

Comparative Analysis of Supply Chain Management for Universities through ITESCM Model

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Abstract

This descriptive study demonstrates the comparative analysis of ITESCM (Integrated Tertiary Educational Supply Chain Management) model applications which was developed by Dr. Habib (2010) for tertiary academic institutions. This model addresses the integrated form of supplied inputs, supplied outputs, education supply chain, research supply chain and educational management for universities. The model was applied by the researchers on two leading Bangladeshi universities, namely American International University-Bangladesh (AIUB) and United International University (UIU) through MLR equations as case study approach. To justify the quality outcomes towards the end customer, i.e., the Society, of the educational supply chain, a total of 117 respondents through simple random sampling procedure; representing current students, university administrators, faculty and staff, graduates, employers of the graduates, parents etc. of above mentioned universities participated in survey. The researchers used SPSS as a statistical tool to furnish data input and analysis for comparing the applications of ITESCM model in different universities. The application of ITESCM model provides a novel approach for prospective investors or current administrators of the universities to review and appraise their performance with comparing other universities toward fulfillment of ultimate goals, i.e. producing high-competent graduates and significant research outcomes for the well-being of the society.

Keywords

Educational supply chain, research supply chain, ITESCM, comparative analysis, case study

1. Introduction

Supply chain management (SCM) helps the business organization to compete in the dynamic global market. The goal of SCM is to integrate activities across and within organizations for providing the customer value. This should also be applicable to the academia, which represents a type of non-profit organizations. It is a surprising fact that researchers develop supply chain models mostly for improving business operations. Few, particularly academics, do not realize that the research on academic SCM may also be conducted for their own educational institutions (Habib and Jungthirapanich, 2008b, 2009c, 2010c), (Habib, 2011b). Only a few addressed issues regarding SCM for the service industry (Dibb and Simkin, 1993), (Fernie and Clive, 1995), (Kathawala and Khaled, 2003), (Nixon, 2001), (Sampson, 2000), (Sengupta and Turnbull, 1995). 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 (Integrated Tertiary Educational Supply Chain Management) model was the first empirical study on educational supply chain management (Habib, 2009d, 2011d), (Habib and Jungthirapanich,

2010c). The ITESCM Model represents supply chain management for the academia (Habib, 2010a, 2011b, 2011c), (Habib and Jungthirapanich, 2010d). 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. ITESCM model has been redesigned for better understanding to apply at real life application (Pathik, 2012a, 2012b, 2012c, 2012d). The ITESCM model was developed based on exploratory study; therefore, the authors applied this model on two leading private universities as case study that presents the applications of that model.

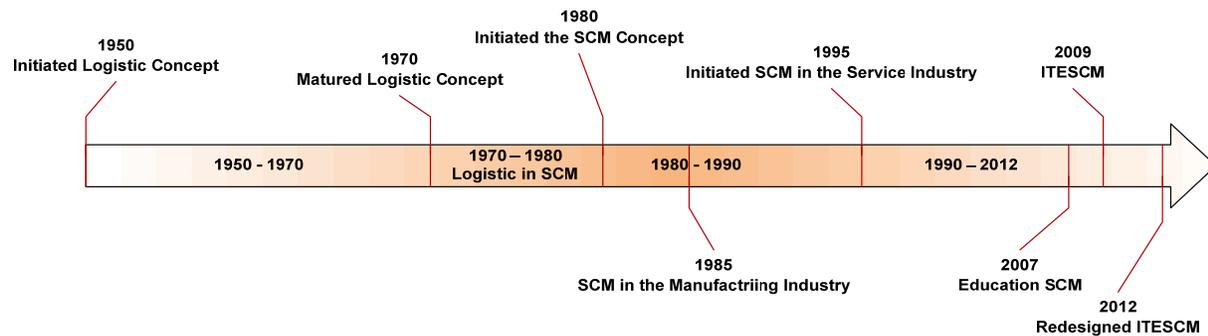


Figure 1. Evolutionary timeline of Supply Chain Management

American International University-Bangladesh (AIUB), a government approved private University, was originated in 1994. 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 11,000 graduates as well as it has over 12,000 students with over 350 faculty members as of August, 2013 (Habib et al. 2013, Bhuiyan, 2013, Chowdhury 2012a, 2012b). On contrary, United International University (UIU), established in 2003, a private university located in Dhaka, Bangladesh with the motto to provide state of the art and high quality education across a worldwide range of ICT, Business, Social and Public Organizations. It has five different schools and institutes namely School of Business & Economics, School of Science & Engineering, English Language Institute and Institute of Business & Economic Research which offer various graduate and undergraduate programs. Being a comparatively newer university, approximately 1,800 students have been graduated successfully from this institution.

This paper, a descriptive study, illustrates sequentially Literature Review, Research Methodology, Case analysis and Discussion, Comparison of ITESCM Model Applications and Conclusion in the following sections.

2. Literature Review

The ITESCM Model

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, 2009b, 2009c), (Habib, 2009d, 2011b, 2011c).

An integrated supply chain involves co-ordination 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, 2009d, 2010a, 2011d).

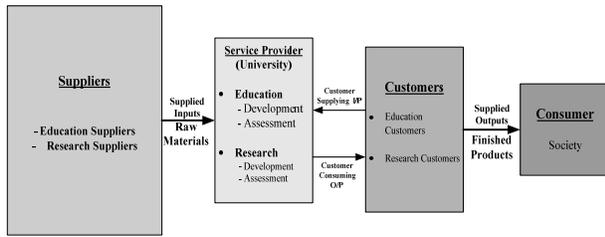


Figure 2: Simplified form of supply chain management for the universities (Habib, 2009a)

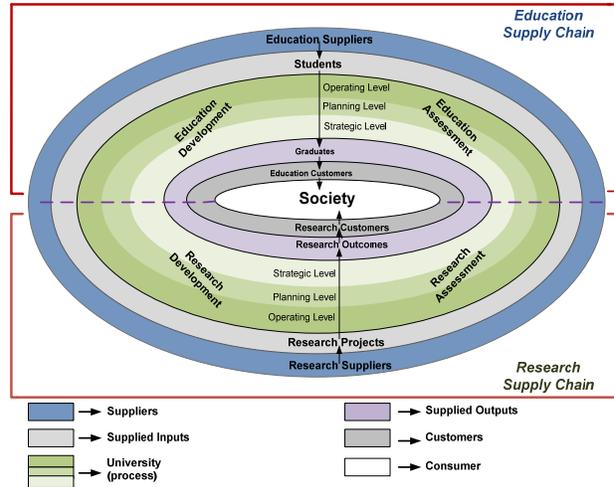


Figure 3: An integrated supply chain for the universities (Pathik and Habib, 2012a)

In this supply chain, raw materials are students as well as internal and external projects. Finished products are graduates and research outcomes (Habib, 2009d), (Habib and Jungthirapanich, 2010a, 2010d). Fig. 2 and Fig. 3 illustrate simplified form of supply chain management for the universities and integrated supply chain for the universities respectively. Educational supply chain and a research supply chain, which together form the integrated supply chain for the tertiary educational institutions, i.e. universities (Habib, 2009d, 2010a, 2010c), In educational supply chain management model, three decision levels, as illustrated in figure 4 are involved in the process of the university.

Phase 1- Strategic Level: In the strategic 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 4.

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.

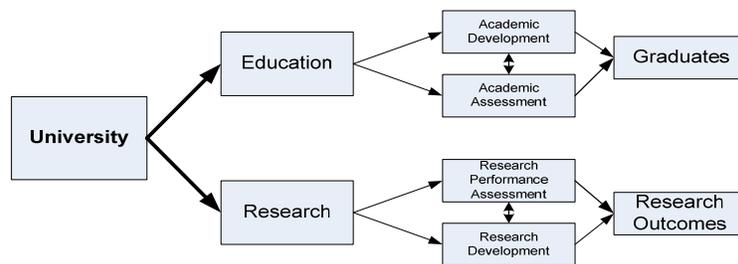


Figure 4: Strategic level in the universities

Suppliers: In the conceptual model, the researcher identified two major parts in the suppliers, namely education suppliers and research suppliers for the universities.

Education Supplier: Suppliers of the student (High school/college) suppliers of the faculty (other universities), self-funding students, source of fund family (parents, siblings), relatives, etc. Government and private organizations (scholarship), suppliers of assets or equipment (furniture, computer, networking equipment, etc.), suppliers of educational materials (stationery, instruction materials, etc.).

Research Suppliers: Suppliers of internal research projects (university self-funding), suppliers of internal research projects (external research funds ministry of education, private organization, etc.).

Service Provider: A university is regarded as a service provider in this paper. The research identified two major wings including development and assessment for both education and research in the university. Fig.4 represents educational supply chain for the universities in four aspects, including programs establishments, university culture, faculty capabilities and facilities, are considered for development and assessment in both education and research segment. The final outcomes of the university, i.e. graduates and research outcomes are delivered to the society.

Customers: In the conceptual model, the researcher identified two major parts in the customers namely education customers and research customers for the universities.

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

Research Customers: Funding organizations of research projects, research outcomes (researchers, 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.).

Consumer: The researcher identifies the society as the end customers or the consumer in this educational supply chain. 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.

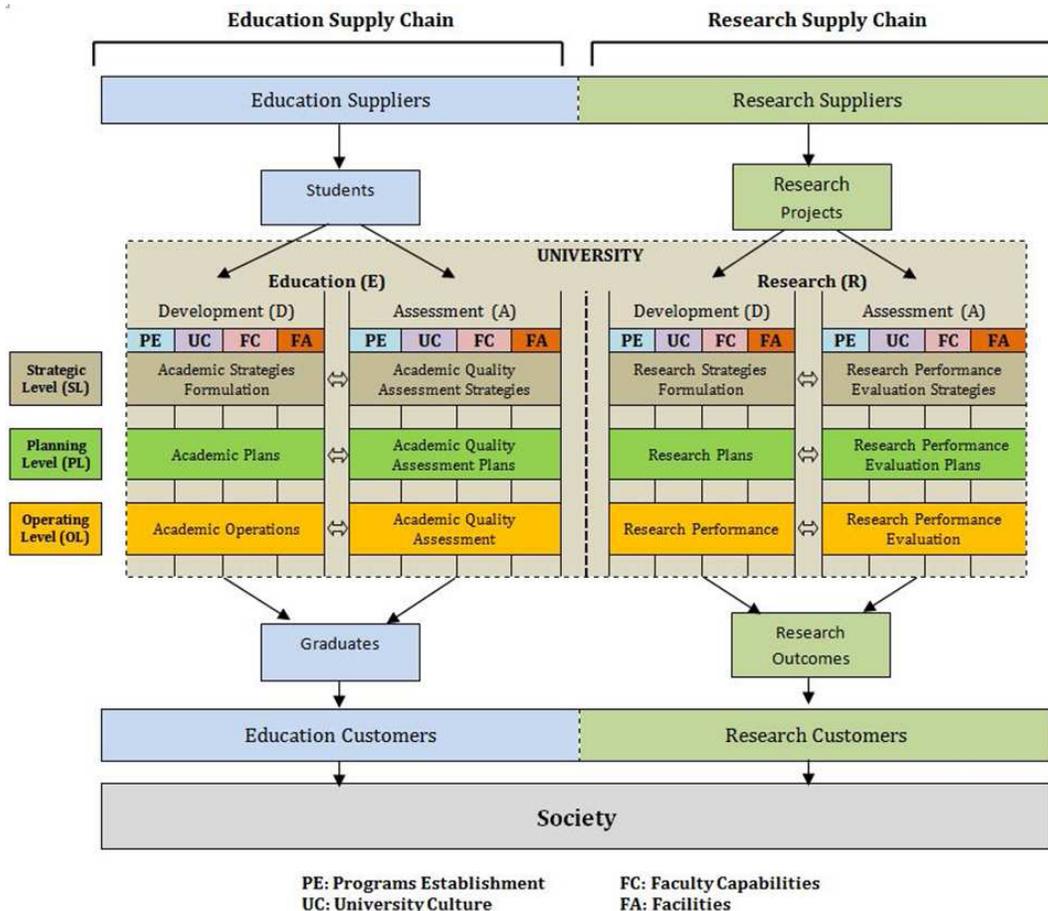


Figure 5: Redesigned ITESCM model (Pathik and Habib, 2012b, 2012c)

Different Aspects in the Universities: The authors identified four main activities for the university namely: Education development, Education assessment, Research development and Research assessment in order to produce quality graduates and research outcomes. To accomplish proper teaching and research works in the universities;

different aspects have to need analyzed. Four aspects, namely faculty capabilities, facilities, programs establishment, university culture would be demonstrated in this section (Habib, 2010, Chowdhury et al. 2012a).

Programs Establishments (PE): Programs establishment would be the occurred for the education and research in the terms of development and assessment in the universities. 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. program establishment. Hands-on experience, industrial placements, social demand, provision of IT facilities, and innovative academic methods all demonstrate attempts to differentiate programs establishment. (Habib, 2009a, 2009b, 2010c)

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 depends on the university management or administrator. In fact, university culture is the personality of the university.

Faculty Capabilities (FC): Faculty members establish good communication, provide rich environment for classroom observation, model best practices, create opportunities for reflection, and support student’s participation in the 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).

Facilities (FA): University offer a wide range of modern facilities to their students, these include state of the art lecture halls, libraries, laboratories and IT service to ensure that students are provided with an environment in which they can learn, both successfully and comfortably. Lecture rooms are principally conducted using state-of-the-art distance learning technology. Online database, e-journal, digital library, etc. represents modern research facilities in the universities.

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 comparative case study on American International University-Bangladesh (AIUB) and United International University (UIU) of ITESCM model. Survey research technique was utilized to analyze all stakeholders’ observation towards the university. 117 respondents of all stakeholders, including faculty members, students, alumni, parents, employers of AIUB and UIU 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 and Excel as statistical tools to furnish the data input and analysis.

4. Analysis and Discussion

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.

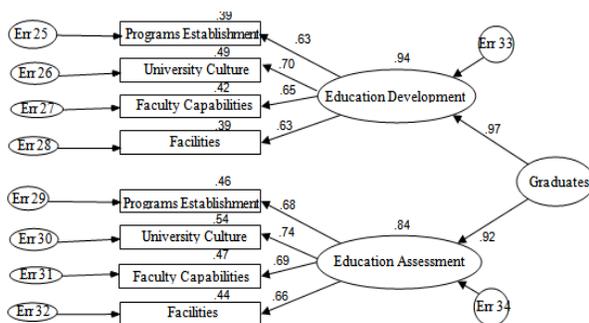


Figure 6: AMOS graphics output of model A (Standardized Estimates) (Habib, 2009c)

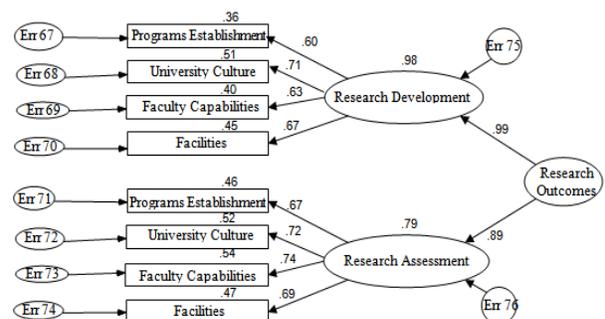


Figure 7: AMOS graphics output of model B (Standardized Estimates) (Habib, 2009d)

Multiple Linear Regression (MLR) Equations for Graduates (Model A): (Pathik and Habib, 2012b)

$$F_{\text{Education Development}} = 0.63 f_{\text{Programs Establishment}} + 0.70 f_{\text{University Culture}} + 0.65 f_{\text{Faculty Capabilities}} + 0.63 f_{\text{Facilities}} \quad (1)$$

$$F_{\text{Education Assessment}} = 0.68 f_{\text{Programs Establishment}} + 0.74 f_{\text{University Culture}} + 0.69 f_{\text{Faculty Capabilities}} + 0.66 f_{\text{Facilities}} \quad (2)$$

$$F_{\text{Graduates}} = 0.97 F_{\text{Education Development}} + 0.92 F_{\text{Education Assessment}} \quad (3)$$

According to the ITESCM model research outcomes was mentioned as final outcomes in the research wing of the university. Research outcomes were 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 for Research Outcomes (Model B): (Bhuiyan et al. 2013)

$$F_{\text{Research Development}} = .60 f_{\text{Programs Establishment}} + 0.71 f_{\text{University Culture}} + 0.63 f_{\text{Faculty Capabilities}} + 0.67 f_{\text{Facilities}} \quad (4)$$

$$F_{\text{Research Assessment}} = .67 f_{\text{Programs Establishment}} + 0.72 f_{\text{University Culture}} + 0.74 f_{\text{Faculty Capabilities}} + 0.69 f_{\text{Facilities}} \quad (5)$$

$$F_{\text{Research Outcomes}} = 0.99 F_{\text{Research Development}} + 0.89 F_{\text{Research Assessment}} \quad (6)$$

The main outputs of universities, including graduates and research outcomes would be delivered to the education customers and research customers respectively. Finally, all outcomes would be generated for betterment of society.

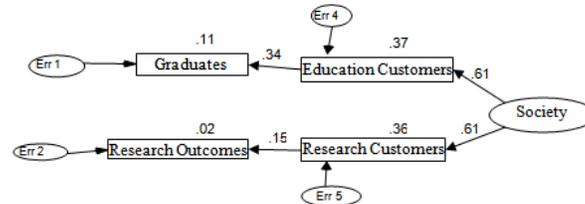


Figure 8: AMOS graphics output of model C (Standardized Estimates) (Habib, 2009d)

Multiple Linear Regression (MLR) Equations for Society

$$\begin{aligned} F_{\text{Society}} &= 0.61 f_{\text{Education Customers}} + 0.61 f_{\text{Research Customers}} \\ &= 0.61 [0.34 f_{\text{Graduates}}] + 0.61 [0.15 f_{\text{Research Outcomes}}] \\ &= 0.21 f_{\text{Graduate}} + 0.09 f_{\text{Research Outcomes}} \end{aligned} \quad (7)$$

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, 2009d, 2011a; Habib and Jungthirapanich, 2010b, 2010c; Pathik and Habib, 2012b, 2012c).

$$\text{Society} = f(\text{Graduates}, \text{Research Outcomes})$$

Based on the survey of American International University-Bangladesh (AIUB) and United International University (UIU) graduates stakeholders, including University administrators, faculty and staff, graduates, employers, etc. the researchers applied the outputs for each parameter in the equation (1), (2), (3), (4), (5), (6) and (7). 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.

Table 1: Survey data for American International University-Bangladesh (AIUB)

	Programs Establishment	University Culture	Faculty Capabilities	Facilities
Education development	2.702	4.160	3.000	4.000
Education assessment	3.986	4.407	3.890	2.743
Research development	5.000	4.407	3.000	3.500
Research assessment	4.000	3.355	4.140	3.819

After putting the values of Table 1 [for AIUB] in equations 1 to 7,

$$F_{\text{Education Development}} = 0.63*2.702 + 0.70*4.160 + 0.65*3 + 0.63*4 = 9.085$$

$$F_{\text{Education Assessment}} = 0.68*3.986 + 0.74*4.407 + 0.69*3.890 + 0.66*2.743 = 10.466$$

$$F_{\text{Research Development}} = 0.60*5 + 0.71*4.407 + 0.63*3 + 0.67*3.5 = 10.364$$

$$F_{\text{Research Assessment}} = 0.67*4 + 0.72*3.355 + 0.74*4.140 + 0.69*3.819 = 10.794$$

$$F_{\text{Graduates}} = 0.97*9.085 + 0.92*10.466 = 18.441$$

$$F_{\text{Research Outcomes}} = 0.99*10.364 + 0.89*10.794 = 19.867$$

$$F_{\text{Society}} = 0.21*18.441 + 0.09*19.867 = 5.661$$

Table 2: Survey data for United International University (UIU)

	Programs Establishment	University Culture	Faculty Capabilities	Facilities
Education development	2.728	3.923	4.500	1.500
Education assessment	4.416	4.747	4.219	3.181
Research development	5.000	4.840	4.333	1.889
Research assessment	4.600	3.000	3.348	2.824

After putting the values of Table 2 [for UIU] in equations 1 to 7,

$$F_{\text{Education Development}} = 0.63*2.728 + 0.70*3.923 + 0.65*4.5 + 0.63*1.5 = 8.335$$

$$F_{\text{Education Assessment}} = 0.68*4.416 + 0.74*4.747 + 0.69*4.219 + 0.66*3.181 = 11.526$$

$$F_{\text{Research Development}} = 0.60*5 + 0.71*4.84 + 0.63*4.333 + 0.67*1.889 = 10.432$$

$$F_{\text{Research Assessment}} = 0.67*4.6 + 0.72*3 + 0.74*3.348 + 0.69*2.824 = 9.668$$

$$F_{\text{Graduates}} = 0.97*8.335 + 0.92*11.526 = 18.689$$

$$F_{\text{Research Outcomes}} = 0.99*10.432 + 0.89*9.668 = 18.932$$

$$F_{\text{Society}} = 0.21*18.689 + 0.09*18.932 = 5.629$$

From the above mentioned discussion, it is noted that there is not much difference in terms of quality of two universities namely, International University-Bangladesh (AIUB) and United International University (UIU). AIUB is better at Education development whereas UIU is better at Education assessment. It also depicts that the assessment of research is stronger at AIUB. Interestingly, according to the model educational contribution of the universities to the society namely, the Graduates, is higher in UIU and research contribution of the universities to the society namely, the Research Outcomes, is higher in AIUB.

5. Comparison of ITESCM model Applications

The ITESCM model is the integrated form of education management and educational supply chain for the universities. There are two main contributions of the universities to the society, namely graduates and research outcomes.

The resulting suitability index, ranges from 0% to 100% with 100% being the most suitable (excellent) and 0% being the least favorable (worst). The researchers defined in terms of different scale like excellent, very good, good, moderate, bad, very bad, worst through percentages that was defined in Table 3. The index of at least 50% may serve as a rough acceptance criterion for the well-being of the society (Habib, 2009d; Bhuiyan, 2013; Chowdhury, 2012a, 2012b).

Table 3: Suitability Index of $F_{\text{University Outcomes}}$ (Pathik and Habib, 2012c)

Range of F_{Society}	$F_{\text{University Outcomes}}$ (%)	Scale
$F_{\text{Society}} = 7.545$	100	Excellent
$6.3378 < F_{\text{Society}} < 7.545$	Above 80 to below 100	Very Good
$5.1306 < F_{\text{Society}} \leq 6.3378$	Above 60 to 80	Good
$3.9234 < F_{\text{Society}} \leq 5.1306$	Above 40 to 60	Moderate
$2.716 < F_{\text{Society}} \leq 3.9234$	Above 20 to 40	Bad
$1.509 < F_{\text{Society}} \leq 2.716$	Below 20	Very Bad
$F_{\text{Society}} = 1.509$	0	Worst

F_{Society} value for American International University-Bangladesh (AIUB) is 5.661 that represents within $5.1306 < 5.661 \leq 6.3378$, i.e. AIUB is good at their outcomes.

F_{Society} value for United International University (UIU) point is 5.629, which is within $5.1306 < 5.629 \leq 6.3378$ this range and after comparing this point with the scale, UIU is also good.

AIUB and UIU both of them are in the range of $5.1306 < F_{\text{Society}} \leq 6.3378$ from the table of Suitability index of ~~University Outcomes~~ it is above 60% to 80% which is in good scale.

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 practical investigations of ITESCM model upon American International University-Bangladesh (AIUB) and United International University (UIU).

This paper, that is based on 117 respondents from all stakeholders including faculty members, alumni, current students, parents' of the students, employers of the graduates, represents the analysis and compare of ITESCM (Integrated Tertiary Educational Supply Chain Management) Model in AIUB (American International University-Bangladesh) and UIU (United International University). AIUB established in 1994 and UIU established in 2003 but their performances difference is very low. They are similar kind of academic organization but AIUB is little better than UIU evidence given by all data results. UIU has done very good regarding it established in only ten years. So AIUB needs to improve very rapidly because if UIU continues likes this they may come better organization than AIUB in the future.

One of the main goals of an educational supply chain is to improve the well-being of the end customer, i.e. the society. Improved well-being society would be possible if quality graduates and research outcomes could be produced 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, are quite satisfactory which has come up through the application upon American International University-Bangladesh (AIUB) and United International University (UIU). 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 the university management to compare their performance with other universities through ITESCM.

References

- Bhuiyan, M. N. I., Pathik, B. B., and Habib, M., "Academic Supply Chain Management in Bangladeshi Universities", Submitted, Proceedings of the 3rd International Forum & Conference on Logistics and Supply Chain Management (LSCM) 2013, Indonesia, June 2013.
- Chowdhury, M. T., Pathik, B. B., and Habib, M., "A Descriptive Study on Supply Chain Management Model for the Academia", Proceedings of the 6th IEEE Conference of Management Innovation and Technology (ICMIT), Indonesia, 2012a, pp. 191-196. ISBN: 978-1-4673-0109-1.
- Chowdhury, M. T., Pathik, B. B., and Habib, M. M., "Analysis of Educational Supply Chain Management Model: A Case Study Approach", Proceedings of the 3rd International Conference on Industrial Engineering and Operations Management, Istanbul, Turkey, 2012b, pp. 1082-1090. ISBN: 978-0-9855497-0-1.
- Comm, C.L. and Mathaisel, D.F.X., "Evaluating teaching effectiveness in America's business schools: implications for service marketers", Journal of Professional Services Marketing, Vol. 16 No. 2, pp. 163-70, 1998.
- Dibb, S. and Simkin, L., "Strategy and tactics: marketing leisure facilities", The Services Industries Journal, Vol. 13 No. 3, pp. 110-24, July 1993.
- Fernie, John and Clive Rees, "Supply chain management in the national health service", The International Journal of Logistics Management, Vol. 6 No. 2, pp. 83-92, 1995.
- Habib, M. and C. Jungthirapanich, "Integrated Educational Supply Chain Management (IESCM) for the Universities", Sixth AIMS International Conference on Management, India, Dec., 2008a.
- Habib, M. and C. Jungthirapanich, "An integrated framework for research and education supply chain for the Universities", IEEE International Conference on Management of Innovation and Technology, Thailand, Sep., 2008b, pp. 1027-1032, ISBN 978-1-4244-2329-3.
- Habib, M. and C. Jungthirapanich, "Research Framework of Education Supply Chain, Research Supply Chain and Educational Management for the Universities", International Journal of the Computer, the Internet and Management (IJCIM), Thailand, Vol. 17, No. SP1, 2009a, pp.24.1-8, ISSN 0858-7027.

- Habib, M. and C. Jungthirapanich, "Integrated educational management for the Universities", *The Journal of China-USA Business Review*, David Publishing Company, USA, Vol. 8, No. 8, pp. 25-38, 2009b, ISSN 1537-1514.
- Habib, M. and C. Jungthirapanich, "Research Framework of Educational Supply Chain Management for the Universities", *IEEE International Conference on Engineering Management and Service Sciences EMS*, China, Sep., 2009c, ISBN 978-1-4244-4638-4.
- Habib, M. "An Integrated Educational Supply Chain Management (ITESCM)", Ph.D. Dissertation, Graduate School of Information Technology, Assumption University of Thailand, December, 2009d.
- Habib, M., "Supply Chain Management for Academia", LAP Lambert Academic Publishing, Germany, December 2010a, ISBN 978-3-8433-8026-3.
- Habib, M., "An Empirical Research of ITESCM (Integrated Tertiary Educational Supply Chain Management) Model", *Management and Services*, Sciyo.com, October, 2010b, ISSN 978-953-307-118-3.
- Habib, M. "An Empirical Study of Tertiary Educational Supply Chain Management", *International Conference on Knowledge globalization, 2010*", Bangladesh, May, 2010c, ISBN 978-984-33-1691-2
- Habib, M. and C. Jungthirapanich, "International Supply Chain Management: Integrated Educational Supply Chain Management (IESCM) Model for the Universities", *International Retailing: Text and Readings*, S L Gupta (Ed.), India, 2010a, ISBN 978-81-7446-859-8.
- Habib, M. and C. Jungthirapanich, "An Empirical Research of Educational Supply Chain for the Universities", *The 5th IEEE International Conference on Management of Innovation and Technology*, Singapore, June, 2010b, ISBN: 978-1-4577-0738-4.
- Habib, M. and C. Jungthirapanich, "An Empirical Study of Educational Supply Chain Management for the Universities", *INFORMS International Conference on Industrial Engineering and Operations Management*, Bangladesh, January, 2010c, ISBN 978-984-33-0989-1.
- Habib, M. and C. Jungthirapanich, "An Empirical Research of Integrated Educational Management for the Universities", *The 2nd IEEE International Conference on Information Management and Engineering*, China, April, 2010d, ISBN 978-1-4244-5263-7.
- Habib, M. M., "An Exploratory Study of Supply Chain Management for Tertiary Educational Institutions", *IEEE International Technology Management Conference (ITMC) 2011*, San Jose, California USA, June, 2011a, ISBN 978-1-61284-950-8.
- Habib, M. M., "An Exploratory Research on Educational Supply Chain Management", *The IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)*, Singapore, December, 2011b, ISBN 978-1-4577-0738-4.
- Habib, M. M., "An Exploratory Analysis of Educational Management for the Universities", *International Journal of Engineering, Business, Management (IJEEM)*, Croatia, Vol. 3, No. 3, September, 2011c, ISSN 1847-9790.
- Habib, M. M., "Supply Chain Management (SCM): Theory and Evolution" Dr. Md. Mamun Habib (Editor), "Supply Chain Management – Applications and Simulations", *InTech Open Access*, Croatia, September 2011d, ISBN 978-953-307-250-0.
- Kotler, P. and Bloom, P., "Marketing Professional Services, Prentice-Hall", Englewood Cliffs, NJ, 1984.
- Kathawala, Y. and Khaled, A., "Supply chain evaluation in the service industry: a framework development compared to manufacturing", *Managerial Auditing Journal*, Vol. 18 No. 2, pp.140-149, 2003.
- Lau, A.K.W., "Educational supply chain management: a case study", *Emerald Group Publishing Limited*, ISSN 1074-8121, Vol. 15 No.1, pp.15-27, 2007.
- Nixon, M., "Innovations in logistics technology: generating top-line value and bottom-line ROI", *World Trade*, June, Vol. 14 No. 6, pp. 62-4, 2001
- O'Brien, E.M. and Kenneth, R., "Educational supply chain: a tool for strategic planning in tertiary education, *Marketing Intelligence & Planning*", Vol. 14 No. 2, pp.33-40, 1996.
- Pathik, B. B., and Habib, M., "An Investigation of Education and Research Management for the Tertiary Academic Institutions", *International Journal of Engineering Business Management (IJEEM)*, Vol. 4, Issue 1, pp. 1-12, *InTech Open Access*, Croatia, 2012a. ISSN: 1847-9790.
- Pathik, B. B., and Habib, M., "Redesigned ITESCM Model: An Academic SCM for the Universities", *International Journal of Supply Chain Management (IJSCM)*, Vol. 1, Issue 1, pp. 12-26, *ExcellingTech Publishing Company*, London, UK, 2012b. ISSN: 2050-7399 (online), 2051-3771 (print).
- Pathik, B. B., and Habib, M., "Application of ITESCM Model for Better Supply Chain Management in Universities", *International Journal of Supply Chain Management (IJSCM)*, Vol. 1, Issue 2, pp. 11-25, *ExcellingTech Publishing Company*, London, UK, 2012c. ISSN: 2050-7399 (online), 2051-3771 (print).

- Pathik, B. B., and Habib, M., “Academic Supply Chain Management for Tertiary Educational Institutions”, Proceedings of the IEEE International Conference on Industrial Engineering and Engineering Management, Hong Kong, 2012d, ISBN: 978-1-4673-2945-3.
- Habib, M., Pathik, B. B. and Chowdhury, M. T. “*An Academic Odyssey: Chronological Advancement of American International University-Bangladesh (1994-2011)*”, AV Akademikerverlag GmbH & Co. KG, Saarbrücken, Germany, 2013. ISBN: 978-3-659-44928-4.
- Sampson, S. E., “Customer-supplier duality and bidirectional supply chains in service organization”, International Journal of Service Industry Management, Vol. 11 No. 4, pp.348-364, 2000.
- Sengupta, S. and Turnbull, J., “Seamless optimization of the entire supply chain”, IIE Solutions, Vol. 28, No. 10, pp.28-33, 1996.

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