Knowledge Management Application in Software Development Companies of Maharashtra State.

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Introduction

In today's era software plays a vital role in day to day life. The software industry has emerged as one of the major factor in boosting Indian economy. Any industry has two kinds of asset tangible and intangible. The tangible asset includes land, labour, infrastructure, manpower, machine, plants etc. whereas the intangible assets are the invisible asset of the organization such as knowledge. For a software industry the intangible asset in the form of knowledge is more crucial than the tangible assets. Knowledge of the employees plays most vital role for any software organization and, efficient utilization and management of this knowledge may yield fruitful benefits for the companies. The software industry is dynamic it is necessary for any software engineer to keep his knowledge updated. Only possessing knowledge is not enough it is necessary to upgrade and enhance the knowledge by acquiring new knowledge as well as disseminating knowledge among others. Knowledge Management is the process of creating value from an organization's intangible assets. Knowledge Management helps organizations to generate value from their intellectual property and knowledge based assets. KM involves the creation, dissemination, and utilization of knowledge to its optimal level.

Knowledge Management is the process of gathering a firm's collective expertise wherever it resides – in databases, on paper, or in people's heads – and distributing it to where it can help produce biggest payoff. The knowledge which is available in the form of papers and documents is called tacit knowledge and knowledge available in people's head is called tacit knowledge. Knowledge management practices involve creating, storing and, sharing or disseminating tacit and explicit knowledge of the organization. It is studied that, up to 95% of information is stored in tacit form of knowledge. This tacit knowledge is the raw material or fuel for innovation and creativity which is the only competitive advantage a firm has to sustain in this unpredictable business environment. It is a challenging task for the companies to identify this tacit knowledge and utilise it towards company's benefit. Knowledge management systems help the companies to manage this tacit knowledge, which is otherwise difficult to capture, by facilitating an environment of creating, storing and sharing knowledge.

Objectives

- To determine the current practices of KM in Software Engineering.
- To identify different models of Software Engineering based on KM Practices.
- To determine the reusability of knowledge in Software Engineering projects.

Hypothesis

Null Hypothesis: KM practices are useful in Software Engineering irrespective of opinion about Software Engineering has wide area of application for KM.

Alternate Hypothesis: KM practices are useful in Software Engineering depends on opinion about Software Engineering has wide area of application for KM.

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. The study is restricted to

Maharashtra region. The software development organizations from various cities within Maharashtra region are selected. A sample of 50 companies is selected for the present study. Maximum companies are selected from Mumbai and Pune city. Out of 50 samples size highest 16 organizations were taken from

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Pune and Mumbai, 9 organizations from Nagpur and 3 organizations 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. Conclusions are drawn from the analysis and interpretation of the data. The present research is limited to only Maharashtra state only. It covers only 50 companies from various regions under Maharashtra state. The scope includes all types of s/w development companies.

Knowledge Management Framework

Knowledge Management concept is based on three pillars; People, Process and Technology. KM involves participation and interaction of these three factors to enhance the organizational efficiency. An organization can be termed as knowledge organization when it creates an environment for its people to freely exchange their ideas, views, expertise about various processes across different functional areas using technology as a tool, and thereby produce knowledge assets which results in increasing the efficiency of an individual, process and as a whole of the organization.

Awad and Ghaziri described that Knowledge Management contains following integral parts:

- Using accessible knowledge from outside sources.

-Embedding and storing knowledge in business processes, products and services.

- Representing knowledge in databases and documents.

- Promoting knowledge growth through the organization's culture and incentives.

- Transferring and sharing knowledge throughout the organization.

- Assessing the value of knowledge assets and impacts on regular basis.[18]

Thus in short, Knowledge Management is a strategy implemented by the organization to make optimum utilisation of its knowledge and gain maximum organizational benefits.

Scope of Knowledge Management in software development:

The software engineering discipline is a knowledge centric process and so it has gained much attention of knowledge management. For any software development organization the main assets are not the physical asset such as plant, machine or hardware etc. but the knowledge held by its employee. Knowledge possessed by the people and experienced acquired during the course of work on the software development project plays a crucial role. Software Engineering field demands the need to manage this knowledge asset present in different forms thereby, paves way for Knowledge Management. Knowledge Management helps to manage this knowledge asset by providing means for creating, acquiring, storing and disseminating knowledge throughout the organization.

Some aspects of knowledge management suggested by Wig are:

• Survey, develop, maintain and secure the intellectual and knowledge resources of the enterprise.

• Determine the knowledge and expertise required to perform work tasks, organize it, make the requisite knowledge available, "package it" and distribute it to the relevant points of action.

• Provide (...) knowledge architecture so that the enterprise's facilities, procedures, guidelines, standards, examples, and practices facilitate and support active Knowledge management as part of the organization's practices and culture. [10]

Thus, it is apparent that knowledge management is beneficial in the software engineering field. Today, many software development companies have implemented Knowledge Management Systems. The present research works studies the application of Knowledge Management in the software development companies within Maharashtra state of India.

Data Analysis and Interpretation

The Data analysis and interpretation below presents the cross factor analysis of some of the questions used in the survey.

Table No. 1 Opinions about   KM Practice Useful in Software Engineering   and Software Engineering Has Wide Area of Application for KM Principles.

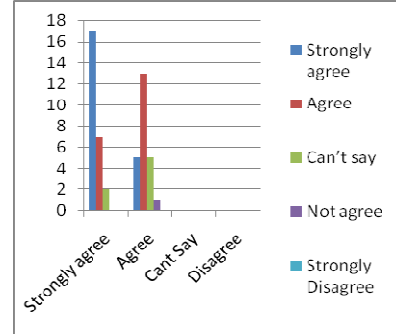| KM practice is useful in software development	Strongly agree	Agree	Can't say	Not agree	Strongly Disagree	Total
Strongly agree	17	07	02			26
Agree	05	13	05	01		24
Can't Say						
Disagree						
Total	22	20	06	01		50

Chart No. 1

It is found from the above analysis that, all the companies are in agreement to the fact that KM practices is useful in software development with majority of the companies amongst these also believing that s/w engineering has wide area of application for KM application. This has been validated by Chi-Square analysis also.

Table No. 2 Number of Projects in which Knowledge Management Practices Applied and Software Engineering Has Wide Area of Application for Knowledge Management Principles.

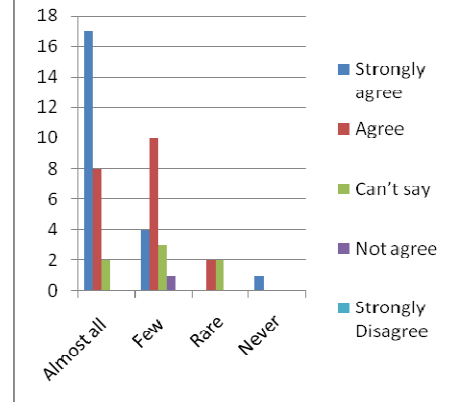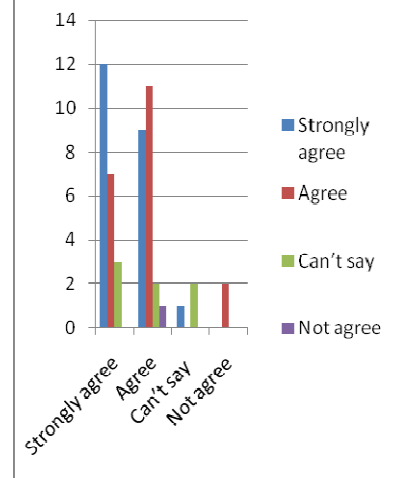| KM applied in projects	Strongly agree	Agree	Can't say	Not agree	Strongly Disagree	Total
Almost all	17	08	02			27
Few	04	10	03	01		18
Rare		02	02			4
Never	01					1
Total	22	20	07	01		50

Chart No. 2

It is observed from the above analysis that, majority of the companies who believe the notion s/w engineering have a wide area of application of KM principles have applied KM practices in almost all projects.

Table No. 3 Opinions about Software Development Process Suitable for Application of Previous Knowledge andSoftware Engineering Has Wide Area of Application for KM Principles.

S/w development suitable for application of previous knowledge.	Strongly agree	Agree	Can't say	Not agree	Strongly Disagree	Total
Strongly agree	12	07	03			22
Agree	09	11	02	01		23
Can't say	01		02			03
Not agree		02				02
Total	22	20	07	01		50

Chart No. 3

It is noted from the statistics that, majority of the companies are in agreement that s/w development is suitable for application of previous knowledge and also s/w engineering has wide area of application for KM application.

Conclusions:

The above study concludes that knowledge management plays crucial role in software development process. It is evident that, Software Engineering field has wide area of application for Knowledge Management. It is also found that most of the companies implement Knowledge Management practices in their software development projects. There are different types of s/w engineering models used by the selected companies. The study also found that s/w software development process is suitable for KM application.

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