

Research Framework of Education Supply Chain, Research Supply Chain and Educational Management for the Universities

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Abstract- This paper investigates the education supply chain, the research supply chain, and educational management as major constituents in integrated educational supply chain management (SCM) for the universities. This empirical study depicts a holistic view, comprising inputs, the process, and outputs of the educational supply chain. Educational management represents the process component, which may be accomplished in three levels, including strategic, planning and operating levels. The exploratory research provides educational management a new dimension to understand how supply chain management contributes to successful university operations. This conceptual framework provides two main contributions including human resource contribution and research contribution to the end customer, i.e. the society.

Keywords- supply chain management, SCM, education, research

1. INTRODUCTION

1.1 Study Background

Supply chain management is needed for various reasons: improving operations, better outsourcing, increasing profits, enhancing customer satisfaction, generating quality outcomes, tackling competitive pressures, increasing globalization,

increasing importance of E-commerce, and growing complexity of supply chains (Stevenson, 2002).

It is a surprising fact that researchers developed SCM models focusing mostly on improving business operations. Few, particularly academic researchers, do not realize that the research on academic supply chain management may also be conducted for their own educational institutions. This research paper attempts to fulfill the following objectives:

- To depict a holistic view, comprising inputs, the process, and outputs of the educational supply chain
- To develop an integrated supply chain management model for the universities
- To develop a model of integrated educational supply chain management. The proposed model addresses integrated educational supply chain management in three levels, including strategic, planning and operating levels.

2. BACKGROUND AND RATIONALE

Education, being part of the service industry, is characterized differently from the manufacturing industry as its product, i.e. knowledge, is intangible. Effective education relies much on its personnel's knowledge, experience, and ethics. Supply chains are quite easy to define for manufacturing organizations, where each participant in the

chain receives inputs from a set of suppliers, processes those inputs, and delivers them to a distinct set of customers. With educational institutions, one of the primary suppliers of process inputs is customers themselves, who provide their bodies, minds, belongings, or

information as inputs to the service processes (Sampson, 2000). In educational supply chain, a university works in close collaboration with schools, further education colleges, its current students, university staff, and employers of its graduates in designing curricula (O'Brien and Kenneth, 1996) to ensure that the needs of all stakeholders are satisfied.

Based on findings from literature review, the researcher found a large number of papers and articles in supply chain management. Most of them investigated supply chain management in the manufacturing sector (Ballou, 1978, 2007), (Heskett, 1964, 1973), (Stevenson, 2002), (Cigolini, 2004), (Oliver, 1992), (Lummus, 1994), (Gripsrud, 2006), (Tan, 2002). Only a few addressed issues in supply chain management for the service industry (Fernie, 1995), Kathawala (2003). Very few focused on educational supply chain management. Just two papers, (O'Brien, 1996) and (Lau, 2007) were found to be relevant to educational supply chain management.

O'Brien and Deans (1996) reported the results from a survey conducted among students and employers. There was no research model in that paper. They examined the concept of adapting industry models to higher education, with specific reference to the idea of an educational supply chain. That study focused on empirical research conducted by University of Strathclyde, wherein reviewing the undergraduate degree, present students and employers of graduates were integrated into the decision-making process.

Lau (2007) performed an in-depth case study approach to developing an educational supply chain management for the City University of Hong Kong. He followed Yin's

(1994) approach to interviewing personnel of a supply chain department and collected the university documents. The research, which used a case study approach to examine a university, affects the research generalization.

3. CONCEPTUAL RESEARCH MODELS

The researcher designs the integrated educational supply chain management for the universities. An integrated supply chain involves co-ordination and information sharing up and down the process. For providing the clear conception of the conceptual framework, the researcher depicts holistic view of educational supply chain in Figure 1.

Though, it is very difficult to determine the supplier and customer of the intangible product in the service industry, the researcher identified suppliers, customers, the service provider, and the consumer in this paper. This exploratory study also identifies supplied input, supplied output. In this supply chain, raw materials are students as well as internal and external projects. Finished products are graduates and research outcomes. The aforementioned holistic view of an educational supply chain may be elaborated through a more detailed illustration in Fig. 2 that illustrates an education supply chain and a research supply chain, which together form the integrated supply chain for the universities. The researchers represent two entities, which are students and research projects in this conceptual model.

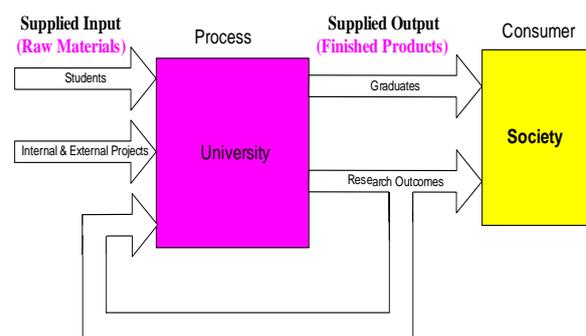


Fig 1: Holistic View of Educational Supply Chain

Both entities eventually become graduates and research findings in the integrated educational supply chain. The final outcomes of this integrated supply chain, graduates with desirable quality and quality research outcomes will be delivered to the end

customer, i.e. the society by the education supply chain and research supply chain respectively (Habib, 2008)

3.1 Suppliers

In the conceptual model, the researcher identified two major wings in suppliers for the universities - education suppliers and research suppliers.

Education Suppliers:

- a) Suppliers of the student (High school/college)
- b) Suppliers of the faculty (Other universities)
- c) Self funding students
- d) Source of Fund – family (parents, siblings, relatives, etc.)
- e) Government and private organizations (Scholarship)
- f) Suppliers of assets or equipment (Furniture, computer, networking equipment, etc.)
- g) Suppliers of educational materials (Stationery, instruction materials, etc.)

Research Suppliers:

- a) Suppliers of Internal Research Projects (University self funding)
- b) External Research Projects (External research funds, ministry of education, private organizations, etc.)

3.2 Customers

In the conceptual model, the researcher identified two major wings in customers for the universities: Education customers and research customers.

Education Customers:

- a) Graduates with desirable quality
- b) Family (Parents, Siblings, Relatives, etc.)
- c) Employers of government and private organizations

Research Customers:

- a) Funding organizations of research projects
- b) Quality research outcomes (Researchers, Research Publications, Findings etc.)
- c) Others (Research Professional Organizations - IEEE, INFOMS, ACM, Society of Manufacturing Engineers etc. and Trade Associations, American Trade Association, Grocery Manufacturers Association etc.)

3.3 Consumer

The researcher identifies the society as the end customer or the consumer in this integrated supply chain. As universities are part of the society, the final outcomes of this supply chain, including graduates with desirable quality and quality research outcomes are delivered to the society. This conceptual model depicts two types of contributions to the society, which are human resource contribution, i.e. quality graduates and research contribution, i.e. research findings.

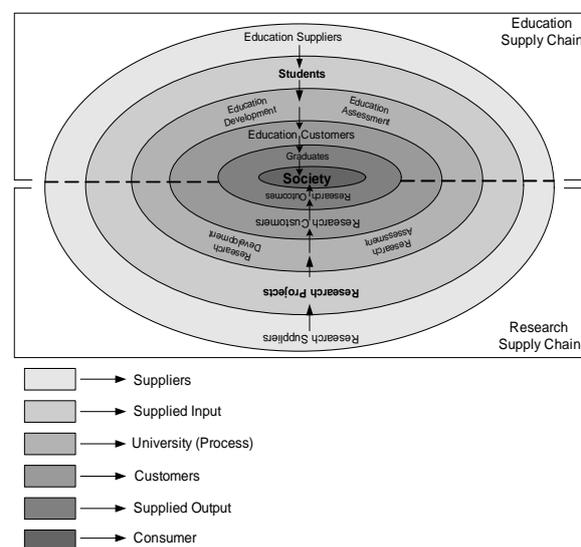


Fig 2: An Integrated Supply Chain for the Universities

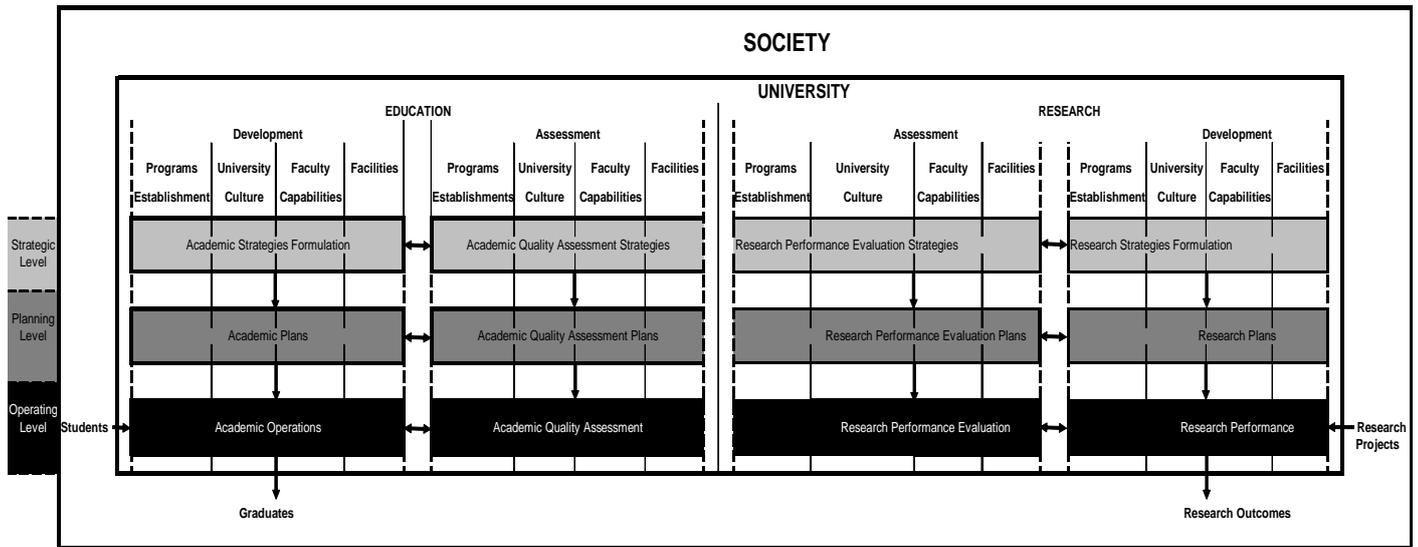


Fig 3: Educational Management for the Universities

3.4 A University

A university is regarded as a service provider in this paper. The researcher identified two major factors including development and assessment for both education and research in the university as illustrated in figure 3. Through proper educational management, the university can produce quality outcomes for the society. The researcher presents three decision phases, as illustrated in figure 3 are involved in the process of the university:

education and research. The procedure is shown in figure 4. Development and assessment should be occurred concurrently for both education and research. Assessment at different levels assures stakeholders' satisfaction in this integrated supply chain. In educational management, three decision phases, as illustrated in figure 3 are involved in the process of the university:

- Phase 1: Strategic Level
- Phase 2: Planning Level
- Phase 3: Operating Level

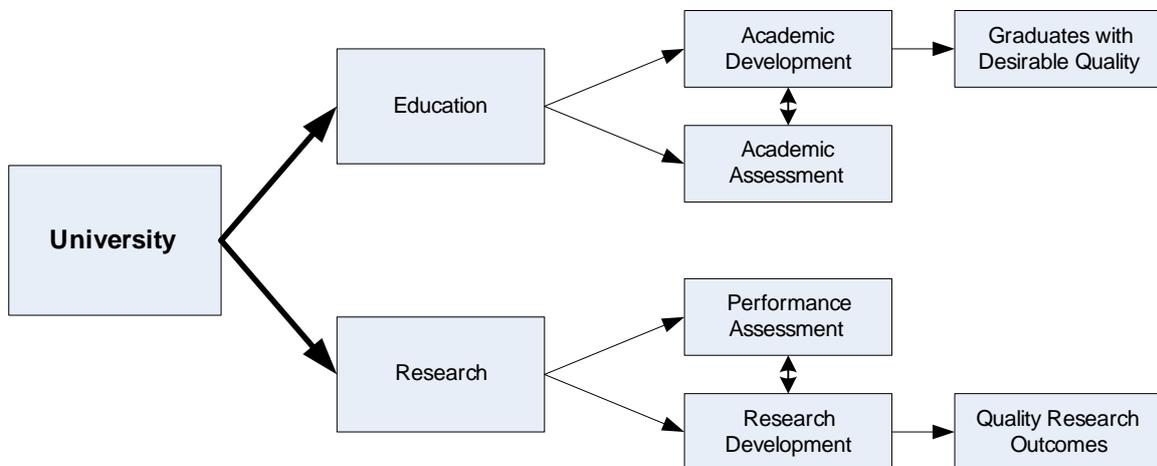


Fig 4: Education and Research in the University

Based on three decision levels, some the universities. Table 1 and 2 illustrates the examples are provided to focus the four examples of the development and assessment aspects for both education and research in for the education in the universities.

TABLE 1
EXAMPLES OF EDUCATION DEVELOPMENT IN THE UNIVERSITIES

Decision Levels	Programs Establishment	University Culture	Faculty Capabilities	Facilities
Strategic	School of Engineering, School of Business, School of Arts	Academic good governance by university council	Professors, associate professors, assistant professors, lecturers	University's academic and supportive facilities
Planning	Department of Electrical Engineering, Department of Finance, Department of Linguistics	Academic good governance by deans/program directors	Professors, associate professors, assistant professors, lecturers	School's academic and supportive facilities
Operating	Majors in power systems, instrumentation and control, robotics	Academic good governance by faculty members	Professors, associate professors, assistant professors, lecturers	Department's academic and supportive facilities

TABLE 2
EXAMPLES OF EDUCATION ASSESSMENT IN THE UNIVERSITIES

Decision Levels	Programs Establishment	University Culture	Faculty Capabilities	Facilities
Strategic	University's academic assurance program	Management by objectives (MBO), university's academic excellence	University's academic faculty performance evaluation	University's academic and supportive facilities quality assessment
Planning	School's academic assurance program	School's academic excellence	School's academic faculty performance evaluation	School's academic and supportive facilities quality assessment
Operating	Department's academic assurance program	Department's academic excellence	Department's academic faculty performance evaluation	Department's academic and supportive facilities quality assessment

On the other hand, Table 3 and 4 illustrates the examples of development and assessment for the research in the universities.

TABLE 3
EXAMPLES OF RESEARCH DEVELOPMENT IN THE UNIVERSITIES

Decision Levels	Programs Establishment	University Culture	Faculty Capabilities	Facilities
Strategic	engineering research programs, business research programs, social research programs	university's research orientation	professors, associate professors, assistant professors, researchers	university's research and supportive facilities
Planning	electrical engineering, mechanical engineering, finance, operations research projects	school's contract research programs and joint research programs	professors, associate professors, assistant professors, researchers	school's research and supportive facilities
Operating	research topics - supply chain management, artificial intelligence	innovative academic research projects enrollments by departments	professors, associate professors, assistant professors, researchers	department's research and supportive facilities

TABLE 4
EXAMPLES OF RESEARCH ASSESSMENT IN THE UNIVERSITIES

Decision Levels	Programs Establishment	University Culture	Faculty Capabilities	Facilities
Strategic	University's research quality assurance program	University's research findings quality assessment, research excellence	University's research faculty performance evaluation	University's research and supportive facilities quality assessment
Planning	School's research quality assurance program	School's research environment assessment	School's research faculty performance evaluation	School's research and supportive quality assessment
Operating	Department's research quality assurance program	Department's research excellence	Department's research faculty performance evaluation	Department's research and supportive facilities quality assessment

Graduates with Desirable Quality: Benchmarking and value enhancement determinants are mentioned and incorporated in the process of the university to produce graduates with desirable quality.

(a) Graduates Benchmarking

- Knowledge (Tacit or Explicit)
- Skills
- Competencies
- Capabilities
- Ethics
- Career Development
- Programs

(b) Graduates Value Enhancement

- Source of Fund (Self funding, scholarship, etc.)
- Wisdom
- Faculty Capabilities
- Facilities
- Information and Communication Technology (ICT)
- Research Involvements

Quality Research Outcomes: Quality research outcomes may include problem solution, pure theory, thesis findings, internal and external projects applications, researchers, research publications, or research findings, etc.

4. CONCLUSIONS

The researcher proposes the model of integrated educational supply chain management for the universities. This model links educational management with general business management. From a managerial perspective, this research provides a novel approach to developing and assessing supply chain management application in the academia.

The proposed conceptual IESCM model for the universities provides a novel approach for decision makers of each supply chain components to review and appraise their performance toward fulfillment of ultimate goals, i.e. producing high-caliber graduates and high-impact research outcomes for the betterment of the society.

This dissertation represents an empirical research. The model is obtained through the gathering and analysis of a vast amount of primary and secondary data. The applicability of the model is then verified and validated via Delphi. The interrelationships among all integrated educational supply chain components are investigated and confirmed by Structural Equation Modeling (SEM) technique. The applicability of the model can be confirmed empirically. However, model evaluation by actual implementation is suggested for

prospective investors or current university administrators.

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