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The Application of Systematic Management to Taiwan's Vocational High Schools of Industrial Programmes

Yoau-Chau Jeng
Ching-An Chen
Chien-Chou Chen
National Changhua University of Education, 1 Jin De Road, Paisha Village, Changhua 500, Taiwan

The management of vocational high schools can combine the four layers including: objective effect, client satisfaction, learning and creativity and internal operation flow. It may apply the *balanced scorecard* to manage the school's organisation and give consideration to both the short-term effect and long-term development of the school. In utilising these methods, the school can achieve the anticipated effect and recreate the social function of vocational education. The drive of systematic management activities can effectively enhance school effectiveness. The status quo of the vocational high schools of industrial programmes management reveals that the management activities presently applied in the schools adopt the four management directions at the same time, and do not have any outstanding management activity. It also represents that the application of systematic management to vocational high schools of industrial programmes is still in its embryonic form and has room for improvement.

INTRODUCTION

Vocational education plays an important role in the economic development in Taiwan and has educated numerous technicians. Over recent years, along with the development of the economy, variations in the industrial structure and social philosophy, as well as the trend of educational revolution, vocational high schools are not allowed to delay adjusting the development policy and improve the educational level. This is especially important given the competition between vocational and common high schools [1].

Vocational high schools are being faced with the pressures of student loss, school competition and school transformation. As such, it has become the chief task that the business management strategies should be applied in the usual management of school in order to enhance competitiveness.

This paper looks at the usual management in vocational high schools, including the theories and concepts concerning Total Quality Management (TQM), the ISO 9000 series of quality standardisation systems, the learning organisation, Management By Objectives (MBO), etc. The paper combines the management spirit of the so-called *balanced scorecard* as the research structure so as to find out the management mode of vocational high schools of industrial programmes and provide them with a reference point for future management.

THEORY AND ANALYSIS OF SYSTEMATIC MANAGEMENT

Definition of School Management

According to Webster's *New International Dictionary*, management has many meanings, including control and direction, the exertion of control over and administration to accomplish or achieve the objectives of the organisation and activity, etc. Drucker stated that:

> *Management exits for the effect of an organisation. Therefore, it should start from the anticipated objectives and adopt the resources in the organisation to create such an effect* [2].

Summaries of the key definitions and characteristics of management and management theory provided by scholars listed as follows:

- Management is administered and operated by members of the organisation to accomplish the organisation's objectives.
- Management anticipates the objectives.
- Management is dynamic and continuous.
- Management combines and adopts the available resources of the organisation to achieve set objectives.

The meaning of school management has been defined as a course wherein

> *human resources, material resources, financial resources, etc. are effectively combined by planning, organising, harmonising, administering, controlling, and other activities* [3].

With reference to the definition, explanation and division by the famous scholars, school management can be defined as a course where the school members participate and administer the school affairs together, in combination with specific activity modes and available resources to apply school resources effectively.

Purpose of School Management

The purpose of schooling lies in achieving a good education and fostering learning activities, whereas school management provides the support for these educational activities. It has been argued by Wu that the school should pay great attention to student learning achievements, principal leadership, school atmosphere, learning techniques and strategies, school culture and values, as well as personnel development, etc, in order to achieve school objectives [3].

Chin pointed out that the range of school management included five parts of organisation and education, personnel affairs, student affairs, financial and general affairs, and relations between the school and the community [4]. Therefore, the objective of school management can be interpreted as managing the school's management range and applying various management activities to achieve the school's objectives.

MANAGEMENT ACTIVITIES

There are many management activities, which can be divided into four types, including MBO, process management, management by client satisfaction and management by organisational learning. Each of these modes has its advantages and applicable conditions.

Management By Ojectives (MBO)

The main purpose of Management By Objectives (MBO) is that the leader discusses the objectives with the subordinates, gives proper help during administration and evaluates the degree of achievement according to schedule. Since most educational objectives are determined by the central governing unit and belong to extensive objectives, MBO is not suitable. In order to achieve the educational objectives sent down by the superior, the principals of vocational high schools mostly establish specific objectives, such as the school upgrading rate, examination passing rate, etc.

In contrast, the company pursues profit above all. Its MBO is relatively specific and easy to appraise; therefore, the company always adopts management by financial objectives. Although the school also has financial pressures, it is not a unit that makes profit but rather pursues *recognition*. The school needs the recognition of society, community, parents and students; the evaluation of vocational schools is one of the primary channels for recognition.

Advantages of the MBO approach lie in that the organisation's members have specific objectives and participate together to achieve the organisational goals, which can be easily managed. However, there are limitations of MBO in that the objectives are not readily constituted and the degrees of sub-objectives are different and can be difficult. This may also cause units to act of their own will.

Process Management

The production of organisation products is sure to have its processes; if the products are required to accord with an anticipated level of quality, then a good quality management system is needed. The most frequently used production quality standardisation system is the ISO 9000 series developed by the International Organization for Standardization (ISO). Some vocational high schools have gained accreditation in the ISO 9000 series.

The application of ISO 9000 series to the school is not only a unique but also a powerful school management tool; it can even improve the system of school management under the evaluation and supervision of the authorisation unit [5]. Since ISO items only provide the criteria and principle of the quality system, the schools should make proper modifications according to the differences in the organisational structure, operational flow and management representative in practice.

The ISO quality standards emphasise consistency in what is said, written and done; each piece of work

should be made into a file and administered according to established regulations to ensure the operational flow and product quality.

Management by Client Satisfaction

As competitive conditions change, past product direction has little or no current competitive power and is replaced by client direction. This discipline focuses the producer considering the position of the client and producing the required products at an acceptable price.

Vocational high schools are facing the same problem as many companies, which is how to establish schools from the perspective of the client in order to encourage acceptance and entry. The client of the school can be defined as the student, graduated schoolfellow, parent, company employer or society. In general, the school should pay attention to the requirements of the student, parent, educational superior and director of future occupation (such as the employer and upgrading schoolteacher).

Management activities promoted by the client satisfaction concept in corporate circles is Total Quality Management (TQM), which has all members participating in quality improvement and being responsible for quality so as to provide satisfactory quality or service [6][7]. Weng considered that TQM emphasised giving priority to the client, sustaining continuous improvement and group cooperation [8].

Weng also considered that TQM should be applied to vocational education in several aspects:

- Take the student as the learning subject.
- Develop school characteristics and pursue excellence.
- Build a competitive brand system.
- Participate in leadership from a humanistic consideration.
- Build prospects to stride into learning society [8].

Zhao considered that TQM should have several meanings prior to its application to the vocational education system:

- Grasp the requirements of client.
- Recognise and support the superior manager.
- Participate together.
- Build a timely and effective education system.
- Improve education through evaluation.
- Sustain improvements [6].

In summary, TQM should be applied to school management as it has a positive affirmative meaning for the integral school management effect. Only the practical difficulties of the organisation members still need the care and encouragement of the leaders [8].

Management by Organisational Learning

The post-industrial societal evolution is imminent. The challenge of economic globalisation and the knowledge explosion have brought about life-long learning social conditions. As a result, organisational learning theory has grown [9].

The management mode of organisational learning and development formed a trend during the 1990s. The concept of organisational learning originated from companies seeking to enhance efficiency for survival and development that corresponded to changing conditions, working sites, clients, workers and other factors.

The concept of the learning organisation can be traced back to the 1920s, but was significantly represented until 1980. Zhang, chairperson of the Taiwanese semiconductor firm Taiji Electronic Co., thought that the learning organisation could accelerate the development of a group and he therefore required organisation members to learn at any moment and to establish a development department. Knowledge is created, recorded, expanded and renovated within the organisation, allowing Taiji Electronic Co. becomes the kernel of knowledge management [10].

In the white book *Stride into the Learning Society*, issued by Ministry of Education in 1998, the seventh of 14 items involves developing various learning organisations, so as to achieve individual and organisational development [11]. It is obvious that the management and promotion of organisational learning have become important aspects of the educational revolution.

There are many definitions of what actually constitutes a learning organisation, but the basic spirit lies in organising continuous learning and alteration, so that the organisation can adapt to changing conditions. Many scholars have made suggestions about how to become learning organisation with Senge an important protagonist in learning organisation theory. Senge combined the systematic dynamic concepts in *The Fifth Discipline* and proposed five basic practices of the learning organisation [12]. These were namely:

- *Systematic consideration*: Use systematic dynamic concepts to understand the force of system actions and their mutual relations.
- *Self-improvement*: Organise members to learn how to expand their capacity and to create an anticipated future.

- *Common prospect*: Organise members to build a common anticipated objective and contribute with one heart to achieve this objective.
- *Intelligent mode*: Members should continuously meditate the thoughts in mind and attitude to take rational actions through self-control.
- *Group study*: Transform the thinking ability of the group and combine the intelligence and ability of every member to learn and develop together.

Organisational learning management emphasises that only by organising the members to continue learning, to develop and create, can good activities and strategies develop and organisational objectives achieved.

BALANCED SCORECARD

In the research results of 12 companies utilising the most advanced evaluation methods, Kaplan and Norton proposed the so-called balanced scorecard; this includes financial objectives, degree of client satisfactory, internal flow, organisational learning and creativity and four directional indices in management. These target the future improvement of the company [13].

The balanced scorecard provides an extensive decision-making method in that it considers four important management directional indices; these consider the management of financial and non-financial elements, long-term and short-term objectives, external objectives, internal flow improvements, past business effects and future behaviour forecasts. The balanced scorecard has answered four basic problems of management, namely:

- *Client viewpoint*: How does the client feel about the products/services?
- *Internal operation viewpoint*: Is there any level of production superiority?
- *Creativity and learning*: Can improvement and value creation be maintained?
- *Financial viewpoint*: What are the stockholders' views?

Client Perspective

The managements of many companies concentrate on the client. If the proclamation of serving the client is changed into a specific evaluation index, the factors that are indeed important to the client can be reflected. The items that the client is concerned with often involve aspects such as time, quality, product/service and price. If these factors can be changed into policies, then the specific proper evaluation objectives can be formulated.

Internal Operations

Besides the viewpoint of emphasising the client, the flow and decision inside the organisation are important factors affecting the client's viewpoint. As such, the second step of the balanced scorecard is determining the operations that mostly influence client satisfaction. For example, the manager should separate the factors of time, quality, price, etc, that act on client satisfaction. These should be divided down to the basic level so that the grass roots of the company can be linked to work to achieve the integral objectives of the company.

Creativity and Learning

Only through continuous creativity, improvement and learning can the organisation adapt to fast changes in business conditions. Only by creating the product value continuously and improving the quality can the company develop and the stockholder value increase.

Financial Elements

The financial reports reflect past business activities and cannot directly improve the degree of client satisfaction and product quality, etc. However, if the business effect cannot be reflected to the financial element (the final result), then past policy cannot achieve the anticipated objective and the manager should review the business policy [14].

Discussion

Although the balanced scorecard is no certainty for success, it can provide the manager with a tool for the transformation of company policy into specific, measurable objectives. This tool will also help the manager to understand the suitability of business policy; if the anticipated objective cannot be achieved, then the manager should review the business management policy.

Since the balanced scorecard has considered the viewpoints of finance, client, internal flow and creativity and learning, it facilitates the manager to understand the interactive relations between the units and to exceed the obstacles between the traditional functional departments. This will be helpful for the organisation to stride towards a common objective [15].

If the management of vocational high schools can combine the four layers including objective effect, client satisfaction, learning and creativity and internal operational flow, apply the balanced scorecard to manage school organisation, and give consideration to both the short-term effect and long-term development of the school, then it is believed that the school can achieve the anticipated effect and recreate the social function of vocational education.

RESEARCH STRUCTURE AND DESIGN

Firstly, this paper discusses the research and theories relative to school management activity to construct a research structure. Then, according to the discussed literature, the semi-structure questionnaire was given to professors, principals of vocational high schools, directors and teachers, which totalled ten people.

Finally, questionnaires, which included the basic data of those questioned, the current and anticipated situations in school management and management activity, were mailed to teachers of vocational high schools of industrial programmes. The research structure is shown in Figure 1.

Research Investigation

The questionnaire took all the vocational high schools of industrial programmes in Taiwan as researching objects. From this, 30 schools and 600 teachers were chosen at random as investigation objects for questionnaire investigation. There were 380 questionnaires received from 1-25 March 2001. Of these, 366 were valid, yielding a return rate of 61%.

Data Collection

In this research, the data collected from the questionnaire investigation were analysed using MANOVA, canonical correlation and other statistical methods. The relative data covered:

- The status quo of systematic management in vocational high schools of industrial programmes.
- The teachers' recognition of the systematic management in vocational high schools of industrial programmes.
- The differences of systematic management activity for different variables in vocational high schools of industrial programmes.

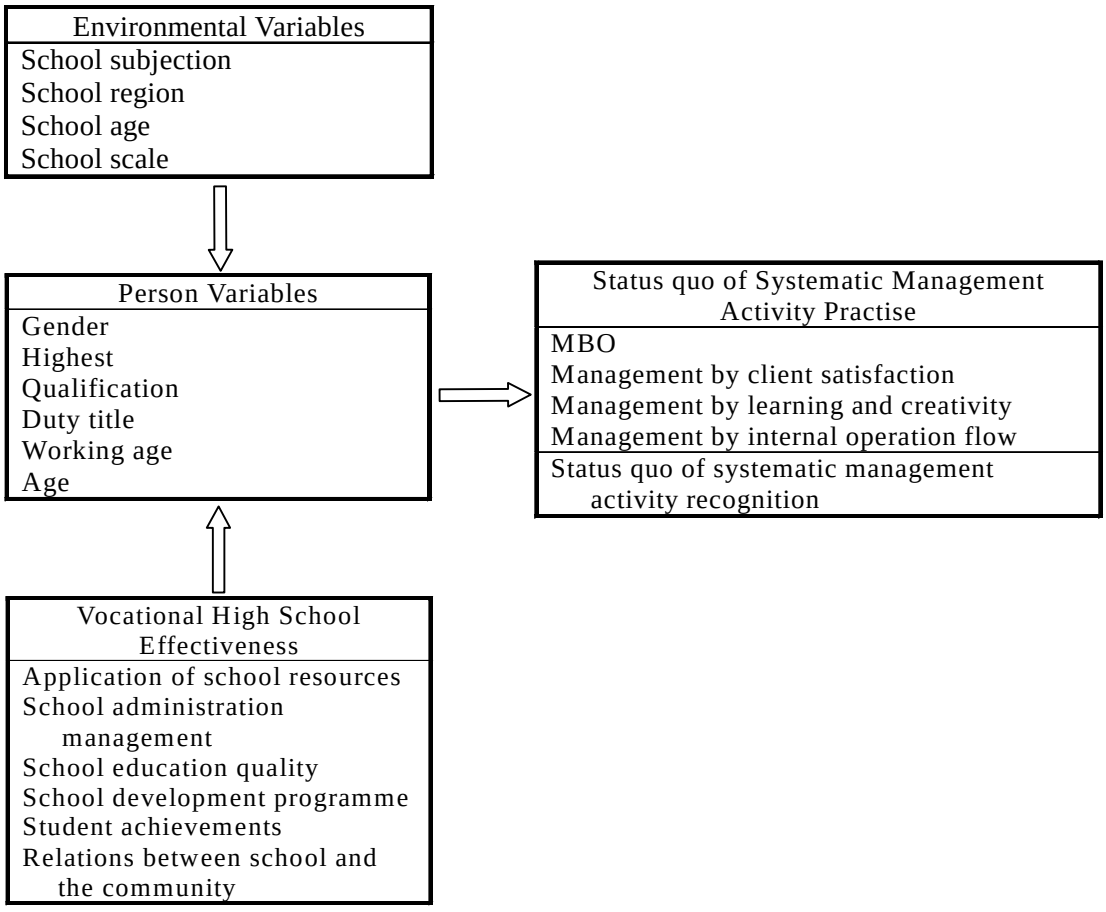

Figure 1: Research structure into systematic management at vocational high schools in Taiwan.

- Relations between systematic management activities and school effectiveness.
- The multiple regression of systematic management activities to school effectiveness.

DATA ANALYSIS

Status Quo of Systematic Management in Vocational High Schools

Amongst the management activities of vocational high schools of industrial programmes, MBO had the highest score (mean=3.84), then management by client satisfaction (mean=3.78) and management by internal operation flow (mean=3.67), with last spot given to management by learning and creativity (mean=3.62).

These results indicate that the management activities presently applied to vocational high schools of industrial programmes in Taiwan have not been fully developed and have space for improvement. That not one of the four systematic management layers is outstanding indicates suggests that the vocational high schools of industrial programmes have not adopted special management activities in school business management.

Teacher Recognition of Systematic Management in Vocational High Schools

Regarding teacher recognition of school management activities, teachers considered that management by client satisfaction was most important for schools (mean=4.36), then management by learning and creativity (mean=4.27), MBO (mean=4.24) and last was management by internal operational flow (mean=4.21).

At present, the teachers in vocational high schools of Taiwanese industrial programmes mostly accept that school should be managed by objectives, which is different from the present school management direction. None of the four layers of teacher recognition is especially outstanding, indicating that the teachers in vocational high schools of industrial programmes have no obvious partiality about the application of special management activities in school management.

Management Activity and Different Environmental Variables

Different school variables are taken as independent variables, including school scale, history, property and four region variables, in the MANOVA analysis of management activity (see Table 1).

Table 1: Scores of different management activities for different environmental variables.

Statistical value	Variable			
	School scale	School history	School property	School region
Management activities Wilks' Λ	0.932**	0.945	0.919***	0.986

Concerning school scale, there is a significant recognition difference of school management status quo for teachers of different scale schools (Wilks' Λ=0.932, $p < 0.01$). According to further analysis by ANOVA, there is still significant difference of teacher recognitions regarding the four aspects. From this comparison, it can be seen that the teachers of classes with 49 students have a higher level of recognition over those of classes with 24-48 students.

There is significant recognition difference of school management status quo for teachers of different school properties (Wilks' Λ=0.919, $p < 0.001$). Teachers in private schools have higher recognition of MBO, client satisfaction and internal operation flow over those in public schools.

Management Activity Expectations for Different Person Variables

Taking five different person variables of schoolteachers as independent variables, including teacher gender, age, working age, educational qualification and duty title, the management activity status quo was analysed using MANOVA (see Table 2).

The results show that there was no significant difference of management activity expectations for different schoolteacher person variables.

Table 2: Difference of management activity expectations for different person variables.

Statistical value	Variable				
	Gender	Age	Educational qualification	Working age	Duty title
Recognition of systematic management activities Wilks' Λ	0.975	0.94	0.968	0.951	0.966

Relationship with School Effectiveness

The relation between systematic management activity and school effectiveness was determined by utilising canonical correlation analysis. X set of variables can explain the difference of 94% of the total variance in Y set by four canonical factors, which shows that the research has rather strong explaining power.

Table 3 shows the multiple regression analysis that takes various layers of systematic management in vocational high schools of industrial programmes as variables and takes the integral school effectiveness as the criterion variable.

When the four predicted variables forecast the criterion variable (integral school effectiveness), three significant variables were included in the regression equation, with the multiple correlation coefficient being 0.823 and the integral explaining variance at 0.675. The explaining variance of management by learning and creativity is 0.610, ie management by learning and creativity can forecast 61% of the school effectiveness variables.

The standard regression equation is that the integral school effect = 0.387* learning and creativity + 0.287* internal operation flow + 0.205* client satisfaction.

CONCLUSIONS

From the literature review and this study, it can be known that the drive of systematic management activities can effectively enhance school effectiveness. In analysing the management of vocational high schools, the management activities presently applied in the schools have adopted the four management directions at the same time and have no outstanding management activity. This implies that the application of systematic management to vocational high schools of industrial programmes is still in its embryonic form and has space for improvement.

Private schools and relative large-scale schools have a higher degree of systematic management, but there is no difference for school age and region. There is no recognition difference for teachers of different gender, educational qualification, working age and duty title, suggesting that teachers have consistent views about systematic management.

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Table 3: Multiple regression of systematic management activities to school effectiveness.

Selective variable sequence	Multiple correlation coefficient R	Decisive coefficient R^2	Increasing explaining amount R	F value	Net F value	Standard regression coefficient
Learning and creation	0.782	0.610	0.610	546.9***	546.9	0.387
Internal operation flow	0.817	0.665	0.055	348.0***	58.6	0.287
Client satisfaction	0.823	0.675	0.010	242.7***	11.3	0.205

***$p < 0.001$

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BIOGRAPHIES

Yoau-Chau Jeng is a Professor of the Department of Industrial Education at the National Changhua University of Education in Changhua, Taiwan. Dr Jeng received his PhD in Industrial Education and Technology and MS in Mechanical Engineering, respectively, from Iowa State University in the USA in 1988. Also, he received his ME of Industrial Education from the National Taiwan Normal University in 1982.

Dr Jeng was a research assistant in the Research Institute of Studies in Education (RISE) from 1984 to 1985, and the research and teaching assistant in the Department of Engineering Mechanics from 1986 to 1988, respectively, at Iowa State University. In addition, he was the lecturer of the Department of Mechanical Engineering of Tongnan College of Technology from 1982 to 1983, and the teacher of the Department of Foundry of the National Changhua Vocational Industrial High School from 1977 to 1979. Dr Jeng was the director of the foundry division in the Taiwan Province Skill Competition Committee and the referee of foundry in the National Skill Competition Committee, respectively, from 1988 to 1998.

Mr Chin-An Chen received his ME of industrial education in June 2001. His major was human resources management. In 1992, he graduated from National Yunlin College of Technology and received his BS in mechanical engineering. Having five years of working experiences after graduation from college, he re-entered the school as a graduate student in the Institute of Industrial Education at the National Changhua University of Education in Changhua, Taiwan, and chose human resources management, instructional evaluation and instructional efficacy as his major fields.

Dr Chien-Chou Chen received his PhD from the National Changhua University of Education in Changhua, Taiwan, in June 2001. The focus of studies lay in human resources management, organisation management as well as energy education.