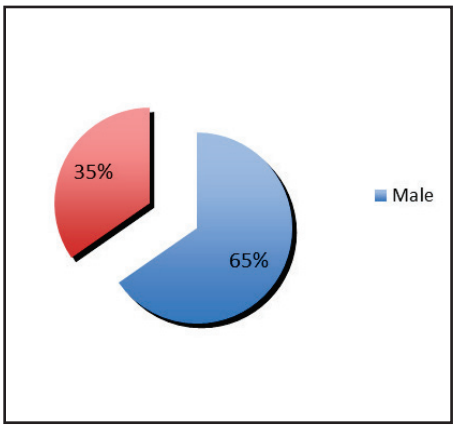
We got in touch with the HR managers of the above mentioned companies. We asked the HR managers to identify projects using agile methodologies such as Scrum, XP and the like to float the survey. The mail indicated the purpose of the study and requested participation, explained the voluntary nature of participation and assured complete confidentiality of the respondents. We had made the HR manager as the point of contact for the employees taking up the survey. After two weeks we sent a reminder mail to urge more participation from the employees.

We considered only complete responses for analysis purposes. Of the 55 responses we received, three responses were incomplete. That puts our survey completion at approx. 95%.

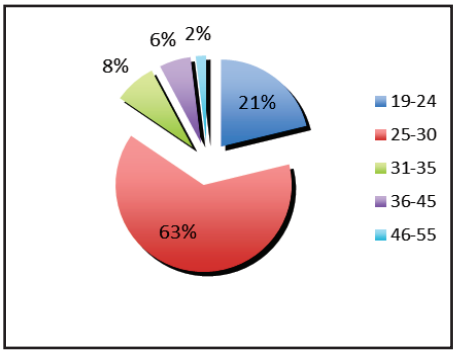
The respondents profile consisted of 65 % Men and 35 %Women. Of those who responded, 40% had less than 2 years of Agile Working Experience whereas 60 % had more than 2 years of experience. The age spread was dominated by the respondents in the age of 25-30 years where they formed 63% of the total respondents. This was followed by respondents in the age group of 19-24 years which formed 21% of respondents.

Demographic Profile of Respondents

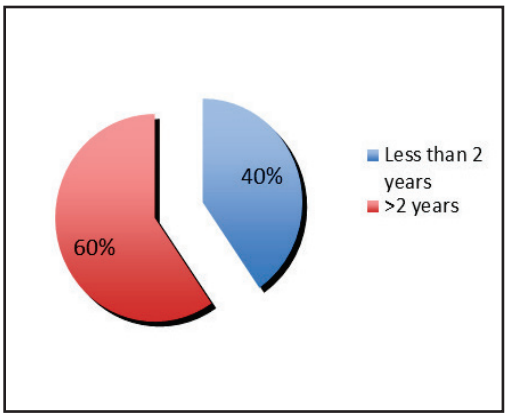
1. Gender Distribution



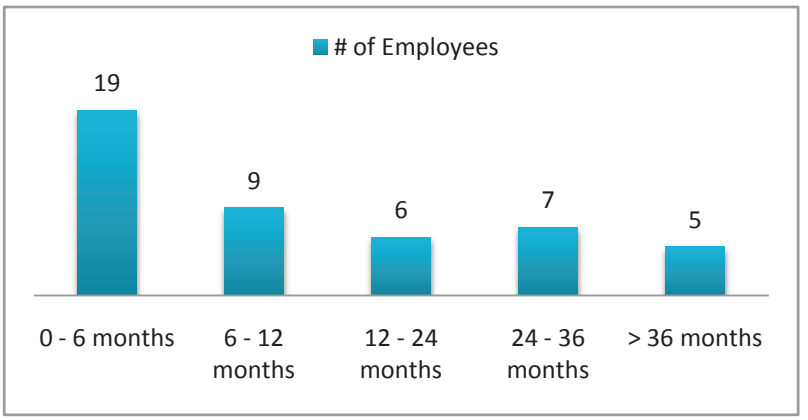
2. Age wise Distribution



3. Work Experience Distribution



4. Duration of Project (Months)



RESULTS

Data Analysis

Factor analysis was performed for four constructs -- process agility, self-organization, job complexity and motivation. Factor analysis helps to explain the inter-relationship between the items and can be used to derive the common underlying dimensions. Principal component analysis was used to convert the correlated items into a set of uncorrelated principal components. Explainable factors are derived from the component matrix.

Process Agility

Factor analysis was performed for 13 items of process agility. After rotation, 3 factors were extracted, as shown in Table 1.

Table 1. Rotated Component Matrix[a]

	Component		
	1	2	3
AG1	**0.73**	0.04	0.33
AG2	0.24	0.17	**0.40**
AG3	**0.51**	0.44	0.03
AG4	**0.86**	-0.02	0.05
AG5	**0.65**	-0.08	-0.24
AG6	-0.07	**0.61**	0.05
AG7	-0.10	**0.64**	0.18
AG8	-0.07	**0.55**	0.39
AG9	0.07	**0.57**	-0.03
AG10	-0.07	-0.14	**0.87**
AG11	0.19	**0.41**	0.39
AG12	0.24	**0.67**	-0.17
AG13	**0.63**	0.05	0.11

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

From the rotated component matrix, the loading of each item on the factors is observed and thus all the items are grouped into three explainable components as given in Table 2. The components are renamed appropriately in Table 3.

Table 2. Item Loadings for Process Agility

	Items	Component	Loading Value
AG1	[Our requirements specification process dynamically evolves through continuous feedback from users.]	1	**0.73**
AG3	[Developers communicate and collaborate with business people continuously to incorporate their evolving requirements.]	1	**0.51**
AG4	[We frequently develop working software that is tested, integrated and executable as a partial system.]	1	**0.86**
AG5	[Our initial system plan consists of minimal, yet essential requirements without complete and detailed specifications.]	1	**0.65**
AG13	[In general, our development process is flexible with minimal planning.]	1	**0.63**
AG12	[Overall, our development process is adaptive and responsive to changing user needs.]	2	**0.67**
AG7	[We believe changing requirements are normal and help to enhance the system quality.]	2	**0.64**
AG6	[Adjustments and refinements to requirements are always welcome at any stage of the development process.]	2	**0.61**
AG9	[The roles and relationships of our team members are flexible and not strictly defined.]	2	**0.57**
AG8	[We don't mind deviating from established processes and procedures as long as we continuously deliver working software.]	2	**0.55**
AG11	[We use short iterations of fixed intervals to quickly design, implement and test a small subset of the requirements.]	2	**0.41**
AG10	[Working software is the primary measure of progress.]	3	**0.87**
AG2	[We constantly seek users' feedback to shape new requirements and re-prioritize features of the system.]	3	**0.40**

Table 3. Component Names

Component	Name
1	Evolutionary Development
2	Process Flexibility
3	Product Feature Agility

These three components together represent the Process Agility construct and they are used to test the hypothesis.

Self-Organization

Three items were used to measure self-organization. On doing a factor analysis, the three items were reduced to a single component. This component was used for further analysis.

Table 4. Item Loadings for Self-Organization

	Items	Component	Loading Value
SO1	[My team has autonomy to organize itself to best complete work items.]	1	**0.82**
SO2	[My team has freedom in deciding how to complete its tasks.]	1	**0.89**
SO3	[My team can manage its own work to achieve the given goals.]	1	**0.65**

Job Complexity

Four components were extracted from the 10 items of job complexity. They were significantly loading on the components and explained 73% of the total variance. These components were renamed as given in Table 7.

Table 5. Rotated Component Matrix[a]

	Component			
	1	2	3	4
CX1	0.25	0.18	-0.08	**0.73**
CX2	0.05	0.04	0.20	**0.87**
CX3	0.23	**0.84**	0.21	0.01
CX4	0.08	**0.80**	0.23	0.23
CX5	0.13	0.21	**0.82**	0.20
CX6	0.35	0.20	**0.79**	-0.05
CX7	**0.65**	0.29	0.18	0.00
CX8	**0.77**	0.22	0.21	0.15
CX9	**0.78**	-0.09	0.23	0.21
CX10	**0.59**	0.49	-0.35	0.23

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Table 6. Item Loadings for Job Complexity

	Items	Component	Loading Value
CX1	[This job is one where a lot of other people can be affected by how well the work gets done.]	4	0.73
CX2	[The job itself is very significant and important in the broader scheme of things.]	4	0.87
CX3	[The job provides me the chance to completely finish the pieces of work I begin.]	2	0.84
CX4	[The job is arranged so that I can do an entire piece of work from beginning to end.]	2	0.8
CX5	[The job requires me to use a number of complex or high-level skills.]	3	0.82
CX6	[The job is complex and non-repetitive.]	3	0.79
CX7	[The job gives me considerable opportunity for independence and freedom in how I do the work.]	1	0.65
CX8	[The job gives me a chance to use my personal initiative and judgment in carrying out the work.]	1	0.77
CX9	[Just doing the work required by the job provides many chances for me to figure out how well I am doing.]	1	0.78
CX10	[After I finish a job, I know whether I performed well.]	1	0.59

Table 7. Component Names

Component	Name
1	Autonomy & Feedback
2	Task Identity
3	Skill Variety
4	Task Significance

Motivation

To measure motivation we used a Situational Motivational Scale (SIMS) developed and tested by Guay et al. (2000). The questions measured four subscales (intrinsic motivation, autonomous (identified) regulation, controlled (introjected/external) regulation and amotivation) with weights assigned to them as +2, +1,-1 and -2 respectively. Based on these weights, the aggregate score for motivation was calculated. Table 8 lists the items and the sub-scale category that it represents. Regression was performed on this aggregate score.

Intrinsic Motivation: Weight = +2

Identified Regulation: Weight = +1

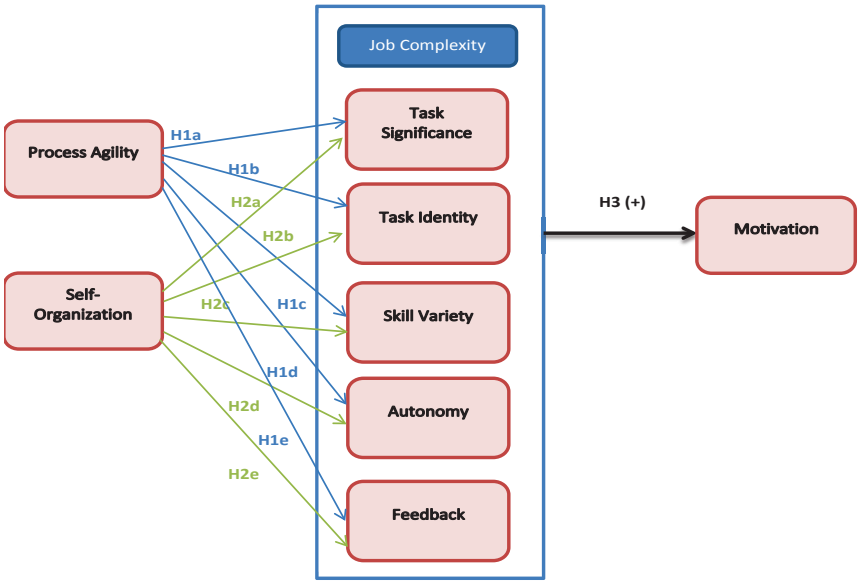
External Regulation: Weight = -1

Amotivation: Weight = -2

Table 8. Motivation Items and their sub-scales

	Items	Subscale
M1	[I think that the methodology is interesting.]	Intrinsic
M2	[I am using the methodology for my own good.]	Intrinsic
M3	[I am supposed to use the methodology.]	External
M4	[There may be good reasons to use the methodology, but personally I don't see any.]	Amotivation
M5	[I think that using the methodology is pleasant.]	Identified
M6	[I think that using the methodology is good for me.]	Identified
M7	[Using the methodology is something that I have to do.]	External
M8	[I use the methodology but I am not sure if it is worth it.]	External
M9	[Using the methodology is fun.]	Intrinsic
M10	[It is my personal decision to use the methodology.]	Intrinsic
M11	[I am required to use the methodology.]	External
M12	[I don't see what using the methodology brings me.]	Amotivation
M13	[I feel good when using the methodology.]	Intrinsic
M14	[I believe that using the methodology is important for me.]	Identified
M15	[I use the methodology, but I am not sure it is a good thing to pursue it.]	External

Based on the findings from factor analysis, the research model has been conceptualized as given below.



Conceptualized Research Model

Hypothesis Tests

Regression was performed to test the relationship between process agility and job complexity and self-organization and job complexity. The results are summarized below.

	Hypothesis	**Significance value**	**R Square**	**Result**
H1	Process Agility is positively associated with Job Complexity	0.06	0.16	Not Supported
H2	Self-Organization is positively associated with Job Complexity	0.01*	0.16	Supported
H3	Job Complexity is positively associated with Motivation	0.02*	0.42	Supported

We wanted to find out the effect of process agility and self-organization on each of the components of job complexity and we performed regressions for each hypothesis mentioned below. As shown below, some of them are supported and others are not supported.

	Hypothesis	Significance value	R Square	Result
H1a	Process Agility is positively associated with Task Significance	0.01	0.51	Supported
H1b	Process Agility is positively associated with Task Identity	0.2	0.37	Not Supported
H1c	Process Agility is positively associated with Skill Variety	0.66	0.24	Not Supported
H1d	Process Agility is positively associated with Autonomy	0.6	0.26	Not Supported
H1e	Process Agility is positively associated with Feedback	0.05	0.45	Supported
H2a	Self-Organization is positively associated with Task Significance	0.61	0.04	Not Supported
H2b	Self-Organization is positively associated with Task Identity	0.01*	0.22	Supported
H2c	Self-Organization is positively associated with Skill Variety	0.29	0.08	Not Supported
H2d	Self-Organization is positively associated with Autonomy	0.06	0.16	Not Supported
H2e	Self-Organization is positively associated with Feedback	0.03*	0.19	Supported

DISCUSSION

Our purpose of the study was to examine the impact of agile methodologies on project management in terms of job complexity, self-organization and hence motivation and individual creativity. We found that agile methodologies do have an impact on certain aspects of job complexities but not all to be able to completely explain job complexity.

With respect to our first aim of determining whether agile processes make the job to be perceived as complex and hence increase the satisfaction level amongst employees, the results were not significant. Although task significance and feedback mechanism were explained well by process agility, the other aspects of job complexity such as identity, variety and autonomy were not significant. Hence, from our study it can be said that in the Indian context, since all of our respondents were based in India, agile processes tend to be controlled to some degree by managers. This can be attributed to the command and control practices prevalent in Indian organizations. Thus employees do not feel the autonomy, variety and identity of the tasks assigned to them even after following agile methodologies. This opens up an area of future research where the Indian context of agile practices can be studied to a greater extent. Our study has not accounted for the impact of supervisor on the agile methodologies. This could have a significant impact on the job complexity as perceived by employees. This could be a significant finding which would imply managers should allow employees autonomy and assist them in giving their tasks an identity which would improve their job satisfaction.

The second contribution of our study was to find the relationship between self-organization and job complexity. We found that self-organization has a positive impact on job complexity and hence adds to employee satisfaction. This implies that employees value self-organization over concrete processes imposed on them. This is consistent with the autonomy an employee would get from providing self-organizing capability in the project management methodology. This has an important implication for IT organizations in that they would be better off in having self-organizing teams.

A third contribution of our study was to study the impact of job complexity on employee motivation. It has been found that job complexity is positively associated with motivation level of employees. This finding was remarkably consistent across study design, methodology and sample. It is worth noting that job complexity provides a feeling of increased ownership over a task. This can be a major reason in increasing the motivation levels of the employees. When autonomy and identity increase it leads to an increase in ownership levels of the employee over a task which translates to increased motivation.

Limitations and Future Research

Despite the contribution of this study, it is not without its limitations. We were not able to gauge the impact of job complexity on individual creativity of the employees. This was due to the complexity involved in collecting the responses and ensuring their consistency. This could be taken up for research in future studies.

Also, our respondents were from Indian IT organizations. This could have an impact on the findings of the study. To have a more unbiased study, it would be important to look at a wider array of IT organizations from all over the world.

Another important limitation of our study was the level of control exercised by the supervisor on the subordinates. This relation could have a significant impact on the findings and could perhaps provide additional findings.

Conclusion

Our study clearly indicates that self-organizing teams have an impact on job complexity as perceived by the employees following agile methodology. This increased job complexity perception has a positive impact on the motivation of the employees. This is of specific importance to organizations and should help them in increasing the motivation levels of their employees.

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APPENDIX

Section A

1. Unique Id * ☐ (1000-9999)

2. Age * ☐ Years

3. Gender *

● Male ● Female

4. Software methodology used in current project *

● Agile ● Traditional

5. Duration of your current project * ☐ Months

6. Number of people in the current project ☐

7. Approximate cost of project ☐ (in $)

8. Work experience with Agile software methodology ☐ Months

Section B

Please rate the following questions based on a scale of seven, ranging from "strongly disagree" to "strongly agree".

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
Our requirements specification process dynamically evolves through continuous feedback from users.	●	●	●	●	●
We constantly seek users' feedback to shape new requirements and re-prioritize features of the system.	●	●	●	●	●
Developers communicate and collaborate with business people continuously to incorporate their evolving requirement	●	●	●	●	●

We frequently develop working software that is tested, integrated and executable as a partial system.	●	●	●	●	●
Our initial system plan consists of minimal, yet essential requirements without complete and detailed specifications.	●	●	●	●	●

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
Adjustments and refinements to requirements are always welcome at any stage of the development process.	●	●	●	●	●
We believe changing requirements are normal and help to enhance the system quality.	●	●	●	●	●
We don't mind deviating from established processes and procedures as long as we continuously deliver working software.	●	●	●	●	●
The roles and relationships of our team members are flexible and not strictly defined.	●	●	●	●	●
Working software is the primary measure of progress.	●	●	●	●	●
We use short iterations of fixed intervals to quickly design, implement and test a small subset of the requirements.	●	●	●	●	●
Overall, our development process is adaptive and responsive to changing user needs.	●	●	●	●	●
In general, our development process is flexible with minimal planning.	●	●	●	●	●

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
This job is one where a lot of other people can be affected by how well the work gets done.	●	●	●	●	●
The job itself is very significant and important in the broader scheme of things.	●	●	●	●	●
The job provides me the chance to completely finish the pieces of work I begin.	●	●	●	●	●
The job is arranged so that I can do an entire piece of work from beginning to end.	●	●	●	●	●
The job requires me to use a number of complex or high-level skills.	●	●	●	●	●

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
The job gives me considerable opportunity for independence and freedom in how I do the work.	●	●	●	●	●
The job gives me a chance to use my personal initiative and judgment in carrying out the work.	●	●	●	●	●
Just doing the work required by the job provides many chances for me to figure out how well I am doing.	●	●	●	●	●
After I finish a job, I know whether I performed well.	●	●	●	●	●

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
I think that the methodology is interesting.	●	●	●	●	●
I am using the methodology for my own good.	●	●	●	●	●
I am supposed to use the methodology.	●	●	●	●	●
There may be good reasons to use the methodology, but personally I don't see any.	●	●	●	●	●
I think that using the methodology is pleasant.	●	●	●	●	●
I think that using the methodology is good for me.	●	●	●	●	●
Using the methodology is something that I have to do.	●	●	●	●	●
I use the methodology but I am not sure if it is worth it.	●	●	●	●	●
Using the methodology is fun.	●	●	●	●	●
It is my personal decision to use the methodology.	●	●	●	●	●
I am required to use the methodology.	●	●	●	●	●
I don't see what using the methodology brings me.	●	●	●	●	●
I feel good when using the methodology.	●	●	●	●	●

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
I believe that using the methodology is important for me.	●	●	●	●	●

I use the methodology, but I am not sure it is a good thing to pursue it.	●	●	●	●	●

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
My team has autonomy to organize itself to best complete work items.	●	●	●	●	●
My team has freedom in deciding how to complete its tasks.	●	●	●	●	●
My team can manage its own work to achieve the given goals.	●	●	●	●	●