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An investigation on the professionalization of education in Maritime logistics and supply chains

Yui-Yip Lau
Division of Business, Hong Kong Community College, The Hong Kong Polytechnic University, Hong Kong, China

Adolf K.Y. Ng
Department of Supply Chain Management, I.H. Asper School of Business, University of Manitoba, Winnipeg, MB, Canada and St. John s College, University of Manitoba, Winnipeg, MB, Canada

Ka-Chai Tam
Department of History, Hong Kong Baptist University, Hong Kong, China, and

Erico Ka Kan Chan
College of Humanities and Law, HKU School of Professional and Continuing Education, The University of Hong Kong, Hong Kong

Abstract

Purpose – This paper aims to investigate the development of logistics and supply chain education through conducting comparative study between high diploma and associate degree. This study will critically review the added value of sub-degree courses of professional education. What exactly drives sub-degree students to enroll for a high diploma and associate degree program in maritime logistics and supply chain studies? How do they select to enroll such programs? Do such programs foster the students to equip in the professions? What do they look for obtaining professional status afterwards?

Design/methodology/approach – To address the stated queries, this study will analyze students' evaluation of the effectiveness of sub-degree education and their motivation on enrolling these courses through a questionnaire survey.

Findings – In the context of higher education, sub-degrees of professional studies experienced tremendous growth in recent decades. Many academic institutions have recorded an upward trend in providing professional education on subjects that traditionally focused on apprentice-style, non-academic learning approach. However, the reasons behind the steady growth of the demand of sub-degree level of professional education have been under-researched.

Research limitations/implications – This research is based on Hong Kong data only.

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Originality/value – The paper not only increases the scope and depth of research area in logistics and supply chain education but also contributes theoretically to the understanding on the curriculum of sub-degree logistics and supply chain programs.

Keywords Logistics, Education, Supply chain, Associate degree, High diploma, Hong Kong's Sub-degree

Paper type Research paper

1. Introduction

Over the past century logistics has been evolving. In the early 1900s, logistics started from agricultural economies which only focused on physical distribution function. During the Second World War (1939-1945), the military led to the rise of segmented logistics functions including inbound outbound transportation, physical distribution, retailing and wholesaling. However, factors such as industrial economies, technological revolution, globalization, establishment of intermodal transport networks and a rise of management science have called for the need to be fundamentally changed from logistics to integrated supply chain management in the twenty-first century (Coyle *et al.*, 2013). Supply chain management has been defined as the:

> [. . .] design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally (APICS Dictionary, 2013).

This is not surprising that logistics has significantly shifted from operational and strategic role. According to The Census and Statistics Department, The HKSAR Government, logistics and supply chain industry is traditionally one of the four economic pillars of Hong Kong. Within service, logistics and supply chain industry has generated 6 per cent of the total GDP of Hong Kong in 2015. Thanks to domestic demand and investment, Hong Kong GDP Annual Growth Rate has been recorded average 5.38 per cent from 1974 to 2015 (The Census and Statistics Department, The HKSAR Government). Recently, Hong Kong has become an international hub for trade, business and finance; notably, Mainland China entered World Trade Organization (hereafter called "WTO") in 2001; Mainland and Hong Kong Closer Economic Partnership Arrangement (hereafter called "CEPA") was introduced in 2003; and the "Belt and Road Initiative (hereafter called "BRI")" was opened in 2013 (Lau *et al.*, 2017; Lau *et al.*, 2018). As such, logistics and supply chain industry has generated significant economic contributions to the ever-changing global environment.

Hong Kong's logistics and supply chain industry has faced keen competition with neighboring countries in Asia Pacific regions. To strengthen the competitiveness of Hong Kong's logistics and supply chain industry in the world, it would be crucial to develop a comprehensive logistics and supply chain education. In today's global and dynamic environment, there has been increasing concerns that professional education could be a direct and effective approach to improve productivity, as well as employees of the highest quality have a talent for responding effectively to continuing changes (Becker, 1993). Recently, there has been a tremendous growth in academic institutions consider apprentice-style, non-academic learning approaches to add on their "professional" and "practice-based" programs (Lau and Ng, 2015).

In the contemporary business environment, it has encompassed a wide and growing range of subjects and fields of sub-degree level. It is undoubtedly that there is a continuously increasing demand for sub-degree professional studies from various kinds of occupational

groups. There are two major reasons for the phenomenon. To begin with, increasing the number of employers (ranging from business firms to government) demand high educational qualification in hiring workers who hold higher positions. Also, they want to secure workers who are highly motivated and more skilled by sponsoring them to attend professional education. Under human capital theory, it advocates that education significantly increases productivity (Becker, 1993). The assumption appeared in hot debate (Marginson, 1997) that the theory continues to underpin many investment decisions by business firms and governments. Many firms now support and enhance their employees to prove higher level of professional education on human capital grounds (Carter and Lindsay, 1996). Additionally, many logistics job would like to become professionalized. They increase their educational requirements so as to raise their prestige and pay in society. Collins (1979) and Larson (1977) proposed that some occupational elites have increased educational requirements as a way of enhancing the prestige of their occupation. Hence, we could conclude that the more educated the members of an occupation, the more willing employers and the public are to accede to their demands for greater prestige, higher pay and more control over their conditions of work.

Under the process of professionalization, it seems that the industry and the occupational groups themselves are willing to become more self-motivated and selective, that they are willing to raise the quality and quantity of their work, as well as continuing their work-related learning. In this sense, we could significantly match with occupational groups which traditionally emphasize skills and apprenticeship rather than academic attainment (Tobias, 2003). As such, the logistics and supply chain industry demonstrates as an illustrative example, notably after its fundamentally transformation from a largely unskilled labor- to a capital-intensive industry, and provided significant insight into the current of tertiary education in logistics and supply chain studies (Wu, 2007; Fawcett and Rutner, 2014). In the 1999 Transportation and Logistics Educators Conference, William Copacino of Andersen Consulting highlighted that the firms are now experiencing a strain on their skilled knowledge labor in the new millennium. Hohenstein *et al.* (2014) reinforced that we have faced a talent shortage tsunami in the forthcoming years. Green (2010) of the Accenture Supply Chain Academy recognized that people are a driving force of supply chains innovation in the coming decade. Stank *et al.* (2011, p. 942) has recognized the "right talent" is one of the five core elements that constitute the fundamentals of The New Supply Chain Agenda. In the context of logistics and supply chain industry, "the logistics process is human centric" (Myers *et al.*, 2004, p. 212). We expect that an investment in skills development should transform into both further enhanced firm and employee performance (Kovacs *et al.*, 2012). In other words, the human capital will be a critical success factor in the rapidly changing business environment. There is an increasing need for highly skilled logistics or supply chain professionals, especially supply chains have been evolved in wider scope and complexity (Bourlakis *et al.*, 2013), notably after 911 terrorist attack. The market environment has been changed into competitive and turbulent (Thai, 2012). Reflecting this, Closs (2000, p. 1) mentioned that "substantial change in logistics and supply chain education is necessary." We expect that "professional education, aiming to bridge scientific knowledge and practical performance, attracts considerable practitioners to become potential students and it becomes a rather common view that professional competence is gained primarily, if not exclusively, through the application of scientific knowledge in solving practical problems" (Ng *et al.*, 2009, p. 251). In this sense, Lau and Ng (2015) proposed that we need to align programs with the needs of various stakeholders. The curriculum should consider different aspects, for instance, team building, strategic, technical, communication and financial skills (Giunipero *et al.*, 2006). Nevertheless, formal education gives students

precious opportunity to obtain an extensive understanding about the entire industrial environment instead of only specialized, narrow knowledge closely associated with their job responsibilities. The view is that education can move the logistics and supply chain industry forward in modern society (Ng *et al.*, 2011). Students are expected to acquire desired skills, professional attitudes and proper knowledge (i.e. generalist and specialist) so as to compete for better compensated and higher ranked positions in a logistics and supply chain industry (Ng *et al.*, 2011; Thai, 2012; Lau and Ng, 2015).

Nowadays, the professionalization journey of these occupations is typically regarded as desirable and necessary in the knowledgeable modern society. This leads to a changing demand for sub-degree professional education. But, the critical factors that motivate practitioners to enroll in sub-degree professional education and their evaluation on the effects of education are still unclear. There are few insights concerning students' expectations when they enroll on such courses. Cheruvalath (2012) addressed students expect the design of programs/courses including the attractiveness of the subject-matter content, popularity of the subject among students, attractiveness of teaching tasks solutions, the application of the obtained knowledge and the presentation of the subject matter by the teacher. Montalvo *et al.* (2007) highlighted the effect of liking or disliking the teacher on student motivation and learning effectiveness. Thus, the element of program design is required to include the quality of teaching staff. More importantly, revising course design and teaching pedagogy is essential for aligning the changing needs of workplace (Dunn, 2014). Furthermore, Debnath *et al.* (2007) used the framework of Hackman and Oldham's Job Characteristics Model to explain the importance of course design and related instructional strategies are key elements in professional education for the business world.

To fill this research gap, we inform practice in the roles and areas of sub-degree education, especially in the concept of professionalization among logistics and supply chain industry. Also, we adopt the human capital approach in examining students' perception on the costs and benefits of enrolling sub-degree professional courses. In our study, we investigate sub-degree students' expectations of sub-degree programs, notably their wider professional development, their studying path and their personal development. To make a comprehensive study of sub-degree logistics and supply chain education, we conduct comparative study between high diploma (hereafter called "HD") and associate degree (hereafter called "AD") to evaluate students' personal and professional development as well as their mobility path in their professions after taking sub-degree courses.

The structure of the paper is as follows. After the introduction in Section 1, Section 2 gives an overview of an existing situation of sub-degree logistics and supply chain education in Hong Kong. Sections 3 and 4 present the methodology and discusses the empirical results respectively. Last but not least, Section 5 investigates the characteristics and structures of the demands for sub-degree logistics and supply chain education programs in Hong Kong. Finally, the concluding remarks in Section 6.

2. Hong Kong's sub-degree logistics and supply chain education

Until now, eight degree-awarding institutions have been funded by the HKSAR through the University Grants Committee (hereafter called "UGC"). The eight degree-awarding institutions offered 15,000 first-year first-degree (hereafter called "FYFD") places per year. Also, the Academy of Performing Arts is recognized as publicly funded and degree granting. However, the Academy of Performing Arts is excluded from UGC category. Because of scare UGC-funded academic degree offering, around 18 per cent of the HKDSE graduates achieves a publicly funded university place. Basically, students enrolled to these sub-degree programs as they have performed poor grades in their Hong Kong Diploma of

Secondary Education (hereafter called "HKDSE") examination result (Yuen, 2015). In general, Hong Kong's sub-degree logistics and supply chain education has been classified into HD and AD. The program structure is significantly difference between HD and AD. On the one hand, HD programs follow UK educational system. On the other hand, AD programs align with US educational systems. Because of this, HD programs consist of 40 per cent general education subjects and 60 per cent discipline-specific subjects, while AD programs are made up of 60 per cent general education subjects and 40 per cent discipline specific subjects. AD and HD logistics and supply chain management programs aim to enable students to acquire generic business skills and knowledge and to specific logistics sectors or job functions. The sub-degree programs help students to establish a foundation to obtain further qualifications or develop professional logistics career. In order to maintain sub-degree logistics and supply chain education, all the qualifications of the sub-degree education programs are required to under the quality control of the Qualifications Register (hereafter called "QR") of the HKSAR. In the Qualifications Framework (hereafter called "QF"), sub-degree logistics and supply chain education programs are commensurate with Level 4 of the Generic Level Descriptors (www.hkcaavq.edu.hk). Additionally, sub-degree logistics and supply chain education programs are awarded professional qualification from logistics associations, for instance, The Chartered Institute of Logistics and Transport in Hong Kong (hereafter called "CILTHK"), Institute of Seatransport, Hong Kong Sea Transport and Logistics Association Limited (hereafter called "HKSTLA"), and Hong Kong Logistics Association (hereafter called "HKLA"). Hence, graduated logistics and supply chain students obtain dual qualification from academic institutions and professional bodies.

Until now, only The Hong Kong Polytechnic University is offering University Grants Committee (hereafter called "UGC")-Funded Higher Diploma in International Transport Logistics program. Other self-financing education institutions are providing self-financing sub-degree logistics and supply chain programs. The key information is summarized in Table I.

Hong Kong sub-degree education institutions are facing unprecedented challenges from a gradually decline in student population and a tremendous growth in the number of sub-degree education institutions. In 2012/2013 academic year, Hong Kong appeared double cohorts of student (i.e. Hong Kong Advanced Level Examination (hereafter called "HKALE"and HKDSE) leads to significantly increase in the student number of sub-degree programs. Basically, HD and AD programs compete with each other. According to the Information Portal for Accredited Post-secondary Programs – "iPASS", it has provided a general overview of enrolments of full-time accredited self-financing post-secondary programs from 2005/2006 to 2014/2015 academic years in Table II. In the coming 10 years, the sub-degree education institutions would face an obstacle to the students' enrolment.

Table I.
Self-financing sub-degree logistics and supply chain programs

Institution	Program
City Community College of City University of Hong Kong	Associate of Business (Administration in Global Logistics and Supply Chain Management) Associate of Science in Airport Operations and Aviation Logistics
Hong Kong Community College, The Hong Kong Polytechnic University	Associate in Business (Logistics and Supply Chain Management)
HKU SPACE, The University of Hong Kong	High Diploma in Logistics and Transport
Vocational Training Council	High Diploma in Airfreight Management and Global Logistics

Academic year	AD	HD	Degree	Top-up degree
2005/06	17,103	16,173	3,646	
2006/07	18,787	19,302	5,127	
2007/08	20,558	22,714	6,856	
2008/09	20,118	23,584	8,584	3,342
2009/10	23,019	24,303	9,814	4,647
2010/11	27,506	24,648	10,799	6,220
2011/12	27,822	23,974	12,003	7,177
2012/13	31,093	27,601	15,870	9,593
2013/14	26,575	25,471	18,509	12,023
2014/15	20,475	19,214	21,893	15,219
2015/16	20,047	17,960	24,499	15,128
2016/17	20,743	16,265	24,258	13,350
2017/18	21,367	14,664	24,195	13,075

Source: Information Portal for Accredited Post-secondary Programs – "iPASS" (2018)

Table II. Enrolments of full-time accredited self-financing post-secondary programs (2005/06 to 2017/18 academic years)

Education Bureau predicted that Hong Kong would face declining S6 graduate population in Table III.

In the context of logistics and supply research, the studies of sub-degree logistics and supply chain education has remained seriously scarce. Most of the studies have been focused either on postgraduate degree (Grant and Bourlakis, 2010; Bourlakis *et al.*, 2013) or undergraduate degree students (Pei *et al.*, 2012; Daud and Ab Talib, 2013; Wong *et al.*, 2014; Lau, 2015). Wu (2007) has discussed that the previous studies were appeared a number of methodological pitfalls. A majority of logistics and supply education research is largely case study-based, as well as the current status of logistics and supply chain programs at the college level have been found to be ignored. Also, little attention has been addressed to students, the direct users of educational services. Understanding such, in this study, we carried out a questionnaire survey with students enrolling in a sub-degree logistics and supply chain program at the Hong Kong Community College (hereafter called "HKCC"), The Hong Kong Polytechnic University (hereafter called "PolyU") and The School of Professional and Continuing Education of the University of Hong Kong (hereafter called "HKU SPACE") to collect the survey data. The paper does not only enlarge the scope and depth of research area in logistics and supply chain education, but also contribute

Year	No. of S6 graduates
2015	61,900
2016	57,100
2017	52,300
2018	51,900
2019	48,500
2020	45,600
2021	43,600
2022	42,700
2023	43,800
2024	46,400

Source: Education Bureau (2015)

Table III. S6 graduate population in the coming 10 years

theoretically to our understanding on the curriculum of sub-degree logistics and supply chain programs in terms of HD and AD programs.

3. Questionnaire survey

In this study, we have designed and conducted a questionnaire survey based on the Likert-style score scale (1 = strongly disagree; 2 = disagree; 3 = fairly disagree; 4 = fairly agree; 5 = agree; 6 = strongly agree) and distributed to an intended study sample, i.e. students who have enrolled in sub-degree programs in logistics and supply chain. The survey was used by a self-administrated questionnaire. In March 2015, 187 questionnaires had been distributed to current students (i.e. 31 Year 1 students and 26 Year 2 students) studying Associate in Business (Logistics and Supply Chain Management) at Division of Business at HKCC, PolyU, as well as existing students (i.e. 61 Year 1 students and 69 Year 2 students) taking High Diploma in Logistics and Transport at College of Humanities and Law at HKU SPACE. The comparative study provides in-depth analysis of Hong Kong's sub-degree logistics and supply chain education context between HD and AD. Students' evaluation of the effectiveness of HD and AD programs and their evaluation on enrolling these programs through a questionnaire survey will be provided.

Since the 1930s, PolyU has been offering maritime training and education for vocational training of electronic officers and deck officers on board sea-going vessels for potential managers to ship management (The Hong Kong Polytechnic University, 2016). In 2001, HKCC has established and is a subsidiary of PolyU (Hong Kong Community College, 2016). HKCC, PolyU is now one of key higher education institution to offer sub-degree logistics and supply chain program. The Associate of Business (Logistics and Supply Chain Management) program is among the 11 programs within the HKCC's Associate Degree Scheme in Business. The total number of students is summarized in Table IV. We can say that HKCC, PolyU offered The Associate of Business (Logistics and Supply Chain Management) program is one of representative case to show the key changes of Hong Kong sub-degree logistics and supply chain education condition almost 20 years. Also, the first Chief Executive of the HKSAR, Mr Tung Chee-hwa presented his Policy Address an important blueprint for the introduction of AD programs in 2000. The establishment of HKCC demonstrated a milestone in higher education (Cheng, 2009). In addition, HKCC's figurehead is currently the Chairman of Federation for Self-financing Tertiary Education (hereafter called "FSTE"). FSTE is a coalition of key non-profit making self-financing tertiary education institutions in Hong Kong and aims to advance the standards and quality of sub-degree and degree education (Federation for Self-financing Tertiary Education, 2016). To a great extent, HKCC is one of key policymakers to determine the sub-degree education development. In view of the changes in the Hong Kong's education system, the program was

Table IV. Total number of students

Academic year	Total no. of students (HKCC)	Total no. of students (HKU SPACE)
2009/2010	50	117
2010/2011	51	195
2011/2012	61	168
2012/2013	80	305
2013/2014	78	248
2014/2015	57	130

Source: Authors

successfully revalidated in March 2012. To respond to the ever-changing needs of the business environment, students require taking both 36 credits of general education (hereafter called "GE") subjects (e.g. Introduction to Economics, Managing Organisations, Creative and Critical Thinking) and 24 credits of discipline-specific (hereafter called "DS") logistics and supply chain subjects (e.g. Fundamentals of Logistics and Supply Chain Management, Introduction to Inventory and Warehousing Management, Global Transport and Trade Operations).

HKU SPACE, formally the Department of Extra Mural Studies, was first formed in 1956 as an extension arm of the University of Hong Kong for continuing education. HKU SPACE has been a major provider of sub-degree of logistics and transport programs in Hong Kong (HKU SPACE, 2016). The total number of students is listed in Table IV. We select HKU SPACE as our illustrative case due to HKU SPACE has been operated in Hong Kong for a half century. In addition, HKU SPACE's managerial member is currently the Executive Committee Member of FSTE. In other words, HKU SPACE is one of main policy makers to determine the sub-degree education development.

In the academic year 2002/2003, the High Diploma in Logistics and Transport Operations program, which is the first three-year full-time program in logistics and transport areas in HKU SPACE, was launched. The program underwent its first program review in 2007, and was approved to continue for a period of five years starting from 2008/09. In November 2010, the second program review was conducted in view of the education reform in the local senior secondary curriculum and the introduction of the Hong Kong Diploma of Secondary Education. In the academic year 2012/2013, the three-year Higher Diploma curriculum has been changed to a new two-year curriculum so as to fit into the new 3-3-4 education system. Students need to take 21 credits in Generic Skills subjects (e.g. Human Resources Management, Introduction to Multimedia, Intra- and Interpersonal Competencies) while the other 45 credits will be in Specialized Subjects (e.g. Logistics and Physical Distribution, Purchasing and Supply Management, Transport Policy and Planning) related to transport and logistics. This program offered by the school is designed to enable students to understand the various aspects of the logistics and transport industry. The program will also equip the students with the technical skills related to logistics and transport, such as computer knowledge.

Since all of the respondents completed their respective logistics and supply chain program for one semester, we expect that all of them could give relevant answers based on real learning experiences. The response rate was highly satisfactory – 83.4 per cent with 156 completed questionnaires by May 2015. We design for the questionnaire into two main sections. In Section A, participants were asked to provide their personal profiles relevant to their studies and work experiences, for examples, their highest academic qualification, nationality, age, family background, years of working experience within a logistics and supply chain industry, etc. to distinguish between AD and HD program enrolled students background easily and foster to minimize research bias. The inclination of interviewees could be expected and calculated. In Section B, participants required to provide detailed information about their studies pertaining to employment and higher education enrolment as well as their plans and preferred work in the future. The questionnaire also covered the following four key topics:

(1) issues considered when deciding to currently pursue their logistics and supply chain programs;

(2) channels of information before selecting to study on logistics and supply chain programs;

(3) a description of the logistics and supply chain programs that the students are currently pursue; and

(4) the students expectations, notably in career paths after graduation, academic knowledge and personal development.

Closed-end questions were presented in the form of statements and the respondents indicated how strongly subjects agree or disagree with statements on a six-point scale (i.e. eight to nine statements per theme). Next, we will show descriptive statistics of all the answers collected from the questionnaires under Sections A and B before analyzing the results of sub-degree students in associate degree of logistics and supply chain programs.

In this study, the respondent answers are only employed for academic purpose with strict confidentiality. The responses collected will only be reviewed in aggregate. In addition, certain information in the discussion section and the survey questions were according to preceding studies and semi-formal in-depth discussions with different relevant materials or parties including industrial practitioners, logistics associations (i.e. Institute of Seatransport, The Chartered Institute of Logistics and Transport in Hong Kong, Hong Kong Sea Transport and Logistics Association), academic scholars and logistics journalists. To address the study objectives and validate, the questionnaire has largely extracted any ambiguous wordings and removed double-barrel items (Malhotra and Grover, 1998). All areas of the elements can be validated and measured in the revised final questionnaire and survey (Ngai *et al.*, 2008). It is critical to make sure the validity of their content, which is a key measure of a survey instrument's accuracy. Content validity assessment normally includes an organized review of the survey's content to make sure that we need to include everything it should and exclude anything it should not. Discussions generated slight adjustment in the examples and wording given in some measurement items, which are lastly employed as related and possessing content validity. The refined measurement items were incorporated in the final survey questionnaire (Rao *et al.*, 1999; Lu and Yang, 2006). Subsequently, we self-administrated the structured questionnaire to the students to collect data in our research studies. To make sure data consistency and reliability, it was proposed that Cronbach's alpha reliability values at least achieved 0.6 to calculate the internal consistency in this study (Nunnally, 1967). Cronbach's alpha values were ranged between 0.815 and 0.846 explained that the reliability has achieved a satisfactory level.

4. Empirical results

4.1 Background information

The majority of current students have finished HKDSE before proceeding to their sub-degree logistics and supply chain programs. For nationality, we have to pay attention to that HKCC students are mainly composed of local students or students from neighboring countries or regions. Further, 85.7 per cent of students are locally born in Hong Kong. Few non-Hong Kong students (i.e. 10.7 per cent of students come from Mainland China; 1.8 per cent of students come from USA; 1.8 per cent of students come from Macau) enrolled in such programs every year. The background of HKU SPACE students is similar to HKCC students; 75 per cent of students are locally born in Hong Kong; and 25 per cent of students come from Asian countries or regions (i.e. 23 per cent of students come from Mainland China; 1 per cent of students come from Macau; 1 per cent of students come from Indonesia). For the entrance requirements, both programs are required students to obtain English language (Level 2) in HKDSE or English Language (Grade E) in Hong Kong Certificate of Education Examination (hereafter called "HKCEE"). Hence, there is less restriction in using

English language as a medium of instruction within their logistics and supply chain programs.

4.2 Professional experiences before and during enrolment

Over 60 per cent of the HKCC students and 85 per cent of the HKU SPACE students had working experience before enrolment (Table VI). As expected, most students did not have any professional logistics and supply chain experiences before enrolling in their logistics and supply chain programs (Table VII), although quite many of them had worked in non-logistics and supply chain-related full-time and part-time jobs. Also, only 7.1 per cent of the HKCC students and 4 per cent of HKU SPACE students planned to work part-time during their studies. This was only desire to strive for further studies in a logistics and supply chain programs through non-JUPAS application.

4.3 Plans after graduation

In total, 89.3 per cent of HKCC students and 83 per cent of HKU SPACE students intended to continue their undergraduate studies in a logistics and supply chain programs after graduation. In the Table VIII, HKCC students provided positive feedbacks about all other sectors. Over 80 per cent of survey respondents indicated that their ideal work was inventory management (89 per cent); procurement management (89 per cent); operations management (86 per cent); warehouse industry (84 per cent); and transport industry

Student category	Male	Female	Frequency	(%)
HKCC Year 1	10	21	31	19.9
HKCC Year 2	15	10	25	16.0
HKU SPACE Year 1	39	21	60	38.5
HKU SPACE Year 2	18	22	40	25.6
Total	82	74	156	100.0

Table V. Detailed information of survey participants

	No		Yes (part time)		Yes (full time)		
Category	Frequency	(%)	Frequency	(%)	Frequency	(%)	Total
HKCC Year 1	14	45.1	13	41.9	4	13.0	31
HKCC Year 2	7	28.0	14	56.0	4	16.0	25
HKU SPACE Year 1	9	15.0	42	70.0	9	15.0	60
HKU SPACE Year 2	6	15.0	25	62.5	9	22.5	40

Table VI. Working experience of survey respondents

	Yes		No		
Category	Frequency	(%)	Frequency	(%)	Total
HKCC Year 1	3	9.7	28	90.3	31
HKCC Year 2	6	24.0	19	76.0	25
HKU SPACE Year 1	11	18.3	49	81.7	60
HKU SPACE Year 2	15	37.5	25	62.5	40

Table VII. Professional logistics and supply chain experience of survey respondents

(82 per cent). Based on the collected data, the survey respondents least preferred to end up working in a shipbuilding industry (70 per cent). In the Table VIII, HKU SPACE students 'responses for all other sectors were similar except for ship brokerage and a shipbuilding industry. The survey respondents indicated that their ideal work was operations management (83 per cent); procurement management (80 per cent); transport industry (76 per cent) and inventory management (70 per cent).

4.4 Motivation to enroll in logistics and supply chain programs

In our data analysis, achieving certain professional status for personal career development is a crucial point of HKCC and HKU SPACE students pursuing in such program (Table IX). Broadly speaking, 87.5 per cent of HKCC students and 72 per cent of HKU SPACE students mentioned that logistics and supply chain traditions play a vital role in making their decision to enroll in logistics and supply chain programs. Not surprisingly, 89.3 per cent of HKCC students and 66 per cent of HKU SPACE students shown that an economy of their hometowns was closely associated with jobs related to a logistics and supply chain industry. Indeed, only 1.8 per cent of HKCC students and 14 per cent of HKU SPACE students reported that their parents viewing negatively to the logistics and supply chain studies. Thus, the results indicated that 92.9 per cent of HKCC students and 61 per cent of HKU SPACE students expressed that the current program is the first choice (most aspired) during their sub-degree application.

4.5 Issues considered in enrolling a logistics and supply chain program

In this section, we addressed the key issues considered by HKCC students and HKU SPACE students when enrolling in a logistics and supply chain program. The comparison of the

Table VIII.
The sectors that students prefer their ideal work

Sectors	Frequency (HKCC)	% (HKCC)	Frequency (HKU SPACE)	% (HKU SPACE)
Shipping Industry	43	77	65	65
Warehouse Industry	47	84	66	66
Transport Industry	46	82	76	76
Inventory Management	50	89	70	70
Procurement Management	50	89	80	80
Operations Management	48	86	83	83
Shipbuilding Industry	39	70	61	61
Ship Brokerage	40	71	57	57
Other Industries	41	73	68	68
Do not know yet	23	41	48	48

Table IX.
Motivations to enroll in logistics and supply chain programs (HKCC students)

Factors	Frequency HKCC	% HKCC	Frequency HKU SPACE	% HKU SPACE
Achieve certain professional status for personal career development	27	48.2	44	44
Change career field	7	12.5	8	8
Family influence	5	8.9	7	7
Other	17	30.4	41	41
Total	56	100.0	100	100.0

statistical difference between two sample means is provided in Table X. To a large extent, both AD and HD program students consider in enrolling a logistics and supply chain programs are mostly similar, although few items can still be identified. Comparing with HKCC students, HKU SPACE students are relatively less concerned about: I can enhance my knowledge about logistics/supply chain industry through the courses by this program; and I can enhance my knowledge about the logistics/supply chain industry through a wide variety of logistics activities (e.g. seminars, site visits, career talks, mentorship, etc.). In principle, the nature of HD program inclines toward practically based while the nature of AD program aims for theoretically based. Delivering knowledge about logistics/supply chain industry and organizing various logistics activities is an effective way to enhance practical purposes. Eventually, there is a significant gap between student perception and unique features of HD program. From student perceptive, AD and HD programs are no significantly difference. The findings show that both program students pay the least attention to "no alternative choices of program". This is the same result of students explicit about the logistics and supply chain program is the most aspired when they apply for their sub-degree programs. Furthermore, HKCC and HKU SPACE students placed "the city where this program offered" in agree rating which is positively correlated with their hometown a city having logistics/supply chain tradition.

4.6 Information channels for the logistics and supply chain programs

To learn how the respondents know the current program they enrolled in. The comparison of the statistical difference between two sample means is provided in Table XI. Independent test for HD and AD students show that both student groups are no significant difference.

Factors	HKCC	HKU SPACE	*F*	Significance
I have no alternatives	3.32	3.59	1.845	0.176
I can enhance my knowledge about logistics/supply chain industry through the courses provided by this program	4.95	4.83	9.428	0.003*
I can enhance my knowledge about the logistics/supply chain industry through a wide variety of logistics activities (e.g., seminars, site visits, career talks, mentorship etc.)	4.91	4.75	4.626	0.033*
I want to be associated with my country's logistics/supply chain (e.g., trading, transportation, warehousing, inventory, procurement etc.) tradition	4.75	4.51	1.4526	0.229
There is a higher chance for me to get a job in the logistics/supply chain industries after graduating from this program	4.70	4.55	2.293	0.132
This program is accredited by the professional unit in the logistics/supply chain industries	4.68	4.64	1.472	0.227
The high reputation of the program/ department within graduates/ friends	4.50	4.40	1.552	0.215
I have great interests in the courses provided by this program	4.75	4.53	0.186	0.667
The high quality of supporting facilities of the institution (e.g., university/departmental libraries)	4.77	4.50	2.320	0.130
The high quality of teaching staff	4.77	4.67	0.114	0.737
The city where this program offered	4.89	4.40	2.864	0.093

Note: * = $p < 0.05$

Table X. Issues considered in enrolling the program by HKCC and HKU SPACE students

Surprisingly, the parties, for instance, friends, former teachers, known person and family members were not an effective information channels for the logistics and supply chain programs. The logistics/supply chain professional bodies foster the student awareness of enrolling the program. In terms of promotion, the advancement of information technology is the most effective information channels for students to explore the programs. Comparing with other promotional tools (i.e. advertisement on public transport, newspaper, exhibitions and logistics professional bodies), the students search the program information without any time and place restrictions.

4.7 Description of the logistics and supply chain programs the respondents are currently pursuing

The comparison with the perceptions of HD and AD students is analyzed in Table XII. Independent test for HD and AD students indicate the perceptive of both student groups are

Table XI.
The way HKCC and HKU SPACE students know the program

Factors	HKCC	HKU SPACE	*F*	Significance
My friends recommend this programme to me	3.32	3.70	0.465	0.496
My former teachers from school recommend this programme to me	3.20	3.26	1.400	0.239
I know someone who had enrolled in this programme before	3.23	3.68	0.111	0.739
My family member is a student/graduate of this institution	2.73	2.88	0.008	0.930
I learn this programme from exhibitions	3.32	3.56	1.531	0.218
I learn this programme from the mass media (e.g., advertisement on newspaper, public transport)	3.59	3.73	3.375	0.068
The programme is suggested by professions in the logistics and supply chain industries	3.70	3.90	2.280	0.133
I intentionally searched for the information of related programmes (e.g., sources from the internet)	4.36	4.09	0.534	0.466

Table XII.
Description of the logistics and supply chain programs by HKCC and HKU SPACE students

Factors	HKCC	HKU SPACE	*F*	Significance
The courses are too academically-/ theoretically-based	4.29	4.20	2.164	0.143
The course are too practically based	3.86	4.09	1.924	0.167
The workload is too heavy	3.91	3.93	4.126	0.044*
It increases students' professional competence and skills	4.50	4.45	0.050	0.824
It provides students updated information related to the industry's development	4.75	4.44	0.027	0.870
It allows students to build up networks with people within the industry	4.57	4.43	0.362	0.548
Courses are taught by well-qualified teaching staff	4.80	4.51	0.338	0.562
It successfully teach industry related academic theories to students	4.91	4.51	4.080	0.045*
It successfully transmits job-relevant skills to students	4.52	4.53	0.651	0.421
It uses varies teaching methods to teach students effectively	4.68	4.56	0.162	0.688
In general, programme outcome fits with my initial expectation	4.63	4.52	0.939	0.334

Note: *= $p < 0.05$

largely similar, although few differences can remain be recognized. In general, the survey respondents reflect the positive feedback about the current program. The majority of survey items have been categorized within a range of rather agree to strongly agree. Comparing with HKCC students, HKU SPACE students expressed that the workload is too heavy. Moreover, comparing to HKCC students, HKU SPACE students generally have few complaints on the program is successfully teach industry related academic theories to students.

5. Discussions

Prior enrolling the program, both AD and HD program students have a lack of relevant logistics and supply chain working experience. Generally speaking, the results indicated that 92.9 per cent of AD program students and 61 per cent of HD program students expressed that the current program is the first choice (most aspired) during their sub-degree application. In other words, HKDSE curriculum design has been covered generic subjects which align with students' ability and interest in taking AD program. In terms of admission requirement, the average of HKDSE *P* scores requirement for AD program is three points higher than HD program. The implication is a high quality of students incline to take AD program as a stepping stone for further university study while an inferior quality of students intend to select HD program as their paths for practical job training. Based on the collected survey data, less than 20 per cent of AD and HD program students preferred to work after graduation. The majority of students intended to choose further study from a wide variety of programs, for instance, UGC-funded programs and self-financing programs in local universities, as well as non-local programs from overseas universities. Because the number of HKDSE students would gradually decline from 2012 to 2024 (see Table III) and an increasing trend of students would rather consider choosing further studies after graduation. Hence, we expect that HKDSE students prefer to take AD program. It is not surprising that HD program may suffer a "phrase out" and AD program would place at a dominant position in the higher education institutions. To some extent, HD program fails to increase employability and support the substantial growth of logistics industry generating increasing productivity. To make distinguish between AD and HD logistics and supply chain programs, HD program can align with some professional bodies' examination (e.g. Institute of Chartered Shipbrokers and CILTHK) and develop a sustainable internship attachment scheme with well-known logistics firms. This leads to HD program seems more practical purposes and provides the added value of creating an alternative routings for HKDSE students to achieve their professional status.

Regarding survey respondents' know the program, the key parties, notably, friends, former teachers, known person, family members have demonstrated an insignificant impact factor in the program. Logistics and supply chain associations, for instance, CILTHK, Institute of Seatransport, HKSTLA, and HKLA have emerged a key role in promoting sub-degree logistics and supply chain programs and established close relationships with higher education institutions. Such as, offering scholarship, organizing seminars and site visits, inviting students as their committee members and providing internships along BRI countries. Broadly speaking, the education institutions would use common promotional tools, for instance, placing program advertisement on public transport newspaper and exhibitions. However, the students indicated that they are most likely to know the program through advanced information technology (i.e. Website, WhatsApp, Facebook, Web search engines and SMS). In the forthcoming years, the education institutions are struggling very hard in education institutions marketing for their sustainable survival (Cheng, 2009). Accordingly, the education institutions can show successful stories of HD graduates establish a successful career path in logistics industry and AD graduates articulate to a

desirable undergraduate logistics and supply chain programs in famous universities. The information channel is critical for students to understand the unique features of AD and HD programs and revisit such program can fulfil their initial expectations. Timely information distributed in various information channels can motivate students to enrol their desirable programs.

To a large extent, both AD and HD program students consider in enrolling a logistics and supply chain programs are mostly similar. Comparing with AD program students, HD program students are relatively less concerned about: I can enhance my knowledge about logistics/supply chain industry through the courses by this program; and I can enhance my knowledge about the logistics/supply chain industry through a wide variety of logistics activities (e.g. seminars, site visits, career talks, mentorship, etc.). From the past to now, the inherent feature of HD program is practically based while the inherent feature of AD program aims for theoretically based. The reality is that organizing various logistics activities and delivering knowledge about logistics/supply chain industry is an effective approach to achieve practical purposes. From students point of views, AD and HD programs are no significantly difference. Clearly, there is a significant gap between student perception and unique features of HD program. Accordingly, education institutions revise the study pattern in HD program design. The HD program can allow students to take specialized logistics subjects earlier like in Semester 1. This can change the student perception on choosing AD and HD programs accurately. In the long term, it can enhance education institutions plan and develop the program effectively. Apart from this, the close association with the own country's logistics/supply chain, employability, professional bodies accreditation, high reputation in an academic world, interest, a quality of supporting facilities of the institution, a quality of teaching staff and the home city where the program offered are both AD and HD program students concern about the important issues no matter selecting what types of programs. The sub-degree institutions can consider inviting academic advisor to conduct periodical reviews and seek advice from various program leaders. Other key stakeholders from articulation partners and a logistics and supply chain industry, notably industrial associations, current and potential employers and alumni can be invited to provide advices to the programs. Their feedback could give an insight into program development in the future. Additionally, the education institutions need to establish a sound internal quality assurance systems, for instance, implementing P-LOAP, organizing the Learning and Teaching Quality Committee (LTQC) and aligned with external quality assurance systems, for examples, Hong Kong Council for Accreditation of Academic and Vocational Qualifications (HKCAAVQ). This helps sub-degree institutions to maintain excellent quality of education in terms of hardware and software and redesign logistics and supply chain program to add value of professionalization in sub-degree education. In the end, human capital promotes to sustain the logistics and supply chain education and develops new "talent" in the logistics and supply chain industry.

According to our statistical results of correlation analysis, there is a causal relationship between respondents' background and their evaluation/perception about the course and institutions. It shows the significant level is less than 5 per cent. This is the same result of students explicit about the logistics and supply chain program is the most aspired when they apply for their sub-degree programs. Both AD and HD program survey respondents expressed that their ideal work were inventory management, procurement management, operations management and transport industry, as well as least preferred to end up working in a shipbuilding industry. Most of the AD and HD program students expect their ideal work to obtain a professional life. In doing so, education institutions require to remarkably revise the program aim, objectives and subject syllabus in accordance with the students'

preferable work area after graduation. These are the main factors contribute to the differences between AD and HD programs. AD program aims to train up students into a management level, while HD program aims to train up students into a practical supervisor. Comparing with AD program, HD program should focus more on specialization and job training. In the future, the education institutions require incorporating subjects related to general business and supply chain management rather than highly specialized or technical subjects in AD program, for instance, Fundamentals of Operations Management, Information Technologies for Logistics and Supply Chain Management, Negotiation Skills in Procurement Management, Research Methods, Project Management, to name but a few. For HD program, highly specialized or technical subjects, e.g. Transport Engineering, Ship Brokerage, Aviation Transport Operations and Engineering Mathematics, etc. It creates various career paths and obtains different professional qualifications in transport and engineering aspects. Nowadays, logistics with engineering is a hot interdisciplinary study area. Besides, E-commerce is an urgent demand for the current business environment. In the existing AD and HD programs, E-commerce is overlooked in such programs. Because Hong Kong is an international business center and transport hub, E-commerce is now a core subject in both AD and HD programs.

Achieving certain professional status for personal career development is a main determinant factor in current students pursuing in AD and HD programs. As shown by our findings, many students view that both programs are being too academically-/theoretically-based. This reflects more about how students treat education rather than the program has a main problem. Nowadays, students have a wrong attitude to university education which is about how to be a better person rather than just finding a job. So, the survey results largely reflect "the type of students" that has been attracted by the program, more than the program itself. To attract students to enroll in logistics and supply chain program, the program is required to establish position itself as "practical" and "professional." In the human capital, logistics and supply chain education is a long-term investment in developing highly skilled logistics or supply chain professionals from teenagers to adult life, to reap rewards of social cohesion and economic productivity in the next generation. In this view, the programs are taught by well-qualified teaching staff. The teaching staff is highly committed, thoroughly prepared and well networked with a local logistics and supply chain industry (Hargreaves and Fullan, 2012). Practical working experiences for a number of years with professional qualification are the key elements of teaching staff, notably in HD program teaching staff. The teaching staff uses different effective teaching methods to help students to transmit their job-relevant skills and enhance their logistics and supply chain knowledge. More importantly, the education institutions review the recruitment of the quality of teachers who deliver the programs is an urgently needed in program implementation.

Furthermore, the students pointed out that HD program has a heavier workload than AD program. The main reason is AD program students require taking fewer credits than HD program students. Thus, education institutions may limit to offer the scope of generic subjects of their respective programs or revise assessment methods for some specific subjects. In the long term, education institutions may review and consider the duration of HD program change from two to three years. The additional one-year program provide students to solid their technical knowledge, explore the career opportunities in the job placement and prepare professional examination in various professional bodies. As discussed before, HD program aims to foster the students to train up their technical knowledge before joining the industry. In other words, HD program is not required to take care of existing articulation system in university. University can tailor-made part time top-up degree programs for such HD graduates while they are working in a full time job.

6. Conclusions

The contribution of this project is threefold. To start with, its findings help to answer and predict the development of sub-degree studies in logistics and supply chain education. Hence, we provide constructive suggestions on how Hong Kong's sub-degree programs can make a solid articulation to both university degrees (both local and overseas) and professional bodies. Although the demands for both AD and HD programs keep on growing rapidly, their roles of sub-degree education remain rather unclear. HD program seems appear to duplicate AD program in the higher education sector. In addition, it will draw useful guidelines for the professional groups on how to improve the quality of these sub-degree courses in the future. Last but not least, we conduct sophisticated investigations to support credentials and professionalization in our research. However, the study poses different limitations. First, self-reported data on respondents' perceptions of professionalization of education in maritime logistics and supply chains may have been subject to students' willingness to give a response and report accurately. Students may have been unwilling to provide actual answer because of insufficient knowledge and a potential personal repercussion. Second, this study illustrated two Hong Kong education institutions sub-degree maritime logistics and supply chain programs as case studies. To generalize our study in the forthcoming years, we could take account of other Hong Kong education institutions which provided sub-degree logistics and supply chain programs. Third, this study's findings showed the situations concerning about professionalization of maritime and supply chain education according to one year. Therefore, further research might be carried out considering the longitudinal way to investigate the short-and long-term impacts of professionalization in the sub-degree logistics and supply chain education context. Fourth, the design of research framework and questionnaire are focused only on maritime logistics and supply chain education. For the future research, it could be more comprehensive to consider other professional specific items (e.g. procurement, warehousing, blockchain, educational leadership, professional values and ethics, problem-based learning) (Tuna *et al.*, 2002; Ng *et al.*, 2011; Martinez *et al.*, 2015) which may have notable effects.

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Corresponding author

Yui-Yip Lau can be contacted at: yylau@hkcc-polyu.edu.hk