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How Understanding of Agile Innovation Work Affects Innovation Teams

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Abstract: This research aims to explore how the understanding of agile innovation work methodologies affect innovation teams and the progress of innovation projects. In a long-term research, three innovation teams were studied through questionnaires, interviews, audio-recorded interviews and rich notes from. The data was analysed using group development theories and knowledge taxonomy to determine the relation of the teams’ estimated knowledge and their performance in relation to the teams’ group development status. The results indicate that innovation teams that are unfamiliar with agile innovation work tend to not seek collaboration due to uncertainty, which results in slow progress. When an innovation team’s surrounding organisation is unfamiliar with agile innovation methodologies it tends to not offer their support until the innovation team can prove progress, also slowing the progress down. The opposite is noticed when innovation teams and the organisation understands how to apply agile innovation work methodologies, collaboration occurs easily, resulting in positive progress. Further research is suggested.

Keywords: innovation; innovation management; innovation team; group development;

1 Problem

Introduction

In the ever-increasing speed of new products being launched on the market (Menon et al., 2002), innovation team are suggested to support companies to develop new products faster to meet that challenge (Nakata and Im, 2010; Tidd and Bassent, 2013). However, the group development process is not easy, nor the innovation process if being inexperienced to innovation work. Only 10-15 percent of all teams reach a performing phase after 6-8 month of work (Wheelan, 2013). Problems related to the group development process and lack of innovation-related knowledge are identified within studies on innovation teams, resulting in e.g. conflicts and poor performance (Kesting and Ulhøj, 2010; Kristiansen and Bloch-Poulsen, 2010). Even though research claims that collaboration and communication are central aspects of innovation work (Plessis, 2007; Shang et al., 2009), none of the innovation teams sought support in the organisation (external collaboration) to overcome these problems.
Therefore, this research aims to explore how maturing innovation teams’ understanding of innovation work and ability to collaborate affect innovation work performance in ongoing innovation projects (project).

2 Current understanding

Even though the group constellation is very well researched, innovation teams are not the same as working teams that may come up with innovative outcomes. Innovation teams are deliberately created to conduct innovation work, i.e., to develop innovation opportunities to the market to create value (e.g. Andersson, 1996; Tidd and Bessant, 2013). When it comes to conduct innovation work in practice, it is very much related to knowledge management, where small group have the advantage of being effective (e.g. Hoegl, 2005), more creative (e.g. Dew and Hearn, 2009) and easier to communicate (Lubaktin et al., 2001) than larger teams. However, at the same time as the speed to market has increased, the innovation process has developed as well to meet that challenge. This has resulted in agile innovation processes, significantly more complex than previous innovation processes (Ottosson, 2012; Trott, 2012), which requires that the knowledge level of team’s members to conduct innovation work have increased as well (Johnsson, 2014).

Prior research regarding group development problems are also well explored, demonstrated as four or five phases, i.e. forming, storming, norming and performing, and finally dissolving (e.g. Buijs, 2007; Tuckmann and Jensen, 1977; Wheelan, 2010; 2013). Until recently, research on how to avoid the conflict phase has not been in focus, but more to rescue teams in crises to get back on track again. Johnsson (2016c) on the other hand suggests a step-by-step preparation methodology to increase the innovation-related knowledge and create an innovation team ready to perform when the project starts.

A new stream of research regarding innovation teams is emerging based on the understanding that innovation teams differ from other teams, still based on the group development process and team knowledge. Recent research show that innovation related knowledge is complex due to innovation enablers’ (factors that enable innovation work) affect on innovation teams’ performance (Johnsson, 2016a; Johnsson 2016b) where Wheelan’s (2013) group development process has been used when analysing data. Further, Gren et al (2015; 2017) have used the Group Development Questionnaire (GDQ) developed by Wheelan and Hochberger (1996) to study teams’ agility in the software industry. They began their research by studying the development of innovation teams in the software industry where they identified various of important factors that support such teams agility (Gren et al, 2015). Their research continued by measuring the correlation between the group development process phases and a team’s agility to suggest that a mature group can act agile but also that agility causes the group to mature that agility may drive the development process and (Gren et al, 2017).

Collaboration and networking is central for innovation work progress, and is highlighted in various aspects, where collaboration is suggested with users (e.g. Ross et al. 2012), customers (e.g. Panesar and Markeset, 2008), suppliers (e.g. Jenssen and Nybak, 2009), competitors (e.g. Ritala and Hurmelinna-laukkken, 2009), experts (e.g. Hurmelinna-luukkanen, 2011), and universities (e.g. Aagaard and Gertsen, 2011). It is also claimed in prior research that an organisation should aim to involve as many employees as possible to become an innovative organisation (Xu, et al, 2006). However, how does understanding of agile innovation processes affect inexperienced innovation teams’ progress? This perspective lack in previous research. Based on that, this research aims to
study maturing innovation teams’ understanding of agile innovation work, and how that affect the progress in ongoing innovation.

3 Research question
How does understanding of agile innovation work affect innovation teams’ progress in an ongoing innovation project?

4 Research design
Data from three innovation teams (Team A – C) have been used within this longitude study between 2012-2015. The three teams were created in accordance with the CIT-process (Creating high-performing Innovation Teams), explicitly developed to avoid group dynamic problems when creating innovation teams (Johnsson, 2016). This resulted in 4 members in Team A, 7 members in Team B, and 4 members in Team C. The CIT-process is a five-step process: 1) secure top managements’ and managements’ commitment. The purpose is to make sure that management officially support the becoming innovation team; 2) identify an innovation team convener (convener). The convener is not a project manager as the purpose is to strive for unite leadership where the team drives the project together, as a team. The convener is more of person that keeps the team together and keep the agenda up to date; 3) prepare the convener with instructions regarding agile innovation work, the group dynamic process and instructions in how to gather team members on an X-functional basis; 4) the convener gathers the team members. When inviting team members, the focus is to identify individuals with various competences that have direct contact to end-users, end-customers, suppliers and distributors, and they should have an genuine interest in developing the organisation, they should have an established network and being able to expand it depending of needs; 5) arrange a kick-off where the teams are carefully introduced in the same way as the convener was, and the project is launched. In the CIT-process, an innovation facilitator (facilitator), a well-experienced individual in innovation management from a theoretical and practical perspective supports the process. The practical innovation work where conducted in accordance with an agile innovation methodology were a close relationship suggested with end-users, end-customers, suppliers and distributors (Johnsson, 2009).

Data were repeatedly collected during the group development process and the ongoing innovation projects through questionnaires, observations and audio-recorded team meetings where notes were taken, audio-recorded interviews. Relevant parts from the recordings were transcribed throughout the projects.

To answer the research question, three streams of theories were used. To understand the progress of the projects, the four-stage innovation process of Tidd and Bessant’s (2013) were used, i.e. to search for new innovation opportunities, to select ideas to develop, to develop the ideas and launch them on the market and to capture values created. To understand the group development process, Wheelan’s (2009; 2013) self-assessment statement questionnaire consisting of 35 statements were used. To understand the participants’ understanding regarding agile innovation work the knowledge taxonomy by Anderson and Krathwohl (2001) was used. The taxonomy is comparing the relation between cognitive - knowledge and process dimension. The cognitive process dimension is divided into six areas: 1) remember, 2) understand, 3) apply, 4) analyse, 5) evaluate and 6) create. The knowledge dimension is divided into four areas: A) factual knowledge,
B) conceptual knowledge, C) procedural and D) meta-cognitive knowledge. This means innovation teams status can be displayed as a combination of a knowledge dimension and a cognitive process dimension to demonstrate, e.g. 1A indicates that an innovation team have the ability to remember factual knowledge, 3A indicates that an innovation team have the ability to remember apply factual knowledge, and 6A indicates that an innovation team have the ability to create new knowledge.

Data collection and analysis
Data was collected from the teams’ ongoing innovation projects, starting from the kick-off and ended approximately one year later. Within this time, Team B and Team C completed their projects while Team A was in the early steps of the implementation phase as demonstrated by Tidd and Bessant (2013). Data was collected from the team members and the sponsor through audio-recorded interviews, questionnaires, and statement based questionnaires. Additionally, rich notes including reflections were taken at team meetings, and e-mail conversations between the facilitator and the convener were included to the data set.

Approximately 40 minutes were spent at each occasion for data collection, where about 20-30 minutes were dedicated for structured and unstructured audio-recorded interviews. The recordings were listened to, to detect explicit and inexplicit comments and explanations related to understanding of agile innovation work, the teams’ status, actions conducted in the project and their progress (Boyatzis 1998; Yin, 2013).

The collected data were analysed by charting the data from the statement-based questionnaires. Relevant transcribed quotes were charted and coded to be analysed to keywords from the statement-based questionnaires by Wheelan’s and from the perspective of the knowledge taxonomy by Anderson and Krathwohl’s. The innovation process by Tidd and Bessant’s served as an analysis tool to determine how the group development process correlated with the innovation process.

5 Findings
All teams showed a significant rapid group development process compared to the ordinary 6-8 months as demonstrated by Wheelan (2013). At the kick-off, all teams began their projects. None of the teams indicated any signs of group dynamic conflicts as they emerged to the performing and even high-performing phase. The teams, as teams, solved all kind of upcoming project-related problems as suggested by Wheelan.

Significant findings are related to both the teams and the surrounding organisation, where the teams’ slow performance was related to the lack of understanding in how to apply the content of agile innovation work. As soon as the teams understood the content of agile innovation work and started to practice it, the learning curve was fast and the project results kept coming. When applying the CIT-process, it also means that the created innovation team must collaborate with other departments and external organisations as well, not trying to conduct all work themselves. The data show that collaboration played a significant important role for the teams’ progress (Table 1 – 2). In the end of each project the knowledge had increased to a level where they could analyse and evaluate an ongoing situation. All teams were developed enough to start up new agile innovation teams with no or minor support from the facilitator.

Table 1. Team A’s progress and taxonomy development
### Team A

<table>
<thead>
<tr>
<th>Phase in innovation process</th>
<th>Action</th>
<th>Collaboration</th>
<th>Comment</th>
<th>Effect on innovation project</th>
<th>Taxonomy of agile innovation work</th>
<th>Team phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation</td>
<td>Team gathered</td>
<td>Internal work</td>
<td>Kick off</td>
<td>Progress</td>
<td>2B</td>
<td>Performing</td>
</tr>
<tr>
<td>Search</td>
<td>Defining scope</td>
<td>Internal work</td>
<td>Work shop</td>
<td>Progress</td>
<td>2B</td>
<td>Performing</td>
</tr>
<tr>
<td>Search</td>
<td>Need finding</td>
<td>Internal work</td>
<td>Not conducting filed work</td>
<td>Rapid progress</td>
<td>2B</td>
<td>Performing</td>
</tr>
<tr>
<td>Select</td>
<td>Idea development</td>
<td>External collaboration</td>
<td>Inviting external company.</td>
<td>Rapid progress</td>
<td>3C</td>
<td>High-performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Design work</td>
<td>Internal work</td>
<td>Conducts work isolated</td>
<td>Slow progress</td>
<td>2C</td>
<td>Performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Strengthen team</td>
<td>Internal work</td>
<td>Engaging engineers</td>
<td>Rapid progress</td>
<td>3C</td>
<td>High-performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Communicating project</td>
<td>External collaboration</td>
<td>Spreading the word in X-department</td>
<td>Rapid progress</td>
<td>3C</td>
<td>High-performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Need to strengthen team</td>
<td>Internal work</td>
<td>Organisation cannot support team. Team does not go external despite knowledge due to internal politics</td>
<td>No progress</td>
<td>5C</td>
<td>Performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Strengthen team</td>
<td>Internal work</td>
<td>Engineers volunteer</td>
<td>Rapid progress</td>
<td>3C</td>
<td>Performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Design work</td>
<td>Internal work</td>
<td>Struggling with available resources</td>
<td>Slow progress</td>
<td>2C</td>
<td>Performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Purchasing components</td>
<td>External collaboration</td>
<td>Parts delivered</td>
<td>Progress</td>
<td>3C</td>
<td>Performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Assembly</td>
<td>Internal work</td>
<td>Waiting for workshop to start assembly</td>
<td>No progress</td>
<td>5C</td>
<td>Performing</td>
</tr>
<tr>
<td>Implement</td>
<td>Assembly</td>
<td>Internal work</td>
<td></td>
<td>Progress</td>
<td>5C</td>
<td>Performing</td>
</tr>
</tbody>
</table>

**Table 2.** Team A’s progress and taxonomy development

### Team B

<table>
<thead>
<tr>
<th>Phase in innovation process</th>
<th>Action</th>
<th>Collaboration</th>
<th>Comment</th>
<th>Effect on innovation project</th>
<th>Taxonomy of agile innovation work</th>
<th>Team phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Team A’s progress and taxonomy development

<table>
<thead>
<tr>
<th>Team C</th>
<th>Phase in innovation process</th>
<th>Action</th>
<th>Collaboration</th>
<th>Comment</th>
<th>Effect on innovation project</th>
<th>Taxonomy of agile innovation work</th>
<th>Team phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>innovation process.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation</td>
<td>Team gathered</td>
<td>Internal work</td>
<td>Kick off</td>
<td>Progress</td>
<td>2B</td>
<td>Team</td>
<td></td>
</tr>
<tr>
<td>Search</td>
<td>Replacing team member or not</td>
<td>Internal work</td>
<td>Team member dropped out</td>
<td>Progress</td>
<td>2B</td>
<td>Forming</td>
<td></td>
</tr>
<tr>
<td>Search</td>
<td>Mapping opportunities and get inspiration</td>
<td>External collaboration</td>
<td>Inviting external company</td>
<td>Rapid progress</td>
<td>3C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Search</td>
<td>Defining scope</td>
<td>Internal work</td>
<td>Workshop</td>
<td>Rapid progress</td>
<td>3C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Search</td>
<td>Need finding</td>
<td>External collaboration</td>
<td>Field study on end-user</td>
<td>Progress</td>
<td>3C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Search</td>
<td>Mapping opportunities and get inspiration</td>
<td>External collaboration</td>
<td>Inviting another external company</td>
<td>Progress</td>
<td>3C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Search</td>
<td>Replacing team convener</td>
<td>Internal work</td>
<td>Quitting team for new job</td>
<td>Progress</td>
<td>3C</td>
<td>Performing</td>
<td></td>
</tr>
<tr>
<td>Select</td>
<td>Defining concept</td>
<td>Internal work</td>
<td>Team is not agreed, but solve problem</td>
<td>Slow progress</td>
<td>3C</td>
<td>Performing</td>
<td></td>
</tr>
<tr>
<td>Select</td>
<td>Idea selection</td>
<td>Internal work</td>
<td>Decide functions</td>
<td>Progress</td>
<td>3C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Implement</td>
<td>Developing ideas for solutions</td>
<td>External collaboration</td>
<td>Invites external company</td>
<td>Rapid progress</td>
<td>3C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Implement</td>
<td>Narrow ideas down</td>
<td>External collaboration</td>
<td>Decide solutions</td>
<td>Rapid progress</td>
<td>3C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Implement</td>
<td>Replacing team convener</td>
<td>Internal work</td>
<td>Quitting team for new job</td>
<td>Progress</td>
<td>3C</td>
<td>Performing</td>
<td></td>
</tr>
<tr>
<td>Implement</td>
<td>Supervising suppliers</td>
<td>External collaboration</td>
<td>All suppliers are on track</td>
<td>Rapid progress</td>
<td>5C</td>
<td>High-performing</td>
<td></td>
</tr>
<tr>
<td>Implement</td>
<td>Demonstration on exhibition (internal)</td>
<td>External collaboration</td>
<td>Concept presentation</td>
<td>Rapid progress</td>
<td>5C</td>
<td>High-performing</td>
<td></td>
</tr>
</tbody>
</table>
Discussion and conclusion

All teams were introduced in the same way and were facilitated by the same individual. However, Team A’s project differ to some degree from the other two teams. Team B and C had a budget covering the whole project while Team A had a budget that covered initial parts of the project, and then had to ask for further funding. The team meeting notes showed examples of the organisation’s scepticism to the teams’ way of not applying already established methodologies to step by step develop the ideas towards. This part was not uncomplicated, as the industry where these teams were created were of an industrial structure were rigid methodologies have developed for centuries to become a strong culture. Some employees were attracted to the free way of working and asked to join the team when they were brave enough to talk about the project, some others were very negative to the agile approach and wouldn’t support the work at all. However, as the teams showed progress, the interest to support the teams increased significant in the organisation.

Team A and Team C acted similar in a couple of ways, but for different reasons. Team A’s unwillingness to ask for support were related to individual issues, as e.g. lack of confidence to manage an innovation project in an alternative way with the risk of failing. As a result, the team tried to conduct all work by themselves which slowed the progress down. The organisations’ unwillingness to offer support were related to scepticism to the new way of working, as it wasn’t tested or evaluated in that organisation before. As a result, the organisation isolated the teams to conduct all work on its own, forcing the teams to seek recourses external to the organisation. This slowed the progress down from
one perspective but on the other hand speed the project up as they got progress. On the other side, as the teams’ knowledge increased and they became more certain in actions to conduct, they were more willing to ask for support. The same phenomenon occurred in the surrounding organisations, as soon as they understood that the teams’ way of working led to the projects’ progress, co-workers spontaneously offered their services to the teams. In both these scenarios, the teams’ resources increased and speed up the progress.

Team C had a slow start compared to the other two teams because of being too homogenous. The team was diverse from the perspective of representing different areas of engineering. However, the team members did not represent all areas as suggested in the Raft-model which in this case caused lack of market focus. As soon as the team was strengthened with market competence the team’s progress increased.

Team B increased their knowledge fastest of the three teams and applied the techniques flawless, they sought for support in the organisation when needed and for external suppliers when necessary to complete the product in time, which resulted in a rapid progress of the innovation project. The only hurdles the team had to pass was that team members left the team for new jobs, and for a short moment the team were not agreed on what goal to go for.

To conclude this research and answer the research question:

- When an innovation team is unfamiliar with agile innovation work methodologies, there are low or no collaboration activities due to the unwillingness to ask for support – resulting in slow project progress.
- When an innovation team is surrounded by an organisation that is unfamiliar with agile innovation work methodologies, there are low or no collaboration activities due to the unwillingness to offer support – resulting in slow project progress.
- When a team is familiar with agile innovation work methodologies, the degree of collaboration activities increases due to the willingness to ask for support – resulting in rapid speed project progress.
- When an innovation team is surrounded by an organisation that is familiar with agile innovation work methodologies, the degree of collaboration activities increases due to the willingness to offer support – resulting in rapid project progress.

6 Contribution

This research contributes to previous research by indicating that a team’s progress is not only related to its understanding of agile innovation work and the ability to collaborate, but also the surrounding organisation’s ability of the same. Even though the CIT-process was successful when creating the innovation teams by means of avoiding conflicts, it is not the only solution to make the newly formed teams able to perform in a new project. It need support from a knowledgeable person in the first steps in the innovation process to overcome uncertainty and to build self-confidence to initiate external collaboration, i.e., the team needs support to advance from understanding how to conduct a certain task to actually be able to conduct it.

Future research

Based on findings from this research, further studies on innovation teams is suggested regarding how to increase innovation team’s willingness or self-confidence to initiate collaboration earlier in innovation projects. Further studies on how a surrounding
organisation could easier adopt a newly formed innovation team’s work approach to not damage or disturb what could develop into an innovative organisation is also suggested. This puts the light on the teaching and learning aspects. As innovation work is complex by nature, and agile innovation work is even more complex. Therefore, further studies in how to improve teaching and teaching and education methodologies is suggested to support an organisation that wants to improve its innovation capabilities in this direction.

One observation that caught my interest, and is a subject for further research is that Team A chose to not start external collaborations even though the project were on hold caused by major layoffs at the company. The result was that the project was delayed. An interesting detail is that the team’s understanding of the agile innovation work at that time had increased to a level where they could evaluate procedural knowledge (5C). Still, they put the project on hold with the respect of whose who had to leave the organisation in the next coming months. In a prior moment of the project, the team involved an external organisation to save time to the project when internal competence was too occupied with other work tasks. On the other hand, this might have increased the relationship between the team and the organisation.

This research is conducted on a small number of innovation teams, therefore one should consider its limitations. Nevertheless, the long-term research enabled in-depth interviews and rich notes to understand the emerging process, which strengthen the results.

7 Practical implications

Innovation managers or innovation leaders can, by understanding that an innovation team’s progress in not only caused by the team’s understanding of agile innovation work and ability to collaborate but also related to the organisation in overall, support and educate the team and the organisation to increase both understanding and collaboration.

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