



An Analysis of suitability of KM applications in Software Engineering

KEYWORDS

Software Engineering, Knowledge Management, Tacit Knowledge, Explicit Knowledge, Organizational Learning, IT Companies.

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ABSTRACT *Software Engineering process is carried out by the people involved in the development of the software. The success and efficiency of the software development process depends on the knowledge of the software engineers; hence, it is referred as knowledge centric process. The knowledge and experience acquired by a software engineer in course of one project can be reused in another project. Due to the constant development in the IT field, a software engineer is forced to work in continuous learning environment. Thus, it has become crucial for the software development companies to manage the knowledge possessed by their employees. The present paper conducts a survey of major software development companies in Maharashtra region and explores the application of knowledge management in these companies and its role in the software engineering process.*

Introduction :

Software development processes have always been knowledge intensive. In the increased complexity of Software Engineering projects work has led to a greater reliance on knowledge processes to solve problems. Software organizations gain local experience through collection of processes and product data, careful measurement of planned software activities, trial and error, and feedback from customers and environment in general. It is the nature of many software projects that unless the latest knowledge is available, opportunities to resolve problems can be lost. Software development team do not work in isolation and are required to work in cross-functional environment. In this situations, effective knowledge sharing among software developers become critical success factor, and Knowledge Management (KM) becomes an enabler of organizational learning.

Knowledge is an abstract concept and needs a systematic approach to manage it. Knowledge is present in two different forms i.e., Explicit and Tacit. Explicit knowledge is the knowledge present in physical forms such as books, documents, software products etc. Tacit knowledge is present in the mind of people in the form of skills, expertise, memory, education, creativity and imagination. Tacit and Explicit knowledge are inter adaptable. The explicit knowledge present in physical form can be converted into tacit knowledge i.e intellectual knowledge. On the other hand, the tacit knowledge present in the mind of people can be documented in the physical form of explicit knowledge. The main objective of knowledge management is to transfer tacit knowledge of an individual into explicit knowledge and then disseminate that explicit to groups within the organization. Knowledge management can be discussed in general as the ability to create, communicate, and apply the knowledge to achieve organizational goals. According to Ross Dawson, Knowledge Management is a newly emerging, interdisciplinary business model that has knowledge within the framework of an organization as its focus. It is rooted in many disciplines including business economics, psychology, and information management. It is the ultimate competitive advantage for today's firm. Knowledge Management involves people, technology and processes in overlapping parts.

Knowledge Management in Software Engineering:

Knowledge Management (KM) encourages the software engineers to reference the lessons they have learned from previous projects, as well as understanding the importance

of sharing best practices amongst peers. As a result software engineers can improve their efficiency and reduce unnecessary re-work. More importantly, managers are able to capture the domain knowledge that software developers acquire during their work. There is a continuous process of capturing, organising and dissemination of knowledge in the development of software.

Objectives :

- To understand the KM implementation in selected companies.
- To identify the stages where KM is considered useful in S.E.
- To understand the knowledge reusability in s/w development process.

Hypothesis:

Knowledge Management is beneficial in the Software Engineering process.

Research Methodology:

The present research conducted to identify various knowledge management activities carried out during the software development process, and understand the benefits of the same. For the present research all the organizations involved in software development process are selected on convenient basis. The study is restricted to Maharashtra region, The software development organizations from various cities within Maharashtra region are selected. Total population of organization in Maharashtra region is more than 2000, out of which, a sample of 50 companies are selected for the present study. Maximum companies are selected from Mumbai and Pune city. To include all the region in the sample, out of 50 sample size highest 16 organizations were taken from Pune and Mumbai, 9 organizations from Nagpur and 3 organization each were taken from Aurangabad, Jalgaon and Nashik region of the State.

Keeping in mind the objectives of the research, a questionnaire, comprising 50 questions was designed. The questions were closed ended with 4 to 5 options. The questionnaire contained questions which revealed answers regarding various aspects of knowledge management and its application in the software development process. In addition to the studied questionnaire, personal interviews with professionals on key post were also conducted to get clearer picture about various knowledge management activities in their respective organization.

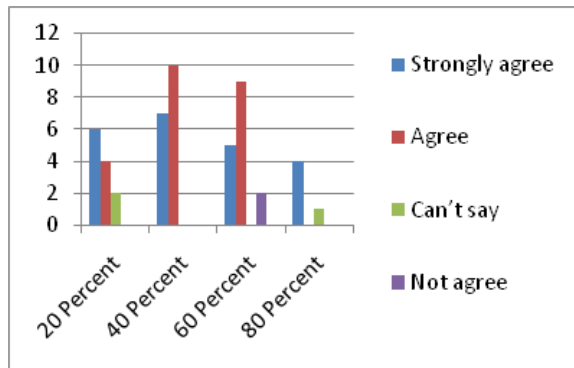
After the data collection, data entry was done in excel worksheets. Tables and charts were generated using MS-Excel and MS-Word. First, individual factor tables were constructed for all 50 questions. Then, cross factor tables were also generated for data analysis and interpretation and drawing up of conclusions. The present paper includes the discussion on selected tables, keeping in mind the objectives of the paper.

Data analysis and Interpretation:

The section below shows the analysis of data using the cross factor analysis of some selected questions.

Table No. 1 Percentage of Knowledge Reused in Software of Same Kind and Opinion about Software Development Process is Suitable for Application of Previous Knowledge.

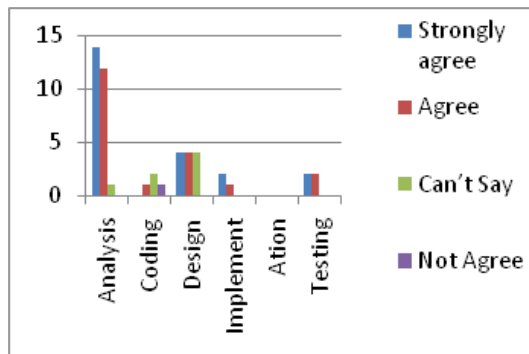
Percentage of reuse	Strongly agree	Agree	Can't say	Not agree	Total
20	06	04	02		12
40	07	10			17
60	05	09		02	16
80	04		01		05
Total	22	23	03	02	50



It is clear from the above analysis that, majority of the companies believe that software development process is suitable for application of knowledge management and also they reuse 40 to 60 percent of previous knowledge in new software projects.

Table No. 2 SDLC Stage where KM is beneficial and Opinion about Software Engineering Has a Wide Area of Application for Knowledge Management

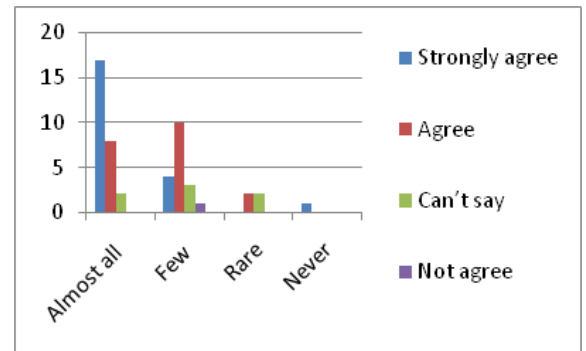
SDLC Stage	Strongly agree	Agree	Can't Say	Not Agree	Total
Analysis	14	12	1		27
Coding		1	2	1	4
Design	4	4	4		12
Implementation	2	1			3
Testing	2	2			4
Total	22	20	07	01	50



The above analysis reveals that, more than 80% companies agree that software engineering has wide area of application for knowledge management principles. Further, amongst these companies majority have opined that KM practices are most beneficial in Analysis phase of SDLC.

Table No. 3 Number of Projects in which Knowledge Management Practices Applied and Software Engineering Has Wide Area of Application for Knowledge Management Principles.

KM applied in projects	Strongly agree	Agree	Can't say	Not agree	Total
Almost all	17	08	02		27
Few	04	10	03	01	18
Rare		02	02		4
Never	01				1
Total	22	20	07	01	50



It is found from the above analysis that, majority of the companies who believe that s/w engineering have a wide area of application of KM principles have applied KM practices in almost all projects. This suggests that, in all the s/w projects there is reusability of KM principles. The set hypothesis is proved that Knowledge Management is beneficial in the software engineering process.

Conclusions :

Following conclusions can be drawn from the above analysis :

It is found that majority of the companies agree that, software development process is suitable for application of previous knowledge and these companies reuse almost 40 to 60% of previous knowledge in new software projects, and this indicates suitability of KM application in the software engineering. Most of the companies believe that software engineering has wide area of application for Knowledge Management and amongst them almost all companies have applied knowledge management principles in software development projects they have undertaken.

Amongst the companies selected who believe that software engineering has wide area of application for KM principles maximum have opined that KM is beneficial in the Analysis stage of SDLC. Some of them have highlighted other stages of SDLC also, but in all the responses it is observed that, analysis is most crucial and hence required KM application.

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