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A Novel Approach for the Model of Knowledge Units and Compound Network in Intra-Organizational Knowledge Transfer

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Abstract --- Efficient knowledge transfer is still remains an unsolved problem in knowledge management System. Effective knowledge transfer can promote knowledge accumulation and enhance knowledge innovation in IT or outsourcing companies. The knowledge network plays an intermediate role between members of the organization to improve the knowledge innovation. In this paper we have proposed different categories of multi model knowledge units, which have been transferring the knowledge from a large knowledge repository and also we have constructed a modern network called compound network to enhance the mutual relationship between network members. An algorithm named "Knowledge Recognition" is used to find the shortest distance and knowledge in the flow of knowledge network.

Keywords: **Knowledge Recognition, knowledge unit, knowledge sharing, knowledge transfer, knowledge Repository.**

I. INTRODUCTION

Knowledge transfer has become not only a hot topic of conversation but, more important, a key focus in business and industry. With the service economy growing, each organization and its members need to transfer and use knowledge as effectively as possible in providing its services. Although knowledge transfer is necessary for all organizations, it is especially critical for IT & Outsourcing companies, because knowledge is the cornerstone of the services such a firm offers its clients [13]. They heavily depend on expertise of their people, focus on customer relations, and employ network architectures and all primary expertise and key knowledge reside in knowledge network [14]. Organization members are not willing to share their knowledge to others, unless they believe that sharing knowledge to others. So, knowledge manager must stimulate members to share and transfer knowledge initially, and promote desire of knowledge sharing in perspective of behaviors [5]. How to advance sharing efficiency of knowledge is an urgent problem.

To simplify the burden of the Knowledge receiver, the large Knowledge repository is segmented into simple Knowledge units. In this paper, we have designed five Knowledge units in accordance with some principles. The construction of network in an organization is based on the Knowledge resource and Knowledge members.

Our network is a compound network which is almost a super network i.e. super network means network above an existing network. So, there is already an existing network of social network having only the public members above that we have constructed one new network of knowledge network having only the resource persons. Our network is the combination of two networks. So we named it as compound network.

II. LITERATURE REVIEW

According to Tien-chin Wang, with the advent of knowledge economy, knowledge itself has become not only a strategic asset but also the main source of organizational competitive predominance [1]. From the points lof Vittal Anantatmula & Shivaraj Kanungo there are many organization are trying to improve performance by knowledge management [2]. According to Seewon Ryu, Seung Hee Ho, Ingoo Han, Organization members are not willing to share their knowledge to others [3].

According to Nonaka, knowledge is classified explicit knowledge (coded knowledge, such as theorem, equation) and tacit knowledge (noncoded knowledge, such as skills, knowhow) [4]. Xiangyi Lin and Qingpu Zhang coined that SNA can map and quantize social relations between members, group and organization to construct knowledge sharing network. SNA can transform sightless information, knowledge to clear network graph, in order to analyze knowledge sharing network [5].

With the advent of knowledge economy, knowledge itself has become not only a strategic asset but also the main source of organizational competitive predominance [6]. There are many organizations are trying to improve performance by knowledge management [7]. Knowledge transfer is viewed as the critical step for knowledge

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management [8], and is the main influencing factor to knowledge management. Just as knowledge management, knowledge sharing & transfer have two attribute: technology and behavior [9]. Organization members are not willing to share their knowledge to others, unless they believe that sharing knowledge to others is valuable or very important, and can bring return [10]. So, knowledge manager must stimulate members to share and transfer knowledge initially, and promote desire of knowledge sharing in perspective of behaviors. The relations between all members form a knowledge sharing & transfer network. All members' share and transfer explicit knowledge in knowledge network.

The knowledge transfer process can take place by various means ranging from electronic exchange of information to personnel co-working e.g. in a project. It is the nature of knowledge exchanged that commands for the utilization of specific media or media portfolios [12]. For example, in a consulting company, explicit knowledge was generally transferred via electronic means, such as computer technology, along with documentation. And tacit knowledge was transferred through methods that helped convey contextual information: training, coaching, counseling, modeling, storytelling, and learning by-doing along with methods of collaboration involving teamwork, facilitated sessions, and a buddy system [11].

III. THE PROBLEM DEFINITION OF KNOWLEDGE TRANSFER

It is still an unresolved problem, which is the effective knowledge transfer in knowledge network.

Hypothesis 1a: Effectively transferred knowledge unit is knowledge unit 3.

Hypothesis 1b: The value of knowledge transfer depends upon the aggregate degree of members.

IV. THE MODEL OF KNOWLEDGE UNITS

According to Nonaka, knowledge is classified into explicit knowledge (Codification Strategy) and tacit knowledge (Personalization Strategy). Explicit knowledge is easy to put in practice for understanding and communication whereas tacit knowledge is somewhat different. The easiest way to share tacit knowledge is face to face communication.

In this research, we have proposed a model of knowledge units which consist of large knowledge repository and discrete units. Each unit is a shared piece of knowledge from the knowledge repository.

These knowledge units are designed for the intention to find the effective transferred knowledge among the knowledge units. The more preferable knowledge unit by the users is probably be unit 3 because of its attractiveness and easy understanding. Learning through the hard documents, books and materials is highly a tough job. There it is difficult to understand the knowledge within it so we intended to prefer the unit 3 as a better one.

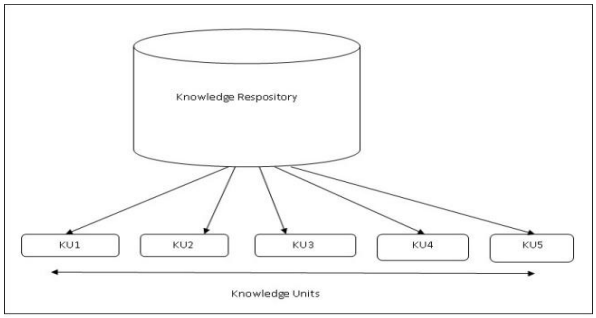

Fig1: The model of Knowledge Units

V. INTRA- ORGANIZATIONAL KNOWLEDGE TRANSFER USING COMPOUND NETWORK MODEL

A research group of seven members are chosen to construct the compound network. We had done a real time survey which showed me the best knowledge absorber could be found by the aggregate degree of relationship between the members.

The aggregate degree of relationship is based on the two way communication (Request – Respond) between the two members. The direct communication of member with the resource person of an organization can give the better transferred knowledge, here not only the knowledge is transferred but also the knowledge is innovated by the member. So there may exist effective knowledge transfer between the resource person and the member of the network.

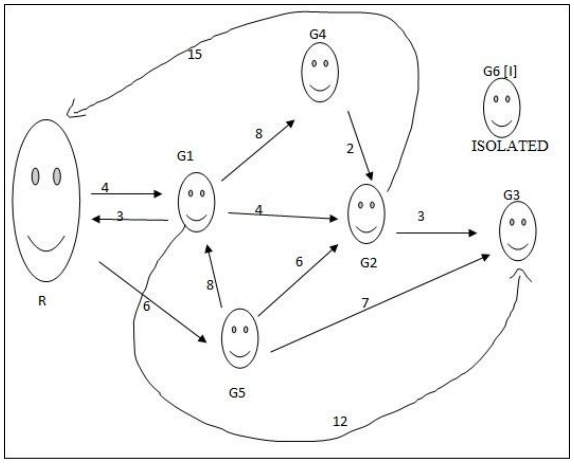

Fig 2. Compound network model

R →Resource

G→Group members

G6→**Isolated**

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From the analysis of the network, we can find the shortest distance between the resource person and the member in the network and the volume of transferred knowledge in the network between the resource person and the member.

In order to find the shortest distance and the volume of transferred knowledge in the network, we have proposed an algorithm called Knowledge Recognition algorithm.

From the analysis of the above compound network, we can evaluate that the desired path from R to any G be R → G1, because it only has the foresaid two way communications with R and also it can only have the shortest distance of 4. It can exhibit the highest transferred knowledge percentage of 99. The Group member G6 is the Isolated one which means it doesn't transferred any knowledge and also it didn't have any communication with the Resource or any other Group members for sending and receiving any knowledge.

VI. DEFINITION OF KNOWLEDGE RECOGNITION ALGORITHM

Step1: Estimate the direct distance matrix

$K^{(0)} = (k_{ab}{}^{(0)})$

If we have the direct path from V_a to V_b, which indicates the shortest distance from every pair vertexes. If there is no direct path between the vertexes V_a to V_b then $K_{ab} = 0$;

Step2: Calculate the shortest distance matrix $K^{(1)}$ i.e. If we have one or more intermediums between the two vertexes. Our preferred path is from V_a to V_b but it have an intermedium of V_c then calculate the distance by $V_a \rightarrow V_c \rightarrow V_b = ((V_a+V_c)+V_b)$

$$K^{(1)} = (k_{ab}{}^{(1)}) = \min(k_{ac}{}^{(0)} + k_{cb});$$

Step 3: Computing the shortest distance matrix $K^{(m)}$

$$= (k_{ab}{}^{(m)}) = \min (k_{ac}{}^{(m-1)} + k_{cb}{}^{(m-1)});$$

Step 4: $K^{(m)}$ is the final shortest distance matrix, where m must meet the conditions of,

if there are n vertexes in the network, then m meets

$2^{m-1}-1 \leq n-2 \leq 2^m-1$ i.e.

$m-1 \leq \log(n-1)/\log 2 \leq m$ ----------(1)

From the above mentioned steps, calculate the $K^{(m)}$ values from the given values of n=7

$K^{(m)} = \log(7-1)/\log 2 = 2.58$

$D^{(m)}$ is the final results.

$K^{(0)}$ = R G1 G2 G3 G4 G5 G6[I]

$$\begin{bmatrix} 4 & 0 & 0 & 0 & 6 & 0 \end{bmatrix}$$

$K^{(1)}$ = R

G1	G2	G3	G4	G5	G6[I]
4	8	11	12	6	0
14	12	13	-	-	-
-	14	17	-	-	-
-	-	16	-	-	-

The direct distance matrix can be calculated if we have only the direct path from R to any G calculate the direct distance otherwise the distance would be 0 in $K^{(0)}$. If we have any intermediums between the directed path then calculate the shortest distance by adding its individual distances in $K^{(1)}$. The $K^{(m)}$ be the final shortest distance matrix of the desired path where m is the total no. of Group members. Shortest distance from Resource(R) to other Group members (G)

VII. RESULTS

Direction	Possible Paths	Sum(Distance)	Distance
R↔G1	R↔G1	4	4
	R→G5→G1	6+8	14
R→G2	R→G1→G2	4+4	8
	R→G3→G2	6+6	12
	R→G1→G4→G2	4+8+2	14
R→G3	R→G1→G2→G3	4+4+3	11
	R→G5→G3	6+7	13
	R→G1→G4→G2→G3	4+8+2+3	17
	R→G1→G3	4+12	16
R→G4	R→G1→G4	4+8	12
R→G5	R→G5	6	6
R→G6[I]	NO PATH	0	0

Table1: Possible paths and sum of distances.[5]

S.no	Direction	Shortest Distance	% of Knowledge
1	R→G1	4	99

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2	R→G2	8	97
3	R→G3	11	96.5
4	R→G4	12	96
5	R→G5	6	98
6	R→G6[I]	0	NULL

Table2: Shortest distance and % of knowledge from R to G [5].

VIII. IMPLEMENTATION OF TOOL

In this research, we have clustered the knowledge units using the WEGA tool. We have surveyed totally 1000 samples. Out of these, we have implemented 125 samples in WEGA tool to obtain the results. We had surveyed 200 members for each knowledge unit and get the expected results.

Knowledge Units	Range of marks
Document	1.056
Notes	1.528
Ppt	2.672
Pict. Rep	2.176
Audio	0.664

Table 3: Range of Marks among knowledge units using WEGA tool

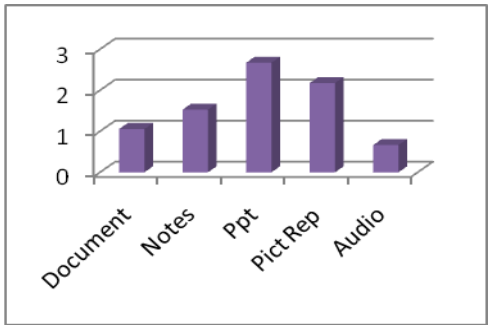

Fig 2: Bar diagram representing knowledge transfer in knowledge units.

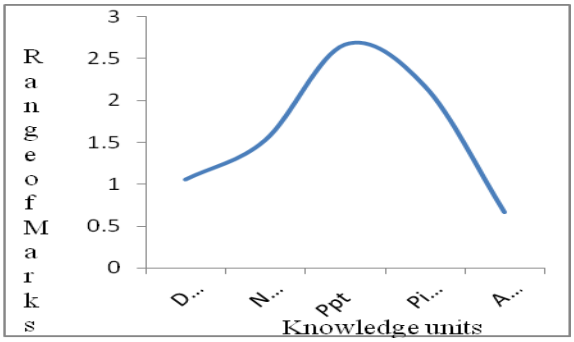

Fig 3: Graph indicating Transferring of knowledge among knowledge units.

SAMPLE OF SURVEY LIST

USERS	DOCUMENT	NOTES	POWERPOINT PRESENTATION	PICTORIAL REPRESENTATION	AUDIO
1	5	0	0	0	0
2	7	0	0	0	0
3	4	0	0	0	0
4	5	0	0	0	0
5	6	0	0	0	0
6	7	0	0	0	0
7	3	0	0	0	0
8	4	0	0	0	0
9	6	0	0	0	0
10	7	0	0	0	0
11	0	8	0	0	0
12	0	9	0	0	0
13	0	7	0	0	0
14	0	9	0	0	0
15	0	8	0	0	0
16	0	6	0	0	0
17	0	9	0	0	0
18	0	7	0	0	0
19	0	8	0	0	0
20	0	9	0	0	0
21	0	9	0	0	0
22	0	0	13	0	0
23	0	0	14	0	0
24	0	0	12	0	0
25	0	0	11	0	0
26	0	0	15	0	0
27	0	0	15	0	0
28	0	0	15	0	0
29	0	0	14	0	0
30	0	0	13	0	0
31	0	0	14	0	0
32	0	0	0	10	0
33	0	0	0	11	0
34	0	0	0	11	0
35	0	0	0	11	0
36	0	0	0	12	0
37	0	0	0	13	0
38	0	0	0	9	0
39	0	0	0	10	0
40	0	0	0	11	0
41	0	0	0	9	0
42	0	0	0	11	0
43	0	0	0	0	4
44	0	0	0	0	3
45	0	0	0	0	4
46	0	0	0	0	3
47	0	0	0	0	3
48	0	0	0	0	3
49	0	0	0	0	2
50	0	0	0	0	5
51	0	0	0	0	5
52	0	0	0	0	5

From the results of above tool implementation, algorithm estimation, network graph, we have found out my expected results. Therefore, I have accepted both of my hypotheses 1a, 1b.

IX. CONCLUSION

In this research, first we have designed the model of knowledge units. Second, we have constructed the compound network using organization members. Third,

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we have found out the estimated results using the knowledge recognition algorithm. Finally, we implemented the surveyed data in WEGA tool & obtained the results. So, from these modules we can obviously say that our model of knowledge units & modules can improve the efficiency of knowledge transfer of explicit knowledge.

X. FUTURE ENHANCEMENT

First, we have prepared the model & all other modules are only for explicit knowledge. So, in future we will be focusing on tacit knowledge too. Second, we have concentrated particularly on five knowledge units; in future we will increase it with different events.

REFERENCES

[1] Tien-Chin Wang, Tsung-Han Chang, Forecasting the Probability of Successful Knowledge Management by Consistent Fuzzy Preference Relations, Expert Systems with Application, 2007, (32), pp.801-803.

[2] Vittal Anantatmula, Shivraj Kanungo, Establishing and Structuring Criteria for Measuring knowledge Management Efforts, Proceedings of the 38th Hawaii International Conference on System Science, 2005, pp.1- 10.

[3] Seewon Ryu, Seung Hee Ho, Ingoo Han, Knowledge sharing behavior of physicians in hospitals. Expert Systems with Applications, 2003, (25), pp.113–122.

[4] Nonaka I, Takeuchi H, The knowledge creating company, Oxford University Press, Oxford, 1995.

[5] Xiangyi Lin, Qingpu Zhang, Optimization of Knowledge Sharing & Transfer Network, IEEE, 2007.

[6] Tien-Chin Wang, Tsung-Han Chang, Forecasting the Probability of Successful Knowledge Management by Consistent Fuzzy Preference Relations, Expert Systems with Application, 2007, (32), pp.801-803.

[7] Vittal Anantatmula, Shivraj Kanungo, Establishing and Structuring Criteria for Measuring knowledge Management Efforts, Proceedings of the 38th Hawaii International Conference on System Science, 2005, pp.1- 10.

[8] Mingjie Rui, Juan Chen, The Framework of High-tech Enterprise's Knowledge System and Its Internal Interaction Model, Shanghai Management Science, 2004,(2)□□pp□7-10.

[9] Guopeng Yin, Yunsheng Mo, Yu Chen, Promoting tacit knowledge management using social network analysis, Journal of Tsinghua University (Science and Technology), 2006, 46 (S1), pp.964-969

[10] Seewon Ryu, Seung Hee Ho, Ingoo Han, Knowledge sharing behavior of physicians in hospitals. Expert Systems with Applications, 2003, (25), pp.113–122.

[11] R. K. Lahti and M. M. Beyerlein, "Knowledge Transfer and Management Consulting: A Look at "The Firm"," Business Horizons, Jan.-Feb. 2000, pp.65-74.

[12] G. Mentzas, D. Apostolou, K. Kafertzis, and P Georgolios, "Inter-organizational Networks for Knowledge Sharing and Trading," Inf Technol Manage, vol. 7, 2006, pp. 259-276, doi: 10.1007/s10799-006-0276-8.

[13] LIU Hongli & Zhao Lei, "Knowledge Transfer in Knowledge Network of IT Consulting Company", 978-0-7695-3876-1/09 © 2009 IEEE.

[14] K. Summerhayes and S. Luo, "Managing Knowledge in professional Consultancy," Monash Business Review, vol. 2, Nov. 2006, pp. 1-13.