# The Study of Knowledge Sharing Behaviour for Forming Community of Practice

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***Abstract*—This paper contributes the result of a social network analysis on knowledge sharing behaviour among IT professionals in Higher Education in Malaysia which aims to provide model elements of group formation. Sharing knowledge among IT professionals is crucial as knowledge has become a critical resource for organizations to be competitive. The elements crucial for modelling group formation related to knowledge sharing interactions between the social network of an organization need to be investigated. The purpose of the study is to investigate knowledge sharing behaviour in IT organization using Social Network Analysis (SNA). Analysis of the result indicated job function, knowledge background and relationship are significant elements in relation to knowledge sharing behaviour. The result of this study shall be proposed to be crucial elements in modelling members' profile in the formation Community of Practice (CoP).**

***Index Terms*—knowledge sharing, community of practice, social network analysis (SNA)**

## I. Introduction

Today successful IT organization must be regarded as institutional where knowledge and skills are continually developed, refined updated and protected through complex learning. IT organization is considered as a knowledge intensive entity [1] and [2], which involved complex technology that causes high knowledge burden to IT workers [3]. According to Park and Lee [3], sharing knowledge in IT organization becomes a requirement to ensure the success of IT projects. Maintaining the skill set of IT professionals is important as the IT organization itself depends largely on the expertise of its human resources [2]. IT skill set is highly dependable on working experiences which are dominantly tacit knowledge.

Capturing tacit knowledge is one of the most difficult process in knowledge management [4]. However, it can be captured through active participation and sharing within a CoP. In order for CoP to have quality interactions leading to quality knowledge sharing, selection of the members in CoP is pivotal to ensure healthy aspects of participation can contribute in maximizing the learning process. Participation in community has been an issue in CoP. According to Probst and Bozilla [5], reasons for failed CoP are lack of core group, trust and low level of interaction amongst members of the community. In addition participation issue gained literature highlights [6] claiming that 90% of the community members are passive members. This signifies one of the agreeable factor limited identification of the community members.

In IT organization, knowledge sharing is associated with many aspects of organizational knowledge. Aspect of knowledge sharing in IT organization includes organization knowledge, managerial knowledge, technical knowledge and domain knowledge [2]. The literature publishes several researches of CoP formation based on members' profile [7]-[9] which included researches promoting semantic technology in forming grouping for CoP [10]-[12]. However, most of the researches are intended for different domain of knowledge intensive organization and educational environment. Studies related to IT practitioners are scarce and limited. In order to determined participation factors of knowledge sharing in CoP of IT professionals, knowledge sharing behaviour and interaction of IT professionals must be examined.

Knowledge sharing interaction pattern has been identified using social network questionnaire. Social Network Analysis (SNA) focuses on the study of people's interaction pattern. It has been widely used in identifying social structure of certain group of actors and patterns of relationships that connect social actors [13]. Social actors interactions are expressed in network graph which describes and measures the relationship between the actor [14]. SNA technique enables knowledge sharing flow to be represented by a series of connections between a pair of individuals.

## II. Method

### A. Participants and Data Collection

The study was conducted among IT professionals in the IT Centre of Universiti Teknologi MARA, Malaysia (UiTM). In order to analyze the knowledge sharing interactions between participants, a survey interview was conducted. Sixty four (64) IT professionals agreed to participate in the study from eight (8) departments of the IT Centre. The survey aimed to identify the knowledge sharing, interaction behavior among IT professionals.

During the study, each respondent was required to answer 3 questions. The questions required each respondent to provide names of whom he or she shares

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knowledge, describes the relationship level and frequency of knowledge sharing interaction with his or her knowledge sharing colleague. The questionnaire was designed with reference to standard social network questions from previous study [15]-[16]. Relationship level is indicated by the scalar 0-No relationship, 1-Stranger, 2-Accquaintance, 3-Friend and 4-Closed Friend. Frequency of knowledge sharing is indicated by 0- Not once in a week, 1- Once every other month, 2- Once a month, 3- Once every other week, 4- Once a week and 5-Several times a week. As a data representation strategy, a scalar matrix table is used to tabulate data before transferring to UCINET software. Each response is given indication '1' when the knowledge sharing interaction has been indicated by two respondents and '0' to indicate no interaction between the respondents.

### *B. Data Analysis*

To analyze and visualize the knowledge sharing behavior, data are represented in SNA graph using NetDraw and the analysis was done using UCINET. UCINET is a frequently used tool for social network analysis. It has the ability to produce a wide range of analytical measures. It is integrated with NetDraw package to enable data visualization in sociograph. Data has been analyzed using visual analysis, network density and mathematical calculation. Firstly, network density was measured to determine density of knowledge sharing by department and job environment Secondly, the knowledge sharing pattern behaviour was examined using visual analysis in the SNA graph by comparing the node pattern with the participants' profile. Thirdly, a mathematical calculation was conducted using the survey data, to calculate the relationship level over knowledge sharing frequency and the result is presented by a bar graph.

## III. RESULT AND FINDING

The result and finding description of the case study is divided into network density measurement of knowledge sharing by department within the IT Centre, the knowledge sharing pattern behaviour was examined using visual analysis in the SNA graph by comparing the node pattern with the participants' profile and eventually the bar graph representation of the relationship level over knowledge sharing frequency using mathematical calculation.

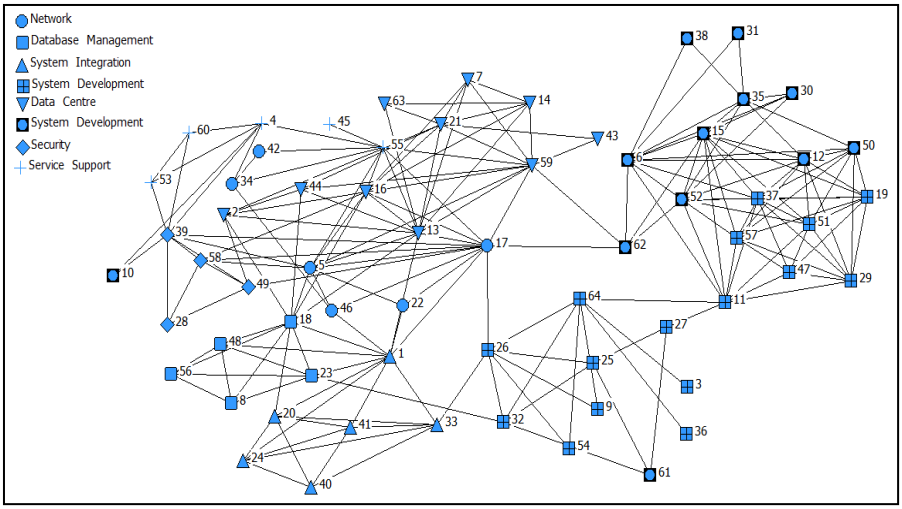


Figure 1. Overall social network diagram of IT professionals.

Table I and Fig. 1 provide density information and overall visualization of the information relating to the question 'I shared knowledge with this person'. From the Table I below, a density of 0.833 of relation in department one (1) indicates higher density within the same department. The measurement of 0.833 density value of all possible knowledge sharing interaction ties between individuals from the department one (1) is high as compared to other departments density values. A positive correlation with other departments also concluded that the result shows highest density among the same department compared to other department. The knowledge sharing interaction between the same department regarding job related task or making decisions are found more dense than the overall network density.

TABLE I. DENSITY OF KNOWLEDGE SHARING BY DEPARTMENT

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1 | **0.83** | 0.01 | 0.00 | 0.08 | 0.00 | 0.10 | 0.00 | 0.00 |
| 2 | 0.00 | **0.53** | 0.00 | 0.10 | 0.01 | 0.08 | 0.00 | 0.00 |
| 3 | 0.01 | 0.00 | **0.23** | 0.01 | 0.09 | 0.01 | 0.00 | 0.00 |
| 4 | 0.08 | 0.05 | 0.00 | **0.43** | 0.01 | 0.03 | 0.13 | 0.08 |
| 5 | 0.00 | 0.00 | 0.10 | 0.01 | **0.36** | 0.00 | 0.02 | 0.02 |
| 6 | 0.10 | 0.06 | 0.00 | 0.03 | 0.00 | **1.00** | 0.00 | 0.00 |
| 7 | 0.00 | 0.06 | 0.00 | 0.13 | 0.02 | 0.00 | **0.50** | 0.15 |
| 8 | 0.00 | 0.05 | 0.00 | 0.21 | 0.00 | 0.00 | 0.15 | **0.83** |

In making comparison with the profile information, the nodes were represented by eight different shapes to signify each department as shown in Fig. 1. Closer examination of the individual nodes, (18, 55, 58) visualizes instances of IT professional doing multiple job functions. As indicated by the nodes, knowledge sharing

for individuals with multiple job functions required certain knowledge area across their main IT knowledge domain.

From the profile information, it was found that nodes (18, 55, 58) are Server Administration and usually shared knowledge with nodes (13, 15, 17) whom the main job function are related to server and network. IT Professionals knowledge sharing is found to be much related to product background in this case study. For instance, we can see the nodes (4, 55, 53) from the Service Support Department, seek information from colleagues who have knowledge of the product that they used from nodes (34, 39, 10) who belong to from another department. The connection was due to the both of nodes having knowledge of similar product background that they are supporting but belongs to different department. The same scenario has been observed for nodes (18, 20, 1), where they are from different departments but using Oracle products.

The study result from participants of the development and maintenance department shows that knowledge sharing not only happens between participants of the same level of knowledge but also between people with different level of knowledge. The level of knowledge during knowledge sharing dictates the method of knowledge sharing. Nodes (52, 11, 15) have a similar level of knowledge in Coldfusion based on their experienced in programming, hence they are positively sharing knowledge. However, the presence of mentoring activities indicates participants from different level of expertise do share knowledge too. Nodes (33, 24, 6) whom are more experienced are mentoring nodes (1, 40, 15, 52, 12). The mentoring interaction mostly happened within the similar department.

System Development and System Maintenance are interrelated departments with one department developing application systems and the latter maintains the application systems. Close examination of the nodes shows the knowledge sharing pattern among participants from both departments are interdependent as visualized by nodes (6,15,12,29,47,35,11,52,50,57,62). These nodes represent individuals developing and maintaining the Human Resource (HR) System. The same pattern is visualized by nodes (64, 27, 3, 36, 61, 25, 26, 32, 54, 9) representing individuals developing and maintaining Student Information System. As presented in Fig. 1, knowledge sharing is denser among individuals of similar system domain, although they are from different departments.

TABLE II. DENSITY OF KNOWLEDGE SHARING BY SYSTEM BACKGROUND

| No. | Student System | HR System | Etc |
|---|---|---|---|
| **Student System** | 0.311 | 0.013 | 0.000 |
| **HR System** | 0.007 | 0.462 | 0.0133 |
| **Etc** | 0.000 | 0.133 | 0.000 |

The evidence also shows in Table II, indicate that 0.311 density value of knowledge sharing has been measured for Student Information system domain as compared to 0.013 density value between Student Information System and HR System. Within the team of HR System the knowledge sharing density is 0.462 as compared to 0.007 density value between HR System team and Student Information System and 0.133 density measured between HR system with other systems.

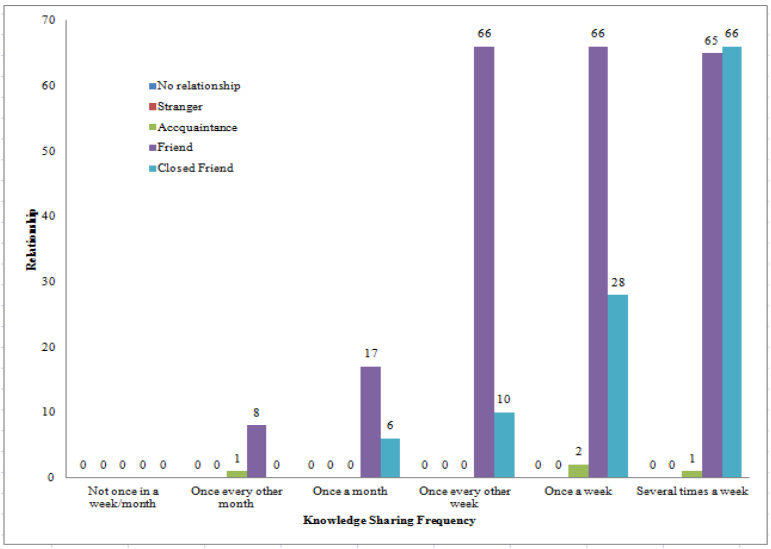


Figure 2. Relationship over knowledge sharing frequency.

To examine the effect of relationship over knowledge sharing behaviour, the result is presented in Fig. 2. The figure presented the analysis of answers for questions 'What is your category of relationship with her/him?' and How often do you share knowledge with her/him?'. For the data analysis the influence of relationship had on knowledge sharing frequency has a significant effect on knowledge sharing intensity. Participants are more likely to share knowledge or seek knowledge with individuals indicated as 'friend' and 'closed friend'. The figure shows in the graph, where categories 'friend' and 'closed friend' has significant knowledge sharing interaction. The result of the study shows categories between 'friend' and 'closed friends' projected a moderate effect on knowledge sharing implying good relationship is one of the important factors in knowledge sharing.

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## IV. Discussion and Conclusion

The study examined the knowledge sharing behaviour among IT professionals within an IT organization to find the element of CoP modelling. The requirement of quality interaction, includes accurate selection of members in CoP in order to gain the learning aspects that can contribute in maximizing the learning process. Knowledge sharing among IT professionals is related to individual job function where an individual with multiple job functions share knowledge with individual of similar job function. Therefore, job function can be used as identification of individual interest and expertise. The tendency of the individual seeking expert advice is among individuals performing the function as their main job function.

In addition the study suggests that domain knowledge impacted knowledge sharing behavior. The domain knowledge depends on related services and tools used causing common grounds with whom they share knowledge. Related services are determined by the services they support which also interrelated with business process. Since working in IT organization involved many different tools and services, it is proposed group formation to consider the criteria of commonalities in choice of services and product used to execute tasks.

In knowledge sharing close relationship or strong ties helps to promote effective knowledge exchange [17]. The importance of relationship have been portrayed in mentoring where mutual trust based on that relationship leads to professional growth [18]. Trust is the most important element in relationship identification and it used to identify preferred expert or individual to collaborate. Although relationship plays a significant meaning in knowledge sharing, moderate degree of friendship is adequate to promote knowledge sharing. This too applies to vertical knowledge exchange in superior-subordinate, friendship makes superior to feel less awkward to learn from subordinate. In vertical knowledge exchange between superior-subordinate, friendship makes the learning process more comfortable among them.

Learning takes place between individual with different level of knowledge and similar level of knowledge. In sharing knowledge when learner is not convinced by the competence of the mentor, the learning process will not be effective [17]. Identification of competency level involved knowing what they know and how much they know are suggested elements for forming groups in CoP. This enables members to maximize the learning experienced by mentoring and group discussion. The nature of IT organization is unique where each department is always interdependent with each other [19]. This has been reflected by the findings on interaction density on each department. There are correlations between density of interactions in each department with relationship, individual domain knowledge and job function. The highest density between individual from the same department is due to the fact that knowledge sharing is easier to happen within individuals in the same department as they have more similarities by common identity such as the type of jobs they are doing, the tools used, the people they bond and the space they shared together.

The study has also demonstrated the value of the social network approach to examine knowledge sharing behavior between IT Professionals in an organization. Several behavior interactions have been identified towards modeling learning profile to form Community of Practice in IT organization.

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