

*A Development of Management Model Using Business Intelligence Methodology for
Higher Education Students to Enter the Occupation Internationally*

Ekachai Naowanich, Namon Jeerungsuwan

King Mongkut's University of Technology North Bangkok, Thailand

0372

The Asian Conference on Education 2013

Official Conference Proceedings 2013

Abstract

The purpose of the research is to develop a model of management using the business intelligence methodology to help higher education students to enter the occupation internationally. The study is consisted of two phases. The first phase is to develop the management model and the second phase is to evaluate the appropriateness of the model. The samples are comprised of ten experts selected by simple random sampling. The research instruments are (1) the developed model and the evaluation form of entering the occupation internationally for the higher education students, and (2) the questionnaire for the experts to evaluate the appropriateness of the model. The research result found that the learning management model using the business intelligence methodology is consisted of three parts. The first part is the data sources such as student data, curriculum data, and employment data. The data includes competencies in English, Information and Communication Technology, and occupational skills in order to enter occupation internationally. The second part is the business intelligence process in which the analyzed data or factors are put into. The third part is the display of the reports and the tenor of the business intelligence presented to the university executive for decision support in managing learning facilitators and related factors to help higher education students enter the occupation internationally.

Keywords: Business Intelligence, Occupation, Professionalism, Management, Organization

1. Introduction

Presently, universities in Thailand are a kind of organizations which is operated in highly competitive atmosphere. It is because there are a lot of universities that open a variety of disciplines to be chosen by students while the number of students who want to enter to the university is decreased. Moreover, many universities become autonomous universities and receive less amount of government support in terms of budget; universities, hence, have a high competition rate in various fields. Therefore, the university administrators have to use ICT as an instrument or contribution in management and decision making which is accurate, fast and effective. According to the National Education Act of 1999 (Ministry of Education, 1999), Section 5 discussing about the administration and management of education in Article 36, paragraph 2 states that educational institutions can be run freely and develop self-management and performance individually. Similarly, the Information and Communication Technology Master Plan for Education, Ministry of Education (2011-2013) addressing the development of strategic ICT systems in mission-4 (Ministry of Education, 2011) also mentions the promotion of management in education field that has an efficient integration and good governance while one of the goals is to manage the education by applying ICT system that works together with the information database in the field of education in order to consider the implementation of policies and other programs/projects for education. Thus, by having an efficient management, the university administrators in different levels will be able to make accurate and fast decisions. This will lead to effective internal management in university. One of the most utilized and productive in business organization for supporting the decision-making is the Business Intelligence (BI) which is a system that helps to collect, connect and present the information in diverse dimensions, so it will provide the answers derived from data analysis and show the tendency that leads to the accurate and fast decision-making opportunities (Vitaya, 2006; Rawewan, & Srisombat, 2011, pp. 160-165). One of the important goals for every university is to produce the graduates who get jobs after their graduation and have international occupational capabilities because they can be referred as qualified products accepted by their workplaces with good cooperation skills in international level.

Stepping in to international occupation is very considerable for this rapidly changing world. To enter international occupation for students means the students' potential capabilities in different disciplines that let them access their professions and work internationally while not counting the academic knowledge and capabilities in their fields such as foreign linguistic skills, information technology, the standardized professional skills in specific areas of study, etc. This research uses Rajamangala University of Technology in Thailand as a case study. Rajamangala University of Technology is an organization that produces a graduate student to a variety of organizations and the labor market (Mariem, 2006; Tithima, 2008), so to develop capabilities in diverse areas within students before their graduation in order to enter the international occupation. Therefore, the administrators, professors, and other stakeholders should realize the factors or issues in any field that the university has to develop or improve within the students of Rajamangala University of Technology in order to enter the international occupation.

It is clear that Rajamangala University of Technology would like to achieve its goal in producing a graduate that can get a job and has international capabilities while the administrators, professors or other stakeholders are able to analyze, plan, and make a

decision that leads to the precise, quick operation to promote the university's vision based on data from information system within Rajamangala University of Technology as well as supportive information from the external sector. As a result, the researcher has adopted an idea to develop management model using Business Intelligence methodology for higher education students to enter occupation internationally with the expectation of the highest benefits for the students and the organization.

2. Research Objective

To develop management model using Business Intelligence methodology for higher education students to enter occupation internationally.

3. Hypothesis

To develop management model using Business Intelligence methodology for higher education students to enter occupation internationally is highly appropriate.

4. Scope of the Research

4.1 Variables using in the Research

4.1.1 Independent variable is management model using Business Intelligence methodology for higher education students to enter occupation internationally.

4.1.2 Dependent variable is the appropriateness of the management model using Business Intelligence methodology for higher education students to enter occupation internationally.

4.2 Population and Samples

In this research, Rajamangala University of Technology of Thailand is used as a case study. The population is administrators, professors in Rajamangala University of Technology, specialists in information and communication technology, and specialists in management.

The samples are consisted of these following:

Three administrators of Rajamangala University of Technology who have experiences in management in Rajamangala University of Technology for more than four years, two professors of Rajamangala University of Technology who have experiences in teaching for more than five years, two specialists in information and communication technology, and three specialists in educational management who have experiences in related fields for at least five years chosen by simple random sampling.

5. Research Methodology

The development of the conceptual framework of management model using Business Intelligence methodology for higher education students to enter occupation internationally can be separated into two phases as follows:

Phase 1 The development of management model using Business Intelligence methodology for higher education students to enter occupation internationally has steps as below:

Study, analyze and synthesize documents and researches related to the Business Intelligence system (Kleesuan, Mitatha, Yupapin, & Piyatamrong, 2009; Falakmasir, Moaven, Abolhassani, & Habibi, 2010; Ouf, & Nasr, 2011; Piedade, & Santos, 2010) and information system for decision-making (Opas, 2004; Taweesak, 2004; Santi & Tedpong, 2009) and studying the structure of the internal and external information systems in order to enter international occupation for students in Rajamangala University of Technology (Rajamangala University of Technology, 2005)

Develop the management model using Business Intelligence methodology for higher education students to enter occupation internationally from the study, analysis and synthesis of the related documents and researches.

Propose the management model using Business Intelligence methodology for higher education students to enter occupation internationally to the advisor for examination and revision.

Create an instrument for evaluating the appropriateness of the management model using Business Intelligence methodology for higher education students to enter occupation internationally.

Phase 2 The evaluation of the management model using Business Intelligence methodology for higher education students to enter occupation internationally is comprised of two steps as follows:

Propose the management model using Business Intelligence methodology for higher education students to enter occupation internationally to the administrators and professors in Rajamangala University of Technology, the specialists in information and communication of technology, and the specialists in educational management.

Analyze the data by using the suitable criteria of the management model using Business Intelligence methodology for higher education students to enter occupation internationally according to the evaluation criteria.

6. Research results

The research process presents the results into two sections as follows:

Section 1 The development of the management model using Business Intelligence methodology for higher education students to enter occupation internationally derived from the analysis and synthesis of the research documents shown in the figure 1 as detailed as below:

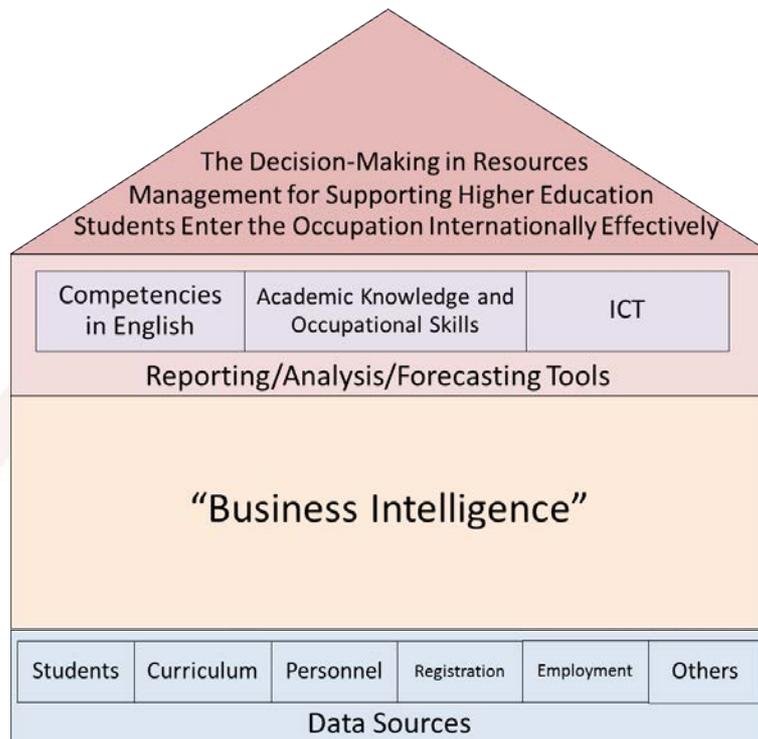


Figure 1 The management model using Business Intelligence methodology for higher education students to enter occupation internationally

The source of data is a part of the main information for accessing the Business Intelligence system which is included of the information about students, programs, personnel, registration, and employment that are internal information in Rajamangala University of Technology and other internal and external supportive information of Rajamangala University of Technology.

The process of Business Intelligence system.

Identify the data source that is consisted of the data from information system related to the access of international occupation of the students in Rajamangala University of Technology that has been used within the university as well as the external information such as statistics from other educational institutions, information from other information system’s projects, reviews and academic writings. Data source has to be conformed to the expected results that specify the data source according to article 1.

The next step is Data Warehouse design in developing the Business Intelligence system which primarily requires some data source from the data warehouse. The Star Schema data warehouse design or the Multidimensional Schema data warehouse design’s data sources can be modified to be suitable and compliant with the pattern of Star Schema data in order to insert the data into data warehouse by using the ETL (Extract Transform Load) process.

Then, there is the documentation that will be stored in Star Schema data warehouse in the form of Multidimensional Model or Cube. This model creates diverse dimensions within the information before being used for creating reports in various patterns according to the design that uses the instrument of the Business Intelligence system in

order to be proposed to the administrators and professors of Rajamangala University of Technology to further consider.

By analyzing and synthesizing literatures, and evaluating the comments of specialists, it is shown that factors affecting the entrance of international occupation of the students in Rajamangala University of Technology includes foreign linguistic skills, information and communication technology skills, and academic knowledge and professional skills. The Business Intelligence system will analyze, present or show the tendency of information related to the development of those three areas of students' capabilities in the various formats of the reports of student that will be proposed to administrators, professors and other stakeholders for assisting the decision-making in resources management; this will support the access of in Rajamangala University of Technology students' international occupation of student in university effectively in the future.

Section 2 The evaluation result of suitability of the management model using Business Intelligence system in order to enter the international occupation for higher education students

The evaluation of the effectiveness of the management model using Business Intelligence methodology for higher education students to enter occupation internationally which is conducted by ten specialists has the interpretation criteria as follows (Prakong, 1999).

4.50 – 5.00 means highest suitable	3.50 – 4.49 is highly suitable
3.49 – 2.50 is moderately suitable	2.49 -1.50 is less suitable
1.49 -1.00 is least suitable	

The evaluation results are outlined in the following table (next page):

Table 1 The Evaluation Result of the Management Model Using Business Intelligence Methodology for Higher Education Students to Enter Occupation Internationally

Elements of the Model	\bar{X}	S.D.	Suitability Level
The principle and the idea used as the basis of the development of the management model using Business Intelligence methodology for higher education students to enter occupation internationally	4.40	.54	High
The purpose of the management model using Business Intelligence methodology for higher education students to enter occupation internationally	4.40	.89	High
The process of Business Intelligence system which is consisted of 4 steps: 1) identifying the related data source, 2) data warehouse's design and implementation, 3) data storage in data warehouse in the multi-dimensional form, and 4) creating the report that will be proposed to administrators, professors, and other stakeholders.	4.60	.54	Highest
The access of international occupation consisted of the students' potential capabilities in 3 sections which are 1) foreign languages 2) information technology 3) academic and professional skills in their educational field.	4.00	.70	High
Total	4.35	.54	High

Table 1 shows that the elements of the management model using Business Intelligence methodology for higher education students to enter occupation internationally is appropriate in high level ($\bar{X} = 4.35$, S.D.= .54). When considering each part independently, it shows that the highest appropriateness values ($\bar{X}=4.60$, S.D. = .54) is the process of Business Intelligence consisted of 4 steps which are 1) identifying the related data source, 2) data warehouse's design and implementation, 3) data storage in data warehouse in the multi-dimensional form, and 4) creating the report that will be proposed to administrators, professors, and other stakeholders. The following also have high appropriateness such as principles and concepts which are used as the basis for the

development of the management model and have high appropriateness ($\bar{X}=4.40$, S.D.= .54), the purpose of the management model using Business Intelligence methodology for higher education students to enter occupation internationally ($\bar{X} =4.40$, S.D.= .89), and the enter to international occupation ($\bar{X}=4.00$, S.D.= .70) respectively.

Table 2 The Evaluation Result of Appropriateness of the Business Intelligence System Processing for Higher Education Students to Enter Occupation Internationally

Process	\bar{X}	S.D.	Suitability level
1.The preparation of related information which influences factors affecting the enter to international occupation for higher education students in three sections: 1) foreign languages, 2) information technology, and 3) academic and professional skills in the studied fields is consisted of:			
1.1 Students' information	4.80	.44	Highest
1.2 Programs' information	4.40	.54	High
1.3 Personnel's information	4.20	.44	High
1.4 Registration's information	4.80	.44	Highest
1.5 Employment' information (graduates' information)	4.60	.54	Highest
1.6 Other related information, for example, the information about international professional qualification certificate's examination	4.40	.54	High
2. The process of Business Intelligence system			
2.1 The process of information preparation for inserting data to data warehouse by using ETL (Extract Transform Load) process	4.60	.54	Highest
2.2 The process of data warehouse designed for using Star Schema data warehouse	4.60	.54	Highest
2.3 The process of information modification stored in data warehouse to be in multidimensional (Cube) form	4.60	.54	Highest
2.4 The process of information presentation for decision-making on resources management in order to entrance to students' international occupation based on the information presentation from a variety of instruments derived from the Business Intelligence system's which is consisted of:			
2.4.1 Reporting Tools	4.80	.44	Highest
2.4.2 Analysis Tools	4.80	.44	Highest

2.4.3 Forecasting Tools	4.80	.44	Highest
Total	4.61	.38	Highest

Table 2 shows that the overall evaluation result of appropriateness of the business intelligence system processing for the enter to international occupation of higher education students is appropriate in the highest level ($\bar{X} = 4.61$, S.D.= .38). When considering the suitability in each area which is to consider the related information preparation that also influences factors affecting the access to international occupation for higher education students in three sections: 1) foreign languages, 2) information and communication technology, and 3) academic and professional skills, we can see that the suitability level is also in highest level such as the preparation of the students' information ($\bar{X} = 4.80$, S.D.= .44), registration's information ($\bar{X} = 4.80$, S.D.= .44), and occupational statuses (graduates' information) ($\bar{X} = 4.60$, S.D.=.54). The second highly suitable are the preparation of programs' information ($\bar{X} = 4.40$, S.D.= .54), Personnel's information ($\bar{X} = 4.20$, S.D.= .44), and other related information like the information of international professional qualification certificate's examination ($\bar{X} = 4.40$, S.D.= .54) respectively. Furthermore, when considering the appropriateness in terms of the process of the Business Intelligence system, it found out that the value of suitability is also in the highest level such as the process of information preparation for inserting data to data warehouse by using ETL process ($\bar{X} = 4.60$, S.D.= .54), the process of data warehouse designed for using Star Schema data warehouse ($\bar{X} = 4.60$, S.D.= .54), the process of information modification stored in data warehouse to be in multidimensional (Cube) form ($\bar{X} = 4.60$, S.D.= 0.54), and the process of information presentation for decision-making on resources management in order to entrance to students' international occupation based on the information presentation from a variety of instruments derived from the Business Intelligence system which is consisted of the presentation in the form of reporting tools ($\bar{X} = 4.80$, S.D.= .44), analysis tools ($\bar{X} = 4.80$, S.D.= .44), and forecasting tools ($\bar{X} = 4.80$, S.D.= .44).

Table 3 The Evaluation Result of the Utilization of the Management Model Using Business Intelligence Methodology for Higher Education Students to Enter Occupation Internationally

Utilization of the Business Intelligence System	\bar{X}	S.D.	Level of Suitability
The management model using business intelligence methodology for higher education students to enter occupation internationally is suitable for data analysis concerning with the enter to international occupations	4.20	.44	High
The process of management model using Business Intelligence methodology for higher education students to enter occupation internationally	4.60	.54	Highest
The developed management model using Business Intelligence methodology for higher education students to enter occupation internationally is possibly used for enhancing the management and decision-making over resources in order to support students' enter to international occupation genuinely.	4.00	.00	High
Total	4.26	.27	High

Table 3 shows that the evaluation result of the utilization of the management model using business intelligence methodology for higher education students to enter occupation internationally is appropriate in high level ($\bar{X} = 4.26$, S.D.= .27). When considering each part independently, it found out that the areas that receive the highest suitability are the process of management model using business intelligence methodology for higher education students to enter occupation internationally ($\bar{X} = 4.60$, S.D.= .54). The second and third highest suitable areas are the management model using business intelligence methodology for higher education students to enter occupation internationally is suitable for data analysis concerning with the enter to international occupations ($\bar{X} = 4.20$, S.D.= .44), and the developed management model using Business Intelligence methodology for higher education students to enter occupation internationally is possibly used for enhancing the management and decision-making over resources in order to support students' enter to international occupation genuinely ($\bar{X} = 4.00$, S.D.= .00).

Table 4 The Conclusion of the Evaluation Result of the Management Model Using Business Intelligence Methodology for Higher Education Students to Enter Occupation Internationally

Evaluation List	\bar{X}	S.D.	Level of Suitability
Elements of the management model using business intelligence methodology for higher education students to enter occupation internationally	4.35	.54	High
The process of the Business Intelligence system for entering international occupations of higher education students	4.61	.38	Highest
The suitability of using business intelligence methodology for higher education students to enter occupation internationally	4.26	.27	High
Total	4.41	.32	High

Table 4 shows that the overall development of the management model using business intelligence methodology for higher education students to enter occupation internationally is highly appropriate (=4.41, S.D.= .32). When considering each part independently, we will see that the process of the Business Intelligence system for entering international occupations of higher education students is the most suitable (=4.61, S.D.= .38). The second and third highest are the elements of the management model using business intelligence methodology for higher education students to enter occupation internationally which is highly suitable (=4.35, S.D.= .54), and the suitability of using business intelligence methodology for higher education students to enter occupation internationally (=4.26, S.D.= .27) respectively.

7. Research Discussion

The evaluation result of appropriateness of the management model using Business Intelligence methodology for higher education students to enter occupation internationally by the specialists is averagely in high level (=4.41, S.D.= .32). The development of the management model using Business Intelligence methodology for higher education students to enter occupation internationally is consisted of three sections: 1) Identifying the data source as a part of main data source that will be inserted in Business Intelligence system such as information related to foreign languages, information and communication technology skills, academic knowledge and professional skills in the fields students studying which affects the enter to students' international occupation. 2) Inputting the analyzed information which is a factor affecting the enter to students' international occupation into the process of Business Intelligence system. 3) Reporting the tendencies derived from the process of Business Intelligence system to the university administrators in order to support the management and decision-making over resources management and promote students' enter to international occupation.

8. Conclusion

The results of the development of the management model using Business Intelligence methodology for higher education students to enter occupation internationally, there are the management model which develop and decision in resource management within university for supporting the students toward effective International Occupation. The development of the management model also improve and encourage the knowledge and skill sets of students toward effective International Occupation, increasingly.

Within the scope of the development of the management model using Business Intelligence methodology for higher education students to enter occupation internationally, most of the data sources from any university that will be considered to enter to the Business Intelligence system are resemble, but there are some information which impacts the enter to international occupation of the higher education students in each university that are different, for instance, the international professional qualification examination or the foreign language competency criteria, etc. To identify the data source, it is possible to identify different information in addition to other data sources. That should be operated appropriately for each university and lead to the increase of effectiveness of the system's performance.

References

- Falakmasir, M., Moaven, S., Abolhassani, H., & Habibi, J. (2010). Business Intelligence in E-Learning. Available from: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5542876> [Accessed 20th July 2012]
- ICT for Education Master Plan Ministry of Education 2011-2013. (2011) Bangkok: office.
- Kleesuwat, S., Mitatha, S., Yupapin, P., & Piyatamrong, B. (2009) *Business Intelligence in Thailand's Higher Educational Resources Management* Available from: <http://www.sciencedirect.com/science/article/pii/S1877042810000194> [Accessed 20th June 2012].
- Mariem, N. (2006) *Factors affecting the Freelance and Occupational Statuses of BBA Graduated Students Year 2002-2004 of Rajamangala University of Technology*. Rajamangala University of Technology.
- Ministry of Education. (1999) *National Education Act 1999*. Bangkok: KhuruSapha Printery.
- Opas, E. (2004) *Preparation before Being a Programmer and System Analyst*. Se-ed. Bangkok, Thailand.
- Ouf, S. & Nasr, M. (2011). *Business Intelligence in The Cloud*. Communication Software and Networks (ICCSN), 2011 IEEE 3rd International Conference on, issue date 27th-29th May 2011.
- Piedade, M.B. & Santos, M.Y. (2010) *Business Intelligence in Higher Education: Enhancing the teaching-learning process with a SRM system* Available from: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5556702> [Accessed 20th June 2012].
- Prakong, K. (1999). *Statistics for Behaviorism Research*. 3rd ed. Published. Bangkok: Chulalongkorn, Thailand.
- Rajamangala University of Technology. (2005) *Rajamangala University of Technology Act, 2005* Available from: http://www.rmutsb.ac.th/university_council/knowledge_council/index2.php [Accessed 20th June 2013].
- Rawewan, K. & Srisombat, W. (2011) The Development of Business Intelligence's Data Warehouse *Executive Journal*, 31(1),160-165.
- Santi, A. & Tedpong, P. (2009) *Analyzing Information for Decision-Making by Business Intelligence*. Seminar 3rd National CS & ICT Conference 2009, Mahasarakarm, Thailand.
- Taweesak, N. (2004) *Decision-Making Support Systems*. Available from : http://www.sirikitdam.egat.com/WEB_MIS/107/index.html [Accessed 20th July 2012].

Tithima, P & et. al. (2008) *Factors affecting the Entrance to Occupation of Students and Satisfaction of BBA Graduated Students, Rajamangala University of Technology Rattanakosin. Rajamangala University of Technology Rattanakosin* Available from :<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=601435> [Accessed 2nd July 2012].

Vitaya, P. (2006) *What is Business Intelligence? How does it Help Business Running?* Available from : <http://www.gotoknow.org/blogs/posts/52660> [Accessed 2nd July 2012].

