

The relationship between knowledge management and instructional innovative ability: empirical research from teaching staff at Taiwanese technological and vocational universities

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ABSTRACT: The main purpose of this study was to discuss the roles and correlation of knowledge sharing and knowledge absorbing capability in developing the instructional innovative abilities of teaching staff at Taiwanese vocational universities. The research implemented an empirical survey through a correlation analysis and the LISREL method on 550 teaching staff members by random sampling from 110 Taiwanese technological and vocational colleges or universities. The results indicate that knowledge absorbing capability is an intermediary variable of knowledge sharing and instructional innovative ability. It shows a positive correlation to knowledge sharing, knowledge absorbing capability and innovative ability.

INTRODUCTION

Research Background and Purposes

Knowledge is power; Sambamurthy and Subramani argued that competition between corporations is more precious than natural resources and capital [1]. In today's world with the rapid expansion of knowledge and increasing competitive stresses in the macro-economy, this argument applies to the academic sector too. In this era of the knowledge economy, we as educators need to cultivate people who have more diversified abilities. As the half-life of knowledge is decreasing, if educators, being in the frontline of knowledge, keep instructing students to adapt to the new world by their past experiences alone, then the knowledge gap increase. Thus, teachers' professional development plays a key role in training students with diversified abilities.

As education is a profession and educators are professional workers, this focus should be reflected in the educational scenario so that educators keep up with the latest trends through continuing research and study. Therefore, knowledge management is an important management systems, and *teaming up* is important for those colleges or universities that belong to the competence network of knowledge management systems. Using knowledge management to increase efficiency is an essential component for the above academic institutes. In addition, research on knowledge management has become a popular topic. In such research, it can be have found that knowledge sharing is the biggest difficulty and challenge to knowledge management [2-4]. Liebowitz pointed out that the basis of knowledge management is knowledge sharing, which might be the power behind the inspiration of knowledge innovation and transformation [5].

Concerning competitive advantage, Hill and Jones asserted that, after selecting a unique competitive focus, companies

could develop their niche by the establishment of their knowledge absorbing capability [6]. In the relevant literature, there are few studies about how to enhance and develop the knowledge absorbing capability – although some innovative researchers have pointed out the remarkable influences of knowledge absorbing capability on workers' innovative ability [7][8].

In past research, the knowledge absorbing capability focused on the ability to acquire knowledge and transformation by academic staff. It was concluded that there was a closed relationship between knowledge and the knowledge absorbing capability. In conclusion, the characteristics of knowledge results in some extension of the relationship between knowledge sharing, innovative ability and knowledge-absorbing capability. However, most research has discussed the result of knowledge sharing based on its influence. Research on whether knowledge sharing would influence the knowledge absorbing capability and ability for innovative work is unclear. Therefore, based on the previously stated background and motivation for this study, the research purposes of the study presented in this article can be divided into the following four categories:

- Research into the relationship between knowledge sharing and instructional innovation by academic staff at vocational institutes;
- Research into the relationship between knowledge absorption and instructional innovation by academic staff at vocational institutes;
- Research into the relationship between knowledge sharing and the knowledge absorbing capability of academic staff at vocational institutes;
- Establishment of the causes and effects of knowledge sharing, knowledge absorption and instructional innovation so as to understand the influences between all the variables.

With information technology, the acquisition and transmittal of knowledge has become more convenient and easier. However, knowledge absorption and innovation can not be obtained through technology [9]. Technology is only a tool and is useless unless it is effectively used by a human operator. The function of the incubation of talent and knowledge as spread by teachers would not be disabled in this era of the knowledge economy. In the knowledge-based economy, teachers would not be able to stay in the traditional role of *knowledge transferring and problem solving*; they have to adjust their roles to the era of the knowledge economy where teachers play the roles of *talent incubator* and *learning inspirer* in the teacher-student relationship. In addition, instructors also have to incorporate knowledge sharing, absorbing and innovating in their development paths.

Knowledge Sharing

Over the years, researchers have defined knowledge sharing differently. Senge defined this as the capability to assist others to develop efficiency in action, in which interactions are involved to transform knowledge to an action capability [10]. Holtshouse pointed out that in the research of knowledge, many believed that knowledge sharing and exchanging was achieved through the steps of investigation, interaction and body language [11]. Lee defined knowledge as *knowledge sharing through all kinds of tools and procedures between organisational members* [12]. Dixon also defined the tools of knowledge sharing and transforming could include the knowledge database, best practice seminars, technology, inter-functional teams, e-mails and community software [13]. Thus, teachers should construct their knowledge and share it with colleagues.

Knowledge can be more fulfilled and carefully thought out through knowledge sharing in informal and formal discussions, brainstorming sessions and interviews. Davenport and Prusak believed that knowledge is a unique asset that, with adequate stimulation, plus knowledge sharing and exchanging, would result in the accumulation of organisational knowledge assets [4][14]. Hooff and Weenen divided organisational knowledge sharing into knowledge offering and knowledge collecting [15]. Hendriks pointed out that knowledge sharing is a process of communication where, unlike the transfer of other products, knowledge is unable to be delivered freely [16].

When organisational members attempt to learn from others, they assimilate, integrate and hence share others' knowledge. Furthermore, knowledge receivers have been restructuring behaviours that are contained within knowledge learning and sharing. Therefore, knowledge sharing involves the following two key factors:

- *Behaviour of externalisation*: knowledge owners have to be willing to present and edit the knowledge system, and organise files or the knowledge database to transmit knowledge communication;
- *Behaviour of internalisation*: knowledge requesters internalise the behaviour of knowledge reconstruction, including on-the-job-training, reading and understanding items of the knowledge database [17].

Based on the above-mentioned points, this research has divided knowledge sharing into externalisation and internalisation.

Most researchers in the management field are in agreement on the importance of the absorbing abilities of organisations. Cohen and Levinthal raised the concept of the absorbing capability and it has since been taken seriously by scholars in the management field. Cohen and Levinthal believed that the absorbing capability is the ability that combines valuation, assimilation and manipulation of external information; finally, from this, commercial abilities are formed [7]. Zahra and George pointed out that the absorbing capability should be formed with potential ability [18]. Organisations might be able to obtain and assimilate key knowledge, but they might not be able to transform and use such knowledge.

Minbeava, Pedersen, Bjorkman, Fey and Park further indicated that the learning ability and learning motivation are the key factors in the absorbing capability. The learning ability is about the professional knowledge of organisational staff and their abilities to utilise that knowledge [19]. On the other hand, learning motivation focuses on the willingness to engage in hard work that results in rewards and encouragement with good performance reviews. Liao, Fei and Chen proved that the learning ability and learning motivation are key aspects for the absorbing capability, which is an important bridge to knowledge sharing and innovative ability [20].

Therefore, this research is divided into learning ability and learning motivation as follows:

- *Learning ability*: the ability that teachers possess to acquire both internal and external knowledge, and transform that knowledge of themselves and organisations;
- *Learning motivation*: teachers are encouraged by academic institutions to manipulate their knowledge so that they are transformed into assets of their institutions and themselves.

Instructional Innovative Ability

Instructional innovation occurs when teachers adapt diversified and agile methods in their teaching to achieve the following:

- Inspire students' inner learning interests;
- Incubate a self-initiated learning attitude;
- Increase the learning abilities of their students [21].

In other words, instructional innovation means teaching with creativity and energy that captivates students and motivates their learning, develops learning initiatives and increases students' learning abilities. Wang considered that the purpose of instructional innovation was to introduce new ideas of teaching concepts, methods or tools, while creative teaching develops and manipulates novel, original and inventive teaching methods [22]. Narrowly speaking, instructional innovation means the use of others' teaching concepts, ideas or tools, or the development of one's own. Creative teaching utilises one's own teaching methods and tools to encourage learning interest. Broadly speaking, instructional innovation and creative teaching are similar in definition; therefore, this research has adopted a broad definition and has taken creative teaching to be the same as instructional innovation.

As an influence of advanced studies, creative teaching is a weakness of the professional skill development of teachers and

an obstacle to the development of the knowledge economy. Thus, the demands to encourage creative teaching are necessary and urgent. When teachers have creative teaching skills, they can use diversified, lively and technologically savvy teaching methods in order to fulfil the inner learning of students, inspire their thinking and develop their learning. In turn, this will provide advantageous competitiveness to advance the knowledge economy.

Knowledge Sharing and Instructional Innovation

Quinn, Anderson and Finkelstein have stated that through knowledge sharing, the information acquired and experience grows linearly [23]. Lee pointed out in research into knowledge sharing and organisational system outsourcing that knowledge sharing is the main predictive factor as to whether corporation outsourcing activities are successful [12]. Hong, Doll, Nahm, and Li discovered that knowledge sharing has a noticeable and positive correlation with the development of new products [24]. Hence, this research proposed the first assumption as:

H1: Knowledge sharing is positively correlated with the teaching innovation of academic staff at vocational institutes.

Knowledge Absorbing and Instructional Innovation

Zahra and George proved that many research studies on the absorbing capability and innovative verifications show noticeable positive correlations [18]. Knudsen and Roman have also pointed out that the absorbing capability is the key factor in predicting the innovation ability of organisations [8]. Thus, the second assumption of this research is:

H2: The knowledge absorbing capability is positively correlated with the teaching innovation of academic staff at vocational institutes.

Knowledge Sharing and Knowledge Absorbing

There are very few studies on knowledge sharing and knowledge absorbing. Robbins believed that many characteristics of organisations, such as team spirit and the ranking of highly respected staff, might result in both positive and negative subjective sensations that might influence performance and satisfaction of staff [25].

Liao et al agreed that if knowledge sharing between staff members is able to become part of the organisational culture, then staff would be influenced by this culture during their interactions with others and accordingly acquire new knowledge and increase their learning abilities [20]. At the same time, learning motivations would be enhanced in this learning atmosphere.

It was also found in practice that different organisations have different influences on knowledge sharing where some would be noticeably affected, while others would be only partly affected. This research proposes a third assumption in discussing the correlation between knowledge sharing and knowledge absorbing in vocational institutes as follows:

H3: Knowledge sharing is positively correlated with the knowledge absorbing capability of academic staff at vocational institutes.

Research Framework

From the assumptions mentioned above, a research framework has been established as shown in Figure 1.

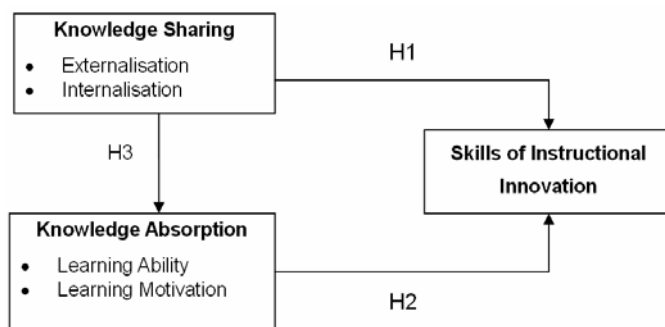


Figure 1: The research framework.

RESEARCH DESIGN

Research Target and Sampling

The target of this research was the academic staff of 110 vocational institutes in Taiwan. The population of the survey was further divided into public and private technological universities and colleges, which were sampled randomly. In total, 550 random sampling questionnaires were collected with effective answers from 349, representing an effective retrieval rate of 63.45%.

Design of the Questionnaire

The research questionnaire was divided into knowledge sharing, knowledge absorbing and instructional innovation capability. Knowledge sharing and knowledge absorbing were further divided into two sub-categories. All parameters were measured with a Likert-type Scale with five choices: *strongly agree* (5 points), *agree* (4 points), *uncertain or don't know* (3 points), *disagree* (2 points) and *strongly disagree* (1 point). The respondents could choose any selection based on situations they were facing.

The content of questionnaire is as follows:

- *Knowledge sharing*: the measurement scale of this category was structured with reference to the views of Hooff and Weenen on knowledge sharing and the views of Lin concerning professions and the cooperation of teachers [15][26];
- *Knowledge Absorbing*: the measurement scale of this category was structured with reference to the views of Cohen and Levinthal, and Mineaeva et al, as well as other professionals' views [7][19];
- *Instructional Innovation*: the measurement scale of this category was structured with reference to the views of Cheng on creativity in the teaching concept, and the *Creativity Education White Paper* of Wu [27][28].

Credibility and Effectiveness of Survey

The analytical measurement scale of this survey used Cronbach's α as the principal component method for credibility and effectiveness. Nunnally suggested that loading values be greater than 0.5 for all factors. All values of Cronbach's α were higher than 0.7 and the eigen value was greater than 1 to

examine all parameters and factors for survey accuracy [29]. All data is shown in Table 1, which identifies that all indicators of credibility and effectiveness of this survey were within the acceptable range. Furthermore, the convergence of all t-values exceeded 2, which suggests that all the questions in every category were effective.

DATA ANALYSIS AND RESULTS

Relevant Analysis

The relevant analysis matrix of all the research categories is shown in Table 2.

The results in Table 2 indicate the following:

- Generally, higher scores in knowledge sharing showed that academic staff with such scores had better results in the knowledge sharing category;
- It was found that the two-dimensional categories of knowledge sharing and instructional innovation had a positive correlation;
- It was ascertained that the two-dimensional categories of knowledge absorbing and instructional innovation had a positive correlation;
- It was determined that the two-dimensional categories of knowledge sharing and knowledge absorbing had a positive correlation.

Analysis of the LISREL Model

The above relevant analysis showed the general research results. In order to understand the relationships between all the parameters further, this research used SEM to analyse the results [30]. These were as follows:

- Adequate analysis of models: as Bagozzi and Yi suggested, GFI>0.9, AGFI>0.9, NFI>0.9, RMR<0.05 and NCI<3, etc [30]. Data of this research was GFI=0.951, AGFI=0.902, NFI=0.91, RMR=0.02 and NCI=2.78, which indicate that all measures were within a satisfactory range;
- Fitness of the model internal structure (path analysis): a route analysis of the estimations of all parameters is listed in Table 3 and the model analysis diagram is shown in Figure 2. Table 3 shows that the t-values of all the variables were greater than 1.96, and all γ and β values were positive, showing that all categories were in positive influence mode.

CONCLUSIONS

There is a positive correlation of the two categories (externalisation and internalisation) of knowledge sharing with instructional innovation, which means that when there is more knowledge sharing, the influences on instructional innovation are greater. The result is consistent with the research result of knowledge sharing and new product development by Hong, Doll, Nahm and Li; therefore, assumption H1 is verified [24].

Table 1: Data obtained from the survey.

Category	No. of Questions	α	CR	GFI	AGFI	RMR	t-Value
Externalisation	5	0.81	0.81	0.958	0.912	0.030	12.7~17.4
Internalisation	5	0.83	0.89				9.8~16.3
Learning ability	4	0.80	0.83	0.926	0.889	0.040	11.4~15.6
Learning motivation	4	0.89	0.83				7.9~16.4
Instructional innovation	4	0.85	0.86	0.937	0.901	0.030	10.9~11.2

Table 2: Matrix of the research parameters and key factors.

Category	1	2	3	4	5
Externalisation	1.00				
Internalisation	0.75*	1.00			
Learning ability	0.41*	0.33*	1.00		
Learning motivation	0.48*	0.45*	0.65*	1.00	
Instructional innovation	0.49*	0.44*	0.55*	0.48*	1.00
Mean	3.95	3.97	3.60	3.43	3.36
SD	0.57	0.45	0.62	0.72	0.73

Note: *p<0.05; N=349

Table 3: LISREL fitness of the model's internal structure.

	Parameter	Standardised Parameter Value	t-value
Externalisation → learning ability	γ_{11}	0.313	3.984**
Externalisation → learning motivation	γ_{21}	0.311	4.012**
Externalisation → instructional innovation	γ_{31}	0.372	2.854*
Internalisation → learning ability	γ_{12}	0.251	3.991**
Internalisation → learning motivation	γ_{22}	0.271	2.764*
Internalisation → instructional innovation	γ_{32}	0.298	3.024**
Learning ability → instructional innovation	β_{31}	0.425	6.213**
Learning motivation → instructional innovation	β_{32}	0.398	6.011**

*p<0.01 **p<0.001

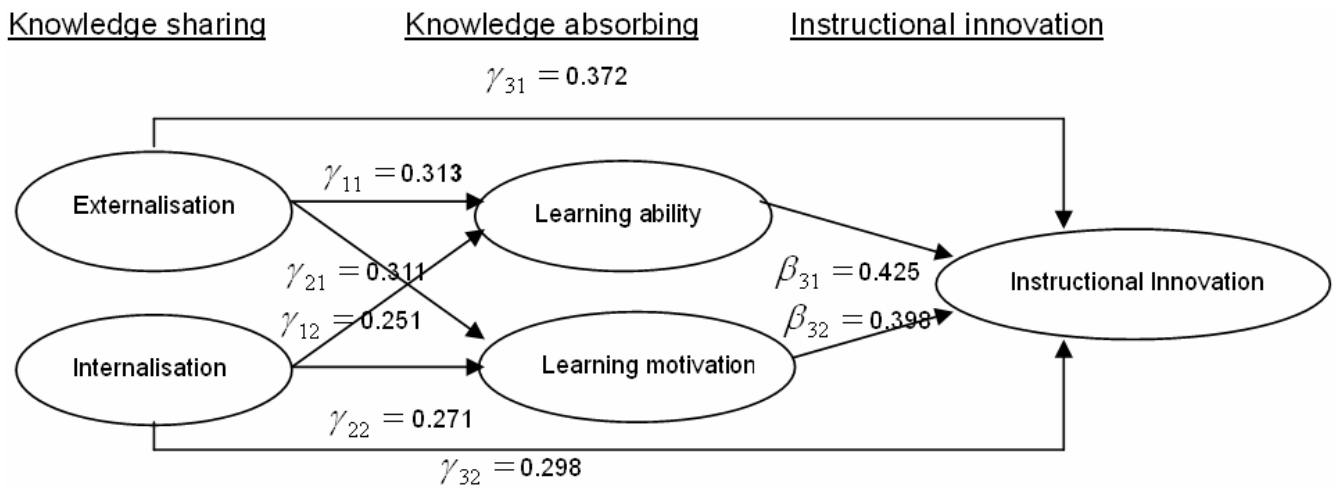


Figure 2: Model of the route analysis.

A positive correlation was found for the two categories (learning ability and learning motivation) of knowledge absorbing with instructional innovation, which means that when the learning ability and motivation are stronger, the performance of instructional innovation is better. This result shows that knowledge absorbing plays an important role in the instructional innovations of organisations. This is consistent with the research results of knowledge absorbing capability deciding or predicting innovation ability of organisations by Cohen and Levinthal, as well as and Nieto and Quevedo [7][31]. Therefore, assumption H2 is verified.

The two categories of the knowledge sharing of academic staff were found to have outstanding influences on the two categories of knowledge absorbing. Therefore, this research suggests that knowledge sharing can assist in the development and upgrading of academic organisations, as well as the knowledge absorption of teachers. This procedure can be seen as learning driven by organisational culture, which is the foundation of the creation of a corporation's competitiveness. Therefore, assumption 3 is verified.

The result of this research shows that knowledge-absorbing capability is the intermediate variable and bridge for knowledge sharing and instructional innovation. In other words, the knowledge-sharing behaviours of teachers not only affect innovation ability, but with the enhancement to knowledge absorption, create a multiplier effect.

This research result is not completely equivalent to the research result for the private sector by Liao et al [20]. In that study, it was suggested that knowledge sharing only had a partial effect on the knowledge absorbing capability. Knowledge sharing was only effective for the innovation ability when combined with knowledge absorption, which was a curious result of this research. It is believed that the reason for this is that organisations have different natures. Although academic organisations and corporations are both gatherings of people and face competitive environments, the purpose of educational and commercial behaviours are different and affect the formation of organisational cultures in different ways.

RECOMMENDATIONS

Knowledge sharing, knowledge absorbing and the ability for working innovation are interrelated. Only successful knowledge sharing can result in a strong knowledge absorbing

capability that would help organisations to surpass other competitors with better innovation capabilities. This research has proved that knowledge sharing could develop the knowledge absorption of teachers, which provides a strong reason for aiming to deploy knowledge sharing.

Knowledge sharing assists in knowledge absorption; therefore, educational organisations should undertake the following:

- Encourage their staff to share knowledge;
- Establish related techniques and rewards guidelines;
- Open different sources for obtaining information.

Teachers should understand that knowledge absorption is an important procedure to maintain the competitiveness within and of academic organisations. By facing the same direction, organisations would be able to grow and thus teachers could find their values.

Knowledge absorbing could influence instructional innovation capabilities. As such, academic organisations should pay more attention to the related skills and capabilities of teachers, and understand how to encourage teachers to share their skills and knowledge so as to enhance the value of both schools and teachers. This would be advantageous to the growth and development of schools.

This research has focused on the importance of knowledge sharing, and the authors have discussed its correlation with knowledge absorption and working innovations. However, it has not focused on how to execute successful knowledge sharing and establish the appropriate factors of knowledge sharing. Further research topics should focus on the competitive advantage, competitiveness and performances of schools.

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