Analysis of Educational Supply Chain Management Model: A Case Study Approach

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Abstract

This paper demonstrates the first practical investigation of ITESCM (Integrated Tertiary Educational Supply Chain Management) model which was developed by Habib (2010) for any tertiary educational institution. ITESCM consists of education supply chain, research supply chain and education management as a major constituents. The model furnishes stakeholders of the supply chain with appropriate strategies to review and appraise their performance toward fulfillment of ultimate goals, i.e. producing high-caliber graduates and high impact research outcomes, which represent two main contributions, for the betterment of the end customer, i.e. the society. As a case study approach, the authors depict the application of ITESCM model on a pioneer private University in Bangladesh, namely American International University-Bangladesh (AIUB). A survey was conducted among all stakeholders, including Employers, Graduates, Current students, University management, Faculty members, etc. to scrutinize the quality outcomes towards the consumer.

Keywords
ITESCM, case study, supply chain, education, research.

1. Introduction

Only a few addressed issues in Supply Chain Management (SCM) for the service industry (Dibb and Simkin 1993; Sampson 2000; Nixon 2001; Sengupta and Turnbull 1996; Fernie and Clive 1995; Kathawala and Khaled 2003). Very few focused on educational supply chain management. Just two papers (Lau 2007; O’Brien and Kenneth 1996) were found to be relevant to the educational supply chain management. Consequently, ITESCM model is the first empirical study on educational supply chain management (Habib 2009d, 2011d; Habib and Junghirapanich, 2010e).

The ITESCM (Integrated Tertiary Educational Supply Chain Management) Model represents supply chain management for the academia (Habib 2010, 2011b, 2011c; Habib and Junghirapanich, 2010f). This model depicts the integrated form of educational supply chain and educational management for the universities. Educational supply chain also consists of education supply chain and research supply chain. The ITESCM model was developed based on exploratory research; therefore, the authors applied this model on a leading private University as case study approach that presents first application of that model.

American International University-Bangladesh (AIUB) is a government approved private University in 1994. It envisions promoting and creating a learning environment through state-of-the-art facilities, expanded frontier of research based knowledge. AIUB offers several degree programs at graduate and undergraduate level, including four distinct faculties namely Faculty of Arts and Social Science, Faculty of Science, Faculty of Engineering and Faculty
of Business Administration. The university produced over 6500 graduates as well as it has over 10,000 students with over 350 faculty members as of December, 2011. This paper illustrates sequentially Literature Review, Research Methodology, ITESCM Model Evaluation, Case-Study Analysis, and Conclusion in the following sections.

2. Literature Review
One of the main goals of an educational supply chain is to improve the well-being of the end customer, i.e. the society. To achieve this goal, educational institutions need to have a certain degree of knowledge about the partners in their supply chains including suppliers, customers, and the consumer. The performance of the supply chain management depends on the seamless coordination of all supply chain stakeholders to ensure attainment of desirable outcomes (Habib and Jungthirapanich 2010b, 2010d; Habib, 2011b). An integrated supply chain involves coordination and information sharing up and down the process. However, it is very difficult to determine the supplier and customer of the intangible product in the service industry. Suppliers, the service provider, customers, and the consumer have been identified in this research. ITESCM also identifies supplied inputs, customer-consuming output (O/P), customer-supplying input (I/O) and finally supplied outputs. Some of the graduates would be added in the service provider as the supplied input. On the other hand, some graduates would be acted as the supplied output to the end customer. Therefore, graduates were identified as the supplying input customer in that supply chain (Habib, 2011c, 2011d).

Figure 1: Simplified Form of Supply Chain Management for the Universities

In this supply chain, raw materials are students as well as internal and external projects. Finished products are graduates and research outcomes (Habib and Jungthirapanich 2009a; Habib 2010f). Figure 2 illustrates an education supply chain and a research supply chain, which together form the integrated supply chain for the tertiary educational institutions, i.e. universities (Habib 2010d; 2010e).
In educational management, three decision levels, as illustrated in Figure 4, are involved in the process of the university:

**Phase 1 – Strategic Level:** The strategies for producing graduates and research outcomes are formulated for the development and assessment in both education and research activities. The procedure is shown in Figure 3.

**Phase 2 – Planning Level:** Academic and research plans, as well as quality assessment plans for both education and research are developed in the planning level.

**Phase 3 – Operating Level:** Academic operation and research performance, as well as academic quality assessment and research performance evaluation are carried out in operating level. The overall performance would be assessed by academic and research performance indicators, survey of all stakeholders, including university administrators, graduates, employers etc.

**The ITESCM Model**

Education supply chain and research supply chain were evolved in ITESCM model. Different components of ITESCM model were illustrated in Figure 4.

**Suppliers:** In that model, two major parts in the suppliers, namely education suppliers and research suppliers for the universities (Habib and Junghirapanich, 2009c, 2010d; Habib 2010a; 2011c, 2011d).

- **Education Suppliers:**
  - Human suppliers: Suppliers of the student (High school/college), suppliers of the faculty (other universities), Self funding students
  - Suppliers of fund: Family (parents, siblings), relatives, etc. government and private organizations (scholarship)
  - Non-human suppliers: Suppliers of assets or equipment (furniture, computer, networking equipment, etc.), suppliers of educational materials (stationery, instruction materials, etc.).

- **Research Suppliers:**
  - Internal Research Suppliers: Suppliers of internal research projects (university self funding)
  - External Research Suppliers: Suppliers of external research projects (external research funds, Ministry of education, private organizations, etc.).

**Service Provider:** A university is regarded as a service provider in ITESCM model. Two major wings including development and assessment for both education and research activities in the university. Figure 4 represents educational supply chain for the universities in four aspects, including programs establishment, university culture, faculty capabilities, and facilities, are considered for development and assessment in both education and research activities (Habib and Junghirapanich, 2009b, 2009c, 2010c).
Customers: Two major parts in the customers namely education customers and research customers for the universities were notified in ITESCM model (Habib and Jungthirapanich 2010a; Habib 2009b).

- **Education Customers:** Graduates, family (parents, siblings, relatives, etc.), employers of government and private organizations

- **Research Customers:** Funding organizations of research projects, research outcomes (writers, research publications, findings etc.), Others (research professional organizations -IEEE, INFORMS, ACM, Society of manufacturing engineers etc. and Trade associations -American trade association, Grocery manufacturers association, etc.).

**Figure 4: ITESCM Model for the Universities.**

Consumer: The society was identified as the end customer or the consumer in ITESCM model. As universities are the 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 (Habib and Jungthirapanich 2008a, 2009c, 2009d).

**Different Aspects in the Universities** (Lau 2007; Habib and Jungthirapanich 2008b, 2009a, 2009c, 2010a)

**Programs Establishments (PE):** Universities design different programs, to enhance the diversification in education development and establish various programs to assess the development. Universities also intend different programs to increase the diversification in research development and research assessment. Universities have to attempt product differentiation, i.e. programs establishment. Hands-on experience, industrial placements, social demand,
provision of IT facilities, and innovative academic methods all demonstrate attempts to differentiate programs establishment (Kotler and Bloom 1984).

Faculty Capabilities (FC): Faculty members establish good communication, provide rich environment for classroom observation, model best practices, create opportunities for reflection, and support students' participation in curriculum planning, teaching and research. Traditionally, university faculty members are evaluated according to the three major criteria: teaching, research, and services (Comm and Mathaisel 1998).

University Culture (UC): The concept of organizational culture would be applicable for the universities by the name of University Culture. However, the type of the university culture will fully depend on the university management or administrator. In fact, university culture is the personality of the university (Habib 2009b).

Facilities (FA): Universities offer a wide range of modern facilities to their students for teaching and research. Lecture rooms are principally conducted using state-of-the-art distance learning technology, online education. Online databases, e-journal, digital library, etc. represents modern research facilities in the universities (Habib 2009b).

Final Outcomes
Graduates with Desirable Quality: Benchmarking and value enhancement determinants are identified and incorporated in the process of the university to produce graduates with desirable quality.
   (a) Graduates benchmarking includes knowledge (tacit or explicit), skills, competencies, capabilities, ethics, career development programs, etc.
   (b) Graduates value enhancement includes source of fund (self-funding, scholarship, etc.), wisdom, faculty capabilities, facilities, Information & Communication Technology (ICT), research involvements, etc.

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

3. Research Methodology
ITESCM, an empirical research model, was developed based on primary and secondary data. This paper was the extensive work as descriptive study, a case study approach on AIUB, of ITESCM model. Survey research technique was utilized to analyze all stakeholders’ observation towards the university. 307 respondents of all stakeholders, including faculty members, students, alumni, parents, employers of AIUB graduates, university management were participated in this survey through simple random sampling procedure. Five-point Likert Scale (1= Strongly Disagree, 5 = Strongly Agree) were asked to the respondents to conduct the survey. The researchers used SPSS as statistical tools to furnish the data input and analysis.

4. ITESCM Model Evaluation (Habib, 2009a, 2010a)
As per the ITESCM model, graduates were identified as final outcomes of the education part in the university. Education part is divided into two segments including education development and education assessment. Model 1 contains education development and education assessment. There are four subgroups namely programs establishment, university culture, faculty capabilities and facilities.
Multiple Linear Regression (MLR) Equations:

F Education Development = 0.63 f Programs Establishment + 0.70 f University Culture + 0.65 f Faculty Capabilities + 0.63 f Facilities
F Education Assessment = 0.68 f Programs Establishment + 0.74 f University Culture + 0.69 f Faculty Capabilities + 0.66 f Facilities
F Graduates = 0.97 F Education Development + 0.92 F Education Assessment

(1)

According to the ITESCM model research outcomes was mentioned as final outcomes in the research wing of the university. Research outcomes was divided into two segments namely research development and research assessment. Both the research development and research assessment have four subgroups, namely programs establishment, university culture, faculty capabilities and facilities, illustrated in Model 2.

Multiple Linear Regression (MLR) Equations

F Research Development = 0.60 f Programs Establishment + 0.71 f University Culture + 0.63 f Faculty Capabilities + 0.67 f Facilities
F Research Assessment = 0.67 f Programs Establishment + 0.72 f University Culture + 0.74 f Faculty Capabilities + 0.69 f Facilities
The main outputs of the universities, including graduates and research outcomes, would be delivered to the education customers and research customers respectively. Finally, all outcomes would be generated for the betterment of the society.

Multiple Linear Regression (MLR) Equations

\[
\begin{align*}
F_{Society} &= 0.61 F_{Education\ Customers} + 0.61 F_{Research\ Customers} \\
&= 0.61 (0.34 F_{Graduates}) + 0.61 (0.15 F_{Research\ Outcomes}) \\
&= 0.21 F_{Graduate} + 0.09 F_{Research\ Outcomes} \quad (3)
\end{align*}
\]

From the research findings, the society, i.e., the consumer of ITESCM model, consists of graduates and research outcomes. The authors defined the society as the function of graduates and research outcomes (Habib and Jungthirapanich, 2009b, 2009c, 2010d, 2010e; Habib, 2010a, 2011c, 2011d).

Society = f (Graduates, Research Outcomes)

5. Case-Study Analysis

Based on the survey of all AIUB stakeholders, including University administrators, faculty and staff, graduates, employers, etc., the researchers applied the outputs for each parameter in the equation (1), (2) and (3). The outputs, e.g., education development, education assessment, research development, research assessment, were derived from the mean of the survey data. Research findings of this paper were determined based on inputs from the stakeholders, therefore, the validity of the outcomes depends much on the completeness and the accuracy of this input data.

\[
\begin{align*}
F_{Graduates} &= 0.97 F_{Education\ Development} + 0.92 F_{Education\ Assessment} = 0.97*3.628 + 0.91*3.235 = 6.495 \\
F_{Research\ Outcomes} &= 0.99 F_{Research\ Development} + 0.89 F_{Research\ Assessment} = 0.99*3.521 + 0.89*3.466 = 6.571
\end{align*}
\]

The outcomes for Graduates and Research Outcomes through Equation (1) and (2) are 6.495 and 6.571 respectively.

\[
F_{Society} = 0.21 F_{Graduate} + 0.09 F_{Research\ Outcomes} = 0.21*6.495 + 0.09*6.571 = 1.955
\]

Finally, the value of the Society in terms of equation (3) is 1.955.

Furthermore, if the researchers select the highest value 5 (strongly agree) for this function (3) in that case the maximum value is 2.8 and lowest value would be 0.56 if the researchers select the lowest value 1 (strongly disagree). According to Habib’s (2009d, 2010a) suggestion, the cut-off value for the function of the Society at fifty percent could be accepted. In this paper the researchers found that the cut off value was 1.68. The value of the Society is acceptable as it exceeds the cut-off value (1.955>1.68). Therefore, quality outcomes in terms of graduates and research outcomes have been produced by AIUB for the well-being of the society.

6. Conclusion

ITESCM model represents the first large scale empirical study that systematically investigate input of the university, output of the university through educational supply chain. That model for the universities provides two main contributions to the end customer, i.e., the society, including human resource contribution and research contribution.
This paper, a novel approach for decision makers, demonstrates the first practical investigation of ITESCM model upon American International University-Bangladesh (AIUB) which represents a leading private University in Bangladesh.

One of the main goals of an educational supply chain is to improve the well-being of the end customer or the society. Improved Well-being society would be possible if we could able to produce quality graduates and quality research outcomes by implementing proper educational supply chain for the universities from the raw materials, i.e. students and research projects to finished products, i.e. graduates and research outcomes. Findings of this study, the value of the Society, is quite satisfactory which has come up through the application upon AIUB. The university administrators who need to improve their outcomes may apply the research equations of ITESCM model to their universities. In that case, this paper would unlock further frontiers for university management.

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