The Influence of Support for Innovation on Organizational Innovation: Taking Organizational Learning as a Mediator

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Abstract The purpose of this study was to examine the role of organizational learning as a mediator variable between support for innovation and organizational innovation. Samples for this study were randomly selected from 22 technological colleges in Taiwan. The final sample included 322 participants in the full sample which accounted for 58.42 % of the sample. A structural equation modeling (SEM) approach was used to evaluate the complex structure of the proposed research constructs. The study concluded that organizational learning was an important determinant of organizational innovation in technological colleges. Support for innovation had a positive relationship on organizational learning and organizational innovation.

Keywords Support for innovation · Organizational learning · Organizational innovation · School innovation · Innovation

Introduction

During the past 50 years, technological and vocational education has made significant contributions to Taiwan's

economic development by training technical specialists (Ministry of Education 2009). However, with now facing global competition and industrial transformation rapidly, technological education is failing to meet the needs of industry (Hsiao et al. 2010). Enterprises need employees with innovation and creativity. Unfortunately, the graduates of technological colleges do not meet the needs of enterprises. It resulted from technological colleges students' creative and innovative abilities were not as good as before (Hsiao et al. 2009).

Currently, the type of industry has been transferring gradually from labor-intensive to technology-intensive and even knowledge-intensive industry (Ministry of Economic Affairs 2011). This transformation has resulted in rapid changes to Taiwan's industrial structure and technology base that has affected the preparedness of technological college graduates to enter the high-tech workforce (Hsiao et al. 2008). Students' creative and innovative performance can predict individual innovation at work after they graduate from technical college. The education of technological colleges in Taiwan offers students a variety of professional courses and focuses on skills and technical training. It also includes the development of their creative and critical thinking abilities in preparation for the workplace where these skills and abilities are much sought after.

Organizational innovation is one of the most increasingly interesting areas of workforce education (McCharen et al. 2011). One of the most complex settings for organizational change is the school (Bonner et al. 2004). Innovation through creativity is an important factor for the success and competitive advantage of organizations (Woodman et al. 1993). In the management perspective, organizational innovation could be regarded as process innovation and product improvement; and from the educational context standpoint, school innovation could lead school system and

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work process innovation and improving the quality of education and policy (McRoy and Gibbs 2009). Schools need to be more creative and innovative in order to compete, to grow, and to lead. Helping students perform in the realm of creative behavior requires changes in both educational policy and teaching practices (ChanLin et al. 2006). School leaders are providing inspiration and motivation for teachers and teachers are introducing more innovative activities into their classrooms (Hsiao and Chang 2011).

The Taiwan's technological and vocational education system has a similar to general organizations in terms of dynamic work process, complex structure, and systemic connections with both internal and external organizations. Principal is a leader of organization as above, and he/she is the most influential person at school (Wahlstrom and Louis 2008). However, school principals can act in both formal and informal ways to build commitment toward the organization (Hsiao et al. 2010). The principals can interact with supervisors, teachers, parents, and students in a loose organizational structure (Catano and Stronge 2007). The teaching and learning process is the foundation of education. In order to achieve educational goals, the school administrators should endeavor to influence teachers (Olaleye 2008). Principals are expected to exhibit leadership and improve schools to enhance teaching and learning in the school. It is their responsibility to have a positive influence on teacher organization. Wahlstrom and Louis (2008) examined various factors that are often present in principal–teacher interactions relationship to see how these may have an impact on teachers' classroom instructional practices. The results show that increasing our knowledge about what leaders do and how they have an impact on the instructional behaviors of teachers will lead us to a better understanding of how leadership has a direct relationship to improved student achievement. These findings create a clearer picture of teacher–principal interactions that support learning and bring us closer to the elusive goal of clarifying the link between leadership and learning.

For teachers to innovate in organizations, they must engage in continuous learning, whether from students, peers, textbook publications, training experiences, or any other domain. Learning means changing our understanding, and changing understanding is fundamental to innovation (West and Sacramento, 2011). Organizational learning could be defined as a collective and collaborative learning process for dynamic and creative decision making to respond to changes in both internal and external environment of the organization (Argyris and Schon 1996). Organizational learning in schools in the context of education is regarded as a learning community (Imants 2003). The organizational learning emphasizes the importance of interaction that encourages “outward focuses” to bring new knowledge into the organization (Burgoyne et al.

1999). Through interaction with others, teachers not only learn effectively, but also shape their motivation for potential innovation and develop skills in a learning community. Argyris and Schon (1996) asserted that organizational learning enhances the organization's innovative capacity. Most studies regarding organizational learning associate it with organizational innovation (Hsiao et al. 2009; Weerawardena et al. 2006). There is evidence that supportive leadership is positively associated with organizational learning (Lei et al. 1999; Montes et al. 2005; Swiering and Wierdsma 1992; Tushman and Nadler 1986) and innovation (Montes et al. 2005). This support leadership enables the building of teams and provides them with direction, energy, and support for processes of change and increased cohesion (Tushman and Nadler 1986).

School leaders are encouraged to use a range of activities and diverse management strategies to facilitate innovation in teachers (ChanLin et al. 2006). Some studies found that support for innovation may have an influence on organizational innovation (Gumusluoglu and Ilsev 2009a; Hsiao et al. 2010; Scott and Bruce 1994). However, there is a lack of studies examining whether the support for innovation has a direct effect. Empirical studies have not examined the mediating role of this contextual factor while investigating the relationship between organizational learning and support for innovation. Based on the above, this study aimed to explore the impact of support for innovation on organizational innovation and the role played by organizational learning as a mediator variable. Figure 1 shows the model developed for this purpose. According to the proposed model, the perception of support for innovation positively relates to organizational innovation. Organizational learning may mediate this effect.

Literature and Hypotheses

Support for Innovation and Organizational Innovation

Gumusluoglu and Ilsev (2009b) concluded support for innovation has a moderating role between transformational leadership and organizational innovation. From their results they concluded that transformational leadership and external support for innovation had a significant effect on organizational innovation, but there was no clear evidence

Fig. 1 The Proposed Model

for internal support for innovation. Eisenbeiss et al. (2008) linked transformational leadership theory to principles of West's (1990) team climate theory and proposed an integrated model for the relationship between transformational leadership and team innovation. This model involves support for innovation as a mediating process and climate for excellence as a moderator. Results from a study of 33 research and development teams confirmed that transformational leadership works through support for innovation, which in turn interacts with climate for excellence such that support for innovation enhances team innovation only when climate for excellence is high. Jung et al. (2003) used a multisource approach to investigate 32 Taiwanese companies, and indicated that transformational leadership had a significant and positive influence on organizational innovation when mediated by empowerment and support for innovation...; "organizational innovation is positively influenced by support for innovation (p. 538)." From the above literature, if there is a supportive atmosphere of innovation, is likely to bring about more organizational innovation. Support for innovation, by implication, should significantly affect organizational innovation. Thus, we propose:

H1 Support for innovation positively influences organizational innovation.

Support for Innovation and Organizational Learning

Support for innovation includes both the climate for innovation (Siegel and Kaemmerer 1978) and tapping enacted support for innovation (Anderson and West 1998). The climate for innovation, by implication, may be found in personnel documents, policy statements, or conveyed by word of mouth. A necessary condition for organizational innovation is enacted support, as opposed to merely climate support, whereby active support is provided for innovatory behavior. Daft (1986), for example, found that resources needed to be made available to develop innovations and support from the power elite for innovation implementation (Anderson and West 1998). The definition of support for innovation by West (1990), in this study, is an idea of the expectation, approval, and practice support of attempts to introduce new and improved ways of doing things in the work environment (p. 38).

Organizational learning has been regarded as one of the strategic means of archiving long-term organizational success (Senge 1990). Organizational learning can be considered as a process of change in thought and action both shared and individually, which is affected by the organization of the institution (Vera and Crossan 2004). Jung et al. (2009) argue that when an organizational culture values initiative and innovative approaches, employees are

more likely to take calculated risks, accept challenging assignments, and derive intrinsic enjoyment from their work. Administrative support for innovation is critical both inside and outside the organization (García-Morales et al. 2008; Burningham and West 1995). If organizational leaders create a work environment supportive of innovation, supervisors may support their staff's empowerment, and staff may respond with increased trust and become more affectively learned and innovative to the organization (Latting et al. 2004). As the model for school innovation that was developed by McCharen et al. (2011), organizational knowledge creation is the critical component for school innovation. In other words, a supportive organizational learning culture positively and significantly impacts departmental creativity and knowledge creation practices in school systems. The environmental aspects increase the chances of developing interdepartmental creative work processes (Nonaka and Takeuchi 1995), which could be foundation for new and innovative knowledge creation practices in the work place (Son and Chermack 2008; McCharen et al. 2011). In this study, support for innovation defines expectations, approval, and practical support of attempts to introduce new and improved ways of doing things in the work environment. Support for innovation, the organizational-level factor, was a good predictor of individual behavior that seems to affect the success of organizational learning. Thus:

H2 Support for innovation positively influences organizational learning

Organizational Learning and Organizational Innovation

Organizations can learn through collective experience, perspective, and capabilities of individuals (Rait 1995; Song 2008). If innovation is to emerge, organizations need to develop highly effective strategies to improve organizational learning (Glynn 1996). Previous research has shown that organizational learning affects organizational innovation. Hsiao et al. (2009) examined 418 teachers in vocational high schools in Taiwan. They found that the school teachers' perception of higher organizational learning having significant influence on organizational innovation was greater. Liao and Wu (2010) selected samples based on Common Wealth Magazine's Top 1,000 manufacturers and Top 100 financial firms in Taiwan. They came to the conclusion that organizational learning was significantly and positively related to organizational innovation. Weerawardena et al. (2006) examined 1,000 firms in Australia. Their results found that the more the organizational learning, the more the organizational innovation. Wang and Ellinger (2011) were collected 268 senior R&D project team members who reported their perception about

the external environment and organizational learning along with 83 R&D managers who evaluated their employees' innovative behaviors. The results indicated that organizational learning was significant to both individual and organization-level innovation performance and contributed more to the individual-level than organizational innovation performance. Based on these findings, organizational learning and organizational innovation were closely related. Therefore:

H3 Organizational learning positively influences organizational innovation.

From the literature review, support for innovation will affect organizational learning (García-Morales et al. 2008; Jung et al. 2003; Latting 2004). Organizational learning has significant influence on organizational innovation (Hsiao et al. 2009; Liao and Wu 2010; Wang and Ellinger 2011; Weerawardena et al. 2006). Of course, the most direct relationship between variables was support for innovation and organizational innovation; support for innovation also has a positive influence on organizational innovation (Gumusluoglu and Ilsev 2009b; Latting 2004; Scott and Bruce 1994). Organizational learning may be an important mediator variable. This study proposes:

H4 Organizational learning mediates the relationship between support for innovation and organizational innovation.

Method

Consistent with the two-step approach advocated by Anderson and Gerbing (1988), we estimated a measurement model before examining the structural model relationship. We used Amos 14.0 to estimate the model. Besides providing statistical evidence for running CFA, this study also performed exploratory factor analysis (EFA).

Samples

Samples from this study were randomly selected from 22 technological colleges in Taiwan. The final sample included 322 teachers in the full sample, which accounted for 58.42 % of the sample. There were 253 male (78.5 %) and 69 female (21.5 %) teachers. The average age of subjects in the sample was 43.37 years with a range of 32–62 years. Subjects in the sample were well educated: 2.5 % had bachelor's degrees, 37.7 % had master's degrees, and 31.8 % had PhDs. 4 % had job tenure below 5 years, 20.2 % with job tenure of 6–10 years, 15.6 % with job tenure of 11–15 years, and 40.8 % with job tenure above 16 years. The statistics for samples are listed in Table 1.

Table 1 Statistics of samples

Descriptive statistics	Items	Numbers	Percentage
Gender	Male	253	78.5
	Female	69	21.5
Education	PhD degree	102	31.8
	Master's degree	212	65.7
	Bachelor's degree	8	2.5
In charge of Administration	Director	14	4.0
	Section head	121	37.7
	Homeroom teacher	187	58.3
Job tenure	Under 5 years	75	23.4
	6–10 years	66	20.2
	11–15 years	50	15.6
	16–20 years	63	19.6
	Over 21 years	68	21.1

$n = 322$

Procedure

The purpose of this study was to investigate the relationship between organizational learning and organizational innovation. The role of support for innovation was a mediator variable. Based on the literature review and previous research, hypotheses were formulated and tested. The first section consists of demographic information about the teachers among the 22 technological colleges in Taiwan. The second section consists of 16 items within 3 scales. All scales were composed of 5-point Likert-type items. The average time for completing each questionnaire was 10–15 min.

Measures

Tests of the instrument items' reliability and validity of the measurement construct are required prior to any further analyses to increase statistical acceptability of the proposed measurement model (Thompson 2004). To estimate the measurement model, we employed CFA to test the fit of scales separately. After the test of measurement model, the item will be deleted if the item is unacceptable. In the meanwhile, validity and reliability can be constructed in the measurement model for each scale. In addition, overall CFA was used to insure the validity issue of proposed measurement model (Kline 2005; Thompson 2004). These item-related reliability and construct-related validity issues were examined to insure the overall quality of data analysis results.

Support for Innovation

Support for innovation (SIS) was measured by seven items to which respondents were asked to respond on a 5-point "strongly disagree" to "strongly agree" scale. The scale

was originally developed by Siegel and Kaemmerer (1978) and modified by Scott and Bruce (1994). Sample items were “Creativity is encouraged here”, “Our ability to function creatively is respected by the leadership,” and “The main function of members in this organization is to follow orders which come down through channels.” Testing the one-factor model (CFA), resulted in a good fit index ($\chi^2/\text{df} = 1.91$, $\text{GFI} = .995$, $\text{AGFI} = .978$, $\text{RMSEA} = .052$, $\rho_c = .85$, $\text{AVE} = .76$).

Organizational Learning

After reviewing how organizational learning is measured in different studies of related research, e.g., Kale et al. (2000), Edmondson (1999), we drew up a four-item scale to measure organizational learning. We developed a confirmatory factor analysis (CFA) to validate our scale and showed that the four-item scale was unidimensional with high reliability ($\alpha = .92$, $\text{AVE} = .70$). Scales that measure organizational learning based on the main participants have been widely used in recent studies (e.g., Bauer and Mulder 2013; Chang et al. 2011; García-Morales et al. 2006; Hsiao and Chang 2011; Rhee and Sigler 2010).

All items were rated using a 5-point scale ranging from 1 (“Very strongly disagree”) to 5 (“Very strongly agree”). Sample items were “The organization has acquired and used much new and relevant knowledge that provided a competitive advantage over the past three years”, “The organization was a learning organization,” and “The educational center greatly encourages the acquisition, sharing, dissemination and application of knowledge, and learning among its different members.” Internal consistency was measured with Cronbach’s α ($\alpha = .92$). A CFA of a one-factor model reflected acceptable goodness-of-fit indexes ($\chi^2/\text{df} = 3.83$, $\text{GFI} = .994$, $\text{AGFI} = .973$, $\text{RMSEA} = .040$, $\rho_c = .90$, $\text{AVE} = .70$).

Organizational Innovation

The Organizational Innovation Scale (OIS) was measured with five items adapted from Friedman (2003). All items were rated using a 5-point scale ranging from 1 (“Very strongly disagree”) to 5 (“Very strongly agree”). Sample items were “Teachers often introduce new ideas for school improvement and change”, “School administration encourages teachers to seek new directions and challenges in teaching,” and “Social and recreational activities are organized for teachers and other staff members.” It was suggested that one item from OIS be removed on the basis of an EFA, due to high structure coefficients loading above 1 (Hair et al. 2010). Cronbach’s α reflected a good level of internal consistency ($\alpha = .88$). A CFA test of one-factor model resulted in suitable goodness-of-fit indexes ($\chi^2/\text{df} = 1.86$, $\text{GFI} = .998$, $\text{AGFI} = .988$, $\text{RMSEA} = .022$, $\rho_c = .86$, $\text{AVE} = .68$).

The EFA for Scales

After establishing the measuring constructs according to the original definition of the three measures, support for innovation, organizational innovation, and organizational learning, EFA is conducted to determine if there are other hidden factors. Table 2 displays the loading of one factor obtained by EFA. As seen in Table 2, there is only one factor with eigenvalue λ greater than 1 in each scale. In view of the discrepancy between the distribution of questions and the original definition of variables, there is no item requiring deletion. As seen in the above reliability analysis as shown in Table 3, the Cronbach’s α of the construct are all above 0.7, revealing that the questionnaire can be a valid measure for the three variables.

Results

Item internal consistency estimates and general zero-order item correlation coefficient estimates were considered for item reliability. Table 3 shows basic descriptive summary statistics of the responses and the Cronbach’s α estimates of the research construct items. Following the first item in the data analysis strategy, item internal consistency and measurement model construct validity were insured through the use of scale reliability, zero-order correlation coefficient estimates, and CFA. Means and standard deviations of SI, OL, and OI are represented in Table 3. All mean scores were >3.0 , ranging from 3.77 to 3.82. This indicated an overall positive perception. According to reliability results, all items for each research construct were found to be statistically reliable based on the coefficient estimates (ranges from 0.85 to 0.92).

Correlation Analysis

The bivariate correlation analysis is presented in Table 4. Organizational learning had a significant and positive correlation for support for innovation ($r = .732$, $p < .01$)

Table 2 EFA of measurement model for scales

No.	Support for innovation	Organizational learning	Organizational innovation
1	.543	.648	.542
2	.600	.743	.681
3	.667	.556	.635
4	.616	.584	.646
5	.595		.544
6	.557		
7	.564		
Eigenvalue (λ)	4.037	2.770	3.032

Table 3 Statistics and reliability coefficient for each subscale

Subscale	Number of items	Mean	SD	Cronbach α
Support for innovation (SI)	7	3.78	.62	.85
Organizational learning (OL)	4	3.82	.67	.92
Organizational innovation (OI)	5	3.80	.63	.88

$n = 322$

Table 4 Correlation coefficients for pairs of variables

Subscale	SI	OL	OI
Support for innovation (SI)	–		
Organizational learning (OL)	.732**	–	
Organizational innovation (OI)	.718**	.726**	–

$n = 322$, ** $p < .01$

and organizational innovation ($r = .718$, $p < .01$). Support for innovation had a significant and positive correlation with organizational innovation ($r = .726$, $p < .01$). Variable correlations are shown in Table 4. Teachers who had positive perception in support for innovation were also likely to lead to more positive experience in organizational learning. It seems that teachers who had more frequently engaged in organizational learning behaviors tended to engage more frequently in organizational innovation. Organizational learning is increasingly becoming recognized as a crucial organizational function. However, teachers who had positive perception toward support for innovation had a better tendency to practice organizational innovation.

Analysis Model

Zero-order correlation analysis showed statically acceptable correlation coefficient estimates at a p value of less than 0.001, which is a higher than moderate level coefficient, among the research constructs (r ranges from 0.718 to 0.732, see Table 4). All the statistically acceptable levels of correlations supported acceptable reliability among the research constructs. Secondly, CFA was conducted. In accordance with standard structural equation modeling (SEM) practices, path coefficient estimates and structural model-fit indices were the primary considerations (Bentler 1990). Running a single full CFA is necessary; the structural model can also be examined by SEM in this study. All employed measures were validated in the literature and developed based on the theoretical foundation, thus providing statistical evidence for running CFA. Tables 5 and 6 present CFA results with multiple model-fit to data indices, which include general Chi square estimate, goodness-of-fit

(GFI), comparative fit index (CFI), and non-normed fit index (NNFI), as well as two error variance indicators of root mean square residual (RMR) and root mean square error approximation (RMSEA).

Using organizational innovation as the endogenous variable, and support for innovation and organizational learning as exogenous variables, each path in the model was tested. The first goal was to estimate the predictive power of the set of independent variables on organizational innovation. As the focus of this study was on the direct and indirect effects of organizational learning on organizational innovation, the strength of predictor variables on the dependent variable was assessed. All the indices were in line with recommended benchmarks for acceptable fit ($\chi^2/df < 2.205$, GFI = .962, AGFI = .940, and RMSEA = .051). The total explained variance in organizational innovation was 69.2 % ($R^2 = .692$). Table 5 illustrates the fit indices for the proposed research model.

Table 6 shows the structural model with the standardized coefficients for the research sample. The results in Table 6 provide sufficient support for H₁. Support for innovation is significantly and positively related to organizational innovation, $\gamma_1 = .789$, $p < .001$. Table 6 also supports H₂ and H₃. Support for innovation is significantly and positively related to support for innovation, $\gamma_2 = .776$, $p < .001$. Support for innovation is significantly and positively related to organizational innovation, $\beta_1 = .426$, $p < .001$. From Tables 5 and 6, we can see that the results of the full examination model and all indexes show very good fit with the model.

Finally, this study was measured using path analysis to show direct and indirect effects of each construct. The results are reported in Table 7. After analysis, the direct effect of organizational learning and support for innovation, $\gamma_1 = .354$, $p < .001$, is significant. The indirect effect is .435, $p < .001$ as shown in Fig. 2. The indirect effect is greater than the direct effect. Therefore, organizational learning mediated the relationship between support for innovation and organizational innovation. H₄ is supported.

Table 5 Summary of goodness-of-fit indices (df = 51)

Fit index	Recommended level of fit	Proposed research mode
χ^2	n.s at $p < .05$	112.465
χ^2/df	<5	2.205
AGFI	>.90	.940
NFI	>.90	.970
CFI	>.90	.984
RMSEA	<.05	.051
RMR	<.05	.028

Table 6 Structural parameter estimates and goodness-of-fit indices

Hypotheses	Paths	Standardized coefficients	<i>t</i> value	Result
H ₁	Support for innovation → Organizational innovation (γ_1)	.789	6.102***	Supported
H ₂	Support for innovation → Organizational learning (γ_2)	.776	6.032***	Supported
H ₃	Organizational learning → Organizational innovation (β_1)	.426	5.862***	Supported
	$\chi^2(51 \text{ df}) = 112.465$	GFI = .962	CFI = .984	
	RMR = .028	TLI (NNFI) = .976	RMSEA = .051	

*** $p < .001$

Discussion

This study was aimed at examining the impact of support for innovation on organizational innovation and the role played by organizational learning as mediating variables. First, results indicated that support for innovation had a direct positive influence on organizational innovation. This result concurred with Gumusluoglu and Ilsev (2009b), and

Scott and Bruce (1994) whose study showed the greater support for innovation, the greater organizational innovation. It was important to show empirically that the effect of administration on organizational innovation increased with significant support for innovation.

Second, the results of the structural equation model indicated that support for innovation had a positive influence on organizational learning. That is, with greater support for innovation, there is more organizational learning. Organizations can learn through collective experience, perspective, and capabilities of individuals (Rait 1995). Therefore, organizational leaders may create a work environment supportive of innovation, like as Latting et al. (2004) emphasized, supervisors or department chiefs may support their staff's empowerment, and staff may become more affectively learned (Latting et al. 2004). Third, the results provided sufficient evidence to support a relationship between organizational learning and organizational innovation. This empirical evidence implies that organizational learning affects organizational innovation. In other words, higher organizational learning leads to improved organizational innovation. Accordingly, this finding is consistent with the research by Liao et al. (2008) and Liao and Wu (2010).

Fourth, the hypothesized mediator role of organizational learning was confirmed. Empirical evidence indicates that the relationship between support for innovation and

Table 7 Direct and indirect relationship

Variables	Endogenous	
	Organizational learning effect	Organizational innovation effect
Exogenous		
Support for innovation		
Direct	.776***	.354***
Indirect	–	.435***
Total	.776***	.789***
Exogenous		
Organizational learning		
Direct		.426***
Indirect		–
Total		.426***

*** $p < .001$ **Fig. 2** Path coefficients of the research model

organizational innovation is significant where the direct effect is less than the indirect effect. Organizational learning triggers the relationship between support for innovation and organizational innovation. In the study of Hsiao and Chang (2011) found that there is the mediate effect of organizational learning on the relationship between organizational learning and organizational innovation. This study not only found a similar result, but further support for innovation can also, through organizational learning, directly or indirectly improve organizational innovation.

Limitation

There are several limitations to the present study. The role of organizational learning as a mediator between support for innovation and organizational innovation was investigated. The results indicated that organizational learning served as a partial mediator. Other contextual variables were not included in the study.

The second limitation is related to the survey data. The survey data may have been subject to social desirability bias. This bias occurs in survey research when participants answer the questions to conform to social norms or expectations. In particular, some of these samples were collected from teachers in charge of administration in technological colleges. Their efforts are a possible determinant of innovation performance in schools. They know more about the organizational innovation in schools than homeroom teachers (e.g., general teachers without administrative duties or responsibilities). However, their perceptions of self-assessment may have a tendency to overestimate organizational innovation. The third limitation of this study is related to the participants. Participants consisted of 322 teachers only from technological colleges in Taiwan. Because it is a sampling from a selection of people in a specific kind of school, findings cannot be generalized to larger populations. For this reason, future research can be conducted with a collection of more samples from different groups of teachers and areas of study to broaden the scope. This may include teacher trainers, students, and parents.

Directions for Further Research

There are several suggestions for future research. First, this study examines only the role of support for innovation, organizational learning, and organizational innovation. This study indicates that support for innovation is a key factor in organizational innovation. It is possible that there are other variables not included in this study. Future research should further explore the perceptions of organizational climate, organizational behavior, and the administrative-teacher exchange relationship. This study

investigated the relationship between the support for innovation and organizational innovation, and organizational learning as the mediator. There may be other factors that affect organizational innovation. Future research should not only explore relevant variables, but also attempt to investigate interactions between group-level variables and individual-level variables. In addition, future research can be conducted with a larger sample across different levels or groups to provide more varied results.

Conclusions

This study explored the relationship among support for innovation, organizational learning, and organizational innovation. The results indicated that the support for innovation and organizational learning are both important determinants of organizational innovation in technological colleges. School principals played a key role in school improvement (Marks and Printy 2003). The results also suggest that successful organizational innovation requires strong support for innovation in the school improvement process. As Bolívar and Moreno (2006) pointed out, the principal is about improving teaching and learning, and should be geared toward the creation of the right conditions for learning, framed into clear expectations of what should be achieved. Principals may often support and encourage their staff in an innovative setting with strategies for organizational innovation. In addition, the study also suggests that in order to improve organizational innovation in technological colleges, future studies could investigate the effects of other contextual variables such as organizational climate, team cohesion, and leader-member exchange.

This research examined the influence of support for innovation and organizational learning on organizational innovation. The findings revealed that organizational learning acted as a mediator of the relationship between support for innovation and organizational innovation. At the same time, school principals played a central role in enhancing organizational innovation (McCharen et al. 2011). This study also found that when school principals used support for innovation through organizational learning, support for innovation would be a highly effective way to achieve organizational innovation in the technological colleges.

According to MOI statistics, Taiwan's total fertility rate has dropped to 0.9 % (MOI 2012). As for the number of senior high school students, the statistics of MOI (2012) reported that there were 956,823 in 2002 and 873,220 in 2012 (MOI 2012). Typically, about 60 % of senior high school graduates will enter technological colleges in Taiwan. There was a decrease of 83,603 students from 2002 to 2012, equivalent to the enrollment of about 20 schools, and the number of students continues to decline. In response to

this challenge, school principals interested in support for innovation and associated organizational innovation have become more focused on school management. Schools must change and develop in order to survive and to remain effective because of the increasingly rapid pace of innovation (Kursunoglu and Tanriogen 2009). However, the behaviors of school principals and teachers occur in a far more complex environment involving many additional factors (Hsiao and Chang 2011). Thus, this study suggests that more insight is necessary into the influence of these factors through measurement of such aspects as the type of leader effectiveness, organizational climate and culture, team/group cohesion, perceived organizational support, and perceived supervisor support.

Organizational learning has focused on collective attention and learning among members when they seek continuous improvement for students, themselves, and the organization (Collinson et al. 2006). Thus, the results of this study suggest that successful organizational innovation requires strong support for innovation at all levels. If the support for innovation and organizational learning were implemented properly, schools would have the capacity to better help organizational innovation.

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