International Journal of Evaluation and Research in Education (IJERE)
Vol.3, No.1, March 2014, pp. 45~52
ISSN: 2252-8822

The Use of Tacit Knowledge and School Innovation in Malaysia Secondary School

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Article Info

Article history:

Received Dec 10, 2013
Revised Jan 20, 2014
Accepted Feb 26, 2014

Keyword:

Tacit Knowledge
School Innovation
Malaysia

ABSTRACT

The role of tacit knowledge in fostering organization innovation has increasingly gained interest many researchers. However, previous research dominating in the business sector. This study addresses these limitations by conceptualization in the academic setting.This study used the partial least squares (PLS) structural equation modeling (SEM) tool to test the relationship between the role of tacit knowledge among Malaysia secondary school principals and school innovation. Three types of skills used to measure tacit knowledge; cognitive skills, technical skills and social skills.As to measure school innovation, there are six latent variables; leadership, curriculum, co-curricular, student affairs, financial and structure and culture. Data from a questionnaire survey of 370 respondents from Sekolah Kebangsaan, Sekolah Jenis Kebangsaan (Cina) and Sekolah Jenis Kebangsaan (Tamil) were used to analyze the model. Partial Least Squares (PLS-SEM) was used to analyze the relationships between all the variables and found that social skill was the most significant predictor of tacit knowledge while co-curricular was the most significant predictor to school innovation and the use of tacit knowledge has a significantly smaller impact on school innovation.

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1. INTRODUCTION

Innovation has increasingly been a crucial topic of discussion for most organizations due to globalization. Innovation is not only the focus of profit organizations but also non-profit organizations. They have intensified their search for strategies that will give them a sustainable competitive advantage. In Malaysia, there are various initiatives to increase innovation, particularly in the public sector. These include the establishment of the National Council for Science and Research (MSPK) that serves to determine the direction in research and development. The purpose is to supervise the progress of the development of an ecosystem of innovation and wealth creation, (MAMPU) in public service that works to improve the culture of innovation in public services, policy formulation Science, Technology and Innovation and the Science, as well as the roadmap of Human Capital in Science, Technology and Innovation (STI) will also serve to further strengthen the country's founding.Similarly, the Malaysian Innovation Foundation (YayasanInovasi Malaysia) with the goal of nurturing innovative and creative human capital through science and engineering. This is to enable the public sector to be innovative and use a knowledge as a base in transforming the economy that requires consistent innovation Majlis Perundingan Ekonomi Negara-MAPEN (2010).

According to Smith et al. (2008) the factors that help an organization to sustain their innovation is through knowledge management where it refers to the utilizing of all types of knowledge, both internal or external [1]. Meanwhile, the innovation or new idea also obtained through the unusual thoughts Basadur and

Gelade (2008) in which an organization is fostering to convert tacit knowledge (which is embedded in the minds of people) to explicit knowledge (can be encoded electronically and transmission) through better knowledge management[2]. So many organizations use information technology to help disseminate this knowledge widely within the organization [3].

So that, knowledge plays an important role in creating innovation. This as contained in Organizational Knowledge Creation Theory by Nonaka (1994), which explains that the knowledge possessed by individuals belonging to the group in an organization can be manipulated into new knowledge that can be used to create innovation in organizations [4],[5]. Therefore, the secondary school principal need to be more innovative by using the tacit knowledge that they possess and improve the status quo of management style to create new knowledge through their existing knowledge.

In education, the Ministry of Education (MOE) has outlined a number of guidelines to enhance the creation of innovation in schools. Among others, the launch of the National Mission for Teras 2 in the Education Development Master Plan (PIPP, 2006-2010) that aims to enhance the creation of new knowledge and innovation and nurture first class mentality among Malaysians. This step follows findings by the Action Plan for the National Innovation Agency (AIM, 2009) stating that the existing curriculum contains low elements of creativity and innovation and that will affect the quality of human capital (Implementation Plan for Capital Development Innovative Human-Tertiary Level MOHE, 2010).

The above background indicates that there is a lot of room for improvement in the use of tacit knowledge in school innovation, where the current research was conducted.This paper aims to investigate the underlying relationship between of the use of school principals' tacit knowledge in Malaysia secondary school and school innovation.Therefore, based on the above discussion, this study proposed these questions:

a. What is dominant of tacit knowledge used among school principals in Malaysia secondary school?
b. What is the school innovation strategy being employed in Malaysia secondary school?

How is the influence of tacit knowledge and the application of tacit knowledge among secondary school principals in school innovation?

2. TACIT KNOWLEDGE AND SCHOOL INNOVATION

The knowledge-based theory of the firm suggests that knowledge is the organizational asset that enables sustainable competitive advantage in the competitive and global environments. The emphasis on knowledge in today's organizations is based on the assumption that barriers to the transfer and replication of knowledge endow it with strategic importance. Wang and Wang (2012) knowledge as the intangible assets for any organizations so it should be managed [6]. The theory of organizational knowledge creation proposes that new knowledge is created through processes of conversion between tacit and explicit knowledge: socialization, externalization, combination, and internalization [4]. Particularly in the emerging distributed organizations, effectiveness is highly dependent on how well knowledge is shared between individuals, teams, and/or units [7]. Many organizations are developing information systems designed specifically to facilitate the sharing and integration of knowledge [3]. Because the major challenges in organizational knowledge creation are to define knowledge sources thus IT is known for its capability but as tacit knowledge is bound to people its hard and cannot be externalized easily [5]. Thus there can be the KMS to support the creation, transfer and application of knowledge in organizations [7]. Organizations can not survive by simply using knowledge of the past and require new knowledge to improve their performance [8]. This is in line with Nonaka (1994), innovation can be understood as the process by which organizations create and define the problem and then make the new knowledge to solve them [4]. According to Nonaka et al (2000) described knowledge and created a social interaction between individuals and organizations [9]. In general, knowledge is divided into two types: explicit knowledge and tacit knowledge. Tacit knowledge is personal and hard to interpret which is rooted in action, procedures, commitment to values, emotions and other [10]. There are various definitions, but the definition given by Polanyi (1966) is more acceptable because he is the founder of the concept of identifying tacit knowledge [11].

Competitive advantage can be achieved if the organization values tacit knowledge [6],[10]. More recently, some previous studies empirically discussed the effect of the use of tacit knowledge on organization innovation [6],[12]-[14]. According to Erden et al (2008) the quality of tacit knowledge has been linked to experiences whereas high quality tacit knowledge will be reflected in the performance and individual ability to spontaneously design tasks, improve them, and discard old solutions and improve new approaches [5]. Therefore, it can be concluded that the use of tacit knowledge among secondary school principals will produce new knowledge that will be used in producing innovation in secondary school in Malaysia.

3. METHODS

The survey research method was employed in this study to collect data for testing the theoretical model. The 370 self-administrated questionnaires were used for collecting data from the respondents. A multiple method of data collection was employed, some questionnaires were mailed and some were personally administrated to the respondents. The questionnaires were distributed to 370 secondary school principals throughout the Malaysia. This process of distribution and collection of questionnaires was carried out over a period of 2 months.The following section presents the assessments of the goodness of measure of these constructs in terms of their validity and reliability which is known as measurement model and path analysis which is known as a structural model in PLS-SEM.A questionnaires using a five-point Likert scale was used to collect information for each construct of the research model.All instruments were adapted from previous literatures and were modified to evaluate the performance.Some modifications were made to align the scales with the Malaysia secondary school context. The two main criteria used for testing goodness of measures are validity and reliability. Reliability is a test of how consistently a measuring instrument measures whatever concept it is measuring, whereas validity is a test of how well an instrument that is developed measures the particular concept it is intended to measure [15].

4. DATA ANALYSIS

Partial Least Squares (PLS) analysis, a Structure Equation Modeling (SEM) techniques were used to evaluate the model. PLS evaluates the measurement model (relationships between items and constructs) within the context of the structural model (relationships among constructs) [16]. This technique does not require multivariate normal distribution or large sample sizes for its data. In this study, tacit knowledge ans school innovation is a formative construct. The majority of the respondents are male (53.8%), aged between 51 and 56 (55.9%), and Malay (71.9%) whereas others are Indian (8.6%) and Chinese (19.5%). Over 41.6% of the respondents have at least 6 years of working experience as a school administrator. The majority of the respondent holds a certificate / diploma (63.2%).

4.1 Evaluation of Measurement Model

The measurement model consists of relationships between the constructs and the items used to measure them. Its effectiveness is demonstrated through convergent and discriminant validity [17]. Construct validity testifies to how well the result obtained from the use of the measure fit the theories about which test is designed [15]. The questions here is does the instrument tap the concept as theorized? This can be assessed through convergent and discriminant validity. First, we looked at the respective loadings and cross loadings from Table 1 to assess if there are problems with any particular items. We used a cutoff value for loadings of 0.5 as significant [17]. As such, if any items which has loadings of higher than 0.5 on two or more factors than they will be deemed to be having significant cross loadings. From Table 1 we can observe that all the items measuring a particular construct loaded highly on that loaded lower on the other constructs thus confirming construct validity.

Next, we examined the convergent validity which is the degree to which factors that are supposed to measure a single construct, agree with each other. As suggested by Hair et al. (2010) we used the factor loadings, composite reliability and the average variance extracted to assess convergence validity. The loadings for all items exceeded the recommended value of 0.5 [17].

TABLE 1: Loadings and cross loadings

Construct	Items	Cognitive Skills	Technical Skills	Social Skills	KEMP	KURI	HEM	KOKO	KEW	SBUD
Cognitive Skills	KK4	**0.6755**	0.3099	0.2764	0.3131	0.3230	0.3858	0.2555	0.2877	0.2000
	KK6	**0.7274**	0.3310	0.3700	0.2606	0.2547	0.2124	0.1951	0.2761	0.2414
	KK8	**0.7909**	0.4034	0.4794	0.3882	0.3834	0.2670	0.2839	0.3266	0.3656
Technical Skills	KT2	0.4279	**0.7100**	0.2995	0.2750	0.3298	0.3108	0.2084	0.2352	0.2748
	KT3	0.2573	**0.7229**	0.3922	0.2332	0.1695	0.1722	0.1792	0.1538	0.2761
	KT5	0.3453	**0.7261**	0.3540	0.2894	0.1449	0.1708	0.2521	0.2345	0.2746
Social Skills	KS3	0.3818	0.3817	**0.7809**	0.4379	0.3677	0.3496	0.3394	0.3640	0.4122
	KS4	0.4328	0.3359	**0.7871**	0.4049	0.3241	0.2264	0.2643	0.2458	0.3514
	KS8	0.3887	0.3975	**0.7340**	0.3464	0.2513	0.2423	0.2682	0.3436	0.3523
KEMP	KEMP1	0.3443	0.2888	0.4451	**0.7135**	0.4677	0.4220	0.3828	0.3773	0.3990
	KEMP2	0.3951	0.3051	0.4301	**0.7913**	0.5739	0.5136	0.4235	0.4493	0.4650
	KEMP3	0.3829	0.3039	0.4267	**0.8093**	0.5043	0.5012	0.4437	0.4027	0.5172
	KEMP4	0.3073	0.2672	0.3266	**0.7382**	0.4495	0.4400	0.3644	0.3445	0.3999
	KEMP5	0.3064	0.2204	0.3433	**0.7200**	0.4552	0.4481	0.4562	0.3825	0.4665
	KEMP6	0.2650	0.2759	0.3784	**0.7547**	0.3989	0.4331	0.4789	0.3511	0.5837
	KEMP7	0.3209	0.2883	0.3729	**0.7384**	0.4138	0.4161	0.4335	0.3540	0.5522
KURI	KURI1	0.2901	0.1894	0.2857	0.4625	**0.7195**	0.4924	0.4194	0.4086	0.3182
	KURI2	0.3685	0.3199	0.3649	0.5744	**0.8296**	0.5479	0.5311	0.4778	0.4501
	KURI3	0.3871	0.2892	0.4051	0.5440	**0.7687**	0.5215	0.5276	0.4062	0.4328
	KURI4	0.3275	0.1357	0.2373	0.3542	**0.7395**	0.5698	0.3553	0.3411	0.2438
	KURI5	0.2923	0.1650	0.2411	0.3878	**0.7449**	0.6154	0.4198	0.3300	0.2685
HEM	HEM1	0.3053	0.2976	0.2736	0.4791	0.6320	**0.8272**	0.5002	0.4185	0.4255
	HEM2	0.3720	0.2450	0.3343	0.5235	0.5955	**0.8170**	0.4521	0.4195	0.3280
	HEM4	0.2459	0.1806	0.2449	0.4421	0.4853	**0.7474**	0.5538	0.4252	0.4427
KOKO	KOKO1	0.2760	0.2601	0.2857	0.5311	0.5480	0.6118	**0.7673**	0.4803	0.4954
	KOKO2	0.2255	0.1802	0.2675	0.4214	0.5070	0.5064	**0.8578**	0.4082	0.5016
	KOKO3	0.2676	0.2138	0.3370	0.4611	0.4869	0.5008	**0.8578**	0.4487	0.5443
	KOKO4	0.2857	0.2263	0.2921	0.4645	0.5342	0.5387	**0.8545**	0.5117	0.5006
	KOKO5	0.3022	0.2631	0.3632	0.4307	0.4247	0.4141	**0.7616**	0.4859	0.5280
	KOKO6	0.2505	0.2940	0.2734	0.3988	0.3484	0.4261	**0.6783**	0.3446	0.5039
KEW	KEW1	0.3731	0.2882	0.3928	0.4557	0.4543	0.4641	0.5216	**0.8145**	0.4700
	KEW2	0.2791	0.1733	0.2536	0.3425	0.3738	0.3652	0.4054	**0.7451**	0.2930
	KEW4	0.2294	0.1865	0.2327	0.2946	0.3099	0.3046	0.3442	**0.7141**	0.3025
	KEW5	0.3318	0.1651	0.2975	0.3451	0.3913	0.3998	0.3430	**0.7191**	0.3008
	KEW6	0.2167	0.2074	0.2797	0.3522	0.3168	0.3354	0.3700	**0.5762**	0.3926
SBUD	SBUD1	0.2961	0.3794	0.4106	0.5191	0.3472	0.4081	0.5697	0.3613	**0.7931**
	SBUD2	0.2808	0.3271	0.4131	0.4765	0.4120	0.3676	0.4892	0.3754	**0.7482**
	SBUD4	0.2811	0.2932	0.3561	0.5579	0.4117	0.4741	0.5457	0.4350	**0.8394**
	SBUD5	0.3183	0.2170	0.3188	0.4691	0.3248	0.3514	0.4168	0.3965	**0.7464**
	SBUD6	0.2995	0.2682	0.3962	0.4848	0.2957	0.3397	0.4658	0.3746	**0.7727**

*KEMP=Leadership, KURI = Curriculum, KOKO=Co-curricular, HEM= Student Affairs, KEW=Financial, SBUD= Structure and Culture

Composite reliability values (see Table 2), show the degree to which the construct indicators indicate the latent, construct ranged from 0.780 to 0.896 which exceeded the recommended value of 0.6 [16]. The average variance extracted (AVE) measures the variance captured by the indicators relative to measurement error, and it should be greater than 0.50 to justify using a construct [16]. The average variance extracted, were in the range of 0.515 and 0.6384. In this model, all the factor loadings and composite reliabilities fall in the acceptable range and are significant at the 0.01 level. The results show that this model meets the convergent validity criteria.

TABLE 2: **Result of measurement model**

	CR	AVE
Cognitive Skills	0.7760	0.5370
Technical Skills	0.7632	0.5180
Social Skills	0.8114	0.5893
Leadership	0.9014	0.5669
Curiculum	0.8731	0.5797
Student Affairs	0.8400	0.6368
Co-curricular	0.9132	0.6384
Financial	0.8402	0.5155
Structure and Culture	0.8862	0.6095

Next we went to test the discriminant validity.The discriminant validity of the measures is the degree to which, factors that are supposed to measure a specific construct do not predict conceptually unrelated criteria [18].

TABLE 3: Discriminant validity

	SBUD	HEM	Cognitive Skills	Social Skills	Technical Skills	KEMP	KEW	KOKO	KURI
SBUD	**0.7807**								
HEM	0.5006	**0.7980**							
Cognitive	0.3765	0.3856	**0.7328**						
Social Skill	0.4850	0.3561	0.5226	**0.7677**					
Technical	0.3823	0.3032	0.4789	0.4836	**0.7197**				
KEMP	0.6440	0.6036	0.4416	0.5174	0.3703	**0.7529**			
KEW	0.4980	0.5279	0.4058	0.4136	0.2901	0.5061	**0.7180**		
KOKO	0.6403	0.6296	0.3354	0.3791	0.2974	0.5671	0.5622	**0.7990**	
KURI	0.4609	0.7168	0.4404	0.4108	0.2984	0.6205	0.5211	0.5998	**0.7614**

*KEMP=Leadership, KURI = Curriculum, KOKO=Co-curricula, HEM= Student Affairs, KEW=Financial, SBUD= Structure and Culture

Diagonals (in bold) represent the average variance extracted while the other entries represent the squared correlations**.**

We used Fornell and Larcker's approach to asses discriminant validity whereby the AVE for each construct should be higher than the squared correlation between the construct and any of the other construct. In total, Table 3 indicates that the measurement model shows the adequate convergent validity and discriminant validity.

Cronbach's alpha coefficient also used to assess the inter item consistency of the measurement item. Table 4 summarizes the alpha values. However, as seen from Table 4, mostly the alpha values are above 0.6 as suggested by Nunnally and Bernstein (1994) and Churchil (1979) except for cognitive skill and technical skill [19],[20]. As for others construct the composite reliability values ranged from 0.763 to 0.913. Interpreted like a cronbach alpha for internal consistency reliability estimate, composite reliability of 0.7 or greater is considered acceptable [16]. So, it can be conclude that the measurement is reliable.

TABLE 4: Result of reliability test

Construct	Measurement Items	Cronbachs Alpha	Number of Items
Cognitive Skills	KK4, KK6, KK8	0.5708	3
Technical Skills	KT2, KT3, KT5	0.5349	3
Social Skills	KS3, KS4, KS8	0.6509	3
Leadership	KEMP1, KEMP2, KEMP3, KEPM4, KEMP5, KEMP6, KEMP7	0.8722	7
Curriculum	KURI1,KURI2,KURI3,KURI4, KURI5	0.8191	5
Student Affairs	HEM1, HEM2, HEM4	0.7133	3
Co-curricular	KOKO1,KOKO2,KOKO3,KOKO4,KOKO5,KOKO6	0.8848	6
Financial	KEW1,KEW2,KEW4,KEW5,KEW6	0.7610	5
Structure and Culture	SBUD1,SBUD2,SBUD4,SBUD5,SBUD6,	0.8393	5

4.2 Evaluation of Structural Model

Figure 2 and Table 1 presented the results of hypothesis testing by examining the structural relationship among the latent variables in our model. For H1, H2 and H3 examined the effects of on the use tacit knowledge on cognitive skill, technical skill and social skill respectively that have values of 0.804, 0.772 and 0.834 ($p<0.05$), so hypothesis H1, H2 and H3 were supported. Thus, this research answered the first questions that social skill was the most significant predictor knowledge among secondary school principalsin Malaysia.

Contrary to school innovation, it indicates that all are positively associated; leadership (ß= 0.842, $p<0.01$), curriculum (ß= 0.802, $p<0.01$), student affairs (ß= 0.796, $p<0.01$), extra-curricular (ß= 0.846, $p<0.01$), fnancial (ß= 0.727, $p<0.01$), structure and culture (ß= 0.768, $p<0.01$) to school innovation. From the Table and Figure show that extra-curricular was the most significant predictor to school innovation. Bootstrap resampling method was used to computed t-value for all paths (Table) which were the parameter estimates for all the paths in the structural model. As shown in the Table all the hypotheses are supported.

The predictive and explanatory power of the model is evaluated on the amount of variation in the endogenous constructs (school innovation).The R^2 value was 0.359 suggesting that 35.9% of the variance in school innovation can be explained by the used of tacit knowledge of cognitive skills, technical skills and social skills.

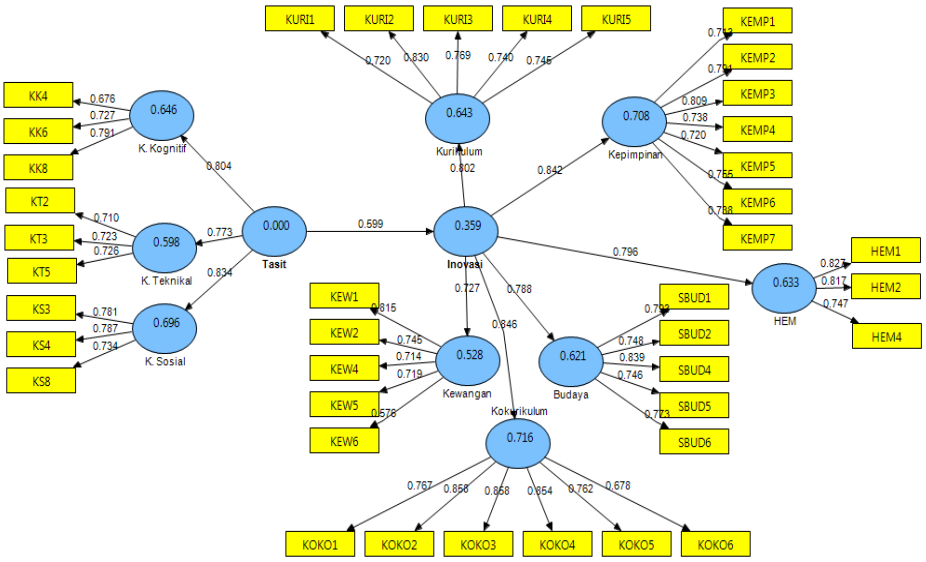

FIGURE 1: Result of the path analysis

TABLE 5: Analysis of Structural Model (path coefficient)

Research Questions	Relationship	ß	*T* value
a	Cognitive Skills→Tacit Knowledge	0.804	34.8454
	Technical Skills→Tacit Knowledge	0.772	29.7454
	Social Skills→Tacit Knowledge	0.834	44.6223
b	Leadership→School Innovation	0.842	51.2499
	Curriculum→School Innovation	0.802	39.6174
	Student Affairs→School Innovation	0.796	39.8675
	Co-curricular→ School Innovation	0.846	47.4841
	Financial→School Innovation	0.727	24.8283
	Structure and Culture→ School Innovation	0.768	39.1209
c	Tacit Knowledge →School Innovation	R^2= 35.9%	

5. DISCUSSIONS

The result of the study showed that the most dominant tacit knowledge used by headmasters in primary schools is in the kind of social skills (see Table 5). This is followed by cognitive skills and technical skills.While using social skills the headmaster treat every customer complaints effectively. They also encourage the school community to act together to improve school performance and they also active in all

programs organized by Majlis Guru Besar (MGB). This will facilitate and create a comfortable work environment, therefore easing the transfer of tacit knowledge which is unmanageable to be transmitted. Moreover, this situation also makes the school members work more efficiently and promote the creation of new ideas.

Based on the findings, the priority of innovation in the primary school is in the fields of co-curricular. This was followed by the leadership, school structure and culture, curriculum, and student affairs and finance. All of this is very relevant to the realities of the job as administrator in the school. Meanwhile, as a leader, they were demanding to innovate themselves so the school will perform excellently. Their leadership style should promote the utilization of tacit knowledge in the school. So that, this will create a bunch of new ideas. No doubt this new idea will be a catalyst to the process of innovation.

From this work, the use if the tacit knowledge influence innovation by 35.9%, which is mean that only 35.9% of the innovation in the primary school were determined by tacit knowledge utilization.It's even showing the use of head master tacit knowledge. And so, all headmaster should enhance the usage of their tacit knowledge in their jobs because according to Popadiuk and Choo (2006) which stated that the optimizing the use of tacit knowledge will increase the innovation [12].

6. CONCLUSION

The relationships between tacit knowledge and school innovation may provide a guide as to how secondary school principal can achieve innovation in their school by utilizing their existing knowledge through effective social skill.They should contemplate the important antecedents of school innovation that lead in improving innovation.Furthermore, strategies and programs should be designed to improve this situation. This result indicates that the exercise of social skills among school principals can enhance the school innovation.This result is consistent with studies by Haslina Said (2012) and Norashimah Ismail (2008) who found that school leader who have a high degree of interpersonal skills with their subordinate be able to produce creative strategies in handling the problem in the school [21],[22]. It due to their existing knowledge and experience and easily respond to handle administrative roles in schools. This was described by Polanyi (1966) that tacit knowledge can be witnessed by the action of the individual solving the problems [11]. Hence, according Norashimah (2008) school leaders gained experience through their experience as a senior assistant, to learn from the clerk, talking to colleagues and reading as well as do reflection on problems encountered during administrating the schools [22]. As Polanyi (1966) states that tacit knowledge gained through experience and social interaction between individual in the organizations [11]. Moreover, Bity Salwana (2009) in her study also found that school leaders have good social skills and relationships with their subordinates when they are concerned, empathetic, fair, honest, open, friendly, flexible, supportive attitude and act as a problem solver in the school [23].

However, this finding is inconsistent with the findings by Azlin (2006) who found that school leaders are not open to change, especially in dealing with the management whereby they found problems in planning activities within the provided time [24]. So according to Haslina Said (2012) this situation may affect the innovation as the school leader cannot interpretthis problem into creative solutions due lack creativity and ability to think globally [21]. Beside, the result also shows that the utilization of cognitive skills and technical skills tend to be used less among the secondary school principals. Amazingly, all respondents in the study have had more than 10 years experience as a head teacher. Hence, here this experience or tacit knowledge has not been utilized on their daily works at school.

This study also suggests that the extra-curricular was the most significant predictor of school innovation. This result followed by leadership, curriculum, student affairs, structure and culture and finally financial respectively. Financial show the less significant predictor of school innovation. As the study by Kamaruzaman (2009) found that financial need more innovationpractice because this factor can hinder the implementation of the school innovation [25].

Nevertheless, this study has produced empirical evidence to support the hypothesized associations that the role of tacit knowledge will give less contribute to school innovation through social skill practices among the secondary school principal.The findings bring more insight how secondary school should enhance their innovation by using the existing tacit knowledge that embedded in the mind of the school principal.

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