

Assessing the Evaluation Factors In Measuring Knowledge Sharing Performance

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Abstract. One of the main procedures in the field of Knowledge Management (KM), which operates in a dynamic setting, is Knowledge sharing (KS). Knowledge plays a significant role as the most influential factor intended for an organization with the aim of attaining competitive benefits in this world. Thus, it is essential for an organization to proficiently manage its knowledge. Evaluating knowledge sharing performance and efficiently managing has arisen as an important research subject. By performance evaluation, organizations can evaluate how well they are performing in knowledge sharing and then control the resource allocation and suitable enhancement strategies for their projects. Hence, in this study, a literature review is conducted and the important factors for measuring knowledge sharing performance are identified. The main objective of this study is to discover the level of importance of these factors. Accordingly, a survey which is questionnaire based is conducted to collect the data from the experts of the field. Then, an appropriate approach is applied to analysis the data using a Multi-Criteria Decision Making (MCDM) technique. We select Analytic Hierarchy Process (AHP) technique among the MCDM techniques and develop 12 pair-wise questionnaires for assessing the factors. The results of applying AHP demonstrate that Trust, Rewards and Leadership are the most important factors in relation to Reciprocal Relationship, Knowledge Self-Efficacy, IT Application Usage, Training & Education and Sharing culture.

Keywords—Knowledge sharing; Analytic Hierarchy Process; Factors; Assessing

I. INTRODUCTION

The role of knowledge is vital as the most influential power for an organization to reach successfulness in this fast changing world. So, it is fundamental for an organization to manage its knowledge efficiently. As classified by [1] there are some sub-processes under the Knowledge Management (KM) such as knowledge storing, , knowledge sharing, knowledge creation, and knowledge utilization. In the Knowledge Sharing (KS) area, with the purpose of assessing the power of the knowledge-sharing performance it is essential to regulate a practical and scientific assessment features. Certainly, an effective Knowledge Management (KM) is the major factor to make sure that an organization is

using its knowledge effects in attaining the highest performance of organization. KM contains of some sub categories that knowledge sharing is one of the mains; hence, assessment of the KS efficacy in an organization is significant. As reported by [1], although such an evaluation model is significant, there are few models have originated in previous studies. According to [2], evaluation of knowledge sharing performance and efficiently managing and have developed as a critical field of research. Moreover, [1] believe that in the sector of performance evaluation, organizations are able to assess the level of their performing in the sector of knowledge sharing, at that point they can regulate the suitable development strategies and resource allocations intended for their missions. In conducting researches in the field of knowledge sharing, using a reasonable and technical assessment factors is compulsion to measure the strength of knowledge-sharing performance. In order to effectively evaluate the performance of knowledge sharing, it should be firstly set up knowledge sharing performance factors by reviewing related research to identifying knowledge sharing evaluation factors.

This paper focuses on the study of current knowledge sharing indicators by looking into the details of the performance measurement models. This study provides the ranked list of evaluation indicators for measuring knowledge sharing performance.

The objectives of this paper are:

- To identify factors for performance measurement in knowledge sharing.
- To analyze and weight the factors for performance measurement in knowledge sharing.

The results of conducting study suggest both empirical and theoretical foundation evidence that indicate the comparative significance of matters, which compromise knowledge sharing. According to the managerial viewpoint, recognizing the factors that influence the organizations knowledge sharing activities is significant. Correspondingly, explanation of the significance of these several factors may help and effective in the sector of knowledge sharing in a method that take full advantage of learning for everybody involved.

The paper is structured as follows: after a brief review of the literature on knowledge sharing, knowledge sharing performance assessment and knowledge sharing performance measurement factors

(Section II), the research methodology is presented (Section III). In Sections IV and V, data analysis and prioritization of factors using AHP are presented respectively. Section VI concludes the paper and suggests future research avenues.

A. Knowledge sharing

As identified by [3], knowledge sharing is a social interaction culture, which includes the employee knowledge exchange, experiences, and some skills by the all of department or organization. According to [4] knowledge Sharing plays the role as containing both supply and demand used for new knowledge.

As considered by several researches [5,6,7] knowledge sharing states as the knowledge interchange and transfer between individuals, groups, and organizations aimed at developing organizational effectiveness through the actual integration, exchange, and knowledge interaction. Moreover, According to [6], it can be observed as the combination of communication, interaction, and learning procedures, which permits individuals to obtain knowledge from others. Reference [1] considered that it also raises a learning situation and lets the formation and reprocessing of particular knowledge. Knowledge sharing takes place in equally the individual and organizational stages. At the stage of individual employees, the knowledge sharing helps colleagues to get something conducted better, faster, and further proficiently. At the organization stage, in the sector of business knowledge sharing is enchanting, recycling, establishing, and conveying knowledge based on experience that is belonged to the organization and making the knowledge obtainable.

B. KNOWLEDGE SHARING PERFORMANCE ASSESSMENT

With the purpose of managing the knowledge sharing procedure, it is significant to evaluate the performance of this activity. There are several researches that have conducted on models approximately for KM; however there are just few studies have conducted on knowledge sharing evaluation. This section seeks to identify a few existing models of knowledge sharing performance, followed by defining some of the objects in the field of knowledge sharing. Knowledge sharing was the major factor in a research that conducted by [8]. The theories they used were goal-setting-social cognitive, incentive, and social motivation theories with the purpose of assessing knowledge sharing in dyads; also to find out the effectiveness of this factor of personal performance. The results that gathered from the study explained the significances of constructions of group oriented encouragement on the knowledge supplier are established when extra positive norms proposed for knowledge sharing transpired amongst dyad associates. The receivers trust the contractor, once his/her self-efficacy consumes a stronger association by performance aims. In another study, [3] offered an evolution model, which incorporates triangular fuzzy numbers and the analytic hierarchy process (AHP)

with the purpose of improving the model of fuzzy evaluation that arranges the factors influencing knowledge sharing relative weights. In another study, [9] conducted a fuzzy-based method focused on trust assessment amongst a knowledge requester and supplier. The results that gathered from conducting the study identified that the trust level replicates the knowledge supplier to share the knowledge. Moreover, the results outlined a decision making model to support knowledge sharing. Lately, evolving an analysis framework proposed for classifying knowledge sharing activities in Community of Practices (CoPs) conducted in a study by [10] in Social Network Analysis (SNA). Consequently, they offered certain approaches conducted for individual CoPs. The significance of their study was to suggest a framework on SNA with the aim of evaluating the knowledge sharing. The mentioned researches determined numerous knowledge sharing fundamentals like knowledge workers.

In a study that conducted by [1], they used a hybrid model according to the Data Envelopment Analysis (DEA). With the purpose of developing the accuracy of model, they combined the Ant Colony System (ACS) met heuristic by Monte Carlo simulation and DEA. This model is called ACS-DEA and it is originated to help to develop the reliability and accuracy of the findings.

According to the above review of the literature, there are several efforts and attainments that have been established on the knowledge sharing procedure effective factors. Consequently, it is necessary to recognize which factors stimulate or impede employee tendencies with the purpose of involving in knowledge sharing behaviors. This study seeks to conduct AHP as an evaluation model that arranges the relative masses of the factors persuading knowledge sharing.

C. Knowledge Sharing Performance Measurement Factors

In knowledge sharing area it's the very basic necessity to determine a reasonable and scientific evaluation factors in order to measure the strength of the knowledge-sharing performance. In order to evaluate the performance of knowledge sharing effectively, we should set up knowledge sharing performance factors first. This section creates a knowledge sharing factor framework by reviewing related research to identifying knowledge sharing evaluation factors. Table 1, presented at the end of this discussion, provides the ranked list of the composite evaluation factors. Table 2 gives some representative factors choose from Table1 and similar factors have been considered once earlier. In Table 2, we summarize the factors more repeated in previous knowledge sharing literature and also we determine which factors belong to which paper and mark them with a tick. As it is clear in the following table this study focused on those factors which are more repeated among recently published studies. As you can see from the Table 2, relevant factors to evaluation of

knowledge sharing are included: Rewards, Reciprocal Relationship, Knowledge self-efficacy, Trust, IT application usage, Training & education,

Sharing culture and leadership. In the next section, AHP is introduced as a methodology for assessing the factors identified from the literature.

TABLE I. TABLE STYLES PRIOR RESEARCH ON EVALUATION FACTORS OF KNOWLEDGE SHARING

Reference	Factors
[11]	Anticipated Extrinsic Rewards, Anticipated Reciprocal Relationships, Sense Of Self-Worth, Fairness, Affiliation, Innovation
[12]	Reputation, Enjoy Helping, Centrality, Self-Rated Expertise, Tenure In The Field, Commitment, Reciprocity
[13]	Agreeableness, conscientiousness, openness, Organizational commitment, self-efficacy, Job autonomy, Rewards, Perceived supervisory and peer support,
[14]	Vision and goals, Trust among employees, Social networks, Centralization, Formalization, Performance-based reward systems, IT application usage, End-user focus, Years of work experience ,Position, Education, Sector
[15]	Sanction, Managers' Attitude, Training, Teamwork, Trust, Self-Efficacy, Greed, Gender, Firm Age, Number Of Employees
[16]	Environmental factors (Social characteristics, Economic characteristics, Industry characteristics) - Organizational factors(Size, Structure, Strategy, Firm resources ,Culture, Top management team characteristics)
[17]	Individual factors(enjoyment in helping others , knowledge self-efficacy)- Organizational factors(top management support, organizational rewards)-Technology factors (information and communication technology use)
[18]	Social network, social trust , shared goals, subjective norm
[19]	Organizational strategy, top management knowledge values
[20]	Knowledge Donating, Knowledge Collecting
[3]	Social networks, Interpersonal trust, Sharing culture, Learning oriented, Organizational rewards, Knowledge self-efficacy, Enjoyment in helping others, Reputation, Vision and goals, Top management support, Top management encourage, Open leadership climate, Technology infrastructure, Database utilization, Knowledge networks
[21]	Loss of Knowledge Power, Codify effort, Image, Anticipated reciprocal relationships Sense of self-worth, Anticipated Extrinsic Reward, Subjective norm, Cultural
[22]	Organizational structure characteristics (Formalization, Complication, Centralization)- Organizational interaction (Commitment, Trust)- Organizational culture(Bureaucratic, Innovative)
[23]	personality traits (agreeableness, conscientiousness, and openness)
[24]	Trust, Intrinsic reward, Extrinsic reward, KMS quality
[25]	Individual factors (awareness, trust, personality ,job satisfaction)- Organizational factors (organizational structure, organizational culture, rewards and recognitions, work process, office layout)- Technological factors (ICT tools, ICT infrastructure, ICT know-how)
[26]	Demographic profile (Gender , Age ,Education level , Position grade , Workplace , Tenure of service)
[27]	Transactive memory system (TMS) and trust
[28]	Norm of Reciprocity ,Trust, Self-Efficacy, Perceived Relative Advantage, and Compatibility
[29]	Norm of Reciprocity , Interpersonal Trust, Knowledge Sharing Self- Efficacy, Perceived Relative Advantage, and Perceived Compatibility
[9]	Trust
[30]	Trust
[31]	Leadership and trust
[32]	Sharing incentives of supplier, Partnership of supplier and recipient, Acceptance ability of recipient, Communication ability Knowledge, Support and participation of leader, Organizational culture, Performance appraisal mechanism, Training and Development, Motivation and compensation Technical, Office automation system and Timely and convenient communication
[33]	Leadership, trust
[34]	Reward, Leadership
[35]	interpersonal trust, virtual networks , physical networks , time availability of individual workers, investments for training knowledge senders and knowledge recipients, shared acronyms
[36]	Leadership, Organizational structure, Trust, Reward, Time, Information technology
[37]	Trust, physical spaces or virtual communities of practice, time availability, information and communications systems technology (ICT) infrastructure, employee's ability to share, training courses or seminars for knowledge sharing, shared language and conventions, Community-specific communication conventions
[38]	Organizational Rewards, Reciprocity, Enjoyment, Social Tie, Social Trust, Social Goals
[39]	leadership
[40]	Reciprocal Relationships, Affiliation
[41]	Leadership, Culture, IT Infrastructure
[42]	Leadership, Trust, Time, Identification of shared interests and the sharing of information associated with those interests
[1]	Knowledge workers , IT & KMS , Training & education , Knowledge sharing sessions
[43]	Tie strength, self-efficacy, altruistic commitment, performance expectation

TABLE II. THE MOST IMPORTANT FACTORS OF KNOWLEDGE SHARING EVALUATION

	Bock, Zmud, Kim, & Lee(2005)	Wasko & Farai (2005)	Cabrera, Collins, & Salgado(2006)	Kim & Lee(2006)	Lu, Leung, & Koch (2006)	Du, Ai, & Ren(2007)	Lin, H.-F. (2007)	Chow & Chan (2008)	Lin & Lee(2008)	Huang, Davison, & Gu (2008)	Lin, W.-B. (2008)	Lee, H. (2008)	Ismail & Yusuf(2008)	Huang, C.-C. (2009)	Lin, M.-J. J., Hung, S.-W (2009)	Chen & Hung(2010)	Chen, T.-Y., Chen, Y.-M., Chen (2010)	Holste & Fields (2010)	Lee, Gillespie, Mann, & Wearing (2010)	Yun (2011)	Lee, K. C., Lee, D. S (2011)	Jahani, Ramayah, & Effendi(2011)	Chen, C., Chang, M (2012)	Seba, Rowley, & Lambert(2012)	Chen, C., & Chang, M. (2013)	Hau, Kim, Lee, & Kim(2013)	Howell & Annansingh(2013)	Kuah, Wong, & Tiwari (2013)	Goh & Sandhu(2013)	Carmeli (2013)	Mahamed Ismail, Welch, & Xu(2013)	Tseng & Kuo (2014)	
F1	√		√	√		√		√	√			√	√									√											
F2	√	√								√					√	√															√		
F3	√	√	√		√	√	√	√	√	√				√	√																		√
F4				√	√			√	√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
F5				√		√							√										√										
F6					√														√				√										
F7						√			√	√			√							√													√
F8									√										√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

F1: Rewards	F2: Reciprocal Relationship	F3: Knowledge self-efficacy	F4: Trust
F5: IT application usage	F6: Training & education	F7: Sharing culture	F8: Leadership

II. AHP

Recently, MCDA (Multiple Criteria Decision Analysis)/MCDM (Multi-Criteria Decision Making) has been an active research for solving real-world decision problems [44,45,46,51,52,53]. According to [47], AHP is a mathematical technique used for multi-criteria decision-making. In a way it is better than other multi-criteria techniques, as it is designed to incorporate tangible as well as non-tangible factors especially where the subjective judgments of different individuals constitute an important part of decision making. The AHP method decomposes the decision problem into a hierarchical decision schema and decision elements. Elements may be criteria, sub-criteria or alternatives, and these elements are judged qualitatively, and criteria are the factors which affect the decision making. Apart from other facts, this is rooted in the special structure of the AHP, which follows the intuitive way in which managers solve problems, and in its easy handling compared with other multi criteria decision-making procedures. Hence the intuitively solved decision problems can now be solved as procedure-orientated using AHP. The use of AHP leads to both, more transparency of the quality of management decisions and an increase in the importance of AHP.

The use of AHP involves various steps. Broadly, the steps are problem decomposition and hierarchy construction from the decision problem, pairwise comparison, weight calculation, consistency check

and priority determination of alternatives [48, 49]. Fig. 1 shows the main steps in AHP.

In Pairwise comparison step elements of each particular level are pairwise compared with respect to specific elements in the immediate upper level [47]. In the first part of the pairwise comparison, the respondent is asked to prioritize between two elements at a time and is then asked to quantify the relative importance. The degree of importance of one element over the other element is expressed on a nine point scale developed by [50]. Table III shows the nine point scale and score definitions. A value of "1" indicates the two elements are of equal importance and the value "9" indicates the absolute importance of one element over the other.

TABLE III. PREFERENCE SCALE FOR PAIRWISE COMPARISONS

	Numerical Value
Equally Preferred	1
Equally to Moderately Preferred	2
Moderately Preferred	3
Moderately to Strong Preferred	4
Strongly Preferred	5
Strongly to Very Strongly Preferred	6
Very Strongly Preferred	7
Very Strongly to Extremely Preferred	8
Extremely Preferred	9

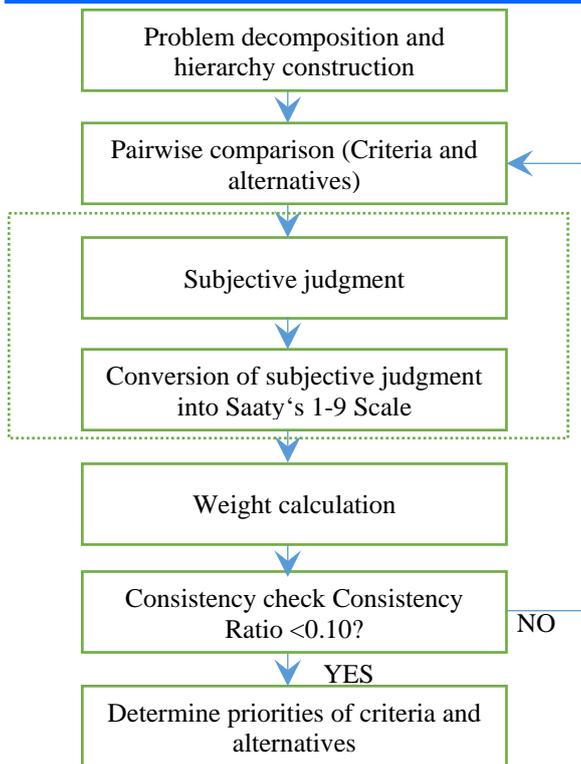


Fig. 1. Steps in the AHP method

III. DATA ANALYSIS

In this study pairwise questionnaires was used and distributed among 12 experts that had experience in the field. Therefore, for this questionnaire the survey instrument was made available to the participants via e-mail. They were requested to fill the pairwise questionnaire a given pairwise questionnaire. The collected data was analyzed using the Expert choice software. The statistics for the respondents demographic is shown in Table IV. The most of respondents aged between 32-45 years old, while the most of the respondents were male. Table V presents the information according to the years of experience.

TABLE IV. DEMOGRAPHIC DATA FOR QUESTIONNAIRE

Demographics	Responses obtained	Percentage %
Gender		
Male	8	66.66
Female	4	33.33
Total	12	100%
Age		
32-38	4	25
38-41	3	33.33
41-45	5	41.66
Total	12	100%

TABLE V. EXPERIENCE OF EXPERTS IN THE SURVEY

Experience	Less than 3 years	Between 3 and 6	Between 6 to 8	More than 8 years
Percentage	30%	40%	10%	20%

IV. PRIORITIZATION OF FACTORS USING AHP

After data collection from 12 experts, prioritization of factors was performed using expert choice for all pairwise comparison matrices. Fig. 2 shows the comparisons of all factors presented in Table 2. Results of the pairwise comparisons in Fig. 3 demonstrate that based on expert judgments Trust with weight 0.219 is the most important factor for the evaluation factors of knowledge sharing. In addition, from the results, Rewards and Leadership have the high priority after Trust with weights 0.155 and 0.140, respectively.

V. CONCLUSIONS

The main objective of this study was to discover the level of importance of factors for knowledge sharing performance evaluation factors. We conducted a survey which was questionnaire based to collect the data from the experts of the field. Accordingly, an appropriate approach was applied to analysis the data using a Multi-Criteria Decision Making (MCDM) technique. We selected AHP among the MCDM techniques and develop 12 pair-wise questionnaires for assessing the factors. The results of applying AHP demonstrate that Trust, Rewards and Leadership are the most important factors in relation to Reciprocal Relationship, Knowledge Self-Efficacy, IT Application Usage, Training & Education and Sharing culture with weights 0.219, 0.155 and 0.140, respectively. The findings of this study are significant not only in providing an AHP evaluation model intended for the relative importance evaluation of these effects on knowledge sharing, but also to help managers emphasis on the most significant factors and recognize the greatest policy for encouraging knowledge sharing. This study also faced with some limitations. This study seeks to use AHP with the aim of developing a model of evaluation to recognize the critical factors in enabling effective knowledge sharing activities. There are several factors in the sector of knowledge sharing performance evaluation in assessing the fuzzy MCDM techniques such as fuzzy TOPSIS that may apply to get more illustrative findings in future studies.

Rewards	Reciprocal	Knowledge	Trust	IT applicati	Training &	Sharing cu	Leadership
	2.0	2.25	1.444	2.25	1.636	1.8	1.286
		1.125	2.875	1.091	1.444	1.444	1.875
			2.556	1.0	1.333	1.222	1.667
				2.556	1.917	2.091	1.533
					1.3	1.182	1.667
						1.083	1.25
							1.364
Incon: 0.03							

Fig. 2. Pairwise comparisons for the evaluation factors of knowledge sharing

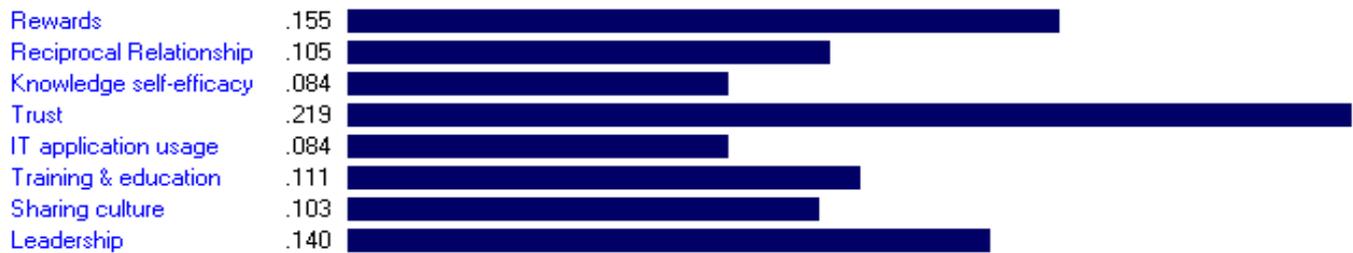


Fig. 3. Ranking the evaluation factors of knowledge sharing

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