Developing the evaluation indices of organisational innovation in vocational high schools: the perspective of a Taiwanese case

Hsi-Chi Hsiao†, Chien-Hua Shen‡, Chun-Mei Chou* & Lung-Yu Chang**

Cheng Shiu University, Kaohsiung, Taiwan†
Transworld Institute of Technology, Yunlin, Taiwan‡
National Yunlin University of Science and Technology, Yunlin, Taiwan*
Takming University of Science and Technology, Taipei, Taiwan**

ABSTRACT: The aim of the research presented here was to build up evaluation indices for organisational innovation in vocational high schools and, then, to determine comparative significances of these parameters. To achieve the set goals, this study was preceded by a literature review, and then a questionnaire survey via Delphi methods was constructed. To understand the comparative weights of the parameters, a focus group meeting of 24 experts was held to conduct an Analysis of Hierarchy Priority (AHP) for comparison. The conclusions derived from this study are as follows: *the leadership innovation* was the most significant, followed by *innovation in administrative operation*, *students' counselling and activity innovation*, *innovation in teaching and course design*, *innovation in teachers' professional development*, *resource application innovation* and *campus planning innovation*. Of all the parameters, the six most important items are vision, campus planning innovation, professional seminars, school affair development, organisational culture and contest activity.

INTRODUCTION

Innovation in schools is established on the foundations of educational values, and not simply calculated or evaluated from economical or budgetary standpoints. Schools are not NGOs (non governmental organisations), but these days vocational high schools have plenty of innovative activities. In light of this, what results can be expected? Are the innovative activities actually innovative or not? For the schools, from the viewpoint of organisational capabilities, organisational innovation comes from creativity within the organisation; but the organisation cannot innovate itself. The members within the organisation are, in actuality, the realisation and capacity for innovation, with the innovative atmosphere as the motive for innovation to take place. Therefore, evaluation of organisational innovation should encompass both interior and exterior evaluation indicators so that both the execution of innovation and the atmosphere in which innovation takes place can be evaluated. Exterior evaluation is conducted through the indicators established in this study.

Currently, the establishment of organisational evaluation indicators is mainly for enterprises [1][2], while research on organisational innovation of secondary education institutions focuses mainly on discussion of the influencing factors of organisational innovation and not on the transforming of this information into evaluation indicators. Relevant studies on organisational innovation in vocational high schools are also mainly focused on influencing factors instead of measurement and content [2][3]. Why then does organisational innovation need to be measured? According to Hsieh, educational indicators should help clarify educational issues and present an overview of education [4]. At the same time, the process and results of evaluation can help researchers understand schools' competitiveness and the challenges one may face, as well as establish benchmark schools.

Thus, a fully established set of indicators should help the general public understand and improve the current educational system. A credible set of educational indicators can also reflect the content of education and help with the promotion of educational reform. For these reasons, educational indicators should be systematic, enabling the discussion of educational issues, causes, direction and changes from multiple aspects, to meet the needs of the educational environment. Therefore, developing a set of organisational innovation indicators and establishing principles for schools to understand their own competitiveness and promote strategic competitiveness with other schools is the main aim of this study. This study, then, is focused mainly on establishing a set of indicators, as well as the content and framework of organisational innovation in vocational high schools.

LITERATURE REVIEW

Organisational Innovation Management in Schools

Management of organisational innovation is necessary in schools so that the needs of students, parents and other potential patrons are met through aspects of product, process and service, as well as to maintain competitiveness and elevate educational quality, through which interior and exterior changes of the organisation can be made. Dimensions of innovation include administration, courses and teaching, sharing of knowledge and public relations. Further, Pu pointed out the concrete characteristics and meanings of innovation management in schools [5].

Therefore, innovation in schools is not only a concept but an implementation, as well. Its content has multiple facets that consist of not just innovation in management, but innovation in teaching also. Throughout this study, the organisational innovation of schools also points to school management as a long-term process and takes into account the needs and resources of patrons in aspects such as administration, teaching, courses, performance ability, facilities and learning environment.

Dimensions of Organisational Innovation Management in Schools

Management concepts concerning innovation in schools can be divided into two forms: *updating* and *reform*. From a dimensional point of view, they can be divided into innovative methods, process and results; methods can be divided into aim, competing strategies and organisational structure; process can be divided into source of innovation, gaining of resources and characteristic thought; and results can be divided into continuity of innovative contents and problem solving. From the viewpoint of academic scholars, dimensions of innovation management in schools should also include administrative innovation, course innovation, curricular activity innovation, campus innovation, external affairs innovation and IT innovation [5][6].

From a wider point of view, management of innovation in schools should include innovation of concepts, values of school performance and skills, such as a change in teaching evaluations; innovation of products, such as students' work, teaching props and lesson plans; innovation of service, such as administrative services and parental services; innovation of process, such as teaching and processing of data; innovation of events, such as opening and graduation ceremonies and school outings; innovation of environment, such as improvement of the exterior of buildings and a redistribution of space; and characteristic innovation, such as school characteristics and culture [7].

In conclusion, for the methods of the scholars mentioned previously in this study, dimensions of organisational innovation in schools are divided into concept innovation, processing innovation and environmental innovation. Concept innovation includes innovative thought and organisational climate; processing innovation includes events, use of resources, courses and teaching and administration; while environmental innovation includes campus beautification and teaching facilities. In actuality, school organisational innovation can be roughly divided into educational and administrative innovation; the former comes from the teaching staff while the latter comes from the administrative staff. As for students and parents, they are the promoters of innovation. The influence from others that affect the school also should not be ignored.

Research on School Organisational Innovation

In Taiwan, studies on organisational innovation are mostly focused on management innovation of businesses and technological innovations. Research on school organisations began in 2001 with encouragement from businesses that emphasised organisational innovation. All the papers published in Taiwan on organisational innovation in schools in the following six years (2003-2008) are shown in Table 1.

From Table 1, it can be seen that papers published in Taiwan on organisational innovation in schools are mostly on the management of elementary and junior high schools. As for methods and quality, most chose data analysis. For quantitative method, all chose to base discussions on the outcomes of questionnaires. Only one MSc thesis was published on vocational high schools [3]. As for journals, several scholars have voiced thoughts on the innovation management of vocational high schools [6][7].

Table1: Studies on school organisational innovation in Taiwan.

Researcher	Research subjects	Research methods
Lin, C.P.[3]	Vocational high school teachers	questionnaires
Pu, S.W. [5]	Elementary school teachers	questionnaires
Wang, M.J. [8]	Administrative staff of senior high schools	questionnaires
Wu, S.C. [9]	Elementary school principals	interviews and observations
Lee, R.O. [10]	Elementary school teachers	questionnaires
Huang, C.R. [11]	Elementary school teachers and principals	questionnaires
Huang, L.M.[12]	Elementary & middle high school teachers	questionnaires
Liu, C.F. [13]	Junior high school teachers and principals	questionnaires and interviews
Kuo, Y.H. [14]	Elementary school teachers	questionnaires
Chiou, H.J. & Wen, F.H. [15]	High school teachers	questionnaires
Chang, I.H. et al [16]	Elementary school teachers	questionnaires

Analysis of Current Organisational Innovation Evaluation in Schools

In the Taiwanese educational system, currently there are no studies that describe the process of establishing evaluation indicators for school organisational innovation. At present, the dimensions and indicators presented by the Chinese Innovativeness Association are the most complete. The Chinese Innovativeness Association presents national awards for school innovation management every year, and its evaluation dimensions include courses and teaching, students' multiple development, campus beautification, use of social and environmental resources and administrative reform.

There are 19 indicators in total. However, the person or persons responsible for establishing these indicators did not state the process from which these indicators were derived. In addition, these indicators do not indicate the overall performance of schools' innovation management, nor do they provide interschool comparisons. Moreover, these indicators are not indicative of student productivity, parent or community participation, or of the relative indicators of all the people who influence the school.

From the viewpoint of the Context, Input, Process, Product (CIPP) model, its current indicators lean toward input and process and lack indicators of background and output dimensions [17]. Indicators of student productivity and school innovation management are not included. However, this system has contributed greatly to the promotion of school innovation management in Taiwan.

From the above, one can infer that in Taiwan's current educational system, most studies of organisational innovation are on junior high schools and elementary schools and lack indicators for the evaluation of school organisational innovation. This study aims to remedy that lack, and provides schools or relevant organisations with self-evaluation and interschool comparative references.

RESEARCH METHODS AND IMPLEMENTATION

Research Methods

Research methods used to satisfy the goals given above are as follows:

- Focus group interviews: 14 representatives from industrial, political and academic fields were interviewed on the subject of vocational high school organisational innovation in order to develop evaluation indicators. Of the 14 representatives, three were from the industrial field, three were vocational high school principals, one was an education administrator, three were education scholars, two were vocational high school teachers and two were vocational high school students.
- The Delphi method: Results from a literature review and focus group interviews were used to develop the first draft of the vocational high school organisational innovation questionnaire. Following this, the Delphi method was used to amend the evaluation indicators established so that a professional set of indicators could be developed. The subjects involved with Delphi included five vocational high school principals, five teachers with administrative duties, five teachers, five educationists, five students and five members of the Parents Association. The research AHP questionnaire was developed after two Delphi sessions.
- Analysis of Hierarchy Priority (AHP): 24 representatives were invited to compare the evaluation indicators to acquire relative weight and to establish an objective foundation for the evaluation indicators. The representatives were: four vocational high school principals, four teachers with administrative duties, four teachers, four educationists, four students, and four members of the Parents Association.

Research Steps

The developmental process of the innovation evaluation indicators of this study are shown below:

- Literature review;
- Focus group interviews;
- First draft of vocational high school organisational innovation model and evaluation indicators;
- Completion of indicators through the Delphi method;
- Credibility analysis of evaluation indicators;
- Confirmation of evaluation indicators and factors;
- Confirmation of evaluation process and implementation principles.

DISCUSSION AND RESULTS

Preliminary Analysis of Questionnaire

According to some scholars, the characteristics of a certain level can only be used when the CRH is smaller than, or equal to, 0.1. After calculations, it was discovered that ten questionnaires did not reach consistency criteria and were omitted, to avoid differences in estimation. The consistency ratios of effective questionnaires are shown in Table 2.

Table 2: List of questionnaire consistency ratios.

Questionnaire Number	Consistency Ratio	Questionnaire Number	Consistency Ratio
002	0.0837	012	0.0457
003	0.0956	013	0.0755
004	0.0645	015	0.0869
006	0.0896	018	0.0645
007	0.10	020	0.0459
010	0.0868	022	0.0885
011	0.0356	024	0.0587

Analysis of Factor Importance of Indicators

The weight of each level of evaluation indicators, λ max, C.I. and C.R. are presented in Table 3.

Table 3: Evaluation results of vocational high school organisational innovation indicators.

Evaluation Indicator	Evaluation Item	Weight	Rank	λmax	C.I.	C.R.
1.0 leadership innovation	1.1 vision	0.4011	1	4.2384	0.0795	0.0883
	1.2 development of school affairs	0.2736	2			
	1.3 participatory decision-making	0.1920	3			
	1.4 project team	0.1333	4			
2.0 administrative process and innovation	2.1 organisational culture	0.3771	1	4.1181	0.0394	0.0437
	2.2 administration	0.2659	2			
	2.3 quality of service	0.2107	3			
	2.4 work reasonability	0.1463	4			
3.0 student counselling and activity innovation	3.1 competitive activities	0.3562	1	4.1108	0.0369	0.410
	3.2 innovative social activities	0.2806	2			
	3.3 learning assistance	0.2006	3			
	3.4 life counselling	0.1626	4			
4.0 courses and teaching innovation	4.1 courses	0.3550	1	4.1204	0.0401	0.0446
	4.2 teaching materials	0.2413	2			
	4.3 teaching	0.2245	3			
	4.4 multi-faceted evaluations	0.1792	4			
5.0 teachers' professional development innovation	5.1 professional learning	0.6010	1	3.0883	0.0442	0.0762
	5.2 behavioural studies	0.2579	2			
	5.3 professional accreditation	0.1411	3			
6.0 resource application innovation	6.1 technical accreditation	0.4227	1	5.3668	0.0917	0.0819
	6.2 industrial-academic collaborations (extracurricular practise)	0.2167	2			
	6.3 use of external resources (community, alumni or business)	0.1708	3			
	6.4 career counselling	0.1152	4			
	6.5 creative results (including patents)	0.0746	5			
7.0 innovation on campus	7.1 campus innovation	0.3773	2	2	0	0
	7.2 teaching facilities	0.6227	1			

Comments

1. On the weight analysis of *leadership innovation* indicator factors: As shown in Table 3, in *leadership innovation* indicators, *vision* and *development of school affairs* totalled 0.6747. Thus, in indicators of *leadership innovation*, the knowledge of the principal's visions and the implementation of school affairs are the most important, followed by the participation of the faculty in decision-making and the establishment of project teams.
2. On the weight analysis of *administrative process and innovation* indicator factors: As shown in Table 3, of these indicators, *organisational culture* (0.3971) was the most important, followed by *administration* (0.2659), *quality of service* (0.2107) and *work reasonability* (0.1463).
3. On the weight analysis of *student counselling and activity innovation* indicator factors: As shown in Table 3, of these indicators, *competitive activities* (0.3562) was the most important, followed by *innovative clubs and societies* (0.2806), *learning assistance* (0.2006) and *life counselling* (0.1626).
4. On the weight analysis of *courses and teaching innovation* indicator factors: As shown in Table 3, of these indicators, *courses* (0.3550) was the most important, followed by *teaching materials* (0.2413), *teaching* (0.2245)

and *multi-faceted evaluations* (0.1792). From this, it was discovered that *courses*, *teaching* and *teaching materials* were the most important factors.

5. On the weight analysis of *teachers' professional development innovation* indicator factors: As shown in Table 3, of these indicators, *professional learning* (0.6010) was the most important, followed by *behavioural studies* (0.2579) and *professional accreditation* (0.1411). Thus, the *professional learning* of teachers is the most important factor in the promotion of *teachers' professional development innovation*.
6. On the weight analysis of *resource application innovation* indicator factors: As shown in Table 3, of these indicators, *technical accreditation* (0.4227) was the most important, followed by *industrial-academic collaborations (extracurricular practices)* (0.2167), *use of external resources* (0.1708) and *creative results* (0.0746). From the above, it is shown that *technical accreditation* is the most important factor.
7. On the weight analysis of *innovation on campus* indicator factors: As shown in Table 3, of these indicators, *teaching facilities* (0.6227) was the most important, followed by *campus innovation* (0.3773). Thus, *teaching facilities* is the most important factor.

In conclusion, the weight of these indicators and factors were calculated and are presented in Table 4.

Table 4: The weight list of vocational high school innovation evaluation indicators and factors.

Indicator/Factor	Original Weight	Combined Weight
1.0 leadership innovation	-	0.2556
1.1 vision	0.4011	0.1025
1.2 development of school affairs	0.2736	0.0699
1.3 participatory decision-making	0.1920	0.0491
1.4 project team	0.1333	0.0341
2.0 administrative innovation	-	0.1772
2.1 organisational culture	0.3771	0.0668
2.2 administration	0.2659	0.0471
2.3 quality of service	0.2107	0.0373
2.4 work reasonability	0.1463	0.0259
3.0 student counselling and activity innovation	-	0.1511
3.1 competitive activities	0.3562	0.0538
3.2 innovative social activities	0.2806	0.0424
3.3 learning assistance	0.2006	0.0303
3.4 life counselling	0.1626	0.0246
4.0 courses and teaching innovation	-	0.1379
4.1 courses	0.3550	0.0490
4.2 teaching materials	0.2413	0.0333
4.3 teaching	0.2245	0.0310
4.4 multi-faceted evaluations	0.1792	0.0247
5.0 teachers' professional development innovation	-	0.1138
5.1 professional learning	0.6010	0.0684
5.2 behavioural studies	0.2579	0.0293
5.3 professional accreditation	0.1411	0.0161
6.0 resource application innovation	-	0.0875
6.1 technical accreditation	0.4227	0.0370
6.2 industrial-academic collaborations (extracurricular practices)	0.2167	0.0190
6.3 use of external resources (community, alumni, business)	0.1708	0.0149
6.4 career counselling	0.1152	0.0101
6.5 creative results (including patents)	0.0746	0.0065
7.0 innovation on campus	-	0.0770
7.1 campus innovation	0.3773	0.0291
7.2 teaching facilities	0.6227	0.0479
Total		1.0000

CONCLUSIONS AND SUGGESTIONS

Conclusions

There are seven main indicators of vocational high school organisational innovation evaluations. Based on weight and importance, they are in the following order: leadership innovation, administrative process innovation, student counselling and activity innovation, courses and teaching innovation, teachers' professional development innovation, resource application innovation and innovation on campus.

Based on combined weight, the six most important factors are *vision* (0.1025), *campus innovation* (0.0770), *professional learning* (0.0684), *development of school affairs* (0.0699), *organisational culture* (0.0668) and *competitive activities* (0.0538). Combined weights are presented in Table 4.

From this study, it was discovered that the ratio of the indicators are: leadership innovation 25%; administrative process innovation 18%; student counselling innovation 15%; courses and teaching innovation 15%; teachers' professional development innovation 10%; resource application innovation 9% and innovation on campus 8%.

Suggestions

The principal should lead the administrative team in being creative and promoting development in school affairs; from this study, it was discovered that *leadership innovation* was the most important indicator in vocational high school organisation innovation. Innovative actions by the principal will put various innovative initiatives into action, so principals should be creative and incorporate innovation into the development of school affairs.

An innovative organisational culture should be created to inspire the creativity of teachers and students; from this study, it was discovered that *administrative process innovation* was the second most important indicator, out of which *organisational culture* was the most important factor. Thus, the leader should assertively create an innovative culture and atmosphere in school to inspire the creativity of students and teachers so that innovative energy within the school can be elevated.

Organisational innovation indicator tests should be performed to confirm study results; from this study, seven evaluation indicators and 26 evaluation factors were established. Tests should be performed on the evaluation questionnaires to confirm study results.

REFERENCES

1. Zhuang, L.M., A study of the establishment and implementation of organisational innovation modes. Unpublished PhD thesis, College of Business Management, Cheng-Kung University (2002).
2. Hsei, C.W., A study on the establishment of organisational innovation indicator systems of government HR development institutions. Unpublished PhD thesis, Graduate School of Industrial Technology Education, National Taiwan Normal University (2003).
3. Lin, C.P., A study on the influencing factors of vocational high schools in Taiwan. Unpublished Master's thesis, Graduate School of Industry, National Taiwan Normal University (2003).
4. Hsieh, C.C., A study on constructing elementary school's innovation management effectiveness indices using balance score concept. Unpublished PhD thesis, Graduate School of Education Policy and Management, National Taipei Educational University (2007).
5. Pu, S.W., A study on relationships between principal's transformational leadership and school cultural preference and school innovative management in elementary schools. PhD thesis, Graduate School of Education, National Cheng-Chi University (2003).
6. Chang, R.J. and Lin, H.M., A comparative study of the content and strategies of vocational high school innovation management. *Vocational Education Forum*, 131-141 (2004)
7. Chang, R.J., Innovative management in vocational high schools. *Teacher's Land*, 139, 59-63.
8. Wang, M.J., A study on the knowledge management attitude of vocational high school executives, organisational innovation atmosphere, and organisational efficacy. Unpublished Master's thesis, Department of Education, National Kaohsiung Normal University (2003).
9. Wu, S.C., A study on school management innovation as exemplified with four elementary schools. Unpublished Master's thesis, Graduate School of Education, National Cheng-Chi University (2004).
10. Lee, R.O., A study on the continuing learning culture, organisational learning, organisational innovation, and efficacy of elementary schools – the construction of learning school model, Unpublished PhD thesis, Graduate School of Adult Education, National Kaohsiung Normal University (2004).
11. Huang, C.R., A study on organisational learning and organisational innovation of elementary schools. Unpublished Master's thesis, Graduate School of Adult and Continuing Education, National Chung Cheng University (2004).
12. Huang, L.M., The relationship between innovative climate and school effectiveness. *J. of Taipei Municipal Educ. University*, 38, **1**, 93-128 (2007).
13. Liu, C.F., A study on organisational innovation and efficacy of middle high schools in Taipei County. Unpublished Master's thesis, Graduate school of Human Resource and Knowledge Management, National Kaohsiung Normal University (2005).
14. Kuo, Y.C., A study on the principal's leadership toward transforming, organisational innovation, and teachers' satisfaction of elementary schools. Unpublished Master's Thesis, Department of Education, National Kaohsiung Normal University (2006).
15. Chiou, H.J. and Wen, F.H., Hierarchical linear modelling of contextual effects: an example of organisational climate of creativity at schools and teacher's creative performance. *J. of Educ. & Psychology, National Cheng-Chi University*, 30, **1**, 1-35 (2007).

16. Chang, I.H., Yen, H.C. and Hsieh C.C., A study of the relationships between organisational learning and innovation in the elementary schools of Hsinchu County and Hsinchu City. *School Administrator's Research Association*, 57, 69-89 (2008).
17. Stufflebeam, D.L., *Metaevaluation: Concept, Standards, and Uses*. In: Beck, R.A. (Ed), Educational evaluation methodology: The state of the art. Baltimore, MD: Johns Hopkins University, 146-163 (1981).