Paper to be presented at the DRUID Academy Conference 2016 in Bordeaux, France on January 13-15, 2016

The Effect of Openness Degree of Knowledge, Human Resource Diversification to Innovation：Using the Improvement of Employee Creativity as a mediated effect variable

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Abstract

Abstract As the change of periods, regardless of the organization or the country, innovation have become the necessary operation methods to enhance competitiveness (Clark & Guy, 1998). Knowledge is the indispensable key factor if organization wants to facility innovation into practice (Amabile, 1983). Knowledge can be said to be the basis of innovation. We should have sufficient professional knowledge to break through the bottleneck each stage to innovate; and the organization should make more efforts to enhance employee' creativity. The other way, marketing innovation is also the most critical part of the internal resource integration and innovation (Hanvanich, Droge, & Calantone, 2003). Enterprises also have to integrate the internal and external resources and innovation activities to respond the needs of customers positively. Especially, marketing innovation is the most critical part of the internal resource integration and innovation (Hanvanich et al., 2003). Facing many problems caused by declining birthrate, the education industry begin to brainstorm special ways to recruit students in the situation of low birth rate. When the managers deal with innovation management in school, they should also pay attention to take the people as the basis. That means they should emphasize the members' mind in innovation (Jones, 2000; Lakshmi, 1989). Thus, the study investigates the impact of open degree of knowledge, human resource diversification, and uses the employee creativity as a mediated effect variable to

innovation. In this study, we use the questionnaires in "Taiwan Innovation Survey -TIS 3" (Using the "The Community Innovation Survey 2008, CIS 2008" in EU as questionnaires sample) as database, and select the education industry as sample. The total samples are 121. We also define the numbers of employee and firm size as control variables. The analysis methods are Pearson Correlation and Regression Analysis. The results found that the effects of the knowledge openness degree and employee diversification would promote employee creativity are significant, while promoting employee creativity can also effectively enhance the marketing and organizational innovation activities in the organization. The results of mediated effects indicate the Improvement of Employee Creativity has the full mediated effect between the Openness Degree of Knowledge and Organization Innovation, and have the partial mediated effect between the Human Resource Diversification and Organization Innovation. The conclusions are: (1) Organization through internal sources, market sources, public sources, and other sources to increase the openness of internal knowledge in organization can effectively promote the creativity of employees. (2) The more diversification of the capabilities of employee are increasing, the more effectiveness of the improvement the creativity of employees in the organization. (3) The firm through different ways to promote the creativity of employees, and to enhance the marketing innovation and organization innovation. (4) We should put more attention to the approach of the Improvement of Employee Creativity and enhance the variety of the Openness Degree of Knowledge and the Human Resource Diversification to improve the performance of Organization Innovation. The management contribution is to provide some discussion to fill the lack of issues of knowledge, human resource and creativity in the educational industry. The practical contributions for education industry can provide that the managers should consider knowledge openness degree, employee diversification and creativity, when they have innovation activities, and they can effectively enhance corporate innovation activities. Keywords: Openness Degree of Knowledge, Human Resource Diversification, and Employee Creativity Acknowledge The authors would like to thank the National Science Council, now the Ministry of Science and Technology, of Taiwan, the Republic of China, for financially supporting this research under Contract no. NSC -102-2627-E-004-001-. Reference Clark, J., & Guy, K. (1998). "Innovation and Competitiveness: A Review," Technology Analysis & Strategic Management, 10(3), 363-395. Amabile, T. M. (1983). The Social Psychology of Creativity. New York: Springer-Verlag New York Inc. Hanvanich, S., Droge, C., & Calantone, R. (2003). "Reconceptualizing the meaning and domain of marketing Knowledge", Journal of Knowledge Management, 7, 4, 124-134. Jones, P.H. (2000). Embedded values in innovation practice: Toward a theory of power and participation in organization. Doctoral dissertation. Cincinnati: The Union Institute. Lakshmi, S. (1989), Innovations in education. New York: Sterling.

Jelcodes:M10,I20

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Abstract

This study investigated the impact of open degree of knowledge, human resource diversification, and employee creativity to innovation. In this study, we use the questionnaires in "Taiwan Innovation Survey -TIS 3" (Using the “The Community Innovation Survey 2008, CIS 2008” in EU as questionnaires sample) as database, and select the education industry as sample. The total samples are 120. The analysis methods are Pearson Correlation and Regression Analysis. The results found that the effect of the knowledge openness degree and employee diversification would promote employee creativity are showing significant, while promoting employee creativity can also effectively enhance the marketing and organizational innovation activities in the organization. The results of mediated effects indicate the Improvement of Employee Creativity has the full mediated effect between the Openness Degree of Knowledge and Organization Innovation, and have the partial mediated effect between the Human Resource Diversification and Organization Innovation. The conclusions are: (1) Organization through internal sources, market sources, public sources, and other sources to increase the openness of internal knowledge in organization can effectively promote the creativity of employees. (2) The more diversification of the capabilities of employee are increasing, the more effectiveness of the improvement the creativity of employees in the organization. (3) The firm through different ways to promote the creativity of employees, and to enhance the marketing innovation and organization

innovation. (4) We should put more attention to the approach of the Improvement of Employee Creativity and enhance the variety of the Openness Degree of Knowledge and the Human Resource Diversification to improve the performance of Organization Innovation. The management implication is to provide the lack of issues of knowledge, human resource and creativity in the educational services industry. The practical implications for education services can provide that the manager should consider knowledge openness degree, employee diversification and creativity, when they have innovation activities, and they can effectively enhance corporate innovation activities.
Keywords: Openness Degree of Knowledge, Human Resource Diversification, and Employee Creativity

Introduction

As the change of periods, regardless of the organization or the country, innovation have become the necessary operation methods to enhance competitiveness (Clark & Guy, 1998). Schumpeter (1934) mentions “Innovation or Die”. Creativity and innovation have been considered as key drivers for the long-term success of business (Davila, Epstein & Shelton 2007; Gibb 2006; Hartley 2005) and become more important in creative workforce for the competitiveness of organizations in the global economy (Oakley 2007; Cox 2005). Intel CEO Grove (1996) indicates that entered the era of ten-speed competition, organizations face a dramatically changing environment, they must grasp innovation opportunity to get a niche. If you want to put innovation into practice, knowledge is the indispensable key factor (Amabile, 1983). Knowledge can be said to be the basis of innovation. We should have sufficient professional knowledge to break through the bottleneck each stage to innovate; and the organization should make more efforts to enhance employee’ creativity. If there is only uniform talent in organization, the knowledge and skills will be limited, and the spark brought out from employee also will be limited. Therefore, the organization should employ diversified talent to improve innovation and organizational performance.

In aforementioned studies, the scholars discuss the issues of an atmosphere of organization innovation and that teachers’ awareness of the perception of innovation can enhance teaching innovation, administrative innovation, learning innovation, and thus to improve the whole school performance to confront the demand brought out from the coming era of knowledge economy. Education and knowledge base are two of six planks, including industry and business, government, the knowledge base, the finance community, the public and the media, and education, to create a climate within which a culture of innovation can prosper (Duggan, 1996).

School Innovation Management and its business performance present higher than medium levels of performance. To create organizational innovation can effectively

uplift management effectiveness of school. The diversity of institutions of higher education is what promotes innovation, and some groups of institutions in higher education will adopt innovation more quickly (Bok, 1986). Creativity and innovation in business, management educators and business managers are required to encourage all of their employees to be creative and to build in a culture of creative innovation (Zhou, 2007, p.17) and creativity can be built by learning (Parnes, 1967) to support the creative human potential and resilience of their employees (Kerr, & Lloyd, 2009, p. 489). Thus, having adequate knowledge can effectively make creativity better. Knowledge is the source of competitiveness. Tangible resources often are limited by the scarcity of resources, but knowledge is able to be accumulated. Hence, the core capability of one also can continue developing. The characteristics of innovation in education is as the outcome of a cumulated process of experimentation (Murnane & Nelson, 1984). As the result, we can realize the relevance between the knowledge ability, talent ability and creativity to innovation.

The Taiwanese Ministry of Education (2005) present "White Paper of Creativity Education" which refer to the five main components objects to form the creative direction of educational development, including individuals, schools, society, industries, and culture. Based on individual knowledge can arouse potential capability of national creativity, develop multiple intelligences, and build a creative country. It also stress that individuals and knowledge are the key factors of promoting creativity and can enhance whole competitiveness. In response to the trends of changes of environment and reformation of education, the school must have a systematic innovative perspective, technologies and services to carry out a series of innovation behavior to improve student learning achievement and the school performance, and then, to rise the competitiveness of the school.

In recent years, “White Paper of Education Policy” (Taiwanese Ministry of the Interior, 2013) mentions that the first issue discussed is the declining birthrate. The total fertility rate of women of childbearing age in 1951 is 7.04 people for a years, and it is down to 2.1 people of replacement level in 1984. The total fertility rate is more down to 0.895 people in 2000, and Taiwan has become to the lowest fertility rates in the world. Although the total fertility rate is up to 1.265 people in 2012, fertility level is still low (Taiwanese Ministry of the Interior, 2013). As early as nine years ago, the educators indicate the low birth rate has become the trend of population development in the future. The problem of low birth rate impact on the education-related institutions directly, such as: universities, junior high schools, elementary schools, kindergartens in education industry. As long as the education related industry may be affected by the impact of the problem of low birth rate. The school institutions deal with the problem by decline of class numbers or combination of schools, and the education industry also maybe face

going bankrupt in the reason of less students. Facing many problems caused by declining birthrate, the education industry begin to brainstorm special ways to recruit students in the situation of low birth rate.

In summary, the study in the demographic trends of declining birthrate understand the reasons of thriving growth from openness degree of knowledge and human resource diversification to improve employee creativity in education industry. And then we discuss the effect of using promoting employee creativity as a mediated effect variable for organizational innovation and marketing innovation. By investigating the pre-factor effects of marketing and organizational innovation in education industry, the education manager can obtain innovation context through this study when they compete in the limited market.

Literature Review

Marketing Innovation and Organization Innovation

Economist Schumpeter (1934), first proposed the concept of innovation, mention that innovation is the driving force of economic growth. In the past decade, the education industry alters dramatically by reason of technological innovations (Hussein & Mourad, 2014). In order to utilize resources efficiently, corporate fulfil the needs of the market in innovative ways. He is of the opinion that of the inventions can be an implement of new combination to develop a socially acceptable and commercial value activity. All of above can be seen as an innovation (Schumpeter, 1942). In marketing innovation, for consumers, the most direct contact that can be awarded of enterprise innovation is the marketing, service and innovations of distribution activities (Kim & Mauborgne, 1997). Therefore, marketing innovation mainly provides value to satisfy customer demands. This value must be able to suffice for the needs of consumers or customers, and these innovations are usually fulfill their potential demands (Slater and Narver, 1998). Generally, marketing innovation most focus on output and customer-oriented or market-oriented, so companies stress on product design, market research, advertising and sales promotion (Scherer, 1980). When the organization fulfill customers' needs and collect competitive information and dissemination of common belief, which is a market-oriented core. When the manager is possess with market-oriented, then he must use technological innovation, imitation policy or outsourcing strategies, etc., in order to respond to different customer demand and competition (Zhong & Zhang, 2005). At the same time, enterprises also have to integrate the internal and external resources and innovation activities to respond the needs of customers positively. Especially, marketing innovation is the most critical part of the internal resource integration and innovation (Hanvanich, Droge, & Calantone, 2003). To create customer value must be through the coordination and integration between the marketing

department and the human resources department or other departments and continue to improve whole customer value as the goal (Han, Kim, & Srivastava, 1998). Thus, marketing innovation is considered the most critical strategies and methods to respond to customer demand (Hanvanich, Droge, & Calantone, 2003), and to satisfy the new consumer demand through the marketing knowledge of marketing program (Hanvanich et al., 2003). In sum, the innovative activities within the organization should show on all marketing activities, thereby to provide a marketing innovation activities better than competitors to gratify customer demands to enhance customer value. The implement of marketing innovation in organizations are often through the appearance of the product, design, packaging, product display or sales, as well as pricing, advertising and related promotions to contact with consumers the most directly and showcase their innovations.

Another important innovation activity in the organization is organizational innovation. In the past, the initial researches of organization innovative issue are discussed about the personal level –leader as the main topics (Neal, 1965). Because the supports of top managers is the key factors of the success of innovation and new product development (Malhotra, Grover, & Desilvio, 1996, Drazin & Schoonhoven, 1996). Discussing the factors of successful innovation, empirical studies have found leadership and business philosophy of managers, innovation management and strategy management will have a direct significant impact to performance (Su, Li, & Su, 2003). Therefore, whether the leaders have the insight of the market and customer demands, and propose the correct direction judgment of innovation is an important factor to corporation management of organization innovation and organizational performance. Until after 1970, the issues of organizational characteristics in organization innovation are noticed and discussed widely, and the topics include organizational structure, the internal features, containing bureaucratic organization, centralization, complexity, interconnectedness, resource adequacy, specialized, functional , professional, technical, management, density, number of organizational hierarchy, and the degree of organization size, etc. (Hull & Hage, 1982; Miller & Friesen, 1982; Meyer & Goes, 1988; Damanpour, 1991; Rogers, 1995); and external features include the ability of communicate with outside of organization, and the openness degree of system (Rogers, 1995). Daft (1978) also classifies organizational innovation, and proposes “Dual-core Theory” (Daft, 2004). He divides organizational innovation into "Management Innovation" and “Technical Innovation”. He defines "Management Innovation" as that the innovations between management members will effect internal organization members and their social behaviors, including: norm, role, process and communication among members. For this reason, organizational innovation in innovative activities contain wide issues. The horizontal level of cooperation is across the departments, and the vertical level covers management level to operational employee. Thus, the study

choose marketing innovation and organization innovation as the two important dimensions in innovation activities.

Openness Degree of Knowledge and the Improvement of Employee Creativity

Society now is oriented of combination of technology, innovation, Internet, globalization and new economy, and knowledge is as the core of education model in knowledge economy. In the perspective of open theory, the external environment is the main source of pressures in school in innovation management. The flow of knowledge between schools and the outside world brings creative and affects the ability of organization innovation. They can facilitate the interaction in the network through the school staff (including administrative staff and teachers), or even the outsourcing staff across organizational boundaries (Chin & Pu, 2006). There are various kinds of knowledge in the organization, and knowledge also need through diverse channels and networks to strengthen organization learning to be absorbed and applied by employees to create added value. In education field, innovation not only rely on an individual but also need the creativity of team or organization. Thus, teachers should also team up a knowledge group to share knowledge with each other, and attach importance to technologies sharing among teams (Chin & Pu, 2006). Gardner (1983) considers high creative genius can have a variety of skills across many different fields but also has a number of different intelligence. Therefore, in the background of high creativity, we need various knowledge and abilities to be able to support high creativity. When we have effective knowledge and skills, and then we can develop creativity.

In the past studies, researchers mentioned innovation management of school based on knowledge management and innovative ideas can build effective information system of administrative management and appropriate management approach to integrate consensus of administrative staff and to enhance the effectiveness and efficiency of administration. That means school administrators and teachers should breakthrough the traditional thinking to out of the routine and develop creative educational activities and can attract students to participate in. And they need new reforms of the existing curriculum development and teaching method in order to obtain better teaching effects to form innovative culture and values, thereby to affect the whole school performance (Fan, 2011). From the above discussion, we can observe the close relationship of organizational innovation, the employee creativity and innovative thinking, but also we need to have adequate sources of knowledge and management to promote outputs of innovative ideas to enhance organization innovation effectively.

Another creativity scholar Amabile is in the perspective of context to realize creativity. She proposes “componential theory of creativity” that the influences on creativity include three within-individual components: domain-relevant skills

(expertise in the relevant domain or domains), creativity-relevant processes (cognitive and personality processes conducive to novel thinking), and task motivation (specifically, the intrinsic motivation to engage in the activity out of interest, enjoyment, or a personal sense of challenge) (Amabile, 2012, P.2). And individual creativity is generated from the interaction of these three components. In the composition two-creativity-relevant processes, she explores tacit knowledge and explicit knowledge inspire new ideas generated. It is quite important for the creation process (Amabile, 1983). In summary, we propose it is effective to enhance employee creativity through various sources and accumulation of knowledge. We propose the hypothesis in this study as follows:

H1: Knowledge openness has positive effect in promoting employee creativity.

Human Resource Diversification and the Improvement of Employee Creativity

School is typical of knowledge-intensive organizations, and school staffs are the core competitiveness. Especially teachers have to constantly update their knowledge and improve their ability to control the dynamics of the environment to obtain new information to flexible use of multiple educational materials, and then to cultivate students' competitiveness (Chin & Pu, 2006). Scott and Bruce (1994: 580-585) indicate that idea is the foundation of innovation and it is produced from people who develop, carry, react to, and modify ideas. Therefore, individual innovative behavior is very important. The meaning of school innovation management is to combine innovation and management to position "innovation" for the body and "business" for the use to develop the functions of school education. When the managers deal with innovation management in school, they should also pay attention to take the people as the basis. That means they should emphasize the members' mind in innovation (Jones, 2000; Lakshmi, 1989). American humanistic psychologist Maslow divide creativity into "special ability to" and "self-realization of creativity". The former belongs to genius, and the latter belongs to everyone. In the opinion of Humanism, everyone has creativity and can show in daily life (An, 1988).Thus we can deduce that creativity that each person has is different. Organizations should accommodate a variety of different talents to bring out the differences of creativity from other organizations. In the view of team work, that means every member can bring out all kinds of different ideas through cooperation to solve the problem and complete the task (Gilson, 2004). When the members have enough creativity, organizational can resolve the problems they encountered through diverse methods and further to improve organization performance.

It can bring benefits for the organization from difference and diversity of members. Management scholar Drucker (Drucker, 2005/2009) mentions that the diversity of members is a very important element of organization innovation. If the members can

be selected diversely in organizations and promote individual differences. It will be able to gain competitive advantage and be in favor of organization (Schermerhorn, Hunt & Osborn, 2010). Diversification of members might inspire different perspectives, creativity and problem-solving approaches. Therefore, the diversity of employee will bring out different creativities, and this is also a very important part in the organization innovation. The education industry in addition to have the educational implications as well as has the general business characteristics. As the result, they should combine the specialties of education industry and pursuit the benefit-oriented of enterprise. In education industry, teachers should still view knowledge as the main core of the competitiveness to promote creativity of employees. Then, the organization's employees have more diverse abilities also can promote the creativity of employees effectively. We proposes hypothesis 2 of this study as follows:

H2: Human Resource Diversification has positive effect for the Improvement of Employee Creativity.

The Improvement of Employee Creativity and Marketing Innovation

In the highly competitive education industry, the innovation of marketing is also an important way to attract mainly parents and students through the different marketing strategies of product, pricing, channel, advertising to improve enrollment of students. To make these marketing strategies, we need through the design and operation of employees in the organization. And Sternberg proposes investment perspective in the creativity research field that creativity is individual utilize six resources owned by himself: Intelligence, Knowledge, Thinking Styles, Personality, Motivation and Environmental Context, and buy low and sell high in the creative market. Good creators are as like good investor to buy low and sell high in the stock market. This is the only way to a successful creation (Sternberg & O'hara, 1999). Thus, in the education industry, if we can promote the creativity of employee effectively, we can bring more kinds of marketing innovation effectively for the organization. Therefore, this study proposed hypothesis three as follows:

H3: the Improvement of Employee Creativity has positive effect for marketing innovations.

The innovation has effected by system, production process, product design and development, or issues relating to the management and development of people (Duggan, 1996). Most initial marketing research on the adoption of innovations focus on terminal consumers. To explore the characteristics of individuals (e.g. innovativeness) as determinants of adoption as well as attitudes and personality characteristics of innovation adopters is more stressed (Lockett and Littler, 1997). To form an attitude

toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision in the innovation-decision process through which an individual (or other decision-making unit) passes from first knowledge of an innovation (Rogers, 2003 p. 170). Universities and higher education institutes (HEIs) are now bombarded with content and tools for sharing information by new technology, such as using mobile learning process in online session to enhance the educational system (Ndubisi, 2006; Wiley, 2006; Mourad, 2010).Therefore, we propose the Improvement of Employee Creativity as mediated effect variable of hypothesis five six assumptions are as follows:

H5: The effect of marketing innovation on Openness Degree of Knowledge is mediated by the Improvement of Employee Creativity.

H6: The effect of marketing innovation on Human Resource Diversification marketing is mediated by the Improvement of Employee Creativity.

The Improvement of Employee Creativity and Organization Innovation

The school innovation management depends on the motivation and encouraging of the school principal to colleagues to put forward ideas, and work together to learn new work skills and techniques (Chin & Pu, 2006). Amabile (1988) emphasized that individual creativity is the main elements of organizational innovation. Without individual creativity would be no organization innovation. The relationship between employee creativity and organization innovation has also been discussed by many scholars, and Amabile (1997) recognizes that creativity and organization innovation interact and affect with each other. The working environment shaped by resources, encouragement of organization, and management practices will affect individual creativity. In the contrast, individual creativity shaped by task motivation, creativity-relevant processes and domain-relevant skills also will affect the work environment, which is the organization innovation. Schermerhorn et al. (2010) mentions that the beginning of the process of creativity and organization innovation starts at the problem or task. Although creativity trends toward individual, the individual creativity is the basis of organization innovation. And organizational innovation can concretize individual creativity. The relationship between them is very close.

Amabile (1988) and Kanter (1988) both consider if an organization wants to have a good competitiveness, they must promote their employee creativities first. Employee individual creativities are the main elements of organization innovation. Thus, individual creativity and organization innovation has a close relationship. As the results, for many organization in companies, they have to make use of innovation in order to maintain competitive advantage. When the organizations have no innovation, they will lose organization competitiveness (Afuah, 1998). Tushman & O'Reilly (1996) consider

that the individual traits and personality tendencies formed creativity and motivation will affect the innovation or performance of organization. If creativity is high, then there will be a positive impact for the organization. Nissley (2008) demonstrates how artful learning opportunities can enhance a capacity for awareness of creativity in one's self and others by arguing about introduction of arts-based learning, based on an innovation emerging model of arts-based learning in management education (Nissley, 2008, p. 22). Kerr & Lloyd (2009) investigate the issue of the necessity for creativity and innovation in the workplace and the need to train better leaders and managers.

In supplement educational industry, the organization also need to maintain innovation and flexibility to face changing rapidly and highly competitive market environment to promote employee creativity effectively, and also enhance organization innovation effectively. We propose the hypothesis 4 as follows:

H4: The Improvement of Employee Creativity has positive effect on Organization Innovation.

Employees can test new ideas as a facilitator or barrier by the level of knowledge and experience of employees. Previous studies show that a significant positive relationship is between IT knowledge within the organization and innovation adoption (Houghton and Winklhofer, 2002; Scupola, 2003; Mourad, 2010). The learning process of employee can help develop particular competencies and the firm can gain competitive advantage by this and further becomes more innovative and successful (Real et al., 2006). We propose the hypothesis 7 as follows:

H7: The effect of Organization Innovation on Openness Degree of Knowledge is mediated by the Improvement of Employee Creativity.

A company's human assets include the people working in it and their skills and abilities (Hooley et al., 1998). Leskovar-Spacapan and Bastic (2007) in their study on factors affecting the innovation capability of organizations found that lack of internal organizational capability including market orientation and others are among the important reasons why organizations exhibit lower levels of innovation capability. Characteristics of individuals working within organizations have been found to be important determinants of innovation adoption (Agarwal and Prasad, 1998). It is individuals within organizations who decide whether they will use the technology or not and this goes back to their characteristics and their acceptance of the changes caused by the new technology. This is particularly relevant when it comes to a service industry that is highly interactive by its very nature, like education (Hussein & Mourad, 2014). Therefore, we propose the Improvement of Employee Creativity as mediated effect variable of hypothesis five six assumptions are as follows:

H8: The effect of Organization Innovation on Human Resource Diversification

marketing is mediated by the Improvement of Employee Creativity.

Research Method

Data Collection and Research Samples

In the influenced of the trend of credentialism and low birth rate trend, parents wish to enhance the competitiveness of their children. Thus, except compulsory education, parents are used to fill children' free time fully, and this is the main reason of the supplement education industries increasing in Taiwan. In the past decade, the number of the education industry increase from 9,702 in 2005 to 18,887 in 2014, and the growth rate become twice within ten years. (Department of Education, Taipei City Government, 2014). In the situation of the population reverse growth trend, education industry is still increasing every year. Therefore, in this highly competitive situation, there is still a huge development opportunity and the expected highly growth market in the education industry. This should be a not ignored development trend in the future. In the reverse growth trend, the operators beside the goals of education and they have to notice the business performance to survive. Innovation is an important development direction in the competitive environment through marketing innovation and organization innovation to enhance effectively the organization business performance. To promote employee creativity is also the driver of organizational innovation. At the same time, knowledge is the basis of the enhancement of creativity, and more diversity capabilities of employees is more effectiveness of enhancement of employee creativity. Therefore, we consider that the education industry has the characteristics of market competitiveness and has the nature of education. They need good education quality and relevant marketing strategies to improve organizational performance. The references about education industry studies also have the characteristics of the education industry.

The study adapt the questionnaire of the database—"The Third Taiwan Innovation Survey, TIS 3" as the research sample[1]. The questionnaire design use "The Community Innovation Survey 2008 (CIS 2008)" in the European Union as sample. The survey period is from April 1 to August 31 in 2011. The survey method includes telephone surveys and interviews. The survey sample base on the top 5000 industries published by China Credit Information Service, LTD as the Population. In order to reflection of population, we adapt stratified random sampling method. The total sample are 13,841. We also use the firms data of "2006 Industry, Commerce and Service Census" published by Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. as population. The research has total 12,464 samples in Service Industry in Taiwan. We

[1] The database design as the same as the questionnaire of CIS 2008 in EU, and the contents include: (1) technical innovation and non-technological innovation; (2) the study sample included Taiwan manufacturing and services industries; and (3) and new environmental issues, and (4) a special issue of Taiwan (OEM / ODM, both sides interaction, etc.).

exclude refusing to be interviewed, midway refusing to be interviewed, incomplete respondents, and wrong contact details. Finally, the total successful samples are 9,138 (including Top 5000 General Census and successful interviewees 7,238).

The study according to "education industry," revised by Ministry of Education (2002), the education industry includes formal and general education system, such as elementary school, junior high school, senior high school and university, and also includes supplementary and continuing education are to supply the national daily knowledge to improve education degree, to teach practical skills, to develop a sound civil, and to promote the purpose of social progress. And it can be divided into three kinds, including supplementary education, continuing education and short-term supplementary education. All the national are willing to enhance their daily knowledge and capabilities, and they can educated by short-term supplementary education. The short-term supplementary education can be conducted by schools, institutions, organizations or private cooperate. And it includes acrobatics supplementary center and Arts, Science & Language Tutorial School. The length of schooling is one month to one year and six months. The study includes the aforementioned kinds of education industry. We have 125 successful interviews in education industry. We exclude 4 distinguishing characteristic samples, and the final total samples are 121.

Research Design

In the aforementioned studies discussion, the research proposes eight hypothesizes in the research framework, and shows as Figure 1:

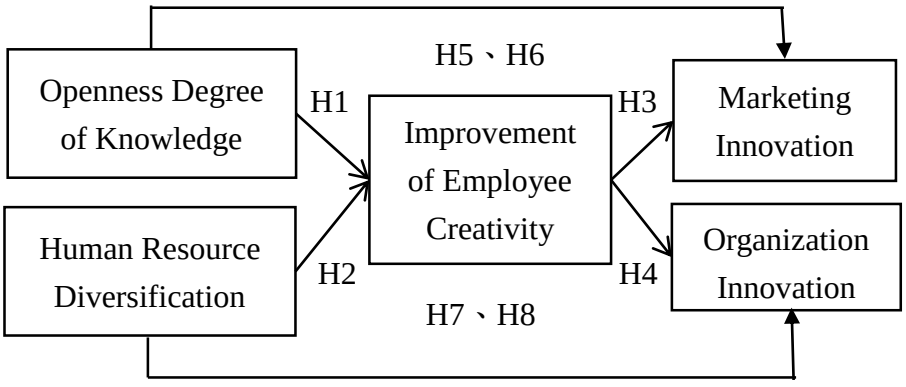

Figure 1 Research Framework

Research Sample Analysis

This study further analyzed the main course content of the samples objects is divided into three types. Most of all is the Arts, Science & Language Tutorial School (short-term), and it sums to 92 samples. Others are 4 samples, such as for Public

Employee, Bible Study Fellowship, and other musical instruments. We consider that the four special kinds of course content, characteristics, teaching objects are different from the characters of Arts, Science & Language Tutorial School. In order to make sure the research Reliability, we exclude the four samples, and the total samples are 121, showed as Table 1.

As the result, the samples of Arts, Science & Language Tutorial School (short-term) and the acrobatics supplementary center are 80%. We can observe that the education industry of the research samples are mainly to the students below high school students, and the course content are after-school class, talent and skills learning. We preliminarily exclude the special and professional characteristics of preparing for the test of institute, a single famous teacher for the primary enrollment. For these reasons, the analysis content of this research still needs the diversity of courses, the high repetitiveness of enrollment target, and the regionalization, and this feature is similar with the formal education industry. Consequently, we discuss the relationship between Openness Degree of Knowledge, Human Resource Diversification, and the Improvement of Employee Creativity to Marketing Innovation and Organization Innovation still has considerable practical implications.

Table 1 The analysis of the course types of samples

Types	**Illustration**	**Numbers**
Arts, Science & Language Tutorial School (short-term)	Mainly for Language and English, and just one for Math.	92
the acrobatics supplementary center	Including Abacus, Dance, Music and Computer Sicence	29
Sum		121

Coding of Samples

We code the dimensions from the research framework, and the questionnaires are in Appendix 1.

(1) Openness Degree of Knowledge

We discuss the Openness Degree of Knowledge according to the No. 20 in the questionnaires of TIS3. We code one score in the high, medium, and low item. That means more scores are higher openness degree of knowledge. The scores are from 0 to 11.

(2) Human Resource Diversification

We discuss the Human Resource Diversification according to the No. 38 in

the questionnaires of TIS3. We code one score in the employee have or outsourcing item. That means more scores are higher human resource diversification. The scores are from 0 to 16.

(3) the Improvement of Employee Creativity

We discuss the Improvement of Employee Creativity according to the No. 39 in the questionnaires of TIS3. We code one score in the effectiveness item, and others are zero score. That means more scores are more improvement of employee creativity. The scores are from 0 to 6.

(4) Marketing Innovation

We discuss the degree of Marketing Innovation according to the No. 29 in the questionnaires of TIS3. We code one score in each item. That means more scores are higher degree of marketing innovation. The scores are from 0 to 6.

(5) Organization Innovation

We discuss the degree of Organization Innovation according to the No. 26 in the questionnaires of TIS3. We code score depending on the number of the item, such as No.1 meaning of one score; No.2 meaning of two scores, and so on, the No. 6 meaning of six scores, and the sum scores means the organization innovation trend. That means more scores tend to strategic organization innovation; in contrast, the lower scores tend to tactical organization innovation. The sum of scores are from 0 to 21.

(6) Control Variables

Because the research issues are including the Openness Degree of Knowledge, the Human Resource Diversification, and the Improvement of Employee Creativity, and these are closely to the numbers of employee and the size of firm. Thus, we define the numbers of employee according to the No. 36.2, the numbers of employee in 2010, and we also define the size of firm according to the No. 35.2, the revenue of firm in 2010, in the questionnaires of TIS3 as the control variables to make sure the research reliability. We code firm size as decimal as one score, and the unit of revenue is thousand, such as No.0 to 1 as the meaning of one score, No.1 to 10 as the meaning of two scores; No.10 to 100 as the meaning of three scores; No.100 to 1000 as the meaning of four scores; No.1000 to 10000 as the meaning of five scores; and so on, No. 10000000 to 100000000 as the meaning of nine scores; No.0 to 1 as the meaning of one score; over and above No. 100000000 as the meaning of ten scores.

The analysis of research results

The study adapts SPSS 18 to test the Pearson's correlation coefficient and multiple regression equation to analysis the research results and discussion. The results show as

follows:

The analysis of Pearson's correlation coefficient

In Table 2, the results show that the correlation coefficient of the Openness Degree of Knowledge, Human Resource Diversification and the Improvement of Employee Creativity to Marketing Innovation and Organization Innovation are positively correlated. And the correlation coefficient of Improvement of Employee Creativity to Organization Innovation is the most relevant of 0.87, and the following is the correlation coefficient of Human Resource Diversification to Organization Innovation of 0.73. We further examine the raw data and exclude the personal error. And then we discovered in the literature review that when the organization more emphasis on the diversity capabilities of employees, as well as emphasis on the cultivation of employee creativity. Then they will tend to be more organization innovation (Amabile, 1988; Kanter, 1988; Amabile, 1997). Thus, we also examine the Collinear of the values of VIF (shows in Table 3) only up to 1, so exclude collinearity of two dimensions. Therefore, the Openness Degree of Knowledge and Human Resource Diversification are higher, the correlation coefficient of the Improvement of Employee Creativity has a positive effect. And when the degree of the Improvement of Employee Creativity is higher, and it also has higher positive effect to Marketing Innovation and Organization Innovation for the organization.

Table 2 Pearson's correlation coefficient

	Mean	S.D.	1	2	3	4	5	6	7
1.Firm Size(thounds)	5.94	.09	1						
2.Employee No.	51.53	15.72	.20*	1					
3.Openness Degree of Knowledge	1.92	3.05	.40**	.28**	1				
4.Human Resource Diversification	2.35	2.58	.20*	.63**	.43**	1			
5.Improvement of Employee Creativity	1.32	1.87	.16	.62**	.47**	.55**	1		
6.Marketing Innovation	0.86	1.39	.20*	.51**	.26**	.68**	.40**	1	
7.Organization Innovation	1.87	1.81	.18	.69**	.45**	.73**	.87**	.55**	1

**p<0.01

Regression Results

This study proposes that education industry in Taiwan is in the highly competitive market, and the Openness Degree of Knowledge and Human Resource Diversification have significant positive effect on the Improvement of Employee Creativity. Furthermore, the Improvement of Employee Creativity also can enhance the diversification of Marketing Innovation and the internal innovation degree of the organization. We add the firm size and the number of employees as the control variable. Therefore, this study uses the linear regression statistical analysis. Firstly, we use firm size and number of employees as the two control variables as Model 1. Secondly, we examine the effect of the Openness Degree of Knowledge and Human Resource Diversification to the Improvement of Employee Creativity as Model 2; Thirdly, the dimension of the Improvement of Employee Creativity includes the capabilities source of internal employee and outsourcing, then we distinguish into two dimensions of internal employees and external employees. We also use the Improvement of Employee Creativity as dependent variables as the model 3. Finally, we use the Improvement of Employee Creativity as independent variables and use Marketing Innovation, Organizational Innovation as the dependent variables was model 4 and Model 5. The results of regression analysis show in Table 3.

We observe the results of control variables, and only the numbers of employees is significant. The force of explanation of the two is 0.26. Then, according to the results of model 2 shows that the force of explanation of the Openness Degree of Knowledge and Human Resource Diversification to the Improvement of Employee Creativity is 0.37 ($p = 0.000 < 0.05$), and it is the significant effect. The force of explanation in Model 3 is 0.37 ($p = 0.000 < 0.05$), and the effects of the internal and external employees to the Improvement of Employee Creativity both arrive significant effect. The force of explanation of the Improvement of Employee Creativity to Marketing Innovation in Model 4 is 0.16 ($p = 0.000 < 0.05$). The force of explanation of the Improvement of Employee Creativity to Organizational Innovation in Model 5 is high as 0.75 ($p = 0.000 < 0.05$), and the results all have significant effect. We further check the raw data of the Improvement of Employee Creativity and Organizational Innovation and also exclude personal error. According to the aforementioned literature review, we recognize the possibility may increase that responders should pay more attention to employee creativity and then they operate organization innovation. Thus, it causes the force of explanatory of this relationship higher.

In the observation of significance, the Openness Degree of Knowledge and Human Resource Diversification to the Improvement of Employee Creativity arrive the significant level of $P < 0.001$. We further examine the collinearity of the three dimensions, and use the variance inflation factor (VIF) to diagnose the collinearity

problem. We check the VIF is 1.0 less than 10. Therefore, the three dimensions have no the problems of collinearity. The results exclude the problems of collinearity. According to Model 2 to 5, the results show that the higher degree of Openness degree of knowledge, more diversity of the capability of human resource and more improvement of employee creativity also can enhance the marketing innovation and organizational innovation in the education industry in Taiwan.

Table 3 the analysis results of Regression

依變數		**Improvement of Employee Creativity**	**Improvement of Employee Creativity**	**Marketing Innovation**	**Organizational Innovation**
constant	.64*** (3.87)	.248 (1.31)	.264 (1.35)	.47** (3.30)	.76*** (7.55)
Firm size	9.08 (.47)				
Employees	.004*** (6.36)				
Openness Degree of Knowledge		.18** (3.52)	.17** (3.41)		
Human Resource Diversification		.31*** (5.27)	-		
Internal employee			.30*** (4.07)		
external employee			.35* (2.55)		
Improvement of Employee Creativity				.29*** (4.66)	.84*** (18.92)
F	20.22***	34.24***	22.69***	21.71***	357.89***
R^2	.26	.37	.37	.16	.75
Adjusted R^2	.24	.36	.35	.15	.75
ΔR^2	.26	.37	.37	.16	.75
VIF	1.0	1.22	1.1-1.2	1.0	1.0

*p<0.05, **p<0.01, ***p<0.001

The effect of the Improvement of Employee Creativity as mediated effect variable

The study adopts the classic regression approach of examine a mediation effect by Baron and Kenny (1986). When the mediation effect is supported need some conditions: (1) The independent variable have significant effect to the mediation variable. We show in Model 1 and Model 4. The Openness Degree of Knowledge (β=.20, P<0.001) and

Human Resource Diversification (β=.11, P<0.5) have significant effect to the Improvement of Employee Creativity. (2) The independent variable and the mediation variable have significant effect to the dependent variable. The results show in Model 3 and Model 6. (3) When we add in mediation variable, the effect of independence variable to dependence variable will decrease by mediation variable. It means mediation variable has the partial mediated effect. If the effect of independence variable to dependence variable will become not significant by mediation variable, and it means mediation variable has the full mediated effect. We compare with Model 2 and Model 5. The result that the Openness Degree of Knowledge (β=-.03, P<0.001) and the Improvement of Employee Creativity (β=.003) become not significant effect to Marketing Innovation. But the Human Resource Diversification maintain significant effect (β=.34, P<0.001). The results mean the Improvement of Employee Creativity has the partial mediated effect between the Openness Degree of Knowledge and Marketing Innovation, and has the no mediated effect between the Human Resource Diversification and Marketing Innovation. Furthermore, The result that the Openness Degree of Knowledge (β=--.011) become not significant effect to Organization Innovation. But the Human Resource Diversification maintain significant effect (β=.23, P<0.001) but the beta value decrease. The results mean the Improvement of Employee Creativity has the full mediated effect between the Openness Degree of Knowledge and Organization Innovation, and has the partial mediated effect between the Human Resource Diversification and Organization Innovation. In sum, the Improvement of Employee Creativity have mediation effect between Openness Degree of Knowledge, Market Innovation and Organization Innovation.

Table 4 The results of the mediation effect of the Improvement of Employee Creativity

Depend variable	**Improvement of Employee Creativity**	**Marketing Innovation**	**Marketing Innovation**	**Improvement of Employee Creativity**	**Organizational Innovation**	**Organizational Innovation**
	β	*β*	*β*	*β*	*β*	*β*
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
constant	1.42*	-.58*	-.59*	1.42	1.37**	.49
Firm size	-.17*	.11*	.11*	-.17	-.10*	-.001
Employees	.01***	.001*	.001*	.01***	.004***	.001**
Openness Degree of Knowledge	.20***	-.03*	-.03	.20***	.11**	-.011
Human Resource Diversification	.11*	.34***	.34***	.11*	.29***	.23***

Improvement of Employee Creativity			.003			.62***
F	28.42***	27.12***	21.51***	28.42***	51.22***	126.736***
R^2	.495	.483	.483	.495	.638	.846
Adjusted R^2	.478	0.465	.461	.478	.626	.840
ΔR^2	.115	0.218	.218	.115	.167	.375
VIF	1.2-1.8	1.2-1.8	1.2-1.7	1.2-1.7	1.2-1.7	1.0-1,9

P***<0.001; P**<0.1; P*<0.5

Research Conclusion and the Suggestions for Future Research

Research Conclusion

This study is to explore the education industry of the feature of high market competitiveness in education services industry in Taiwan, and we investigate the drivers of the enhancement of marketing innovation and organizational innovation. The study discuss the conclusion as follows:

(1) The organization through internal sources, market sources, public sources, and other sources to increase the openness of internal knowledge in organization can effectively promote the creativity of employees.

(2) The more diversification of the capabilities of employee, including in graphic design, multimedia, website or software development, market research or application engineering, mathematical, database management, and other professional skills are increasing, the more effectiveness of the improvement the creativity of employees in the organization.

(3) The Company through different ways, such as: brainstorming meeting, interdisciplinary or cross-department team work, job rotation of employees, incentives of award or non-money for employees, training of creativity to promote the creativity of employees, and to enhance the marketing innovation and organization innovation.

(4) We should put more attention to the approach of the Improvement of Employee Creativity and enhance the variety of the Openness Degree of Knowledge to improve the performance of Market Innovation and Organization Innovation.

In sum, the study provides practical implications for the innovation activities in education services industry, and they should consider the openness degree of knowledge and the human resource diversification with the organization, and to promote the creativity of employee can enhance innovation activities effectively in corporate. In the management implication, the discussion in education service industry

most are in school opinion in the past, and we can provide the research to make up the lack of the discussion of the education industry. The study can the contribution of innovation activities and the discussion of the relevant drivers in the education industry.

The Limitations and Suggestions for Future Research

This study is limited by the TIS questionnaire based on the design of CIS 2008 questionnaires in European Union, thus the design of questionnaire cannot be designed suitable for the market environment in Taiwan. As the results of the research analysis, we discover that the promotion of employee creativity has high correlation of organization innovation, and has the highly force of explanatory at the same time. Therefore, we propose the suggestions for future research as follows:

(1) We will continue to discuss whether there are other factors of the improvement of employee creativity and organization innovation. Further, we wish to propose the practical implication and contribution to the education industry.

(2) We suggest that may be added in the questions about market environment item, in order to clarify whether there are other factors that affect marketing innovation and organization innovation.

(3) We suggest that can have more research and analysis of innovation relevant activities in high competition market to provide innovation strategies for practitioners.

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Appendix A

1. Openness Degree of Knowledge:

During 2007 to 2010, the importance level of the source when your firm have technological innovation activities?

Item	Source of Information	Importance Level			none
		High	Medium	Low	
Internal source	Firm internal or subsidiary corporation	□	□	□	□
Market source	The supplier of Equipment, materials, services, or software	□	□	□	□
	Customer or consumer	□	□	□	□
	Competitors or other firms	□	□	□	□
	Consultants, private for-profit laboratory or research institutions	□	□	□	□
Public source	University or other higher education institute	□	□	□	□
	Government or public research institutions (such as ITRI, Institute for Information Industry ... etc)	□	□	□	□
Other source	Professional conference or product exhibition	□	□	□	□
	Science, Business Journal or magazine	□	□	□	□
	Professional and Industrial Institute	□	□	□	□
	Standards institute or Documents of technology or services	□	□	□	□

2. Human Resource Diversification:

During 2007 to 2010, whether the employee have the capabilities or have to outsource to other firms?

	the employee have	outsource	Do not need the capability
(1) image / layout / advertising	□	□	□
(2) the design of physical or service	□	□	□
(3) Multimedia (combination of music, images, text, graphics, animation, video, etc.)	□	□	□
(4) website design	□	□	□
(5) Development of software	□	□	□

(6) market research	□	□	□
(7) Engineering / Applied Science	□	□	□
(8) Mathematics / statistics / database management	□	□	□

3. the Improvement of Employee Creativity:

During 2007 to 2010, does your firm have the approach to enhance the creativity or ideas of employee? If yes, whether the approaches are effective or ineffective to improve the creativity or ideas of employee?

approach	effective	ineffective	Have no idea	Do not adopt the approach
(1) held brainstorming meetings	□	□	□	□
(2) the composition of interdisciplinary or multi-disciplinary team	□	□	□	□
(3) arranged for staff in different departments or division between work rotation	□	□	□	□
(4) the proposed reward to creative employees	□	□	□	□
(5) provide the creative staff of non-monetary rewards, such as: more liberal use of time, public recognition, more interesting work, etc.	□	□	□	□
(6) provide employees on the training of how to enhance creativity	□	□	□	□

4. Marketing Innovation:

During 2007 to 2010, does your firm have huge change in the items? (can multi-select)

Marketing	New approach	(7)
	Innovation area	

Innovation	(1) Product Appearance /Image Design	(2) package	(3) Sales channel	(4) Display approach/ channel of product	(5) Price/payment approach	(6) Advertising/ promoting /marketing	No new approach
Sell to customers in new approach in the market	□	□	□	□	□	□	□

＊Only “huge change” is innovative, seasonal or frequent changes not innovation.

＊If the product design function lead to a change of use, and that is regarded as "product" innovation, instead of (1) the product appearance / image design. Product appearance / image designed primarily focus on the aesthetic effect.

5. Organization Innovation:

During 2007 to 2010, does your firm has the huge change in the items?

Organization Innovation	Yes	No
(1) To use new working approaches to operate the organization process (such as, supply chain management, knowledge management, quality management, etc.).	□	□
(2) 改變組織的權責分配或決策方式。To change responsibility or the decision-making power in the organization.	□	□
(3) To set up a new department to carry out new operations.	□	□
(4) 公司的組織架構重組，重新調配部門間的關係。To restructure the company's organization and redeployment relations between departments.	□	□
(5) Strategic alliance with other companies	□	□
(6) Strategic alliance with university, college or research institute	□	□
(7) The change of the relationship between suppliers and customers	□	□
(8) The company merged with another company (or division) or set up a new joint venture company.	□	□
(9) Others_____（Please describe）	□	□