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Personal Knowledge Management among Adult Learners: Behind the Scene of Social Network

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***Abstract*—**The burst of Web 2.0 technology and social networking tools manifest different styles of learning and managing knowledge among both knowledge workers and adult learners. In the Western countries, open-learning concept has been made popular due to the ease of use and the reach that the technology provides. In Malaysia, there are still some gaps between the learners' acceptance of technology and the full implementation of the technology in the education system. There is a need to understand how adult learners, who are knowledge workers, manage their personal knowledge via social networking tools, especially in their learning process. Four processes of personal knowledge management (PKM) and four cognitive enablers are proposed supported by analysed data on adult learners in a university. The model derived from these processes and enablers is tested and presented, with recommendations on features to be included in adult learners' learning environment.

***Keywords*—**Personal knowledge management, adult learners, social network, learning environment.

I. Introduction

AS we witness the change in education system and learning styles from one generation to the next, the environment of the learning processes is changing as well. Learning is part of managing personal knowledge, where one's knowledge is created, transferred and even grows as one learns more every day.

The burst of Web 2.0 technology and social networking tools reveal different learning styles and managing knowledge among both knowledge workers and adult learners. In the Western countries, open-learning concept has been made popular due to the ease of use and the reach that the technology provides. In Malaysia, there are still some gaps between the learners' acceptance of technology and the full implementation of the technology in the education system. There is a need to understand how adult learners, who are knowledge workers, manage their personal knowledge via social networking tools, especially in their learning process.

Nowadays, there are many types of Web 2.0 tools being used in adult learners' learning processes, such as online social network, blog, web feed, and the like. The students have their own learning style to get the required knowledge, what more to understand and finally apply it in their quest to complete their study.

In some occasions, the learning platforms (often provided by the institute of higher learning) are not suitable for the students. This is seen in terms of the suitability of the learning platform (i.e. learning management system) with the students' learning style, which causes the declining number of visits to the learning platform by the students every semester. Learning management system is known to have limitations, such as providing only unidirectional knowledge creation, limited in communication, lack of collaboration and having the learning ends with the semester [1]. Furthermore, learning style and environment in a university is different from other universities, which motivates the need to propose better tools for students based on an understanding of their learning styles. It can be as general as their way of managing their personal knowledge over the Web 2.0 tools, at most times, not realising that they are doing so by being online.

In the domain of knowledge management, four processes of personal knowledge management (PKM) and four cognitive enablers are proposed in recent years [2]. The model derived from these processes and enablers is tested and presented, based on the research objectives and hypotheses.

This research is outlined based on effective PKM processes (Get, Understand, Share, Connect or GUSC) model, with the aim to prove the following hypotheses:

H1: Get knowledge is positively related to effective PKM in learning.

H2: Understand knowledge is positively related to PKM in learning.

H3: Share knowledge is positively related to PKM in learning.

H4: Connect to knowledge source is positively related to PKM in learning.

This research also validates the existing cognitive enablers as mediating factors for the above hypotheses. With this reason, the following hypothesis is to be proven as well:

H5: Method, Identify, Decide and Drive affect the relationship between the GUSC and effective PKM in learning.

II. Related Works

A. Personal Knowledge Management

Personal knowledge management is known as "an evolving set of understandings, skills and abilities that allow an individual to survive and prosper in complex and changing organisational and social environments" [3]. In recent years,

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there are evidences to show that personal knowledge management exists in the context of working environment as well as learning environment. Although the concept was first suggested for knowledge organisation [4], it was seen to be applicable to other environments as well, since almost everyone working with computers and internet technologies can be considered as knowledge workers.

In the Malaysian scenario, research on personal knowledge management (PKM) processes analyses how a knowledge worker manages personal knowledge through four common steps, and it is found common across three main industries: manufacturing, service and education. The common processes describe the way knowledge workers manages knowledge, regardless whether it is for personal or official tasks, as long as it involves knowledge retrieval, understanding of knowledge, sharing of knowledge and most significantly, connection to knowledge sources. These processes are found to be more significant with the support from Web 2.0 technology and tools, which attract a number of studies that investigate the technicality of the PKM processes over the tools including social networks in the past decade [5].

These four main processes of PKM is suggested by Ismail and Ahmad [6], based on numerous reviews by the Western's PKM researchers, such as Grundspenkis [7], Jarche [8, 9], Martin [10], Avery et al. [11], Pettenati et al. [12], and Razmerita et al. [13]. They consist of tasks performed to get/retrieve knowledge (e.g. online search, RSS feed, aggregation, 'follow' shared updates), understand/analyse knowledge (e.g. summarise, write research papers), share knowledge (e.g. blog, RSS to blog, share link with reviews, tag people when sharing link, wiki), and connect to other knowledge sources and/or knowledge experts (e.g. from comments by others, from votes by others, from 'following' other's work or profile, email, online messages) [6].

On top of the PKM processes, recent researchers also suggested the 'people factor' that enables the whole processes since PKM has a very fundamental concept of managing knowledge at 'people' or individual level instead of the organisational level. The usual examples given are characteristics or behaviour in managing tacit knowledge, where tacit knowledge is something that is within a person's mind or skill that is difficult to be transferred, as proposed by the renowned Nonaka and Takeuchi [14]. In the effective PKM model proposed in recent research, these 'characteristics' are called cognitive enablers [2], and it is aligned with the concept of enablers put forth by Malhotra [15]. Knowledge is active (i.e. best understood in action, it is the practice of theory that makes the difference), affective (i.e. takes into consideration not only the cognitive and rational dimensions but also emotional dimensions of human decision-making), and dynamic (i.e. based upon ongoing reinterpretation of data, information, and assumptions while proactively sensing how decision-making process should adjust to future possibilities) [15]. With these cognitive enablers in consideration, the representation of knowledge provides a more realistic construct.

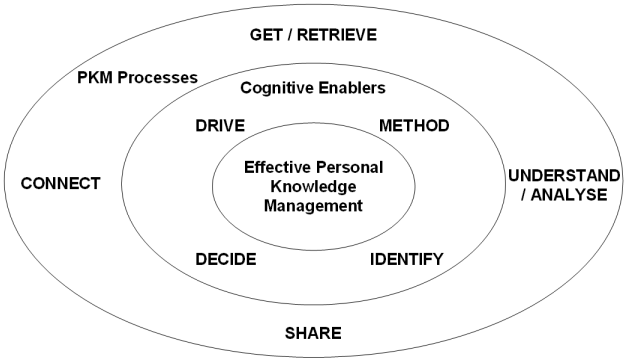

Fig. 1 Effective Personal Knowledge Management Framework (Ismail & Ahmad, 2012)

For the purpose of this research, the effective PKM model by Ismail and Ahmad [2] is used to look into the PKM in learning among adult learners. As shown in Fig. 1, the model consists of four PKM processes: 'get/retrieve' knowledge, 'understand/analyse' knowledge, 'share' knowledge, and 'connect' to knowledge source; and four cognitive enablers: 'method' of managing knowledge, 'identify' the right knowledge and/or knowledge source, 'decide' on knowledge and/or knowledge source, and 'drive' in managing knowledge according to the four processes.

B. Adult Learners and Social Network

The research on learning environment has expanded to informal learning and "managing knowledge in the process of learning, using tools made available by computer and internet technologies" [5]. The concept of learning does not stop at merely primary school or high school with students range from age 6 to 17, but it is a lifelong concept that even knowledge workers go through in their daily life.

There are certain criteria of 'adult learners' as defined by various parties. For example, according to the 2002 report on nontraditional undergraduates by the National Center for Education Statistics, an adult learner is a person who delays the enrollment (i.e. does not enter postsecondary education in the same calendar year that he or she finished high school), attends part-time for at least part of the academic year, works full time (i.e. 35 hours or more per week) while enrolled, is considered financially independent for purposes of determining eligibility for financial aid, has dependents other than a spouse, is a single parent, or does not complete high school with a completion certification [16]. Another characteristic of adult learners is having increased variation in learning styles, but with individual differences among people that increase with age [17]. In this research, the above criteria are found to be embedded within the background of the students in an institute of higher learning.

In the Malaysian institutes of higher learning, students are treated as 'adult learners', where the age requirement for them to register as students can be of any age above 17, or after high school. At most times, the moment they go through their second year degree programme (or fourth semester degree), they are considered as adult learners of approximately 21

years of age. In most cases, they are degree programme students who joined the work force before they registered for further studies, and also some who work part-time during their studies. In a few cases, students defer their studies for one or more semesters in order to work due to some family situations and financial difficulties – or in other words, they are taking their responsibility as being 'adults'. These are the category of 'students' whom we consider as adult learners.

In some researches, to understand the behaviour of adult learners, it is found that "learners are no longer necessarily tied to a particular course in order to gain a qualification but are able to present their learning to prove that they possess such competencies or are able to achieve those outcomes" [18]. In other words, the concept of 'learning' does not mean the usual learning processes that students go through in their daily college life, but also in the "working life of knowledge workers" [5].

With the emergence of Web 2.0 tools, learners started to make use of the tools in their learning processes, with or without them realising it. One of the tools that are used in managing their learning processes, which also caught the attention of current action researches, is the social network. In definition, social networks (sites) are Web-based services that allow individuals to: construct a public or semi-public profile within a bounded system; articulate a list of other users with whom they share a connection; and view and traverse their list of connections and those made by others within the system [19]. The key point from these definitions is 'connection', which enhances the capability of social networking trend among students to break down social barriers, promote trust, and enable wider learning experience [20].

Recent researches showed that students of institute of higher learning feel comfortable to make full use of the features in the social networking site, especially to initiate discussions among them [20]. This is then related to the fact that students can 'get' and 'understand' knowledge from the interactions within the social network group, 'identify' who could benefit the knowledge that they 'share', motivated or gain the 'drive' to learn new knowledge by getting their understanding clarified from the interactions and 'connections', and can 'decide' on and use different 'methods' or features in the social network to learn new knowledge (e.g. 'tag', 'like', write 'comments', share photos or link, and post review on the 'wall') [5]. At certain level, lecturers also use social network to 'identify' students who need close monitoring in order to perform better in class, also to 'understand' the students' problems in fulfilling the requirements of the course, all through the online interaction [20].

In a recent research conducted across universities in Malaysia, it is found that the PKM processes model can be used to measure the effectiveness of students' knowledge management in learning processes over the social network. It is also found that the "cognitive enablers are the hidden but important elements that ensure the efficiency of the PKM processes, as identified in the contents and interaction within the settings of this study" [5]. These show that the concepts of managing personal knowledge and learning processes by adult learners complement each other.

III. Methodology

A questionnaire survey was conducted on students of an institute of higher learning in Malaysia, with a focus on students who were in their fourth semester onwards. The survey was conducted to understand the processes and cognitive enablers of PKM over their use of the computer and internet tools and technologies among these adult learners, in relation to their learning activities. The reason behind choosing students at their fourth semester onwards is due to the nature of the syllabus that require them to analyse, evaluate and synthesise more than they did in the first three semester, as they embark the phase of working for their final year degree projects.

A. Research Settings and Instrument

The distribution of the questionnaire is based on quota sampling, where the number of the respondents is based on the percentage of students in the degree programmes they belong to. To achieve a confidence level of 95 percent for the target students of the institute, the sample size needed is 180. Out of 180 respondents, the distribution needed to reach the number of students based on the degree programmes are as shown in Table I.

TABLE I
Respondents Distribution across Programmes

Programme	Sampling (%)	Target Sample (Number)
NS	34	61
CE	5	9
SE	12	21
CEC	2	4
CSS	10	19
IMD	17	32
CAD	7	12
CEM	12	22
Total	100	180

The questions are divided into two main sections: the four PKM processes (i.e. GET, UNDERSTAND, SHARE and CONNECT), and four cognitive enablers (i.e. METHOD, IDENTIFY, DECIDE and DRIVE). Respondents were also asked to rate the effectiveness in managing personal knowledge for learning using the same scale.

The questionnaire was designed based on the constructs defined according to the variables shown in Fig. 1. Six constructs were designed for three independent variables (i.e. GET, CONNECT and METHOD) and five constructs were designed for the other five independent variables (i.e. UNDERSTAND, SHARE, IDENTIFY, DECIDE and DRIVE). The dependent variable (i.e. Effective PKM) is based on six constructs. The constructs appeared as statements in the questionnaire, and the respondents were asked to agree on them using the 5-Likert scale (i.e. 1 for "strongly disagree", 2 for "disagree", 3 for "neutral", 4 for "agree", and 5 for

"strongly agree").

The constructs are given codes to differentiate the variables that they belong to: GE code represents GET, UN code represents UNDERSTAND, SH code represents SHARE, CO code represents CONNECT, ME code represents METHOD, ID code represents IDENTIFY, DE code represents DECIDE, and DR code represents DRIVE. The code includes a number representing the construct number under the variable they belong to. For example, GE3 code means the third construct under the variable GET, and ID2 code means the second construct under the variable IDENTIFY. Among a few samples of statements that are used as constructs are as follows:

- GE3: I get new knowledge from RSS feed and/or aggregation tool.
- UN3: I comment and/or write reviews on the new knowledge to verify my understanding.
- SH3: I share links and/or tag others to sites or pages, with my reviews on what I have analysed.
- CO1: I connect to others by posting 'comments' and/or votes online.
- ME2: I need to start by searching online, database, discussion forum and/or my own knowledge repositories.
- ID2: I get recommendations from offline friends to identify where I should get new knowledge.
- DE2: The important thing is the ease of use of tools to look for a person who has the knowledge I need.
- DR3: If the environment is conducive (e.g. facilitating conditions, easy to accomplish, accessible information, available tools), I would look for knowledge experts.
- EP2: My understanding of new knowledge is verified by using Web 2.0 tools.

B. Reliability and Validity of Questionnaire Design

Within the duration of two weeks, a total of 115 responses were fully answered and returned, with only 114 responses are found as valid for quantitative analysis. Data collected are analysed using SPSS, with reliability of the questionnaire design tested according to the variables shown in Table II.

TABLE II
RELIABILITY OF QUESTIONNAIRE DESIGN

Variables	Cronbach's Alpha (α)	Number of Items
GET	0.810	5
UNDERSTAND	0.779	4
SHARE	0.768	5
CONNECT	0.831	5
METHOD	0.617	4
IDENTIFY	0.813	4
DECIDE	0.854	3
DRIVE	0.631	3
Effective PKM	0.808	4

Cronbach's alpha reliability coefficient measures the internal consistency, looking at how a set of items are closely related as a group. The values derive different meanings according to the range they belong to: $\alpha > 0.9$ is excellent, $\alpha > 0.8$ is good, $\alpha > 0.7$ is acceptable, $\alpha > 0.6$ is questionable, $\alpha > 0.5$ is poor, and $\alpha < 0.5$ is unacceptable. Since this research is considered as an exploratory study, the Cronbach's Alpha (α) is acceptable from 0.60 onwards. Table II shows the remaining items or constructs that are reliable for each variable.

For the sets of data with low Cronbach's Alpha value, the reliability test was done repetitively to get an acceptable value by removing items suggested by SPSS for each analysis cycle. This analysis method results in less number of items than the actual number of constructs for some of the variables listed in Table II.

This test is supported by factor analysis that checks the sampling size, which should be ample for further exploration and analysis. The validity value for all constructs are above 0.60, except for one construct in CONNECT (i.e. CO3) and one in Effective PKM (i.e. EP1). These 'invalid' constructs were removed during the reliability test.

IV. RESULTS AND FINDINGS

In order to validate the Effective PKM framework for learning, the collected data from the questionnaire survey was analysed using multiple regression method in SPSS, where the value of Pearson correlation coefficient (r) is generated to further understand the relationship between any two variables. This correlation coefficient helps in examining and interpreting the degree of relationship between the 4 main model constructs and the main dependent variable, for the purpose of proving the four hypotheses. Positive value shows a positive relationship between the variables (thus proves the hypotheses), whereas negative value shows a negative relationship.

TABLE III
RELATIONSHIP BETWEEN THE VARIABLES IN EFFECTIVE PKM IN LEARNING

Hypotheses	Correlation Coefficient (r)	Sig. (1-tailed)
H1: Get knowledge is positively related to effective PKM in learning	+0.468	0.000
H2: Understand knowledge is positively related to PKM in learning	+0.267	0.002
H3: Share knowledge is positively related to PKM in learning	+0.372	0.000
H4: Connect to knowledge source is positively related to PKM in learning	+0.320	0.000

With the presentation of Table III, the first four hypotheses are proven (i.e. H1, H2, H3 and H4). This means that all the four main variables that describe the PKM processes in learning – GET, UNDERSTAND, SHARE and CONNECT – are positively related to the Effective PKM in learning.

Table III also shows that the four variables are positively affecting the effective PKM in learning, with GET knowledge being the strongest factor that influences adult learners (r = +0.468). UNDERSTAND knowledge is proven to be the weakest factor that influence adult learners (r = +0.267), mainly due to the fact that they do not perceive that their activities online could be considered as an act of understanding new knowledge. These correlation coefficient

values are statistically significant, with the significance level value below 0.05.

Based on the findings presented in Table III, the effective PKM model can be defined in a form of general equation as follows:

$$y_{EP} = \beta_0 + \beta_1 x_G + \beta_2 x_U + \beta_3 x_S + \beta_4 x_C \quad (1)$$

with y_{EP} representing the dependent variable of effective PKM, whereas the x_G, x_U, x_S and x_C represent the independent variables of GET, UNDERSTAND, SHARE and CONNECT.

The analysis based on multiple regression method gives more detailed results, which helps in further proving this equation. Using the enter method, a model emerged ($F_{4,109}$ = 9.919, $p < 0.0005$), with the adjusted R square = 0.240. The predicator variables for this model are as follows:

- GET: Beta = 0.364, p <0.0005
- UNDERSTAND: Beta = 0.027, p = 0.775
- SHARE: Beta = 0.198, p = 0.060
- CONNECT: Beta 0.049, p = 0.636

(UNDERSTAND and CONNECT are not significant predictors in this model.)

From the generated coefficients table in SPSS, the constant and coefficients for each variable mentioned in equation (1) are identified, and the general equation is refined to include these constant and coefficients and form a full equation representing the Effective PKM model. (2) shows the result of the formulation, taking into account only the four main variables:

$$y_{EP} = 6.864 + 0.242x_G + 0.027x_U + 0.161x_S + 0.035x_C \quad (2)$$

In order to prove the final hypothesis, the multiple regression method is regenerated to include the four cognitive enablers as additional independent variables. The result of the regression analysis shows some changes in the coefficient of each variable, with the adjusted R square = 0.304. Equation (2) is refined with the inclusion of the additional 4 variables, as shown in (3).

$$y_{EP} = 5.046 + 0.250x_G + 0.040x_U + 0.186x_S + 0.012x_C + 0.098\,x_{ME} + (-0.168)x_{ID} + 0.113x_{DE} + 0.086x_{DR} \quad (3)$$

with additional x_{ME}, x_{ID}, x_{DE} and x_{DR} represent the independent variables of METHOD, IDENTIFY, DECIDE and DRIVE.

From the comparison between equations (2) and (3), the coefficients of each main variable (i.e. GET, UNDERSTAND, SHARE and CONNECT) increases with the existence of the four additional variables (i.e. METHOD, IDENTIFY, DECIDE and DRIVE), represented by the variables x_{ME}, x_{ID}, x_{DE} and x_{DR}. This proves the final hypothesis, ***H5: Method, Identify, Decide and Drive affect the relationship between the GUSC and effective PKM in learning.***

V. Discussions

Regardless of the success in forming the equations based on the overall high significance level of data analysis, the detailed analysis needs to be looked at to ensure high significance in further proving that the whole model is indeed a good model.

In the first stage of analysis on the four main independent variables (i.e. GET, UNDERSTAND, SHARE and CONNECT), the multicollinearity of independent variables are all above +0.3, with significance level value less than 0.05. It shows that the collinearity exist, even though it is not as high as above +0.6. Fig. 2 shows the existence of correlations or statistical relations between the variables, such that systematic changes in the value of one variable are accompanied by systematic changes in the other.

Correlations

		EPKM	GET	UNDERSTAND	SHARE	CONNECT
Pearson Correlation	EPKM	1.000	.468	.267	.372	.320
	GET	.468	1.000	.373	.373	.419
	UNDERSTAND	.267	.373	1.000	.437	.359
	SHARE	.372	.373	.437	1.000	.550
	CONNECT	.320	.419	.359	.550	1.000
Sig. (1-tailed)	EPKM	.	.000	.002	.000	.000
	GET	.000	.	.000	.000	.000
	UNDERSTAND	.002	.000	.	.000	.000
	SHARE	.000	.000	.000	.	.000
	CONNECT	.000	.000	.000	.000	.
N	EPKM	114	114	114	114	114
	GET	114	114	114	114	114
	UNDERSTAND	114	114	114	114	114
	SHARE	114	114	114	114	114
	CONNECT	114	114	114	114	114

Fig. 2 Correlations between the four main independent variables and the dependent variable

The collinearity diagnostics produced in SPSS shows the other side of the coin. A condition index greater than 15 indicates a possible problem, whereas an index greater than 30 suggests a serious problem with collinearity. In this case, regardless of the high significance level found earlier, the condition index shows that the collinearity has a possible problem (i.e. condition index greater than 15), but it is not so crucial. The collinearity diagnostics produced in this research is shown in Fig. 3.

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	GET	UNDERSTAND	SHARE	CONNECT
1	1	4.948	1.000	.00	.00	.00	.00	.00
	2	.020	15.903	.04	.98	.04	.04	.02
	3	.014	18.490	.04	.00	.40	.02	.57
	4	.010	22.482	.61	.01	.55	.04	.18
	5	.008	25.074	.31	.00	.01	.91	.24

a. Dependent Variable: EPKM

Fig. 3 Collinearity diagnostics on the four main independent variables and the dependent variable

Model summary table in SPSS explains the goodness of fit of model. As shown in Fig. 4, R square = 0.267 means that 26.7 percent (26.7%) of variation is explained by the model. The adjusted R square adjusts for the number of explanatory terms (i.e. independent variables) in a model and increases only if the new independent variable (or variables) improves the model more than would be expected by chance. This is found to be true when the cognitive enablers are introduced in the model as independent variables alongside the main four

independent variables. The result is as shown in Fig. 5.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.517[a]	.267	.240	1.86077

a. Predictors: (Constant), CONNECT, UNDERSTAND, GET, SHARE

b. Dependent Variable: EPKM

Fig. 4 Model summary for the four main independent variables and the dependent variable

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.552[a]	.304	.251	1.84670

a. Predictors: (Constant), DRIVE, UNDERSTAND, IDENTIFY, DECIDE, CONNECT, GET, METHOD, SHARE

b. Dependent Variable: EPKM

Fig. 5 Model summary for the eight independent variables and the dependent variable

As shown in Fig. 5, the R square value is increased to 0.304 from the original 0.267, and the adjusted R square value is increased as well from 0.240 to 0.251. In addition to that, the R value is also increased from 0.517 to 0.552. This means that with the introduction of the cognitive enablers as independent variables, 30.4 percent (30.4%) of variation is explained by the model, compared to the earlier 26.7 percent (26.7%).

Instead of considering the cognitive enablers as independent variables, they should be considered as control variables or mediating variables (i.e. variables that mediates the relationship between an independent variable and dependent variable). It is suggested that the cognitive enablers are included as control variables using partial correlations analysis in SPSS. Fig. 6 shows part of the correlations results from the partial correlation analysis.

	EPKM	Correlation	.468	.267	.372	.320	1.000
		Significance (2-tailed)	.000	.004	.000	.001	.
		df	112	112	112	112	0
	METHOD	Correlation	.058	.017	-.015	.059	.021
		Significance (2-tailed)	.537	.859	.873	.533	.827
		df	112	112	112	112	112
	IDENTIFY	Correlation	.051	.054	.057	.036	-.115
		Significance (2-tailed)	.593	.568	.547	.703	.222
		df	112	112	112	112	112
	DECIDE	Correlation	-.126	-.114	-.115	.052	.012
		Significance (2-tailed)	.182	.228	.223	.579	.899
		df	112	112	112	112	112
	DRIVE	Correlation	.024	.004	.009	.027	-.003
		Significance (2-tailed)	.800	.969	.921	.778	.978
		df	112	112	112	112	112
METHOD & IDENTIFY & DECIDE & DRIVE	GET	Correlation	1.000	.362	.365	.428	.482
		Significance (2-tailed)	.	.000	.000	.000	.000
		df	0	108	108	108	108
	UNDERSTAND	Correlation	.362	1.000	.427	.369	.281
		Significance (2-tailed)	.000	.	.000	.000	.003
		df	108	0	108	108	108
	SHARE	Correlation	.365	.427	1.000	.565	.393
		Significance (2-tailed)	.000	.000	.	.000	.000
		df	108	108	0	108	108
	CONNECT	Correlation	.428	.369	.565	1.000	.323
		Significance (2-tailed)	.000	.000	.000	.	.001
		df	108	108	108	0	108
	EPKM	Correlation	.482	.281	.393	.323	1.000
		Significance (2-tailed)	.000	.003	.000	.001	.
		df	108	108	108	108	0

a. Cells contain zero-order (Pearson) correlations.

Fig. 6 Correlations between the four main independent variables and the dependent variable, with the additional four control variables

Referring to Fig. 6, there are some differences between the row on EPKM (as shown in the first row) and the row on EPKM after the cognitive enablers are included in the partial correlations analysis (as shown in the last row). The original correlations values for each relationship between the independent variables (i.e. GET, UNDERSTAND, SHARE and CONNECT) and the dependent variable EPKM are as shown in Table III. When the mediating variables are included, the correlations values changed to +0.428, +0.281, +0.393 and +0.323 respectively.

From this partial correlations analysis, the following results are conceived (as shown in Table IV), to show the difference between the relationships when the cognitive enablers are introduced as mediating variables.

TABLE IV
RELATIONSHIP BETWEEN THE VARIABLES BEFORE AND AFTER MEDIATING VARIABLES (*M*) ARE INTRODUCED

without Cognitive Enablers as Mediating Variables	with Cognitive Enablers as Mediating Variables
r(GET, EPKM) = **+0.468**	r(GET, EPKM|*M*) = **+0.482**
r(UNDERSTAND, EPKM) = **+0.267**	r(UNDERSTAND, EPKM|*M*) = **+0.281**
r(SHARE, EPKM) = **+0.372**	r(SHARE, EPKM|*M*) = **+0.393**
r(CONNECT, EPKM) = **+0.320**	r(CONNECT, EPKM|*M*) = **+0.323**

Even though the difference shown in Table IV looks quite small, it still shows the influence of the cognitive enablers, especially for variables GET, UNDERSTAND and SHARE relations with the dependent variable EPKM. Even with the increase of value in correlations, the significance level remains high, which is less than 0.05. With the result from this partial correlations analysis, equation (3) should be reproduced to represent how the cognitive enablers are actually reflected in the model.

VI. Conclusion

This research has achieved the main objective of validating the Effective Personal Knowledge Management model by proving the five hypotheses developed in the beginning. The first four hypotheses are proven by analysing the Pearson correlation coefficients between each independent variable (i.e. GET, UNDERSTAND, SHARE and CONNECT) and the dependent variable (i.e. EPKM). The fifth hypothesis is proven by formulating equations based on the model, with equation (2) formed by the four main independent variables (i.e. GET, UNDERSTAND, SHARE and CONNECT), and equation (3) formed by the same variables including the four cognitive enablers as additional four independent variables (i.e. METHOD, IDENTIFY, DECIDE and DRIVE). The difference between the equations proves that the cognitive enablers affect the relationships between the original four variables and the dependent variable, thus proving the fifth hypothesis.

This research paper can be further refined in terms of data analysis methodologies and the questionnaire design, to improve the significance of the model, especially in proving that the model is a good fit. Even though the model is originally developed for knowledge management in

organisation, this research paper proves that the model can also be applied in education environment, where adult learners are also practising personal knowledge management in their learning process. In order to care for the different scenario of respondents and research environments, the questionnaire design should be relooked to make it suitable for different type of knowledge workers or adult learners to understand and respond to. The questions can be of different style as well, such as score sheets developed and used in previous research by Ismail, Abdul Latif and Ahmad [5], which fits the purpose of that particular research settings.

In general, a higher significance level should be the optimum aim for the future research on this topic. Social network is just one of the many computer and Internet technologies and tools that is used by knowledge workers in their daily lives to manage their personal knowledge; leaving room for this research to be further expanded to other tools and other categories of knowledge workers. The results may differ, but the model should be proven applicable to these expanded research areas.

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