USE OF AGILE AND OPEN INNOVATION APPROACHES IN EXECUTING THE PROJECTS: A FIELD STUDY ON PROJECT MANAGERS

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Keywords	Abstract
Agile Innovation, Agility, Open Innovation, Project Management.	Agility and open innovation are two concepts that support each other as well as being approaches that contribute a lot to the project managers. While they seem to be different methodologies, the fact that particularly they are collaborative and knowledge-based approaches and that they aim to attain innovative outputs by looking at the events from similar perspectives bring the open innovation and agility close to each other. This study strived to measure the awareness of the project managers about agile and open innovation approaches in executing the projects. While it was observed in the study results that an awareness about and use of the two approaches started to form, it appeared that the projects in which these two approaches are used differed in a certain extent from each other.

PROJELERİN YÜRÜTÜLMESİNDE ÇEVİK VE AÇIK İNOVASYON YAKLAŞIMLARININ KULLANIMI: PROJE YÖNETİCİLERİ ÜZERİNDE BİR ALAN ARAŞTIRMASI

Anahtar Kelimeler	Öz
Çevik İnovasyon, Çeviklik, Açık İnovasyon, Proje Yönetimi.	Çeviklik ve açık inovasyon birbirlerini destekleyen iki kavram olmakla birlikte proje yöneticilerine de oldukça katkı sunan yaklaşımlardır. Farklı metodolojiler olarak gözükse de başta işbirliğine ve bilgiye dayalı yaklaşımlar olması ve olaylara benzer perspektiflerden bakarak yenilikçi çıktılar elde etmeyi amaçlamaları açık inovasyon ve çevikliği birbirine yaklaştırmaktadır. Bu çalışmada proje yöneticilerinin projeleri yürütürken çevik ve açık inovasyon yaklaşımlarına ilişkin farkındalıkları ölçümlenmeye çalışılmıştır. Çalışma sonuçlarında iki yaklaşıma ilişkin de bir farkındalığın ve kullanımın oluşmaya başladığı gözlemlense de bu iki yaklaşımların kullanıldığı projelerin belirli düzeyde birbirinden farklılaştığı ortaya çıkmıştır.

1. Introduction

The relationship between agility and innovation should be started to be examined from the emergence of the agility; because agile approaches in fact date back to very old periods, and tell similar things with the innovation philosophy.

It is possible to carry rise of the agility back to the periods when lean production first emerged (Ghezzi & Cavallo, 2018; PMI, 2017). Lean production has emerged in the production sector after the second world war for the purpose of creating high value-added products considering the customer needs (Ghezzi & Cavallo, 2018; Hines, Holweg, & Rich, 2004; Womack & Jones, 1997). It is possible to ground this approach on five basic principles: 1) produce things that create value for the customer 2) eliminate the uncertainties 3) eliminate the approaches

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disrupting the production flow 4) produce products desired by the customer 5) determine and eliminate the invaluable things (Womack & Jones, 1997).

The developments experienced in the IT technologies with the 1990s have started to shift the direction of the agility to different sectors, particularly to the software. Many agile methods have been developed in this period such as Extreme Programming (XP) (Beck, 1999), Scrum (Schwaber, 1995), Adaptive Software Development (Highsmith, 2000), Crystal (Highsmith & Cockburn, 2001), Dynamic Systems Development Method (Stapleton, 1997), Feature-Driven Development (Coad & Palmer, 1999) and Rational Unified Process (Jacobson, Booch, & Rumbaugh, 1999; Philippe, 2000). In addition, it was appreciated that the Kanban systems, a popular lean approach, could be used in both the production sector and the software sector (Ghezzi & Cavallo, 2018). In 2001, seventeen software engineers among the creators and leading appliers of agile methods came together and published the agile manifesto whereby they set the 12 basic principles and values of agile methods as stated in Table 1 and an alternative to the conventional software development processes (Beck et al., 2001).

Agile and lean approaches have continued developing independently of each other (one in software and the other in production system), and although different voices have risen up, the general view has been that lean and agility cannot be evaluated separately from each other.

As the side dominated by the software developers continued developing different agile approaches, researchers from MIT started to examine the Japanese production systems, especially Toyota production systems in the late 1980s and early 1990s. They systematized the concept "lean" to define the methods of increasing the productivity of the system by eliminating the wastes ("muda") through reducing the irregular workflows ("mura") and the destructive overloading ("muri"). While lean methodologies are not presented as agile frameworks, official lean, and Kanban software development systems emerged in the 2000s (Epping, 2011; Highsmith, 2009; Rigby, Sutherland & Takeuchi, 2016). In the beginning, some people who adopted the agile methodology declined to recognize these approaches as agile methodologies. However, defenders of the agile approach concentrated their focus on customer collaboration, and these approaches and their hybrids started to be accepted mainly as legitimate practices of the agile values and principles (Rigby, Sutherland & Takeuchi, 2016).

While lean and agile approaches were suggested as different methodologies by different people at different times, it was seen over time that they did not have many differences from each other. The innovation concept has also got involved in this similarity over time. For example, Bessant et al. defined organizational agility as the ability of an enterprise to respond to the changes in a fast and flexible way and to react to the resulting difficulties innovatively (Bessant et al., 2001). Sambamurthy et al. defined organizational agility the ability of an enterprise to identify the innovation opportunities and maintain its competitive market structure (Sambamurthy, 2003). Lokuge made a definition of agile innovation. According to Lokuge, agile innovation is, rather than incremental and radical innovations, the classic types of innovation, the fact that the operation among the information technologies pushes the enterprises to make innovation (Lokuge, 2015). Wilson and Doz have defined the agile innovation model as management and organization of the innovation based on knowledge obtained from anywhere. Because the changes are occurring fast now, and in addition, knowledge sources are increasing day by day (Wilson & Doz, 2011). Morris et al. substituted the software word included in the agile manifesto with innovation, and initiating a new trend in the agile innovation concept. they drew attention to the fact that innovation can be achieved with agility and an adaptable structure in today's competition circumstances (Morris et al., 2015).

Many studies are seen related to the fact agility and innovation concepts were used together before, too (Pérez-Bustamante, 1999; Vinodh et al., 2007). Böhmer, Beckmann, and Lindemann have stated that agile methodologies such as Scrum and Kanban could be incorporated into the innovation processes and open innovation structure (Böhmer, Beckmann & Lindemann, 2015).

Setting out from the literature, it appears that agility and innovation concepts have many aspects in common. In addition, despite the many aspects in common, not many studies are encountered on whether innovation activities affect agility or whether agility activities affect innovation, and on the ability to sustain these activities concurrently. Therefore, this study strived to examine how much the approaches of agility, and open innovation, which is accepted as one of the most relevant innovation models nowadays, are known by project managers, and how much the managers resort these approaches in executing their projects. Although agile and open innovation have not been adequately studied in the literature, this study makes a sense of these two concepts and their similarity.

2. Agility and Open Innovation in Project Management

The researchers proceed in their studies usually by addressing the execution and management of the innovation projects and the execution and management of agile projects differently. It would be helpful to examine in the first place in this section how the innovation projects are addressed.
Suggesting the open project management concept, Huff emphasized that openness should be ensured in project management (Huff, 2016). Huff made a definition that is close to the open innovation concept by defining the open project management shortly as obtaining the offers for the solution of the problems from different external innovation sources.

It was suggested in a different study that using flexible project management approaches based on collaboration rather than classic project management approaches is a requirement for project vision (Lippe & Brocke, 2016).

There are also propositions as to that, in the context of innovation, classic project management approaches do not exhibit a good performance in large and complex projects, or, namely in the circumstances where uncertainty prevails in market quests; that at this point, project management should evolve from an operational approach to a creative approach (Ben Mahmoud-Jouini, Midler, & Silberzahn, 2016).

In addition, it is highlighted in another study that project management and innovation management should be addressed together hereafter. It is stated that these two approaches gain an ongoingly growing acceleration and that virtually most of the innovation activities should be carried out within the framework of a project management (Midler, Killen, & Kock, 2016).

In another study, while it is suggested that business processes and innovation will acquire a further agile, global and specialized structure day by day through open community communications, it is stated that innovation and agility should be evaluated in a more integrated structure (Similä, Järvilehto, & Kuvaja, 2008).

Conforto et al. have concentrated on a definition after making 59 definitions about the agility concept. Accordingly, agility is capability of the project team to configure the changes in customer and stakeholder needs as well as market and technology structure so that they are quickly adaptable to the project plans in order to output better products and projects in an innovative and dynamic pattern (Hobbs & Petit, 2017).

While agile approaches require close collaboration between the stakeholders and responding to the changing needs quickly (Recker et al., 2017), open innovation approaches set forth that innovation activities should be carried out by observing the changings needs within the collaboration and listening to all stakeholders (Çubukcu & Gümüş, 2015; Dahlander & Gann, 2010; Enkel, Gassmann, & Chesbrough, 2009; Huizingh, 2011).

Table 1. Principles of Open Innovation and Agile Manifesto

6 Open Innovation Principles (Chesbrough, 2006)	12 Agile Manifesto Principles (Beck et al., 2001)	
Not all of the smart people work for us* so we must find and tap into the knowledge and expertise of bright individuals outside our company	Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.	Working software is the primary measure of progress.
External R&D can create significant value; internal R&D is needed to claim some portion of that value.	Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.	Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
We don't have to originate the research in order to profit from it.	Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.	Continuous attention to technical excellence and good design enhances agility.
Building a better business model is better than getting to market first.	Business people and developers must work together daily throughout the project.	Simplicity--the art of maximizing the amount of work not done--is essential.
If we make the best use of internal and external ideas, we will win	Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.	The best architectures, requirements, and designs emerge from self-organizing teams.
We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.	The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

As one looks at the agility and open innovation concepts from the project management perspective, the rates of similarity in approach and practices further increase. Even agile tools were recommended for innovative project teams (Sheridan, 2009). Agile project management approaches are recommended to enable that the innovation projects full of uncertainties are performed within a certain project plan and control (Chin, 2004; Conforto & Amaral, 2010; Highsmith, 2004). Highsmith states that one of the basic components of the agile project management is sustainable innovation (Highsmith, 2004). Agile principles, such as high level for autonomy, recognizing the role of experimentation and the chance to promote a culture for individual initiatives could be be useful

in open innovation projects and these two concepts share several dynamics and fundamental principles, even though they have not been adequately studied in the literature (Pellizzoni, Trabucchi, & Buganza, 2019).

As seen in Table 1, although agile manifesto was developed on the basis of the software sector, it is evident that the specified basic principles can be used in many sectors. In this respect, when examined Table 1, open innovation and agile approaches put the 'knowledge' and 'human' in the focus. In addition, these approaches aim to obtain sustainable innovative outputs as a result of effective collaborative efforts. In conclusion, while agile approaches cannot be applied successfully in an ecosystem where open innovation approaches are not used, it does not seem too possible also to apply open innovation approaches successfully in an ecosystem where agile approaches are not used.

The fact that complexity and uncertainty levels in today's projects are increasing day by day and the age of information technologies where rapid changes are experienced makes it compulsory to use agile and open innovation approaches. In addition, since it is difficult to think of the agile and open innovation approaches independently of each other, the awareness about these approaches should be high, especially for project managers.

3. Research Model

Project management practices expected to be result with the execution of projects in firms. Therefore, agile approaches used in projects provides the incremental, iterative, and agile project management practices within the firm:

H1: Agile approaches used in projects increase the use of agile/iterative/incremental project management practices.

Open innovation approaches can be applied in many different ways. However, since the common focus of the agile and open innovation approaches is 'knowledge' and 'human', especially 'knowledge acquisition' and 'collaborative innovation' dimensions of open innovation were examined in this study.

It is seen that spread of especially IT based innovations plays a very important role in shaping the business agility (Mathiassen, & Pries-Heje, 2006). In a study conducted in 2005 in Malaysia, it was revealed that there was a positive relationship between the adoption of IT and the quality of the knowledge acquired and the organizational agility (Zain et al., 2005). Therefore, when examining the relationship between agile and open innovation approaches, organizational agility should be implicated in this relationship.

H2: Use of agile approaches increases as organizational agility increases.

H3: Use of collaborative innovation approaches increases as organizational agility increases.

H4: Use of knowledge acquisition approaches increases as organizational agility increases.

Although agile approaches focus essentially on knowledge and human, studies about how the open innovation principles can complement an agile approach are not encountered much. At the same time, the concept of bringing together the open innovation principles may be challenging for an agile project manager; but taking an open innovation route as basis may also provide many additional benefits for an agile environment (Conboy & Morgan, 2010). In addition, it was seen that some difficulties may emerge when project teams apply open innovation and agile approaches together. For example, the openness principle may be compromised due to the reasons such as a perceived competition element or lack of transparency between the operation units. On the other hand, the requirement of minimum documentation may usually decrease effective knowledge transfer (Conboy & Morgan, 2011). Nevertheless, it is also emphasized that the effects of open innovation in development of agile systems should be understood (Conboy & Morgan, 2011).

Despite the different views and the fact that there are not too many studies on this subject, it is seen that agile and innovative approaches are complementary and supportive of each other. In another study, it was stated that agile approaches should be used in the course of new product development, which is an important sub process of the innovation process (Kettunen & Laanti, 2008). It was stated in another study that agile frameworks can be applied within the open innovation ecosystem and in the innovation process, at the product development phase, and it was analyzed that the agile methods included in Figure 1 can be used in various phases of the innovation process (Böhmer, Beckmann & Lindemann, 2015; Morris et al., 2015).
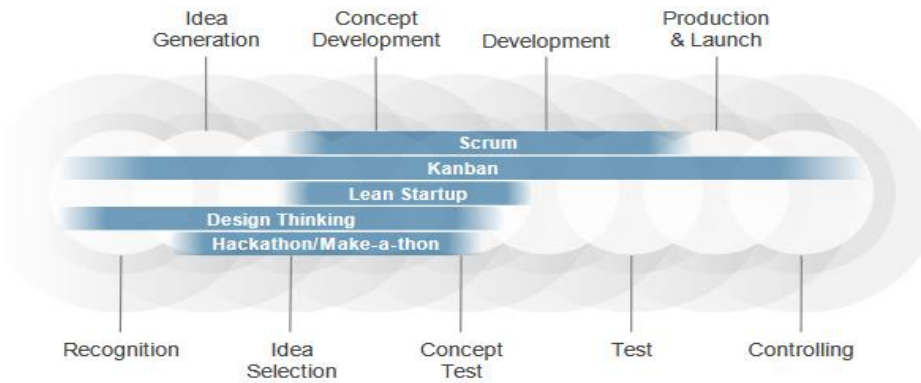
Figure 1. Agile Frameworks within the Generic Innovation Process Model
(Böhmer, Beckmann & Lindemann, 2015; Morris et al., 2015)

Again, another study reveals that open innovation methodologies assist agility by enriching and accelerating new product development with the emerging new market opportunities (Teece, Peteraf & Leih, 2016). In this respect, the following hypotheses were added to the study model in order to determine to what extent the project managers use agile and open innovation approaches together in the project activities.

H5: Use of collaborative innovation approaches increases as use of agile approaches increases.

H6: Use of knowledge acquisition approaches increases as use of agile approaches increases.

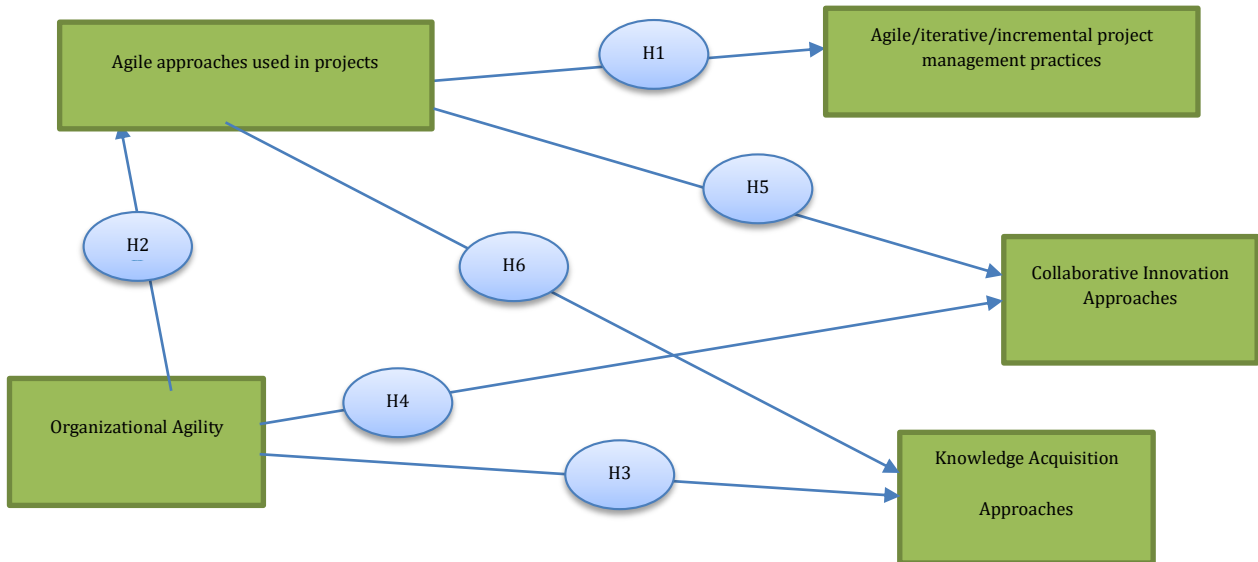In this respect, the final state of the research model emerged as seen in Figure 2.

Figure 2. Research Model

4. Research Method

A survey study was developed for use in the research. The recommended directions were followed to develop measurements of our structures and prove their validities (Churchill, 1979). In the phase of development of the survey study, it was tried to determine questions, especially about the agile and open innovation approaches, which establish the main flow of the study, and to make use of the literature. Since open innovation approaches intersect with agile approaches at the 'knowledge' and 'human' focus, mainly the knowledge acquisition and collaborative innovation dimensions of open innovation were examined in the study. In the innovation activities related to collaborative innovation, the project managers were asked whether they collaborate with external suppliers, customers, competitor firms, enterprises other than competitor firms, universities and other research institutions as well as technology development/R&D centers in executing their projects.

The values concerning collaboration and use of knowledge were looked into in a study conducted with regard to measuring the open innovation dimension at the SMEs. When examining the collaboration models in innovation activities of the SMEs, they were examined in two groups - the external firms and market, and the universities and

research centers (Lee et al., 2010). In this study, too, possible innovation collaborations with the stakeholders that can take part in this group were looked into separately.

Another component which is as important as collaboration in open innovation is the knowledge acquisition methods (Chesbrough, 2003; Kang & Kang, 2009). If the enterprises want to increase the innovation performance while substantially needing external knowledge sources, they should balance the use of the internal and external knowledge sources for effective innovation indicators (Berchicci, 2013). Therefore, it is necessary to resort to both external and internal sources in the open innovation activities. In this study, it was examined how much it is resorted to internal and external sources in the R&D activities and training and consultancy activities. Moreover, it was examined to what extent it is resorted to the idea/suggestion systems/software, whereby idea discussions may be made and/or new ideas may be generated regarding the encountered problems. Emergence of the innovations starts with gaining of innovative ideas (Janssen, 2004; Rogers, 2003; Van der Vegt & Janssen, 2003). These innovation sources may be reached by collecting idea solutions from broad masses with broad networks, through R&D centers, collaborations with the places like universities and research institutions, and by means of information technologies (Björk & Magnusson, 2009). At this point, idea/suggestion systems/software are as an important instrument as the internal/external R&D and training and consultancy activities in knowledge acquisition.

The 10th Global Project Management Survey conducted in 2018 by PMI (Project Management Institute) in relation to the questions asked about the agile approaches was utilized (PMI, 2018). The questions asked about the project management methodologies of PMI and the use frequency of agile approaches, and Likert structure, were used in the study. Also, the question "What is the use frequency of waterfall, agile, hybrid and other methodologies in the projects completed at your enterprise within the last one year?" included in that survey was measured again in this study.

The organizational agility contained in the research model was measured in this study based on the question "How did organizational agility of your enterprise change in the last five years" contained in the survey conducted by PMI. The same study was utilized with regard to measuring the complexity and uncertainty of the projects (PMI, 2018).

The pilot data collection phase was performed through the survey conducted before switching to the actual data collection phase. The objective in pilot studies is to determine whether the questions are understood by the participants, and to reveal the scope and clarity of the scale applied based on the literature, and to prove the content validity of the survey. It is seen that the sample size usually starts with a minimum 5-10 in the pilot studies (Reynolds, Diamantapoulos and Schlegelmilch, 1993). In this respect, survey was applied by reaching eight project managers in the pilot study phase. The participants were asked to state suitability of each item used to measure the various structures in the Likert scale. Managers both filled in the survey and presented correction recommendations. It was seen that no revision was required other than minor wording and expression revisions.The pilot analysis provided confidence for application of the survey to the sample group.

The data collection process was carried out face-to-face in the "Professional Development Activities" held monthly by PMI TR (PMI Turkey Chapter) and through the social media platforms of PMI TR. PMI TR provided full support in conducting the survey. Through the professional developed activities held monthly and the online platforms, the survey was applied to the project managers within two months, and 56 project managers were reached within this period. Since 40 project managers filled in the survey completely and suitably, the analyses were conducted on this sample.

Missing data analysis was conducted by reviewing the frequency distributions for determining whether a large amount of data is missing from the survey questions. Since it was determined that the missing data among the total data is less than 5%, it was not required to take any action. An analysis toward determining the differences in the survey questions was considered needless since the amount of missing data was little (Tabachnick & Fidell, 2001).

5. Findings

When examined the study results, it was started to see that the enterprises have begun placing importance to agile and open innovation approaches in executing their projects. Project managers expressed that agile approaches are resorted to frequently and all time at the rate of 25% in the projects completed at their enterprises within the last one year. 27.5% of the agile project management approaches cover agile/iterative/incremental project management practices, 15% cover agile/iterative/incremental program management practice, 12.5% cover

agile/iterative/incremental portfolio management practices and 15% cover specific agile approaches (Scrum, kanban, lean production, etc.).

It was also observed that knowledge acquisition and collaborative innovation approaches are resorted to frequently and at all time at the rate of 45% in average in the projects. However, among the knowledge acquisition approaches, 1) using the knowledge needed, which is produced through internal R&D and other means, and 2) making use of the internal training and consultancy services in relation with the needed knowledge, were seen to be the most used approaches with the rates of 50%. Although open innovation cares about the knowledge produced internally, in fact, openness can be ensured completely through use of external knowledge. Therefore, the rate of 45% should not be too misleading.

In the collaborative innovation approaches, being in constant contact and collaboration with the customers of the project was the part with the highest percentage in this category with 85%. The resulting findings revealed that open innovation approaches are used at least as much as the agile approaches in executing the projects. In conclusion, it was observed in the study that agile and open innovation approaches are used in at least 1 of 4 projects.

6. Empirical Results

First, factor analysis was resorted to for proving validity of the survey and reducing data. In factor analysis, the questions concerning agile approaches and the questions determined about open innovation approaches were subjected to factor analysis separately. No rotation method including Varimax was used in this process. Criteria indicating that only those factors with more than one eigenvalue should be kept in the analysis were used. Whether the data obtained from the study group are suitable for factor analysis may be explained by Kaiser-Meyer-Olkin (KMO) and Barlett test. In order to use factor analysis for data analysis reliably, it is accepted that KMO value should be minimum 0.50 points and that significance value of Bartlett should be close to zero (Frohlich & Westbrook, 2001). Analysis results satisfied all these requirements without need for data reduction. Moreover, the questions asked within the scope of the hypotheses in regard to application of the project management methodologies and agile approaches explain 78.237% of the total variance, whereas it explains 75.906% in the questions related to application of open innovation approaches. Thus, it was seen that the multiple-choice questions, validity of which was tested, are suitable for the hypothesis tests and that various statistics can be conducted.

Finally, survey results were subjected to reliability analysis to conclude validity and reliability of the study. The value of 0.7 as the lowest value for reliability analysis was stated in previous studies (Cronbach, 1951; Tabachnick & Fidell, 1996). In this study, this value of survey reliability came across us as a very high value like 0.923 without need for removing any item once all survey data were entered in the system. This value emerged as 0.897 in the questions related to application of the project management methodologies and agile approaches, and as 0.772 in the questions related to application of open innovation approaches.

In the subsequent phases, the test processes of the research model seen in Figure 2 has been switched to. Simple linear regression analysis were resorted to at this phase.

H1: Agile approaches used in projects increase the use of agile/iterative/incremental project management practices

According to regression results, use of agile approaches increase the use of agile/iterative/incremental project management practices (p = 0,000 < 0,05; R^2= 0,675, as seen in Table 2 and 3).

Table 2. Regression coefficient-R Results for H1
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,821^a	,675	,666	,65679

a. Predictors: (Constant), Agile Approaches Used in Projects

Table 3. ANOVA Test Result for H1
ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33,983	1	33,983	78,779	,000b
	Residual	16,392	38	,431		
	Total	50,375	39			

a. Dependent Variable: Agile / Iterative / Incremental Project Management Practices
b. Predictors: (Constant), Agile Approaches Used in Projects

H2: Use of agile approaches increases as organizational agility increases.

According to regression results, organizational agility increases the use of agile approaches (p = 0,003 < 0,05; R^2= 0,209).

H3: Use of collaborative innovation approaches increases as organizational agility increases.

Collaborative innovation approaches were examined in this study in 6 dimensions. These are: a) Establishing project/business partnerships with other enterprises. b) Working with external suppliers for software, equipment and hardware to be used in the project. c) Being in constant contact and collaboration with customers of the project. d) Being in contact and collaboration with the competitor firms. e) Being in contact and collaboration with the universities and education/research institutions. f) Being in contact and collaboration with the technology development centers, techno parks or R&D centers.

According to regression results, organizational agility only increases being in constant contact and collaboration with customers of the project in the collaborative innovation environment (p = 0,023 < 0,05; R^2= 0,130).
H4: Use of knowledge acquisition approaches increases as organizational agility increases.

Knowledge acquisition approaches were examined in this study in 5 dimensions. These are: a) Using the knowledge needed, which is produced through internal R&D and other means. b) Using the knowledge needed, which is produced through external R&D and other means. c) Obtaining the currently needed knowledge from other enterprises or institutions. d) Using the internal training and consultancy services with regard to the needed knowledge. e) Purchasing the external training and consultancy services with regard to the needed knowledge. f) Using idea/suggestion systems/software, whereby idea discussions may be made or new ideas may be generated regarding the encountered problems, are resorted to.

According to regression results, organizational agility increases using the knowledge needed, which is produced through internal R&D and other means (p = 0,001 < 0,05; R^2=0,238) and external R&D and other means (p = 0,044 < 0,05; R^2= 0,103). None of other knowledge acquisition approaches used in open innovation affected by organizational agility.

H5: Use of collaborative innovation approaches increases as use of agile approaches increases.

Using agile approaches increases working with external suppliers for software, equipment and hardware to be used in the project (p = 0,026 < 0,05; R^2=0,124). None of other collaborative innovation approaches used in open innovation affected by agile approaches.

H6: Use of knowledge acquisition approaches increases as use of agile approaches increases.

Using agile approaches increases using the external R&D and other means (p = 0,041 < 0,05; R^2= 0,105), increases using the internal training and consultancy services (p = 0,004 < 0,05; R^2= 0,196) and increases the using idea/suggestion systems/software to (p = 0,018 < 0,05; R^2= 0,139). None of other knowledge acquisition approaches used in open innovation affected by agile approaches.

7. Result and Discussion

Recognition and popularity of agile and open innovation approaches increase day by day. Although they are perceived as different methods, both approaches point out a dynamism indicator against the changing competition structure by putting knowledge and human in the focus. While agile innovation concept is now frequently encountered within the literature of innovation, it became possible to see the innovation activities among the agile approaches.

It was recently started to see in the studies that open innovation and agile approaches support each other and that they are approaches close to each other. It was also seen in the study conducted that agile and open innovation approaches are used in one of every four projects. As both approaches started to become very popular, studies and applications combining these approaches are not encountered much.

Open innovation approaches can be applied in many different ways. However, since the common focus of the agile and open innovation approaches is 'knowledge' and 'human', especially 'knowledge acquisition' and 'collaborative innovation' dimensions of open innovation were examined in this study.

The study shows that there is a moderate relationship between open innovation and agility. Nevertheless, it appeared that the projects in which these two approaches are used differed in a certain extent from each other. For instances, using agile approaches increases working with external suppliers in projects. On the other hand, projects that other collaborative innovation approaches used such as working with business partnerships, customers, universities or R&D centers are differed from projects that agile approaches used.

Agility and open innovation has a closer relationship at the dimension of knowledge acquisition. Using agile approaches increases using the external R&D and other means increases using the internal training and consultancy services and increases the using idea/suggestion systems/software. This means projects that external R&D, internal training programs and idea/suggestion systems are used have a moderate relationship with projects that agile approaches used.

The relationship between the organizational agility, agile and open innovation approaches are also examined in the study. It was seen in the analyses that use of agile approaches increases as the organizational agility increases. The factors causing increase of the organizational agility most were the interest in innovations, the necessity to adapt to the changes and competition in the market, and the change in the customer demands, in order. From another point of view, the interest in innovations increases the tendency toward agile approaches. Nevertheless, there is a moderate relationship between organizational agility and open innovation.

This study has some limitations. The inadequacy of the studies in which open innovation and agility were used together created difficulties in forming the scope of the study. While open innovation and agility support each other as a conceptual framework, use of different approaches in different projects and a moderate relationship in the study results show that outputs and opportunities of the approaches are not fully understand. On the other hand, more specific measurements regarding the approaches could not be carried out precisely due to the lack of sample.

While agility and innovation are factors that trigger each other, one of the most important ways and methods of agility is the open innovation approaches. It is required to resort also to the open innovation approaches in an ecosystem where agile approaches are used or to resort also to the agile approaches in an ecosystem where open innovation approaches are used. Although the study results show that this acquisition has not formed in the project managers, it is considered that this may be eliminated with increase of awareness about both methods. These two approaches often similar to each other. The project managers should be caused to acquire this awareness, as well. It should be evaluated that many more agile approaches presented from the perspective of innovation management such as design thinking and lean startup and the agile approaches presented from the project management perspective such as scrum and kanban can be used in a more integrated manner especially in the new product development process. Future studies can reveal this relational link between them by examining specific agile project management approaches and agile innovation approaches in more depth.

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Conflict of Interest

No conflict of interest was declared by the author.

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