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Finance and Information Systems: Perspectives on the Cost of Higher Education ค่าใช้จ่ายในการศึกษาระดับอุดมศึกษา ในมุมมองทางด้านการเงินและสารสนเทศ

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บทคัดย่อ

บทความนี้มีจุดประสงค์เพื่อศึกษาเกี่ยวกับค่าใช้จ่ายที่เพิ่มขึ้นในการเรียนระดับอุดมศึกษา และศึกษาด้วยว่ามหาวิทยาลัยจะสามารถรับมือเกี่ยวกับเรื่องนี้ได้อย่างไรในสภาวะแวดล้อมที่มีการแข่งขันสูง โดยขอบเขตการศึกษา คือ มหาวิทยาลัยในประเทศออสเตรเลียและนิวซีแลนด์ บทความนี้ได้พิจารณาด้วยกัน 2 ด้าน คือ ด้านการเงินและสารสนเทศ โดยมุมมองด้านการเงินได้มุ่งเน้นในเรื่องของค่าใช้จ่ายในการศึกษา ซึ่งรวมถึงเงินกู้ยืมเพื่อการศึกษา ค่าลงทะเบียนศึกษา และแหล่งเงินทุนต่างๆ ด้านสารสนเทศได้มุ่งเน้นศึกษาด้านการจัดการความรู้ ประสบการณ์ และ World Wide Web เพื่อให้มหาวิทยาลัยสามารถเพิ่มศักยภาพการแข่งขันในตลาด

คำสำคัญ: การเงิน สารสนเทศ ค่าใช้จ่ายในการศึกษาระดับอุดมศึกษา

Abstract

This paper aims to discuss the cost of higher education and how Thai educational institutions can cope with the competitive environment in Australia and New Zealand. This paper includes two areas: financial and information systems perspectives. The financial perspective focuses on the cost of higher education, including student loans, tuition fees, and alternative sources of funds. The information systems perspective focuses on using Knowledge Management, Case-Based Reasoning and the World Wide Web to enable universities to be more efficient in the competitive environment.

Keywords: Finance, Information Systems, Cost of Higher Education

Introduction

Funding cuts* in the higher education sector have led to an increase in university tuition fees in Australia and New Zealand. This higher cost is affecting students striving to fulfil the dream of a college education, and establishing a professional career in today's workforce. With the higher cost of tertiary education and inadequate student support, many students hesitate to pursue higher education (Barr, 2005: 35). This situation can lead to insufficient numbers of graduates in the workforce able to respond to the need of industries, and consequently affecting the country's economic stability.

In response to the decline of funds, universities need to increase their number of international students. Barr (2001) argues

that increasing the number of international students indicates the trend as a major financial strategy by universities in Australia and New Zealand in the last decade. [Kang, S.1] However, an increase in tuition fees may affect the inflow of international students in the future. To cope with these situations, there needs to be significant improvements in colleges and universities. These improvements can be in the area of sophisticated information systems and content oriented systems with more advanced technologies, which will enable the higher education sector to be more competitive and efficient. This lies at the heart of a revolution that is currently transforming the traditional institution towards an innovation one.

* See also Appendix: Table 1

The remainder of this paper is organised as follows. The second section focuses on the cost of higher education in Australia and New Zealand. The third section discusses alternative solutions in information systems perspective, including Knowledge Management, Case-Based Reasoning, and the World Wide Web. The fourth section introduces the SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) to identify and analyse the strengths and weaknesses of higher education, as well as the opportunities and threats revealed by competitors. The final section concludes the paper and suggests areas for further study.

Financial Perspective

This section discusses the cost of higher education for students in terms of student loans, tuition fees (including variable and fixed

fees), and an alternative source of university income from overseas students.

Loans

Tuition fees increase every year, thus the higher cost can prevent students from pursuing higher education. With sufficient student loans supported by the government, students who are deterred from attending university due to the higher cost would be able to pursue their higher degrees. In New Zealand, since student loans were introduced by the National Government in 1992, the participation in tertiary education has almost doubled. The number of young people entering higher education was the highest in any Organization for Economic Co-operation and Development (OECD) country[U2].* It is argued that the New Zealand higher education finance system in the 1990's was the best in the world

* Countries who are members of the Organization for Economic Co-operation and Development (OECD) include Australia, Canada, Denmark, France, Germany, the Republic of Ireland, Japan, Netherlands, New Zealand, Spain, Sweden, United States of America.

(Barr, 2001). After that, in 2000, there were some changes to student loan schemes.* Among those changes, with significant impacts on the design, was the abolition of interest for student loans while students were studying, and the freezing of the student loan interest rate (Barr, 2001; LaRocque, 2003, 2005). It is reported that student loan interest write-offs increased from approximately NZ\$20 million in 2000 to NZ\$192 million in 2001. Without the scheme abolishing interest, borrowers would have less incentive to make voluntary repayments (LaRocque, 2005).

In Australia, the government introduced the Higher Education Contributions Scheme (HECS),** combined with the tuition fees/income-contingent student loan scheme in 1989. Afterwards, reforms of HECS in 1996

resulted in a fee increase and their structure changed. That is, rather than being changed by all universities, fees were varied based on the subject. As a result, the student contribution increased approximately 25 percent to 37 percent (Barr, 2001). In 2002, researchers from the Australian National University reported that there was an increase in the number of students participating in higher education. This fact indicated that the HECS reform, which included fee increases, did not deter students from pursuing higher education, irrespective of financial background (Barr, 2001).

Variable and Fixed Fees

Fees are one of the resources universities use to improve quality of learning and efficiency of teaching. In general, it is accepted that universities need more money than existing

* Some of the key features of New Zealand student loan scheme are as follows: (i) students can borrow to cover tuition fees, living costs, course-related costs and student association fees; (ii) full-time/full-year students and part-time and/or part-year students earning less than NZ\$26,799 (2005/06) have all their interest written-off while they are studying; (iii) student loan repayments begin once graduates taxable income reaches NZ\$16,588 (2005/06) and is adjusted annually to reflect changes in the Consumer Price Index; (iv) interest written-off for borrowers on incomes below \$16,588 (2005/06), though loan principal is adjusted for inflation; (v) interest rate is currently set at 7 percent; (vi) eligibility is not means-tested and there is no duration limit on receipt; (vii) borrowers repay ten cents for every dollar they earn above the threshold; (viii) students who go overseas must set up a repayment schedule; (ix) policy responsibility sits with the Ministry of Education, while loan advances and repayments are the responsibility of the Ministry of Social Development and the Inland Revenue Department respectively (LaRocque, 2005).

** HECS was introduced in 1989. It established the principle of tuition fees, and introduced charges of around AUS\$2,000 per student per year, irrespective of subject or university. Students could pay up-front with a discount, or could attend university free and repay the fees through a loan (Barr, 2001).

government funds. Therefore, students should contribute additional funds. The students' contributions are paid after they have graduated through the tax system on the basis of ability to pay (United Kingdom, Department for Education and Skills, 2003). The interesting issue is how the fee is decided. This is a controversial issue as there are those who argue for fixed fees, and those who argue for variable fees.

The argument against variable fees is that the variable fee is likely to deter students who are from poor backgrounds from pursuing higher degrees. This leads poorer students to making cheaper choices and students who are from wealthy families opting for more expensive universities. This seems unfair to poor students because students' choices should not be limited by their financial background, but by their ability (United Kingdom, Department for Education and Skill, 2003).

On the other hand, it is argued that a 'one size fits all' model (or fixed variable) is not fair to students. In other words, it is not right to assume that every student plans to use higher education in the same way, or that every university should be the same. Different universities have different strengths and different strategies, and they know how fees should be set. Allowing universities to set

their own fees policy is the way to encourage excellence and innovation in the university sector, and to improve the quality of higher education. Also, universities will make sure that they offer good value for money. With fixed fees, universities can reconsider their strategies. Recently, universities are taking in more postgraduate and overseas students in order to raise their income. However, Australia and New Zealand universities reveal that higher variable fees do not affect the participation of students from less wealthy backgrounds (United Kingdom, Department for Education and Skill, 2003).

Alternative Source of Funds

Scott and Scott (2004: 17) revealed that the main English-speaking destinations were the most expensive places to study. The most expensive destinations for international students (per annum) are the UK (US\$ 11,152), Australia (US\$ 9,519), the USA (US\$8,989), Canada (US\$8,925) and New Zealand (US\$8,686). This contrasts significantly with those in Asian countries such as Hong Kong (US\$7,081) and Malaysia (US\$ 3,785) (Australia, National Association of Independent Schools, 2005). Among English-speaking countries, the cost of higher education in Australia and in New Zealand is very competitive with their counterparts (such as UK and USA) (United Kingdom, Department

for Education and Skill, 2003). Universities are now very competitive for both local and overseas students. Marketing for students has become a significant practice for almost all universities in Australia and New Zealand, where a number of changes have been introduced to meet overseas students' needs. For example, universities in Australia and New Zealand have great flexibility in course design, course content, and the method of delivery for overseas students (Alvey, Birks, and Burman, 1998; United Kingdom, Department for Education and Skills, 2003, 2006).

In Australia, the number of overseas students has doubled during the last five years since 2000. It was 112,342 in 2000, 157,208 in 2001 and 170,258 in 2002, and increased significantly to 210,397 in 2003 and 228,555 in 2004 (United Kingdom, Department for Education and Skills, 2006). In particular, from 1996 to September 2007, the higher education sector has 59,336 to 175,459 overseas student enrolments (Australia Education International, 2007).^{*} The largest overseas student enrolments, in 2004, were Monash University (17,077), RMIT University (15,132), Curtin University (14,319), and Central Queensland University (10,460) (Harman, 2006).

^{*} See also Appendix: Table 2

^{**} See also Appendix: Table 3

In New Zealand, from 1994 to 2006, the evidence shows that the number of international students (full-fee paying) had risen from 5,371 to 27,536.^{**} Fees from international students accounted for \$75 million in 1997 (Alvey, Birks, and Burman, 1998). Oettli (2006) states that overseas income from education was higher than the New Zealand wine industry. New Zealand has provided international education services since 1988. Since then, the government has switched from an "aid" to a "trade" approach to international students. Moreover, the Education Amendment Act required that tertiary institutions charge international students fees which cover the full cost of the courses. Tuition fees for international students have increased from below NZ\$ 2,000 per year to a full cost fee of approximately NZ\$6,200 per year in the period 1992 to 1997. (Alvey, Birks, and Burman, 1998). Alvey, Birks, and Burman (1998) document that the yearly increase of New Zealand universities' tuition fees does not impact the enrolment number of international students.

Interestingly, the evidence shows that overseas student enrolments at the University of New South Wales decreased by 5 to 10 percent this year. This did not influence the

university to lower the fees. This is because it offers a high-quality standard of educational product, so the fees cannot be lower. Moreover, the university will not offer special scholarships during this low international demand period (Thompson, 2004).

Information Systems Perspective

This section focuses on Knowledge Management, Case-Based Reasoning and World Wide Web. These advances will enable institutions to be more efficient in supporting every part of their needs. The World Wide Web technology that is currently transforming the traditional institution towards an innovative one is also discussed.

Knowledge Management

Knowledge Management (KM) concerns acquiring, accessing and maintaining knowledge within a higher education institution (Turban and Aronson, 2001: 347). It has emerged as a key KM System (KMS) of many education sectors because KMS provides a way of viewing internal knowledge as an intangible asset that creates new value and leads to a competitive edge. There are many different approaches in which KMS is used in higher education.

In general, KMS as a repository model focuses on managing information and reusing

knowledge in tangible formats. It is also seen to be “making a direct connection between an organisation’s intellectual assets” (Barclay and Murray, 1997). For instance, one Australian university has applied knowledge management practices widely to improve support for students and staff. As a result, a large repository of knowledge management application is available for students, faculties and staff. Since 2005, the university accommodation service reminds students of their due payments as well as sending them via email new policies and procedures that may apply to certain residences. With sharing of information among departments, a student is likely to be warned by the university services of outstanding library fees, accommodation rents or parking fines, and thereby avoid suspension. The faculty now has a more timely way to publish online information to students such as announcing changes in curriculum. It often provides the latest information online rather than in booklets. For staff, more information is leveraged for research interests within the department, or even interdepartmental, studies.

A legal approach involves the utilisation of intellectual capital, copyright, patents and trademarks. KMS can also be regarded as institutional intelligence that produces the latest information for operative and strategic

decision-making (Hannula and Pirttimaki, 2003: 595). This intelligence enables a decision maker to analyse the patterns quickly as well as identify the most significant trends. Thus, with the help of institutional intelligence, institutions achieve competitive advantages to meet the need of a rapidly changing industry demand by utilising intelligence thus gained. During informal interviews between 2005 and 2006 in one of Australia's local universities, one of the findings shows that 85% (55 out of 65) of postgraduate research students strongly expect universities to keep in contact with previous graduates.

Unfortunately, this consideration is not yet implemented in the KMS. One[U3] states that ongoing academic work such as publications should be encouraged by the university so that further institutional intellectual property may be accumulated over time. Realization of this strategy may improve sharing of internal and external information to enhance and update intellectual assets within the institution in the long term. In summary, there is a need to have a more systematic approach to share what we already know within an organisation.

Case-Based Reasoning

Given present trends, if we assume a new demand and need for people in colleges and universities as a problem, it is likely that

the number of problems is increasing day by day. Fortunately, there are a number of internal and external solutions within the higher education sector, if we assume information or expertise to respond to these demands and needs be seen as a solution. One study of information systems related to this category of the demand and need is called Case-Based Reasoning (CBR). CBR is similar to the way we deal with a new problem by observing new information to generalise new solutions from past experiences. By understanding a new problem, we can quickly find a solution based on our experiences. For example, a newly enrolled student may wish to ask for a piece of advice from someone but s/he often does not know where to start. In general, this sort of question can be answered by a subject coordinator. However, without a way to deal with the same ongoing problems over time, it increases pressures and workloads for faculty members.

In a CBR system, a term case is used to present the lesson it teaches, and the context in which the lesson can be taught. The CBR system commonly refers to a problem-solving paradigm that relies on case representation, instead of only relying on general knowledge of a problem domain. Case representation in a CBR system includes a detailed problem description and a detailed solution description.

Within a case representation, most types of data can be stored in a case. For example, stored data, photographs, sound, and video can be represented in a case. However, it may be difficult to represent a large amount of inter-related data in a case. The following part shows a sample case of the student enquiry system that responds to an applicant whether or not s/he is eligible to apply to a

postgraduate study if s/he has the following qualifications. A sample query (Figure 1) is “I have the qualification of a three-year Bachelor of IT and I have professional certificates that include Microsoft Certificate Professional Systems Engineer. Will I be eligible for admission to the Master in Information Systems course?”

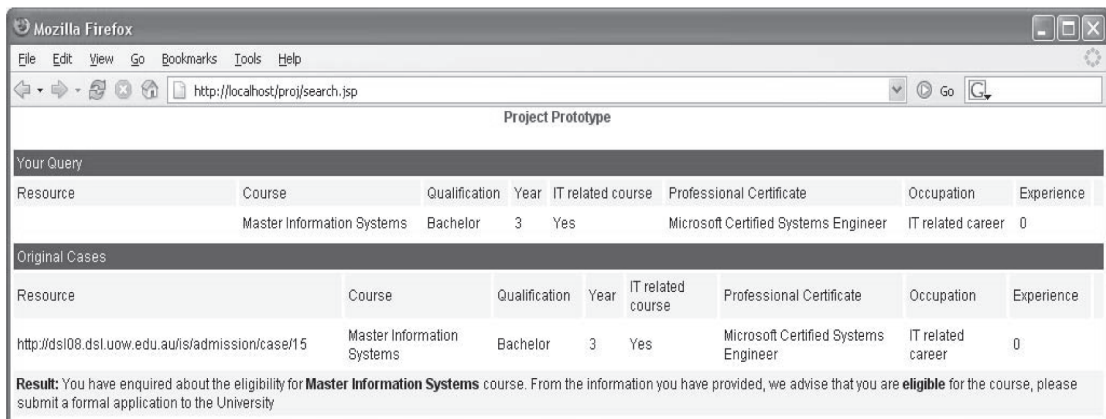


Figure 1 A Sample Output of Matched Original Case

In fact, CBR is dependent on the structure and collected cases in the case repository, so it is important to have a mechanism that organises information in a way it can be retrieved when required. Case representation also should have a standardised mechanism that is supportable, suitable and appropriate to support case retrieval. The CBR system also provides a revision process that allows us to share existing knowledge. Furthermore, a refinement process allows us to extend a current solution to refine new solutions for

reuse in the future. The above sample output shows the matched original case, in other words, there is an existing solution (so called original cases) for the entered query. The expected output shows that the applicant satisfies the admission criteria and thus is eligible to apply for admission to the course. This example demonstrates the use of existing knowledge (original case) to solve a new problem (your query). In summary, we state that we should make more use of what we learned from past experiences, then make our lessons

available to solve new problems.

World Wide Web

In accounting, recording information about economic events is important, and this activity is mostly automated through the use of a scanning device like Point-Of-Sale (POS). By the use of accounting software like Quicken and MYOB, it even simultaneously prepares the final statements. Moreover, companies publish their financial statements on the World Wide Web (WWW) or the Internet to create healthy relationship with their shareholders and potential investors. Thus it extends the value of their market position. One of the international initiatives like XBRL (eXtensible Business Reporting Language) aims to standardise terms used in business statements so that accounting information can be automatically processed, and then presented for other users. It is worth noting that we can therefore spend more time on value creation, since we save time on the consuming processes.

Without doubt, more and more information is available on the WWW. We search, browse and use information for learning and teaching in the higher institutions. We are willing to share our knowledge, and even publish our teaching and learning experience on the WWW. However, when we try to access

information, the result of our search is not always reliable or up to our expectation because there is a difficulty known as “knowledge representation bottleneck.” It refers to the hardship of representing knowledge explicitly in a domain of interest. Because a domain expert such as a lecturer often finds that it is not possible to fully describe his/her knowledge to the knowledge engineer, such as a computer programmer, about his/her particular knowledge. Sometimes there is a need to compare or merge information of two or more terms to check whether it refers to the same thing. In such cases, knowledge representation has to be more systematic.

For knowledge representation, jargon can be used in financial statements which may be easily replaced with common expressions for those who are not familiar with the financial discipline. When we search for information, very often a keyword or the combination of keywords to retrieve information is poorly described. This search may obtain information that may not link to keywords. A lot of the time, the same keywords can also have different meanings depending on the context. An example is the use of keywords such as “cold” or “flu” or “influenza” which have the same meaning in a commonly used human-context, but may not have the same

meaning in a different knowledge domain of interest such as in medical or weather contexts. If the WWW-based system is not able to differentiate the meaning, or the context in which the keywords are used or referred to, then it may respond to irrelevant references and retrieve irrelevant information. In addition, how are terms, phrases or statements that have the same meaning differentiated? Does the term “cold” refers to meaning of “A condition of low air temperature” or “any of several diseases caused by bacteria or viruses and marked especially by respiratory symptoms.” The former meaning might refer to cold, but there is no guarantee that the latter meaning, known as “flu or influenza”, refers to the term “cold” without having an explicit relationship within the context of medicine. Thus, it is worth investigating a way to facilitate a dictionary of terms and similes with which to model the domain knowledge of the WWW-based systems. With a well-structured content, the WWW-based system provides a tool to a group of people to express, view and share information, as well as to perform their communication needs.

To achieve the above more explicit representation of information, the term ontology has recently been introduced to the WWW. Ontology deals with describing and distinguishing and providing descriptive

analysis and classification of the concepts or facts in the field of the Semantic Web. The Semantic Web is an extension of the current WWW that provides well-defined meaning and a structured WWW (Berners-Lee, Hendler, and Lassila, 2001). In summary, the next generation of the WWW will provide more opportunities to the users to meet their needs and requirements.

Challenges[U4]

There are some setbacks in higher education even though IS (Information Systems) brings an overall improvement in many ways. Current culture may not encourage sharing their knowledge within faculties. This often causes unnecessary duplicate workloads in practice. For example, the handouts of subject material are printed for students as well as being made available to students online. Thus, these implementations may increase the costs of maintaining traditional teaching and learning. There is no clear line between supplementing and replacing traditional teaching and learning using IS facilities. However it is clear that duplicated learning and teaching materials which are online often increase operating expenses. In this case, holding both traditional and modern teaching and learning using IS facilities are often not feasible for a financial

reason. Thus a set of actions should be taken if the institution is to capture the benefits from reducing the number of redundant activities and performing the remaining activities more efficiently.

Lack of commitment from senior management is another obvious challenge. When academic staff are forced to use IS facilities without sufficient follow-up support such as training courses, interest in IS initiatives may gradually diminish. For instance, as a tool for online teaching and learning WebCT has been available for years, but it took a while to be utilised by academics in classes. WebCT is an e-learning system for educational institutions (WebCT, 2006). Even though there are number of training courses available for academics, there are no courses available for non-academic users such as students. It is not clear whether there is any benefit in not training a large number of students in the name of saving costs associated with the training sessions. Conversely, it is true that the majority of users of WebCT are students, but the current focus is still based on teaching rather than learning. There is now a new opportunity with increasing overseas students within the university, and a need for differentiated strengths regarding decreasing overseas students domestically. When we evaluate a

strategy such as the process conceptualised by a manager, new processes need to be measured in accordance with variations in generic managerial level strategies. Even though strategies differ in different types of institutions, controls should be tailored to the requirements of specific strategies. Using a time horizon of, for example, three to five years, a strategic planning process needs to be in place for external environmental opportunities and internal strengths.

Financially, it is hard to measure advantages of IS facilities because these benefits are not very visible. According to the cost reduction strategy, focus should be on a basis for sustaining competitive advantage. It[U5] can be seen as an improvement for the performance of key activities and their cost drivers in an organisation. Cost reduction may involve the use of a mix of methods to reduce strategically important costs such as decreasing staff members. In some cases, the strategically important issue is to increase costs to achieve other competitive gains. For example, early introduction of online teaching tools such as WebCT may result in wide acceptance of use that opens up new opportunities. As a matter of fact, many subjects are delivering teaching materials over the WebCT in different campuses. In other words, this delivery method standardises

teaching in terms of sharing the same resources among a limited number of teaching members. In the long term, the way to improve teaching quality and reduce the cost of operation through technology is to use technology to supplement high quality employees. In other words, IS facilities will work better and be more beneficial when complemented by people who are well trained, highly motivated and committed to continuous improvement.

SWOT Analysis

With reference to initiating new strategies, this study introduces the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis which is a useful tool for understanding and decision-making in higher education (Sabbaghi and Vaidyanathan, 2004: 2). The

SWOT analysis provides a good framework for reviewing strategy, position and direction of a higher education sector proposition. With SWOT analysis, we report our findings of higher education in Australian and New Zealand. The focus is based on the source of funding in a university, which historically relies on the government and students. The opportunity, and therefore the subject for the SWOT analysis, is for the university to improve the own strength to distribute its services directly to certain students which are not being covered or developed. A number of threats, such as favouring for well-known competitors and distraction from core business, were identified that may jeopardize the success of the current program.

Table 1 SWOT Analysis

Subject of SWOT analysis: the improvement of own strengths to access new students not currently being developed.	
<p><i>Strengths</i></p> <ul style="list-style-type: none"> • Student enrolment control and direction. • Right degrees, courses and reliability. • Superior research performance vs competitors. • Better teaching and learning environment. • Surplus research and development capacity. • Some staff having experience with foreign educational systems. • Having student lists. • Curriculum innovation ongoing. • Offering courses from existing sites. • Having courses required accreditation. • Committed and confident management. 	<p><i>Weaknesses</i></p> <ul style="list-style-type: none"> • Some gaps in range for certain foreign educational systems. • No direct marketing experience. • Cannot access students abroad. • Need more teaching staff. • Limited budget. • Insufficient pilot or trial done yet. • Don't have a detailed plan yet. • Teaching-staff need training. • Student service staff need training. • Processes and systems, etc • Management insufficient cover.
<p><i>Opportunities</i></p> <ul style="list-style-type: none"> • Could develop new curriculum. • Local competitors have poor courses. • Profit margins will be good. • Students respond to new courses. • Could extend to overseas. • New specialist applications. • Can surprise competitors. • Support core business economies. • Could seek better foreign (exchange) program deals. 	<p><i>Threats</i></p> <ul style="list-style-type: none"> • Legislation could impact. • Students would favour well-known competitors. • Existing core business risk. • Market demand very seasonal. • Retention of key staff critical. • Could distract from core business. • Possible negative publicity. • Vulnerable to reactive attack by major competitors.

Conclusion and Future Research

This study discusses costs and information systems of higher education institutions in Australia and New Zealand. First, this paper has discussed the costs of higher education which increased significantly during the past ten years. This increase can deter students to pursue their higher degree. However, the evidence shows that the number of students participating in higher education in New Zealand have almost doubled. Secondly, this paper presents the argument that fees should be fixed or varied by focusing on universities in Australia and New Zealand. Thirdly, this study discusses alternative sources of funds in terms of overseas students becoming an alternative source of funds for universities. However, universities face lower enrolment of international students, which is caused by increased tuition fees. There are many reasons why a number of overseas students are becoming fewer in the last few years. One reason we cannot ignore is the strong economic growth in both Australia and New Zealand. As a result, the value of the Australian and New Zealand currencies are currently relatively higher than counterparts such as UK and USA. As an alternative strategy, KMS is used to improve internal and external information flows. A potential opportunity of utilising the

Semantic Web technology is also discussed in terms of sharing common knowledge within an organisation. Some possible challenges such as unnecessarily duplicated workloads, lack of commitment are also discussed to monitor possible obstacles. Finally, the SWOT analysis is carried out to outline the reviewing strategy, position and direction of a higher education proposition. Universities can adopt these information technologies to produce better learning environments resulting in the production of better outcomes at a reduced cost to their institutions.

Future research is expected to focus on constraining resources that impact on costs and performance of higher education. The constraint resource is the financial leverage point for the whole institution. The relative profitability of education and improvement priorities are driven by the constraint resource. There is some criticism that this financial decision is driven by the constraint resource, which can achieve only short-term benefits. Thus, improving constraint throughput by improving yields, and reducing constraint downtime by incurring lower cost for operations is not always feasible. Moreover there is a need to improve the process time of the constraint resource. This improvement is often balanced by using technological

advantages. In addition, further study is expected to examine the empirical relationship between financial perspective and information systems perspective.

Appendix

Table 1 Real Funding of Universities in New Zealand of Equivalent Full-Time Students (EFTS) from Year 1980-2002

Year	Real Ministry of Education Funding/ Domestic EFTS between 1980-2002 (NZ\$)
1980	11,293
1981	10,998
1982	10,622
1983	10,417
1984	10,166
1985	11,186
1986	11,024
1987	10,770
1988	10,747
1989	10,087
1990	9,473
1991	9,741
1992	9,609
1993	9,358
1994	8,947
1995	8,788
1996	8,451
1997	8,094
1998	7,833
1999	7,309
2000	7,061
2001	7,202
2002	7,367

Source: Scott and Scott (2004: 21)

Table 2 Number of International Student Enrolments in Higher Education in Australia between 1994 and 2007

Year	Overseas Student Enrolments
1994	43,721
1995	50,711
1996	59,336
1997	69,206
1998	79,348
1999	90,395
2000	107,622
2001	129,071
2002	116,934
2003	136,125
2004	146,260
2005	157,684
2006	166,721
Sept. 2007	175,459

Source: Adjusted from Australian Education International (2007)

Table 3 Number of Full-Fee-Paying International Students in all Public Tertiary Educational Institutions in New Zealand between 1994 and 2006

Year	All Full-Fee-Paying International Students
1994	5,371
1995	6,635
1996	7,427
1997	7,679
1998	7,276*
1999	7,783
2000	10,066
2001	14,683
2002	22,333
2003	29,877
2004	21,116
2005	32,189
2006	27,536

Sources: Adjusted from New Zealand Ministry of Education (2005, 2007)

*The number of international students in 1998 was slightly lower because of the Asian financial crisis.

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