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Managing Global Software Projects through Knowledge Sharing - A Study with Reference to Co-located and Globally-Distributed Software Teams

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ABSTRACT

The intent of this research study is to propose a knowledge sharing framework to manage software projects where employees are working in different work locations. To support the arguments based on review of literature, the paper presents a holistic framework of knowledge sharing objectives. Finally, the paper applies the framework to study the existence of knowledge sharing process in a software development company for the purpose of examining the effectiveness of knowledge sharing.

Keywords: Global Software Projects, Knowledge Sharing, Organizational Culture, Awareness, Trust, Willingness, Project Management.

INTRODUCTION

Due to the changing business environment today, organizations are facing challenges of global competitiveness. Furthermore, organizations are confronted more and more with issues such as fast technological changes, etc. It is also becoming imperative for organizations to be able to manage highly distributed and diversified knowledge. Challenges lie on the identification of crucial knowledge that improves the business process. Knowledge is central to the understanding of the knowing process, and the learning and knowledge transfer/sharing process. Companies, understanding the need to harness knowledge, are becoming more aware about the crucial issue of creating a work environment that fosters knowledge-sharing mechanisms and learning capabilities within and across organizations. It is well recognized that knowledge-sharing mechanisms are highly complex processes that spur growth in an organization.

KNOWLEDGE MANAGEMENT – AN OVERVIEW

Knowledge management requires technology, business strategy and people that transfer knowledge into means of a readily accessible vehicle. We understand that knowledge management is one of the key areas for sustained support, enhanced business and to be on top of the client's competitors. We have practiced the knowledge management processes given in this thesis successfully for the past six years and have constantly improved the process based on lessons learnt/feedback from the client and issues faced in previous knowledge management experiences. The knowledge management area is broadly divided into two major categories, viz., knowledge acquisition and transition and knowledge retention. The knowledge acquisition and transition area deals with acquiring new knowledge from the vendor/client and transitioning it over to the support team. The process followed here makes sure that the transition is complete in all aspects including creation of knowledge repository. This will act as an input to knowledge retention process. The knowledge retention deals with retaining the acquired knowledge and enhancing it to meet the growing needs of the customer and the business.

NEED FOR THE STUDY

The biggest challenge to developing a global delivery system is getting all team members to work efficiently and effectively together. Sharing-knowledge and expertise is crucial in any team, and in a team where members work in different countries and time zones and speak different languages, and communication is not something that can be left to chance.

Knowledge-sharing within projects and across projects over time can improve both the efficiency and effectiveness of project management. However, it is not easy to do so. There are many types of knowledge and knowledge-sharing methods. Further, many factors can encourage or inhibit sharing of knowledge. The large number of possible combinations of knowledge types, sharing methods, and affecting factors are to be analyzed and understood. The right methods deployed, and continuous creation of knowledge are the most important managerial challenges organizations face today. While the technology for collecting, storing, and accessing information continues to grow exponentially, the ability to effectively and efficiently use this information to enhance job performances, as well as deliver quality products and services remains elusive.

The management challenge is to create an environment that truly values Knowledge-sharing. The personal challenge, often downplayed, is to be open to the ideas of others, willing to share ideas, and maintain a thirst for new knowledge. Knowledge in organizations manifests itself in one of the two forms, viz., explicit and tacit. Explicit knowledge can be easily articulated, captured, and transferred. Tacit knowledge, on the other hand, is intangible and not easily transferable, and therein the problem exists. How do we share and transfer the tacit knowledge that resides in an organization is an important question for which we seek to find an answer through this study.

LITERATURE REVIEW

It is well recognized today that knowledge is one of the most competitive resource for the dynamic global business environment (Sharif, 2005). Indeed, in recent years companies have strongly focused on organizing creating, transferring, searching, sharing Knowledge under the roof so-called Knowledge Management (Hildreth, 2002).

On the other side, the multidisciplinary academic world such as philosophy, sociology, computer sciences have generated a large amount of publications on various perspectives and dimensions of knowledge management (Davenport, 1996, Davis, 2002). It is usually agreed that there is no common definition of knowledge but let's recall some of the popular definitions. "Knowledge is a justified true belief that increases an individual's capacity to take action" (Ayer, 1956). Davenport (2000) defines knowledge as "a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information". According to (Brooking, 1999) knowledge is defined "as information in context with understanding to applying that knowledge".

A more comprehensive knowledge definition highlights that there are several forms of knowledge; tacit, explicit, implicit and systemic knowledge at the individual, group and organizational levels (Davenport, 2000, Dixon, 2002a, Polanyi, 1958, Nonaka, 1995, Ink pen, 1996). Explicit knowledge has a tangible dimension that can be easily captured, codified, and communicated. It can be shared through discussion or by writing it down and stored into repositories, document, notes etc. Examples might include a telephone directory, an instruction manual, or a report of Research findings. In contrast, tacit knowledge is linked to personal perspectives, intuition, emotions, beliefs, know-how, experience and

values. It is intangible and not easy to articulate. So it tends to be shared between people through discussion, stories and personal interactions. The management of explicit or tacit knowledge consists of performing one or several of the knowledge processes such as transferring, creating, integrating, combining and using knowledge. It is acknowledged that knowledge sharing is a nebulous concept very important for harnessing knowledge (Petersen, 2002, little, 2002) and thus enquires a holistic sharing inter-organizations (Husman, 2001) or inter-units in a firm (Davis, 2002).

Knowledge sharing is not well defined in the literature partially because the research area has not been very active. Knowledge sharing has been defined as providing one's knowledge to others as well as receiving knowledge from others (Dixon, 2002b, Davenport, 2000, Bircham- Connolly, 2005). A more pragmatic description of knowledge sharing could be stated as exchange of knowledge between at least two parties in a reciprocal process allowing reshaping and sense-making of the knowledge in the new context.

Today, many organizations are concerned about how organizational members share their knowledge and accordingly have set up some incentives to motivate them to make their knowledge available to the organization or to retrieve knowledge stored in the corporate repositories when needed (Gupta, 2004). The literature study shows us that there are several models for knowledge sharing (Petersen, 2002). The sharing knowledge takes place either with direct interaction between people or through indirect interaction through the document creation. However, analysis of knowledge sharing practices shows that reluctance to share is dominating the organizational reality (Husted, 2002, Willem, 2003).

Factors affecting the behavior of knowledge sharing have been quite heavily investigated (Wasko, 2000, Ardichvili, 2003). However, most of studies have focused either on social or technological dimensions and very few studies integrating the both dimensions have been conducted (Fu 2005).

GAPS IN THE LITERATURE

From the review of the literature, it is possible to draw some overall conclusions as follows:

a. Knowledge management is one of the key areas for sustained support and enhanced business support focused at winning client's competitors.
b. There are several forms of knowledge; tacit, explicit, implicit and systemic knowledge at the individual, group and at organizational levels.

c. How can we empower our teams to confidently execute projects end? What prevents us from executing flawlessly?
d. What barriers exist to ensuring a proper and ongoing flow of knowledge during the project's execution?
e. Improving knowledge transfer between offshore and onsite project management.
f. Some people object to sharing as they feel that others will steal their ideas. This is a fallacy. Knowledge sharing isn't about blindly sharing everything; giving away your ideas; or being open about absolutely everything. You still need to exercise judgment.

Previous studies which have focused on the knowledge-sharing are very generic and there are no studies conducted specific to the fast growing software development industry. The research efforts are motivated by the above identified research gaps and the researcher decided to study how to manage global software projects through knowledge-sharing by conducting a case study project with reference to co-located and globally-distributed software team.

OBJECTIVES OF THE STUDY

The main objective of the study is to measure the existence of the knowledge sharing process and effectiveness of knowledge sharing process for managing global software projects and the following research objectives are set:

1. To study the knowledge sharing process of IT companies.
2. To identify the contribution of employees (Offshore/Onshore) in the knowledge sharing process and effectiveness of knowledge sharing (T-test).
3. To find the influences of organizational elements of IT companies on the knowledge sharing process and effectiveness of knowledge sharing (ANOVA).
4. To classify the perception of employees on knowledge sharing process and effectiveness of knowledge sharing in the organization(Cluster test).
5. To ascertain the association between various organizational elements and the knowledge sharing process and effectiveness of knowledge sharing (Chi-square analysis).
6. To establish the relationship between knowledge sharing process and effectiveness of knowledge sharing to construct an empirical model to sharply estimate the successful knowledge sharing process and effective knowledge sharing (Discriminant analysis).

KEY STAGES OF THE STUDY

The first stage is to identify demographic and organizational variables like work location, age, gender, designation and experience of the employees. In the second stage, it is necessary to identify the knowledge sharing elements like knowledge sharing with internal team members, knowledge sharing with co-located team members, knowledge sharing with non-team members, sharing knowledge on general overviews, sharing knowledge on specific requirements, sharing knowledge on process techniques, sharing knowledge on progress reports, sharing knowledge on results, communication frequency, job security and recognize knowledge as asset.

In the third stage, it is necessary to identify effectiveness of knowledge sharing like improving competitive advantage, improving customer focus, innovations, inventory reduction, employee development, cost reduction, revenue growth, better decision-making, intellectual property rights, and faster response to key issues, improving quality and improving delivery.

METHODOLOGY

Hypotheses

The following hypotheses were framed for the research study:

Hypothesis 1: There is no significant influence of contribution of employees in the knowledge sharing process.

Hypothesis 2: There is no significant influence of contribution of employees in the effectiveness of knowledge sharing.

Hypothesis 3: There is no significant influence of the organizational elements of IT companies on knowledge sharing process.

Hypothesis 4: There is no significant influence of the organizational elements of IT companies on effectiveness of knowledge sharing process.

Hypothesis 5: The perception of employees do not differ with respect to knowledge sharing process.

Hypothesis 6: The perception of employees do not differ with respect to effectiveness of knowledge sharing process.

Hypothesis 7: There is no significant association between organizational elements and knowledge sharing process.

Hypothesis 8: There is no significant association between organizational elements and effectiveness of knowledge sharing.

Hypothesis 9: There is no significant relationship between knowledge sharing process and the effectiveness of knowledge sharing.

Sample and Data

A sample of 300 respondents in total has been selected to conduct a case study on managing global software projects through knowledge sharing. The primary data were collected through a survey conducted using questionnaire and interview methods. The secondary data's were collected from books, Magazines, News papers, Reports prepared by research scholars, Internet, various National and International journals.

Pilot Study and pre-Testing

A pilot study was conducted where nearly 60 questionnaires were distributed and all were collected back as completed questionnaire was redrafted to its present form.

LIMITATIONS OF THE STUDY

1. The study is limited to focus on the Managing Global Software Projects in a selected IT company. The result of this study is applicable only to IT companies.

2.The study is confined to only the eleven knowledge sharing elements and twelve effectiveness of knowledge sharing elements and key stages of the model for software development company, though there are many more elements or subsystems in practice.

3. The study was based on a systematic sampling of 300 respondents and their responses might be passive or impulsive, purely based on their experience and mood which is likely to change instantly

4. The study is based on the perception of the project managers, project leaders and software engineers.

DISCRIMINAT ANALYSIS OF KNOWLEDGE SHARING MODEL

The K-means cluster analysis is applied to classify the respondents on the basis of knowledge sharing elements and effective knowledge sharing in a selected company. This clearly identified the existence of three predominant heterogeneous groups with different characteristic features. The associations among them are also verified and in this juncture it is important to note the cluster justification and number of clusters is required with mathematical proof. Therefore a suitable and appropriate statistical tool discriminate analysis is used. It empirically gives out the results to construct the knowledge sharing model in global software projects.

A. Cluster Justification of Knowledge Sharing Elements

The three clusters "Gregarious employees", of knowledge sharing elements are justified through the application of discriminant analysis with the following results.

Table I: Equality of Group Means for Cluster Justification of Knowledge Sharing Elements

	Wilks' Lambda	F	df1	df1	Sig
Q3 (KS with internal team members)	.878	20.566	2	297	.000
Q4 (KS with co-located team members)	.972	4.207	2	297	.16
Q5 (KS with non team members)	.983	2.627	2	297	.74
Q6 (share knowledge on general overviews)	.911	14.419	2	297	.000
Q7(Share knowledge On specific Requirements)	.873	21.546	2	297	.000
Q8(Share knowledge on process techniques)	.996	.538	2	297	.584
Q9 (Share knowledge on progress reports)	.867	22.717	2	297	.000
Q10(Share knowledge on results)	.754	48.450	2	297	.000
Q11(Communication frequency)	.944	8.773	2	297	.000
Q13 (Job Security)	.776	42.960	2	297	.000
Q14(Recognize knowledge as assert)	.499	149.235	2	297	.000

Source: computed

Table II: Test Results of Equality of Group Means for Cluster Justification of Knowledge Sharing Elements

Box's M	213.180
F	1.529
Approx.	132
df1	209463
df2	.328
Sig.	.000

Source: computed

Tests null hypothesis of equal population covariance matrices.

From the above table I and II, it is found that the eleven variables of elements possessed significant F value except for knowledge sharing with non team members and knowledge sharing on process techniques which are statistically significant at 5% level. This shows that the F values 20.566, 4.207, 14.419, 21.546, 48.450, 8.773, 42.960, 149.235 are significant in proving the contribution of nine variables classifying the respondent perception. It also implies that the respondents do not differ in their opinion on sharing of knowledge with non team members as well as process techniques and CMMI methods and other testing procedures. They do not discriminate the employee's perception. It is further confirmed by the box M test with F value 1.529 and the M value 2.13180.These values are statistically significant in proving the contribution of nine variables in the formation of clusters. It is followed by two discriminant functions which are used as the tool to classify the sample unit.

Table III: Eigen Values of Knowledge Sharing Elements

Function	Eigen value	% of Variance	Cumulative %	Canonical Correlation
1	1.881#	56.9	56.9	.808
2	1.423#	43.1	100.0	.766

First 2 canonical discriminant functions were used in the analysis
Source: Computed

Table IV: Wilks' Lambda of Knowledge Sharing

Test of Function(s)	Wilks' Lambda	Chi-square	Df	Sig.
1 through2	.143	567.433	22	.000
2	.413	258.416	10	.000

Source: Computed

From the above table III and IV, it is found that a two discriminant function with individual variances 56.9, 43.1 and canonical coloration values 0.808 and 0.766 are statistically significant. The existence of these two functions are further consolidated through Wilks' Lambda value 0.143 and 0.413 with high statistically significance. This concludes that the two discriminant functions are useful in identifying different characteristics of the clusters.

The following table generates the discriminant function for knowledge sharing, and they are explicitly written as Z1 and Z2.

Table V: Standardized Canonical Discriminant Function - Coefficients of Knowledge Sharing Elements.

	Function	
	1	2
Q3 (KS with internal team members)	.234	.504
Q4 (KS with co-located team members)	.025	-.272
Q5 (KS with non-team members)	.086	.065
Q6 (Share knowledge on general overviews)	-.323	.243
Q7 (Share knowledge on specific requirements)	-.238	.407
Q8 (Share knowledge on process techniques)	.019	.003
Q9 (Share knowledge on progress reports)	-.025	.527
Q10 (Share knowledge on results)	-.481	-.554
Q11(Communication frequency)	.278	.210
Q13(Job Security)	-.254	.620
Q14(Recognize knowledge as assert)	.929	-.045

The following structure matrix indicates the significance of the variables:

Table VI: Structure Matrix of Knowledge Sharing Elements

	Function	**Function**
	1	2
Q14	.729(*)	-.064
Q6	-.192(*)	.139
Q13	-.173	.405(*)
Q10	-.273	-.362(*)
Q9	-.041	.324(*)
Q7	-.084	.304(*)
Q3	.128	.275(*)
Q11	.109	.161(*)
Q4	-.003	-.141(*)
Q5	.047	-.098(*)
Q8	.007	-.50(*)

* Largest absolute correlation between each variable and any discriminant function

Source: Computed

Pooled within groups correlations between discriminating variables and standardized canonical discriminant functions variables ordered by absolute size of correlation within function:

Z1=0.234*Q3+0.025*Q4+0.086*Q60.238*Q7+0.019*Q80.025*Q90.481*Q10+0.278*Q11-0.254*Q13+0.929*Q14

Therespective questions are replaced with values

Z1=0.234*1+0.025*1+0.086*1-0.323*5-0.238*1+0.019*1-0.25*1-0.481*1+0.278*1-0.254*1+0.929*5

Z1=2.674

The second discriminant functions for the knowledge sharing are calculated as follows

Z2=0.504*5-0.272*5+0.065*5+0.243*1+0.407*5+0.003*5+0.527*5-0.554*5+0.210*5+0.620*5-0.045*1

Z2=7.748

This numerical enumeration sharply estimates the knowledge sharing process situation through the responses of 300.The following in value:

2.674<Z<7.748

The above value indicates the limitations for knowledge sharing process. The numerical analysis clearly says that the knowledge sharing process is perfect among the employees if the z value lies between 2.674and 7.748. Any z value beyond these numerical limitations tells about a poor knowledge sharing process in the perception of employees.

B. Cluster Justification of Effectiveness of Knowledge Sharing

The three clusters “Dynamic participants”, “Saturated participants”, “Moderate participants” of effectiveness of knowledge sharing elements are justified through the application of discriminant analysis with the following results.

Table VII: Tests of Equality of Group Means of Knowledge Sharing Effectiveness

	Wilks' Lambda	F'	df1	df2	Sig
Q25A(Improving competitive)	.771	44.153	2	297	.000
Q25B(Improving customer focus)	.900	60.477	2	297	.000
Q25C(Innovations)	.905	15.522	2	297	.000
Q25D(Inventory reduction)	.938	9.754	2	297	.000

Q25E(Employee development)	.873	21.580	2	297	.000
Q25F(Cost reduction)	.857	24.682	2	297	.000
Q25G(Revenue growth)	.692	66.115	2	297	.000
Q25H (Better decision-making)	.910	14.670	2	297	.000
Q25I(Intellectual property rights)	.985	2.255	2	297	.107
Q25J(Faster response to key issues)	.788	39.955	2	297	.000
Q25K(Improving quality)	.971	4.376	2	297	.013
Q25L(Improving delivery)	.968	4.864	2	297	.008

Source: computed

Table VIII: Test Result of Knowledge Sharing

Box's M	**143.253**
F Approx.	**.865**
df1	**156**
df2	**207807.590**
Sig.	**.887**

Tests null hypothesis of equal population covariance matrices
Source: Computed

From the above table 5/01 and 5.82, it is found that the twelve elements possessed significant F value except for the intellectual property rights which ;are statistically significant at 5% level. This shows that the F values 44.153, 16.477, 15.522, 9.756, 21.580, 24.682, 66.115, 14.670, 39.955, 4.376, 4.864 are significant in proving the contribution of eleven variables classifying the respondent perception. It also implies that the respondents do not differ in their opinion on effectiveness of knowledge sharing with improving competitive advantage, improving customer focus, innovations, inventory reduction, employee development, cost reduction, revenue growth, better decision-making, faster response to key issues, improving quality and improving delivery. They do not discriminate the employee's perception. It is further confirmed by the box M test with F values 0.875 and the M value 143.253. These values are statistically significant in proving the contribution in the formation of clusters. It is followed by two discriminant functions which are used as the tool to classify the sample unit.

Table IX: Eigen Values of Knowledge Sharing Effectiveness

Function	Eigen value	% of Variance	Cumulative %	Canonical Correlation
1	1.882 #	54.6	54.6	.808
2	1.568#	45.4	100.0	.781

First canonical discriminant functions were used in the analysis
Source: Computed

Table X: Wills' Lambda of Knowledge Sharing Effectiveness

Test of Function(s)	Wilks Lambda	Chi-Square	Df	Sig
1 Through 2	**.135**	583.474	24	**.000**
2	**.389**	274.908	11	**.000**

Source: Computed

From the above, it is found that a two discriminant function with individual variances 54.6, 45.4 and canonical coloration values 0.808 and 0.781 are statistically significant. The existence of these two functions are further consolidated through Wilks lamda value 0.135 and 0.389 with statistically high significant. This concludes that the two discriminant functions are useful in identifying different characteristics of the clusters.

The following table generates the discriminant function for the knowledge sharing and they are explicitly written as Z1.

Table XI: Standard Canonical Discriminant Function Coefficients of Knowledge Sharing Effectiveness

	Function 1	Function 2
Q25A (Improving competitive advantage)	.798	.312
Q25B (Improving customer focus)	.309	.307
Q25C (Innovations)	.127	-.428
Q25D (Inventory reduction)	-.219	.423
Q25E (Employee development)	.574	.236
Q25F (Cost reduction)	.474	-.505
Q25G (Revenue growth)	-.145	-.813
Q25H (Better decision-making)	-.064	.494
Q25I (Intellectual property rights)	.171	.062
Q25J (Faster response to key issues)	.805	-.211
Q25K (Improving quality)	-.270	.092
Q25L (Improving delivery)	.187	.060

Source: computed

Table XII: Structure Matrix of Knowledge Sharing Effectiveness

	Function	
	1	2
Q25A	.377(*)	.138
Q25J	.357(*)	-.138
Q25E	.271(*)	.068
Q25F	.246(*)	-.183
Q25L	.127(*)	.039
Q25K	-.114(*)	.057
Q25I	.084(*)	.034
Q25G	-.029	-.532(*)
Q25C	.036	-.255(*)
Q25H	-.030	.249(*)
Q25B	.153	.206(*)
Q25D	-.059	.194(*)

*Largest absolute correlation between each variable and any discriminant function.

Source: Computed

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions. Variables ordered by absolute size of correlation within function & follow:

Z1=0.798*Q25A+0.309*Q25B+0.127*Q25C-0.219*Q25D+0.574*Q25E+0.474*Q25F-145*Q25G-0.064*25H+0.171*Q25I+0.805*Q25J-0.270*Q25K+0.187*Q25L

The respective questions are replaced with values

Z1=0.798*5+0.309*1+0.127*1-0.219*1+0.574*5+0.474*5-0.145*10.064*1+0.171*5+0.805-0.270*5+0.187*5

Z1= 13.703

Z2=0.312*Q25A+0.307*Q25B-0.428*Q25C+0.423*Q25D+0.236*Q25E-0.505*Q25F-0.813*Q25G+0.494*Q25H+0.062*Q25I-0.211*Q25J+0.092*Q25K+0.060*Q25L

Z2=0.312*1+0.307*5-0.428*5+0.423*5+0.236*1-0.505*1-0.813*5+0.494*5+0.062*1-0.211*1+0.092*1+0.060*1

Z2= 0.039

From the above calculation, it is clear that the Z1 and Z2 are not matching between 4.549 and 13.157. So effectiveness of knowledge sharing is insignificant and it can be concluded that the effectiveness of knowledge sharing does not exist.

C. Empirical Relationship between Knowledge Sharing Elements and Effectiveness of Knowledge Sharing

The present research aimed at ascertaining the process of knowledge sharing in a global project development and its total effectiveness for the increase in the individual efficiency, organizational efficiency and productivity. The gaps in the literature clearly identified the various elements of knowledge sharing like sharing with internal team members, sharing with project development with co-located team members and sharing with non team members besides these elements the literature also identified knowledge sharing on general views, specific requirements, process techniques, progress reports, total results and proper communication to onsite or offshore project team members. In this process of knowledge sharing, it is expected to have its relationship with job security, team reorganization, increasing competence advantage and improving customer focus. The research empirically proved knowledge sharing increases innovations increases innovations and reduces inventory along with employee development, quality development and growth in the revenue. In this final stage, it is indispensable to establish the relationship between knowledge sharing process and the effectiveness of knowledge sharing. Therefore, the total average scores of the elements in the appendix Q3 to Q11 to Q15 are segmented, similarly the total average scores of twelve elements of knowledge sharing effectiveness are tested for the existence of correlation. The result of the test hypothesis is presented below.

Table XIII: Correlations for Relationship between Knowledge Sharing Elements and Effectiveness of Knowledge Sharing.

	TEKS	**TEKS**
TKSE Pearson Correlation	1	.125
Sig. (2-tailed)		.030
N	300	300
TEKS Pearson Correlation	.125	1
Sig. (2-tailed)	.030	
N	300	300

Source: Computed

From the above table, it is found that the co-relation, coefficient r=0.125 and p value=0.030 are statistically significant at 5% level. This leads to the rejection of hypothesis at 5% level and concluded that there is a significant relationship between knowledge sharing process and effectiveness of knowledge sharing. The knowledge sharing improves the customer focus, competitive advantage and innovative technologies. It has residual effectiveness over reduction of inventory, development of employee, cost reduction and revenue growth. The better decision making, intellectual property rights, faster response are also obtained in the organization in particular. The knowledge sharing improved the perceptiveness in the quality and perfect delivery system without procrastination.

The factor analysis followed by cluster analysis is empirically applied on the block of knowledge sharing process and its effectiveness is classified into three different groups of employee's perception. The classification of knowledge sharing process and its effectiveness with respect to employee's responses are identified as Strong, Moderate and Weak Cluster. This shows that there exist three different groups of employees in IT Industry based on their perception on onshore and off shore knowledge sharing. The research further ascertained three prominent classifications in knowledge sharing needs namely career development oriented cluster, sufficiently attained cluster and perfect cluster respectively. The study further revealed the two prominent factors innovative.

The knowledge sharing practices in IT Industry are exactly classified into three groups culminated cluster, knowledge oriented cluster and learning cluster. The employee's perception again revealed the existence of three major factors: Transformational Practices, Employee Up gradation and Policy Enforcement.

The study mainly focused on the knowledge sharing elements like Objectives, Needs and Practices. The Karl Pearson's Co-efficient of Correlation established a significant relationship among the various elements of knowledge sharing. In particular, the knowledge sharing is materialized with the help of onshore and offshore sub systems. The study highlighted on team approach and Development, Performance Assessment System and Career Growth Opportunities. An empirical relationship by Stepwise Discriminant Analysis is established for clusters of knowledge sharing effectiveness. An ingenious exploitation of Karl Pearson's Co-efficient of Correlation showed a parametric relationship between customer focus, competitive advantage with Career Growth of the employees.

SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSIONS

The main aim of the thesis emerged as an exploration of the managing global software projects through knowledge sharing process. It was soon realized that there are several knowledge sharing elements and its effectiveness influencing managing global software projects. Knowledge sharing processes have been studied in the literature for their impact on managing global software projects. However, probably no published work appears to have examined on managing global software projects through knowledge sharing process.

It is often said that it is essential to create a "knowledge sharing culture" as part of a knowledge management initiative. An isolated knowledge management program looked after by a privileged few is a paradox in itself and will not survive for long. Only effective collaboration and communication which span across the whole company structure will give knowledge management the boost it really needs. In order to enrich a company's current culture the change must start at the individual level. Every employee has a sphere of influence along with their own individual knowledge, and this is where he believes a knowledge sharing culture can begin.

Findings Pertaining to Objective 1

It is found that the current status of knowledge sharing process in IT companies is in introduction and nascent stage (26%) where as 24% of the employee perception is that the current status of knowledge sharing process is in growth stage. This clearly shows the importance of knowledge sharing process and IT companies is towards establishing the knowledge sharing process.

Employees of IT companies identified lack of information as the key problem of globally-distributed development teams. 17% of the respondents said that loss of crucial knowledge due to key employees leaving the organization is the problem of globally distributed team. So, it is critical to implement mechanism for retaining the knowledge of employees so that when an employee leaves the organization the knowledge is retained within organization. Poor sharing of knowledge in the organization is another key problem of globally-distributed development teams (18%).

The perception of IT companies' employees on knowledge sharing thinking is that it is strategic part of business (25%). 22% of the respondents are never heard about knowledge sharing. 14% of the respondents think something that they are

already doing but not under the same name, 19% of the respondents think about something that could be beneficial for the organization. Sharing knowledge is the another key factor in global software project organization. 31% of the respondents said that knowledge storage is quite important but not updated regularly and 38% of the respondents said that knowledge storage is just trivial, a part of formalities and of no use.

It is found that 27% of IT companies employees obtained relevant knowledge within few days and 25% of the respondents derived knowledge within few minutes. Percentage analysis further revealed 23% obtained the required knowledge within few hours. The survey results ascertain that the perception of IT companies' employees on new knowledge creation is the job of internal quality department (29%) where as 24% of the IT companies' employees said that it is everyone's job and everybody contributes to it, 23% of the respondents said that top management takes active interest in it and supports it continuously and 24% of the respondents said that it is part of our organizational philosophy and culture.

Finding pertaining to Objective 2

One of the major issues of investigation has been the opinion of respondents on knowledge sharing and job security in global project management cases the employees of IT companies strongly disagree with personal evaluations and expressed a neutral opinion on internal team members and their knowledge sharing, collocated team members and their participants in knowledge sharing. They are rational in identifying the influence of non team members, project goals and problems as well as personal evaluations. Therefore, it can be concluded that the employees of IT companies are not fully involved in the knowledge sharing process amid the globalised phenomenal.

The effectiveness of knowledge sharing on project management is not influenced by one parameter that it is compositional of various aspects of relationship among the employees during offshore and onshore interaction process. The present study predominantly concentrate twelve factors of effectiveness of knowledge sharing process namely improving competitive advantage, improving customer focus, innovations, inventory reduction ,employees development, cost intellectual property rights , faster response to key issues, improving quality and improving delivery. This ascertains the personal evaluations and expressed a neutral opinion improving competitive advantage, improving customer focus of IT companies maintain themselves equidistant for inventory perception of employees

over cost reduction, revenue growth, better decision-making is also natural in the opinion. It is intellectual property rights and faster response to key issues that tend to conclude that the employees of IT companies expressed equal importance on the 12 variables in achieving the best result in global software projects.

Finding Pertaining to Objective 3

The survey result found that onshore located employee strongly disagrees with knowledge sharing corresponding to job security than the employees in the offshore location. This implies that onshore located employees have deep disagreement for knowledge and it has relationship with job security. They feel that the knowledge retaining has not at all affected the secured job. It is also found that other knowledge sharing processes do not differ with the onshore and offshore employees. In fact, they have same opinion on knowledge sharing process in their organization.

It is found that the offshore located employees strongly disagree with knowledge sharing corresponding to improving delivery than the employees in the onshore location. This implies that the offshore located employees have deep disagreement for effectiveness of knowledge sharing. The employees of IT companies feel that improving delivery is not related with effective knowledge sharing in achieving the best result. It is also found that the other eleven variables of effectiveness of knowledge sharing factors namely improving competitive advantage, improving customer focus, innovations inventory reduction, revenue growth, employee development, cost reduction, better decision making, intellectual property rights, faster response to key issues and improving quality do not differ with respect to the opinion of offshore and onshore employees. In fact, they have the same opinion on the role of effectiveness of knowledge process in their organization.

It is found that male gender disagrees with effectiveness of knowledge sharing corresponding to revenue growth than the female gender. This implies that the male gender employees have deep disagreement for effectiveness of knowledge sharing and it has relationship with revenue growth. They feel that revenue growth is not related with effectiveness of knowledge sharing in achieving the best result. It is also found that other eleven variables of effectiveness of knowledge sharing factors namely improving completive advantage, improving customer, focus, innovations, inventory reduction, revenue growth, employee development, cost reduction, better

decision making, intellectual property rights , faster response to key issues and improving quality and improving delivery do not differ with respect to the opinion of male female employees. In fact, they have same opinion on the role of effectiveness knowledge sharing process in their organization.

Findings Pertaining to Objective 4

The survey result classified the employees for IT companies based on their response, first group consists of 120 employees (40%) with agreements for member responsibilities, preliminary findings, unexpected outcomes, or clear recommendations. Therefore, this group of employees is known as gregarious employees. The second group is a composition of 88 employees (30%) are in agreement for knowledge sharing with internal team members, knowledge sharing with non team members, sharing knowledge on progress reports such as status updates, resource problems or personnel evaluation, communication with Onsite/Offshore project team members and recognizes knowledge as a part of their asset base. Therefore, this group is belongs to saturated employees. The third group is neutral in their opinion on knowledge sharing and it also comprises 30% of their employees. They are heterogeneous group of employees is known as unenthusiastic employees.

The research question is on how many heterogeneous groups of employees with different perception on effectiveness of knowledge sharing in global project management context. The result found that the first cluster consists of 101 employees (34%) are in agreement for improving competitive advantage, employees development, improving competitive advantage, employee development, improving customer focus, faster response to key issues, better decision-making, improving delivery and intellectual property rights. Therefore, this group of employees is known as dynamic participants. The second group is a composition of 84 employees (28%) who are in agreement for revenue growth, innovations, cost revenue growth, cost reduction and faster response to key issues. Therefore, this group is known as saturated participants. The third group is neutral in their opinion on effectiveness of knowledge sharing and it also comprises 38% of the employees. They are heterogeneous group of employees known as moderators.

Findings Pertaining to Objective 5

This research has demonstrated that 36% of the employees working on single project at offshore locations are highly gregarious. There is no entry of onshore working in more than one project are saturated employees. This implies that the work location is not affecting the knowledge sharing process. In fact, it is not associated with different locations where the employees are duty bound to share their knowledge. It is also found that 35% participants working on single project at offshore locations are moderate participants. There is no entry of onshore working in more than one project known as saturated participants. This implies that the work location is not affecting the effectiveness of knowledge sharing.

It is found that 36% employees reporting to one project manager are highly gregarious. This ascertains the association between knowledge sharing process and no of reporting managers. It is also found that 34% participants reporting with one project manager are moderate participants. There is no entry for employees reporting to manager three, four and five are gregarious participants, saturated and moderate participants. This implies that the number of reporting managers is not affecting the effectiveness of knowledge sharing.

It is found that 14% employees feel storing knowledge is quite important those regularly are highly gregarious. 8% employees feel storing knowledge is quite important but not updated regularly are saturated employees. This implies that stored knowledge is not affecting the knowledge sharing process. It is also found that 14% participants feel storing knowledge is just trivial. 7% of participants feel storing knowledge is quite important and relevant. 7% of participants feel storing knowledge is quite important and relevant. This implies that stored knowledge is not affecting the effectiveness of knowledge sharing.

It is found that 11% of the employees think knowledge management is each and everybody' job, everybody has the best of knowledge and also the prevailing notion is that the knowledge management is the task of a few designated ones. 6%of employees have an open, encouraging and supportive culture who are saturated employees. This implies development team's culture not affecting the knowledge sharing process. It is also found that 11% of participants think knowledge management is each and everybody's job and so everybody has the best of knowledge; and the prevailing notion is that the knowledge management is the task of a few designated ones. 6% of saturated participants think their basic values & purpose emphasis on sharing of knowledge. This implies development team's culture not affecting the effectiveness of knowledge sharing.

Association between knowledge sharing process and cultural barrier ascertain that 8% of employees feel cultural barrier functional silos are highly gregarious. 1% of employees who feel cultural barrier of knowledge sharing is not a part of daily work are saturated employees. This implies cultural barrier not affecting the knowledge sharing process. It is also found that 7% of moderate participants responded lack of participation is the main reason for cultural barrier. 2% of saturated participants feel that knowledge sharing is not a part of daily work. This implies cultural barrier not affecting the effectiveness of knowledge sharing.

Findings Pertaining to Objective 6

Cluster justification of knowledge sharing elements and effectiveness of knowledge sharing proved that a poor knowledge sharing process exists in the perception of employees and effectiveness of knowledge sharing does not exist.

RECOMMENDATIONS

One of the objectives of this thesis was to discover the key success factors on managing global software projects through knowledge sharing for IT companies. From the findings discussed above it is possible to make some recommendations.

1. Implement mechanism to retain the knowledge of employees so that when key employee leave the organization, the knowledge is retained within organization.
2. Create awareness on knowledge sharing and its benefits for both onshore and offshore employees.
3. The age group between 23 to 30 years' employees have deep disagreement for effectiveness of knowledge sharing and it has relationship with delivery. It is recommended to create more awareness on relationship between knowledge sharing and effectiveness delivery for this age group.
4. Create more awareness among male gender on effectiveness of knowledge sharing and it has relationship with revenue growth.
5. The employees experience groups between 1 to 5 years and 6 to 10 years have deep disagreement for effectiveness of development. It is recommended to create more awareness program for these employee groups.

6. The work in locations is not affecting the knowledge sharing process. It is recommended to implement common knowledge sharing practice for both onshore and offshore to minimize the cost spent on creating knowledge sharing awareness and training program.
7. The survey found that storing knowledge is quite important but not updated regularly. It is recommended to implement procedure and process to have regular knowledge update and also for motivating and rewarding knowledge sharing.

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