Journal of Software Engineering

ISSN 1819-4311

Academic Journals Inc.

www.academicjournals.com

Journal of Software Engineering 7 (4): 151-155, 2013
ISSN 1819-4311 / DOI: 10.3923/jse.2013.151.155

Innovation Strategies: Challenges or Opportunities in Software Development Teams

Hasan Asil
Islamic Azad University, Azarshahr Branch, Azarshahr, Iran

ABSTRACT

Innovation is considered as one of the reinforcing agents in organizations. Software engineering teams are composed of different people with different skills. These teams can make use of innovation. The aims of using innovation in these teams are of three types: competition in market; production of goods and general or other goals. This research attempts to examine different viewpoints and offer innovation as an opportunity in software teams. However, if not controlled, innovation can be a real challenge for these teams. This research try to answer the question that whether innovation is an opportunity or a challenge in software development. As the research indicates, innovation as an opportunity in software development teams was accepted and if controlled and managed correctly, it can bring about many advantages for the team and the organization.

Key words: Organization, software, innovation, development team, opportunity, challenge

INTRODUCTION

Workforce is the main capital of organizations in the modern era. In fact, any organization's performance and efficiency depends on the performance of its workforce. Organization employees are among the factors for measuring an organization's superiority over others (Drucker, 2002). The concept of innovation is recognized as one of the vital tools of reinforcement for creating competitive value and stability for organizations in complex environments. Organizations with higher potentials of innovation are more successful in responding to variable environments and creating new abilities that can let them achieve higher levels of innovation. The starting point of innovation depends heavily on knowledge, expertise and commitment of human resources as the main inputs in the process of creating value and innovation. Strategic operations of human resources are the main tools for shaping and influencing skills, tendencies and behaviors of people in doing their job and ultimately achieving the organizational goals of innovation (Basadur *et al*., 2002). In order for innovation to emerge, organizations can make use of their human capital to develop their organizational skills and create new services and products. Software engineering is one of the many branches of IT in which innovation can be used very effectively. But the argument in this study is about the effects of innovation on software engineering teams. That is, what effects can innovation have on the management of a software project in the process of system development?

This research attempts to examine different viewpoints and offer innovation as an opportunity in software teams. This research tries to cheek effect of innovation in software team. This subject likes to previous works but in this research when use innovation and use new technology, probably it converts to Challenges because changing technology have cost.

INNOVATION IN SOFTWARE DEVELOPMENT

All organizations need original ideas for growth and survival. Original ideas are like new blood that is injected into the veins of the organization and rescues it from demise. Today, our world is constantly changing and turbulent and it needs innovation and creativity (Baldwin and Da Pont, 2003).

In such a place, the significance of human resources is clear because if this force which is the main source of energy production in the organization, is neglected or suppressed the organization will get weaker day by day and its wheels of production will stop moving one after another. Therefore, the key factor and the center of attention for organizations and human communities is the massive source of human force and managers' skills in identification of people's behavior and personality and appropriate reception which is the same as human and relationship skill, is very important in the creation of an appropriate environment for the emergence and nourishing of talented human forces. In any organization, emergence and direction of people toward creativity and innovation is done with specific purposes (Hamel, 2006). In the discussion related to software development using innovation the aspect of creativity and innovation can be defined with three major goals which are as follows:

Product competition: Competition market is a market in which a great number of producers and customers exchange a certain 'good'. In this type of '(economy) market' each producer's share of producing that certain good is very small and one producer, for example, does not have a high percentage of control over the market. As a result, no single producer can affect the market price by decreasing or increasing its production. So, it has to create a kind difference in its product in order to succeed in the market (Gilmore *et al*., 2001). One of the main reasons that innovation is discussed in the software field is the competition between producers in a market.

Innovation can reduce the costs and raise the organization above the others. Innovation can also help us make use of creativities in the software and offer systems with higher levels or abilities or attraction.

Production: The process of software development which is referred to as "the lifecycle of software development" is a structure which is implemented on the development and production of software products. Different models such as (certain) processes exist and each one of them determines a certain approach for the things and activities involved in it. In order to produce high-quality, high-tech, customer-oriented products, new technologies and methods have to be learned and implemented on the products. For creating new products, extensive research is done by the company and the result is an original and creative product. Here, just like the previous areas, it has to make use of creativity and innovation. In fact, it can be said that generally and can make use of innovation in communications and interactions of the team, designs, implementations, tests, supports, optimizations, etc. or in other words, throughout the whole process of system development.

The general view: The expansion of IT and the need for new software have caused several ideas to be created and leave their influence on software development. This has led creativity and innovation to become essential parts of software development whether knowingly or unknowingly (Bessen and Maskin, 2000).

Use of innovation is done in software engineering with three major goals (Gilmore *et al*., 2001). However, the question here is what could be the effect of innovation on a project? Is it a challenge or an opportunity in the field of software engineering? This question will be discussed in the next sections.

SYSTEMS INNOVATION IN SOFTWARE ENGINEERING: YES OR NO?

What has been obvious over the past few years is the role and effect of human on software engineering innovations. But the amount of these innovations has been much less than expected (Trott, 2008). The main reason for this is the rapid changes in technology. What be seen today as changes in software are considered as technological updates for, not innovation in, software engineering. Some reasons for this argument are as follows (http://www.bmwi.de/Homepage/download/technologie/Softwarepatentstudie.pdf):

The number of technologies is increasing every day and this reduces the costs in production. On the other hand, hardware performance is improving as well and this has had much influence on software and reduced costs in terms of time, etc. This process, however, is not innovative by nature.

Another issue related to software innovation is the increase in the use of a particular method. The emergence of technologies and using of them in different systems causes people and the market to be inclined toward them. After a while, this technology becomes popular and is treated as a standard. Therefore, it is used in projects without any specific reasons but not as an innovation. A good example for this is the use of www addressing in web browsers.

Software features can change over time. These features are being added and changed according to the needs of users and customers. Sometimes this is considered to be an innovation which is a mistaken belief.

As mentioned earlier, these are some examples of mistaking something for innovation and development in software engineering. It should also be noted that there are other things that could be regarded as innovations. One example is open source software development. This innovation established a new way in software engineering that expanded software and paved the way for expansion of small software corporations. Having a simple user interface, developing software with the least cost and space, designing optimized software, designing dynamic software, etc. could be regarded as examples of innovation and creativity. Therefore, the conclusion to this discussion is that should not mistake innovation for something else. Another issue on which further research could be done is "creation of technology is a creativity not using it." The next topic here is that although creativity could have many advantages, it could cause problems for a team, too (BCG, 2006). Some of these problems are as follows:

- Innovation could increase the risk involved in a project and if these risks are not identified, they can cause problems
- Innovation can increase prejudices in a team because people do not have the same abilities
- Innovation can cause problems if there are no organizational morals
- Innovation can reduce coordination in a team
- Innovation might need a certain knowledge of which some members could be unaware
- Innovation could flout the standards in things such as implementation, design, etc. For example, a programmer could innovatively and creatively write a code but at the same time he could flout the standards and others might not easily understand his purpose
- Innovation might have high costs
- ...

Some of the issues above are related to software teams and some are generally true. So, as be seen, not only can innovation create opportunities but also challenges and problems (Beise, 2001). To investigate this issue, this study attempts to look at using innovation in human resources of software teams which is the main topic for next section.

INNOVATION IN SOFTWARE DEVELOPMENT: A CHALLENGE OR AN OPPORTUNITY?

As discussed earlier, innovation in software engineering is done with three major goals that can have advantages as well as disadvantages. This study attempts to examine the effect of innovation on software development teams as a challenge or an opportunity. This research is a posteriori trying to answer the question that whether innovation is an opportunity or a challenge in software development. To answer this question, considering the producers to be the statistical society, samples were chosen from 80 companies using the Morgan table. To increase reliability, 400 companies were chosen using random sampling.

Data were gathered by researcher-made questionnaire. To evaluate its validity, 30 people that were not part of the statistical society were asked to fill out the questionnaire. Data were typed into SPSS software and the Alpha-Cronbach method was used to calculate the validity of the questionnaire. Since the alpha coefficient was not more than 67%, no questions were removed. The questionnaire was e-mailed to software developers. After receiving the filled-out questionnaires, the organization checked them and 367 of them were accepted. The questions were coded and typed into SPSS 17 software.

Data normality test was done by using Kolmogorov-Smirnov method in order to choose an appropriate statistic sample and accept or reject the hypotheses about the effect of innovation in software development as an opportunity and the result was that data are normal. Therefore, descriptive statistics was used for the hypothesis test.

The SPSS output results for variables are as Table 1.

For hypothesis test, it is assumed that if the mean for questionnaire data is 3 or greater than 3, the hypothesis is accepted.

$$\begin{cases}\text{Hypothesis H0}:\rho-3=0\\ \text{Hypothesis H1}:\rho-3\neq 0\end{cases}$$

As Tables 1 and 2 indicate, according to the answers provided by participants, the mean for the effect of using innovation on the opportunity factor is significantly more than mean = 3 and t value (0.05) is more than p = 0. Therefore, the research hypothesis is accepted.

Table 1: Output results for variables and normally data

	Quantity	Mean	Standard deviation	Mean standard deviation
Opportunity	367	3.275	0.8001	0.032

Table 2: Sample test

	Test value = 3					
					Certainty space 95%	
	t-value	Freedom	p value of both sides	Mean difference	Min. limit	Max. limit
Opportunity	9.027	369	0.000	0.3807	0.304	0.466

This research tries to cheek effect of innovation in software team. The difference this research with previously studies is in technology. This research attempt to cheek effect of innovation but in this research when use innovation and use new technology, probably it converts to Challenges because changing technology have cost.

CONCLUSION

Innovation is recognized as one of the vital tools of reinforcement for creating competitive value and stability for organizations in complex environments. Organizations with higher potentials of innovation are more successful in responding to variable environments and creating new abilities that can let them achieve higher levels of performance. Innovation and its related activities depend heavily on staff knowledge, expertise and commitment as the inputs for the process of value creation. This research attempts to examine the various views on innovation in software development teams. Then, it evaluates innovation as a challenge and an opportunity in software development teams. As the research indicates, innovation as an opportunity in software development teams was accepted and if controlled and managed correctly, it can bring about many advantages for the team and the organization.

REFERENCES

BCG, 2006. Harnessing the power of India: Rising to the productivity challenge in biopharma R and D. The Boston Consulting Group. http://www.bcg.com/documents/file14798.pdf

Baldwin, J. and M. Da Pont, 2003. Innovation in Canadian manufacturing enterprises. Statistics Canada, Ottawa, Canada.

Basadur, M., P. Pringle and D. Kirkland, 2002. Crossing cultures: Training effects on the divergent thinking attitudes of Spanish-speaking South American managers. Creat. Res. J., 14: 395-408.

Beise, M., 2001. Lead Markets: Country-Specific Success Factors of the Global Diffusion of Innovations. Springer, USA., ISBN-13: 9783790814309, Pages: 306.

Bessen, J. and E. Maskin, 2000. Sequential innovation, patents and imitation. MIT Department of Economics, Working Paper No. 00-01. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=206189

Drucker, P.F., 2002. The discipline of innovation. Harvard Business School Publishing Corporation. http://mis.postech.ac.kr/class/MEIE780_AdvMIS/2012%20paper/Part1%20(Pack1-3)/01_intro/1-2)%20The%20Discipline%20of%20Innovation.pdf

Gilmore, A., D. Carson and K. Grant, 2001. SME marketing in practice. Marketing Intell. Plann., 19: 6-11.

Hamel, G., 2006. Why, what and how of management innovation. Harvard Business Review Article, Prod. #: R0602C-PDF-ENG. http://innovbfa.viabloga.com/files/HBR___Gary_Hamel___The_Why_What_and_How_of_Management_Innovation___2006.pdf

Trott, P., 2008. Innovation Management and New Product Development. Financial Times Prentice Hall, USA.