

Developing a hierarchical structure for assessing cooperative education programs from intellectual capital perspective: a case study in Taiwan

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Prioritization of intellectual capital measurement indicators for business firms under uncertain conditions has been reported. In this study, an experiment was performed to understand the use of intellectual capital for the evaluation of cooperative education program in a vocationally-oriented university. A model of value creation process is proposed to develop the intellectual capital components as the central intangible value of a cooperative education program. Analytic hierarchy process is applied to formulate the intellectual capital measurement indicators of cooperative education program for obtaining higher employment value that rapidly benefits to the employing firms. A case study is empirically explored at Shu-Te University in Taiwan. Preferences of the experts are gathered using a pair-wise comparison to prioritize the intellectual capital measurement indicators for providing a guideline for the effort on cooperative education development. Such an approach, we believe, improves the likelihood of constructing the suitable model of intellectual capital reports as the important evaluation facilitators for each case of cooperative education program to the overall benefit and it may be of interest to more cooperative education practitioners. (*Asia-Pacific Journal of Cooperative Education*, 10(2), 57-64).

KEY WORDS: Cooperative education, intellectual capital, analytic hierarchy process, case study, Taiwan.

The significance of the value of cooperative education with combining academic and vocational studies has continued to be recognized by many countries in recent decades (see, e.g., Aberšek, 2004; Saunders & Machell, 2000; Stern et al., 1997; Tabbron & Yang, 1997). A particular form of traditional cooperative education programs are the so-called 'sandwich' courses, cooperative education involving a period of 6 to 12 months work experience in vocational undergraduate courses, where all students spend at least 24 weeks in work experience which integrates with, and is additional to, their school studies. The variance in approach, ranges from one day per week during a period of study, to 12 weeks work done during summer vacations, understandably gives rise to some confusion. Basically, the traditional sandwich courses place more emphasis on the learning in alternating school study and work experience, and it is typically carried out as two or three placements; each of three-months duration at the end of two or three academic year. It possibly accounts for the significance but not for the value creation of cooperative education.

Co-op is strongly emphasized for many graduates seeking employment in the vocational and technical universities by the Ministry of Education in Taiwan. However, several vocationally-oriented universities either require or encourage a tighter integration of current industrial experience as part of their vocational education curriculum in the new government employment promotion project, namely, the *Last Mile Project*. The implication of Last Mile is to reduce the discrepancy between the vocational university studies and industry skill needs. It has been explicitly recognized in Taiwan that the comprehensive cooperative education programs in vocationally-oriented universities need to be evaluated to establish their higher value for the stakeholders from more innovative perspective.

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In this era of the so-called knowledge economy, knowledge has been used to emphasize the importance of the growth and development of organization in a competitive business environment (Beamish & Armistead, 2001; Bontis, 2004; Drucker, 1993). However, knowledge management is an emerging paradigm, and not many organizations have a clear idea of how to deal with knowledge management (Wong & Aspinwall, 2006). Likewise, intellectual capital is seen as the pursuit of effective use of knowledge, as opposed to information, and is an essential source of organizational advantage to encourage value creation (Bontis, 1998).

Intellectual capital is categorized in the literature by reference to constructs including *human capital*, *structural capital*, and *relationship capital* (Edvinsson & Malone, 1997; Roos & Roos, 1997). Human capital is the individual-level knowledge, such as skill and innovativeness, that each employee possesses (Bontis, Keow, & Richardson, 2000). It is human capital that provides the most valuable asset, which is, however, enabled by structural capital (Edvinsson & Sullivan, 1996; Stewart, 1999). Structural capital is the sum of all assets that realize the value creation process; such as the vision of the organization, its management philosophy, organizational culture, strategies, processes, working systems and information technology. Relational capital is the sum of all assets that pertains the organization to manage with the environment, including the relations with customers, shareholders, suppliers, rivals, official institutions, and society (Bozbura, 2004).

Up until the present, the intellectual capital debate has been a forum for practitioners, even though the term has rarely been used to interpret the valuable resources in universities. It embodies a belief that intellectual capital embedded in school knowledge management systems can be a critical resource for graduates to make effective performance in the workplace (Leitner, 2004). Thus, constructing intellectual capital statements for cooperative education programs is important for the development of a knowledge-based vocational university because intellectual capital statements report on its manifestation in cooperative education activities that management initiates, and supports in the name of value creation. Therefore, this paper aims to use intellectual capital as a better way of understanding how cooperative education programs can create higher value for their stakeholders. At the Shu-Te University in Taiwan, an employment-oriented cooperative education program has been offered for four years to provide the graduate students a better opportunity for entry into the employment marketplace, and we have seen a steady increase in graduate employment. The experience is new and valuable to prospective industry participants, and to university faculty. Hence in this study, preferences of experts are gathered using a pair-wise comparison to prioritize the intellectual capital measurement indicators of cooperative education program for providing guidelines on the development, and productive use of investments in intangible assets of a knowledge-based educational institution.

VALUE CREATION MODEL FOR COOPERATIVE EDUCATION PROGRAM

Although there has been an substantial interest in intellectual capital or cooperative education, little research was found about the relationship between intellectual capital report and cooperative education programs, and how they relate to value creation process. For most cooperative education theoreticians and practitioners, it is difficult to define the concept of intellectual capital, and to fit its notion into cooperative education practices. Hence, an experiment was performed in this study to understand the use of intellectual capital for the

measurement indicators of cooperative education program in a vocationally-oriented university. So far, research on intellectual capital has focused on three categories: human, structural and relational capital. However, it is not the categories of intellectual capital, but the value creation process between them, that directly influences the performance of cooperative education programs. The process creates value through realizing benefits to stakeholders, and particularly to the employing firms in industry. The cooperative education valuation account of benefits to employing firms; such as, manpower benefits, financial benefits, and strategic benefits, is discussed below. Based on previous relevant studies (e.g., Leitner, 2004; Peppard & Rylander, 2001), a model employing the principle of conventional input-output conversion process is proposed to demonstrate the value creation relationships and this is shown in Figure 1.

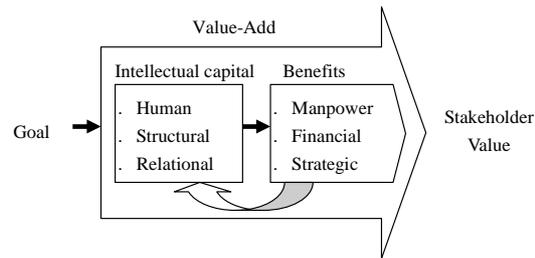


FIGURE 1
Value creation process for intellectual reporting of cooperative education program

According to the proposed model, measurement indicators constructed include intellectual capital reports on goal-based activity inflows of cooperative education, which tend to realize benefits to stakeholders by tracing a value creation process through implementing value-added potential cooperative education program in a vocational university. Additionally, the process points to the influence of adopting intellectual capital indicators as evaluation facilitators on the overall performance of cooperative education in an institution. It is, therefore, proposed in this study that intellectual capital measurement indicators help us form a better understanding of cooperative education programs in creating stakeholder value.

A CASE APPLICATION

A challenge for academic institution to exploit the employment opportunities in workplace, often provided by the realization of cooperative education programs, may lead to an internal structural differentiation to produce greater academy-industry benefits (Anderson, 2001). At Shu-Te University, we have offered an employment-oriented cooperative education program called the 'topping course', a variant of the traditional 'sandwich course', in the BSc (Management) degree for four years. The topping course is normally conducted at the end of the last academic year and includes a total of six months relevant work experience. Currently nearly one third of the students in the School of Management are enrolled in this cooperative education program, which is facilitated by a cooperative education program team with participants of academic supervisor, tutors, and industry employers. Student selection and admission to the program is carried out on a case-by-case basis, with students screened on their academic record, and personal interviews.

Research on the beneficial aspects of cooperative education programs based on the employer’s perspective, provides valuable information for the investigation on employment value (Leslie & Richardson, 2000; Somer, 1995). Areas of concern on the aspects of the cooperative education program at Shu-Te University also have been summarized in our previous work (Chen & Lee, 2006; Chen, Lee, & Kao, 2006). Three major evaluation criteria based on benefits from the employers’ perspective including manpower benefits; financial benefits and strategic benefits with their sub-criteria are identified to use for the prioritization of intellectual capital measurement indicators. A synopsis of these indicators is provided in Table 1.

TABLE 1
Evaluation criteria of intellectual capital measurement indicators

Criteria	Sub-criteria
Manpower	Develops the social and oral skills of students in work place
	Provides students with professional skills or innovative skills on latest technology
	Promotes students’ working motivation and attitudes
Financial	Reduces training cost
	Gains financial supports from government
Strategic	Internal management implications
	Enhances company’s image to public

In this study, we seek to identify intellectual capital measurement indicators that reflect the cooperative education characteristics, and core competencies. We find highly relevant studies which first construct intellectual capital as interpretation of the most important resources and attempt to associate it with the stakeholder value of R&D organization or university (Chu et al., 2006; Leitner, 2004). Quality of human resources; structural capital assets pertaining to the curriculum design, and the administrative infrastructure may be viewed as the three major categories of intangible elements of the intellectual capital that provides support for the university or R&D organization so necessary to create higher stakeholder value. The vision of with the strategic deployments, its management leadership, processes or working systems, curriculum design and information technology are among the candidates of the intellectual capital measurement indicators for cooperative education program. After discussion with experts, seven of the intellectual capital measurement indicators were selected, and defined below:

Indicator 1:

An explicit vision with employment-oriented goal and its strategic deployments

Indicator 2:

Leadership of managing cooperative education program at sponsoring university

Indicator 3:

Human resource quality of cooperative education program team with participants of tutors, academic supervisor, and industry employers

Indicator 4:

A continual improvement process in implementing cooperative education program including, such as, communication, evaluation, and screening process

Indicator 5:

Curriculum design index, such as, involvement and feedback from employing firms, interesting or

motivating to students, updated professional knowledge

Indicator 6:

Adequate information technology in service

Indicator 7:

Relationship index, such as relationship management with employing firms or government.

The *Expert Choice*, a computer software package, was used to measure and synthesize the evaluation criteria and indicators using pair-wise comparisons to arrive at a prioritized list of intellectual capital measurement indicators for cooperative education program. Analytic hierarchy process was applied for prioritization. Figure 2 illustrates the hierarchical structure, which serves for prioritization of intellectual capital measurement indicators that were evaluated against the criteria in this hierarchy.

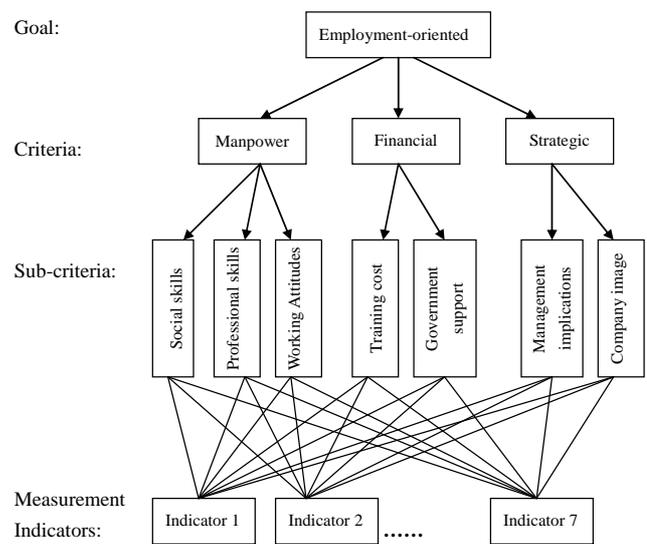


FIGURE 2

The hierarchical structure of criteria for prioritizing the intellectual capital measurement indicators

The evaluation judgments need to be compared to put a weight factor to each criterion and sub-criterion. A measurement questionnaire was developed with each judgment compared at a peer level in terms of importance to the goal for employment benefits with a sample of the cooperative education experts. The criteria are compared for their relative importance to the goal such as: *Equal, moderate, strong, very strong, and extreme*. The verbal responses are then quantified and translated in a score through the nine-point scale. Figure 3 shows the priorities of each set of criteria judgments.

The manpower criteria, which have an overall weight of 59%, play an important role in experts' choice of intellectual capital measurement indicator selection. Each sub-criterion is also represented with the relevant weight of the seven sub-criteria across all the criteria. Among the sub-criteria, the working attitude is the primary concern for the prioritization of

intellectual capital measurement indicators than other factors. The working attitudes can be defined as the general feeling there is that one's work is something that must be done whether one likes it or not.

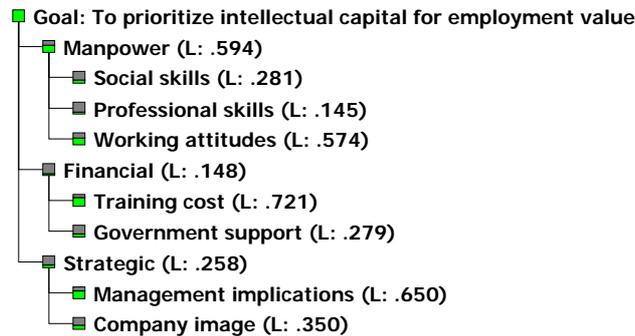


FIGURE 3
Priorities of each set of criteria judgments for maximising employment value of cooperative education program

The comparative criteria and sub-criteria judgments are therefore used for the actual evaluation or prioritization of intellectual capital measurement indicators. This evaluation process involves another set of pair-wise comparisons between each measurement indicator evaluated against each criterion and sub-criterion. Upon completion of the evaluation process, the overall priority of the intellectual capital measurement indicators for cooperative education program was derived according to their relative importance to satisfy the employment-oriented goal. Figure 4 indicates that among the seven intellectual capital measurement indicators, Curriculum design index (Indicator 5), with the highest priority value, is the most important. Moreover, the overall inconsistency of the input judgments 0.01 is within the acceptable ratio of 0.1.



FIGURE 4
Prioritization of intellectual capital measurement indicators

In this case, enterprises tend to place a high value on social skills, working attitudes and motivation in recruiting graduates. This suggests that the cooperative education practitioners must pay full attention to curriculum design, such as involvement and feedback from employing firms on the subject of working attitude promotion. The employment opportunities are therefore developed through the initiative of the curriculum design from intellectual capital perspective.

CONCLUSIONS

The vocational higher education policy in Taiwan is located in the general drift toward a more explicit link between what students learn in the classroom, and what they might be doing in the workplace. In other words, the vocationalizing of the higher education curriculum has been extended from the relatively narrow base of conventional vocational courses to a much broader concern with explicit connections to higher employment value.

A model of value creation process together with intellectual capital statements for cooperative education program on promoting graduate employment is proposed for the interpretation of its valuable resources. A hierarchical structure is developed as a better comprehension of cooperative education program and its activities by using the analytic hierarchy process method. A case of cooperative education program with employment-oriented goal at Shu-Te University in Taiwan was studied to prioritize the intellectual capital measurement indicators by experts. This indicates that working attitude is the primary concern for the prioritization of intellectual capital measurement indicators than other sub-criteria. Among the seven indicators, curriculum design plays the most important role in this case study which explores the value creation process. This implies that a better employment opportunity can be generally established through the initiative of the curriculum design from a more innovative and intellectual capital perspective. Although the evaluation criteria and measurement indicators may be affected by the contingent factors of different cooperative relationship, it is the adaptation of the intellectual capital reporting model to those factors for further study on cooperative education issues. We also expect that this research will support the establishment of the intellectual capital reports for the important evaluation facilitators of the cooperative education value.

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