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Acceptance of Information System Modules in Logistics Program: Perceptions From Logistics and Supply Chain Undergraduate Students

Dazmin Daud[a],*; Ong Huey Fang[b]

[a]Faculty of Business and Information Science, UCSI University, Kuala Lumpur, Malaysia.
[b]Faculty of Computing, University Malaysia of Computer Science & Engineering, Putrajaya, Malaysia.
*Corresponding author.

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Abstract

In most universities, Information System module is embedded into the curriculum for undergraduate logistics and supply chain students. This study applies perceived users towards technology based on the Information System Success Model and intention to use the technology based on the Technology Acceptance Model. Dimensions in these two models are used to study how Information System module influences undergraduate logistics and supply chain student desire to learn it. Data was gathered through questionnaires from 181 logistics and supply chain undergraduate students from a private university. Respondents provided answers by perceiving the user satisfaction, system quality and information quality towards intention to study Information System module. Results indicated that system quality and user satisfaction are positively associated with students' intention to study. The standardized coefficients for system quality was higher (β = .28) compared to user satisfaction (β = .19) toward intention to use at .05 level. The study implies that improve system quality and user satisfaction in *SPA 8i* to attract students for learning the module.

Key words: Information system; Logistics; Supply chain management; Higher education; Malaysia

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INTRODUCTION

With the emergence of the Information System (IS), universities and colleges have realized the need to adopt IS module in all arts and science streams. The term IS module is referring to the standardized segments (or chapters) which contain theoretical and concept about IS. These standardized segments or chapters constitute a course or module. In logistics industry, the importance of information and communication technologies such as the Internet and other digital devices to develop effective coordination among logistics functions can be traced back since 1990s (Introna, 1991; Lewis & Talalayevsky, 1997). To date, few studies are focusing on the importance of IS in logistics curriculum. For example, IS is considered the next important subject to teach in the USA and in the UK (Wu, 2007). In another example, IS is offered for undergraduates' logistics programs as a non-logistics subject after customer service in the USA (Lutz & Birou, 2013).

Gravier and Farris (2008) argued that higher education institutions should consider focusing more effort on ensuring the IS curriculum in logistics program match with the current needs for both students and industry. In this study, one private higher education institution (PHEI) in Malaysia was selected as a case study to assess the perceptions of logistics undergraduate students on IS module. The IS module, or also known as Business Information System (BIS), was designed based on the needs of business students to understand concepts and tools necessary for planning, analyzing, designing, developing, and maintaining organizational information resources. For instance, it was offered in year one for the Bachelor of Arts (with honors) in Logistics Management and also for the Bachelor of Art (with honors) in Supply Chain Operations Management.

Student's perception towards IS modules is not a well-researched topic especially in the case of Malaysia PHEI which is offering undergraduate logistics and supply chain

programs. As mentioned by Pickens (2005), perception is closely associated to attitude. This understanding can help PHEI to better design and deliver IS contents which relevancy to the logistics and supply chain needs. In view of the research gap and the lack of information concerning the perceptions of Malaysian undergraduate logistics and supply chain students from the PHEI on IS, more focus research attempts need to be carried out. The study conducted in foreign country is deemed inapplicable to Malaysian context because demographic backgrounds affect one's perceptions. Therefore, an empirical study to investigate Malaysian student's perceptions needed to be done.

The success of IS module in the logistics and supply chain undergraduate programs is expected to enhance through student intention to learn it. The dimensions in the Information System Success (ISS) model were used to study on how IS module influenced logistics students' desire to gain interest in learning it. The main objective of this paper is to empirically establish the theoretical linkage between the ISS dimensions and the intention to study the IS module in undergraduate logistics and supply chain programs. This paper is organized as follows. The following section reviews the literature on IS dimensions and intention to use. The next section describes the methodology employed and the hypotheses. Then the results of the data analysis are presented, followed by a discussion of the findings of this study.

1. LITERATURE REVIEW

1.1 The DeLone and McLean Information System Success Model

The DeLone and McLean Information System Success (DMISS) Model is used to identify factors that contribute to information systems (IS) success (DeLone & McLean, 1992; 2003; 2004). The original dimensions of this model were six namely: i) system quality, ii) information quality, iii) use, iv) user satisfaction, v) individual impact, and vii) organizational impact (DeLone & McLean, 1992). The updated DMISS Model includes arrows to demonstrate proposed associations among success dimensions in a process sense (DeLone & McLean, 2003) and is used to measure the successful of e-commerce activities (DeLone & McLean, 2004).

In the case of Malaysia, previous studies have applied the model to study the success of technology in Government administration (Sambasivan, Wemyss, & Raduan, 2010), public university library (Mohamad Noorman, Adnan & Sobariah, 2010, financial services (Kumar & Balaji, 2015) and E-learning at Malaysia public universities (Ramayah, Noor, Hazlina, & Lo, 2010).

In relation to education, majority of the previous studies focused on assessing online learning (Cheng & Chau, 2016; Eom, Ashill, Arbaugh, & Stapeton, 2012; Ozkan & Koseler, 2009). Cheng and Chau (2016) proposed a hybrid model based on the combination of several models including the DeLone and McLean information system success model. The study was aimed to examine whether quality factors to nurse students affected their intention to continue using the blended electronic learning (e-learning) system. In another study, it was found that the use of e-learning system did not positively related to systems quality, information quality, self-managed learning, and user satisfaction (Eom et al, 2012). However, only system quality and information quality had an effect on user satisfaction with the e-learning system. A study in Turkey had revealed the importance of undertaking a systematic view of learning management system (LMSs) (Ozkan & Koseler, 2009). The paper addressed the conceptualization and measurement of e-learning systems success in higher education. The findings were first "user is positively influenced by the popularity of e-learning system and distance learning application in the environments and second "learner attitudes towards computers will positively influence perceived e-learner satisfaction from the e-learning system".

1.2 System Quality

According to Norshidah (2008), system quality is concerned with whether or not there are bugs in the systems, the consistency of the user interface, ease of use, response rates in interactive systems, documentation quality and program code maintainability. In the case of public user assessment of Malaysia's e-government applications, a study from Norshita et al. (2010) had indicated high and positive correlation between system quality and information quality. They further suggested that the user concerned about the quality of the information system presented to them and the quality of the information could make system more quality and frequently use. Their findings supported the previous study where system quality and information quality contributed to the critical success factor in Website usage (Liu & Arnett, 2000).

The construct of system quality was originally derived from DeLone and McLean (1992) study. Other researchers such as Turban and Gherke (2000) and Han and Noh (1999) have suggested additional variables such as 24-hour availability, stability of software and hardware, page loading speed, the system architecture, visual appearance and accessibility as part of the system quality. Other applied combinations of positive and negative measures (for example Seddon & Kiew, 1996) or merely positive measures (for example Norshidah, 2008) in their questionnaires.

1.3 Information Quality

Information quality measures outputs of information system and it is expected to influence user's intention

to use a technology (DeLone & McLean, 1992). Information is perceived by Internet users as an important aspect in e-recruitment process (Dineen & Noe, 2009; Maurer & Cook, 2011). van der Meijden, Tange, Troost, and Hasman (2003) argued that frequent attributes for information quality are completeness, data accuracy, legibility and timeliness. These attributes concerned with the input and output of a system. Meanwhile, accuracy, precision, reliability, currency, completeness, format and volume are attributes in IQ that believed to influence significantly user intention to use a technology (Wixom & Todd, 2005).

Lee, Strong, Kahn and Wang (2002) developed a research methodology to form a basis for information quality assessment and benchmarking. Their methodology encompassed a model of IQ, a questionnaire to measure IQ, and analysis techniques for interpreting the IQ measures. In relation to personalise services in Internet, information overload, uses and gratifications, and user involvement have been identified as factors that may affect user satisfaction (Liang, Lai, & Ku, 2007). Liang et al. further explained that content recommendation would be more useful for knowledge management systems, where users are often looking for specific knowledge at Websites.

1.4 User Satisfaction

The construct of user satisfaction has occupied an important role in behavioral research in Information Systems (IS) (Paulemelone, 1990). User satisfaction refers to the successful interaction between the information system itself and its users (DeLone & McLean, 1992). Previous studies have indicated user satisfaction with IS effectiveness (Muylle, Moenaert & Despontin, 2004), support systems (Bharati & Chaudhury, 2004), office automation success (Legris, Ingham, & Collerette, 2003) and tool of IS in decision-making (Goodhue, 1995).

User satisfaction provides a significant surrogate for the critical product of the information system and therefore could be used as a measure of system success (Norshidah, 2008; Zviran, Glezer, & Avni, 2006). Zviran et al. investigated the effect of user-based design and Website usability on user satisfaction satisfaction across four types of commercial Website: online shopping, customer self-service, trading, and publish/subscribe. Their findings resulted that Website success was related to usability measures, as well as incorporating the user-based design construct.

In their updated model for measuring e-commerce system success, DeLone and McLean (2003) emphasized that the construct of 'user satisfaction' remains as important means of measuring customers' opinions of an e-commerce system. The principle objectives of E-commerce system therefore are to minimize users' look up time and make e-commerce sites usable so users can easily and quickly access information (Tucker, 2008). In a related issue, Brown, Massey, Montoya-Weiss and Burkman (2002) stressed that there are numbers of user satisfaction research which only focused on the attitude toward the output of IS.

1.5 Intention to Use the Technology

Norazah and Ramayah (2010) argued that the component of intention to use (ITU) is derived from the Technology Acceptance Model (TAM). The TAM was introduced and developed by Fred Davis in 1986 with the concept of examining user behavior to accept and use a technology (Davis, 1989). Previous studies have shown that the dimension of ITU in the TAM is significantly influenced by the usefulness and ease of use dimensions (for examples see Davis, Bagozzi, & Warshaw, 1989; Yusliza, Ramayah, & Haslindar, 2010; Tong, 2009).

The ITU is defined as the existing of attitude, subjective norms and perceived behavioral control that influence one to use a technology (Norazah & Ramayah, 2010). According to Maurer and Cook (2011), strong attitude formation from effective e-recruiting Website will significantly affect intention to apply for job. Furthermore, their study explained the relationship between attitude formation and behavioral action in online recruitment based on theoretical elements of Realistic Job Previews (RJPs), Person–Organization (P–O) Fit, the Elaboration Likelihood Model (ELM) and signaling theory. Other dimensions studied in relation to ITU were self efficacy and financial costs (Luarn & Lin, 2005), perceived stress, privacy risk, performance expectancy (Tong, 2009) and organizational image (Mareschal & Rudin, 2010).

In the extant literature, there is a cross-cultural study that concludes perceived technology (perceived ease of use and perceived usefulness) influences technology usage intention (Teo, Luan, & Sing, 2008). The results of this study show that respondents from Singapore and Malaysia do not differ in their behavioural intentions with regards to technology acceptance. Meanwhile, Colesca and Dobrica (2008) studied factors that could affect the citizens' adoption of e-government services, analyzing the case of Romania. In their study, demographical factors such as age, income and internet experience indicated significant relationship towards intention to use the technology.

1.6 Computing Studies in Undergraduate Logistics and Supply Chain Programmes

Computing study in general means any modules which have contents pertaining to use hardware and software of computers. It teaches students how computers compute. Computer studies are important for all students because it assists in fastening doing tasks. Many tasks can be performed faster and this leads to time savings. In addition to that, data and documents can be stored effectively and efficiently leaving behind the issue of physical space for storage. Generally, computing courses cover the hardware, software, database, network and people in relation with Business Information System.

There are previous relevant studies which highlighted an association between computer studies and logistics education. Wu (2007) study had shown the importance of computing studies in logistics undergraduate programme. Efficient logistics activities would not be possible without sufficient computing studies in transportation model, inventory control, enterprise resource planning (ERP), customer relationship management (CRM), production scheduling and materials management. Wu added that the integration of skills between IT and logistics for a logistics graduate is necessary to meet their future career challenges.

Present and future higher education institutions use global virtual teams as a tool in the logistics and supply chain management classroom to prepare students in a simulation environment for the demands of their future careers in the profession (Trautrims, Defee, & Farris, 2016). Trautrims et al. believed that it is critical that supply chain education incorporates virtual team training to ensure students are adequately prepared to enter a global, highly interactive supply chain working environment. An earlier study from Rao, Stenger and Wu (1992) confirmed the above study where they had proposed the need for an effective computing study in logistics education. In addition to that, the needs and concerns about the effective teaching methods in the undergraduate computer programming courses would lead to minimize failure rates among the students (Sarpong, Arthur, & Amoako, 2013).

2. RESEARCH FRAMEWORK

This study focuses on the assessment of IS Model as a systematic way in measuring logistics undergraduate students' intention to study Information Systems modules. By examining the relationship between the dimensions in the IS Model and intention to use should contribute to extend knowledge of the relationship that exist between them. The link between the dimensions of IS Model and ITU is shown in Figure 1.

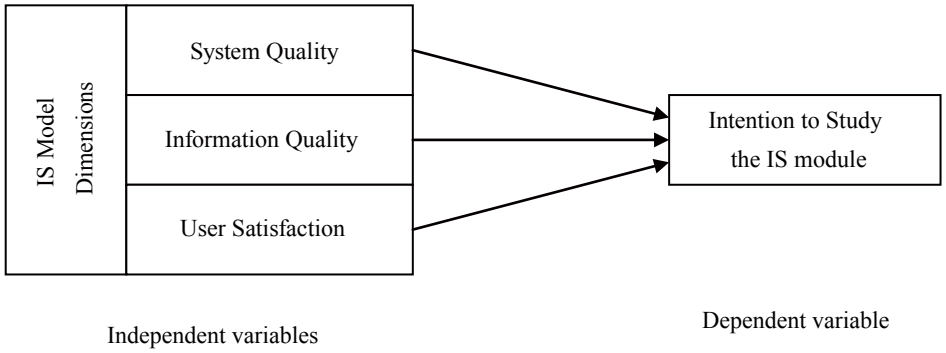

Figure 1
The Research Framework

The following hypotheses were formulated for the study:

H1: System quality will positively influence intention to study the IS module.

H2: Information quality will positively influence intention to use the IS module.

H3: User satisfaction will positively influence intention to use the IS module.

3. METHODOLOGY

3.1 Sample

A self-administered questionnaire was employed for gathering data in this study. A total of 265 survey questionnaires were distributed and 181 usable questionnaires were returned, yielding a response rate of 68.3%. The sample is comprised of 181 final year students studied in a private university in Peninsular Malaysia. These final year students were drawn from two undergraduate programmes (Bachelor of Art in Logistics Management and Bachelor of Art in Supply Chain Operations Management). Table 1 indicates the characteristics of the sample.

There were 86 (47.5%) male and 95 (52.5%) male respondents. Out of this group of respondents, 40.9% were aged between 20-21 years old and the remaining 59.1% were aged 22 and above. 98 (54.2%) of respondents were from Bachelor of Art in Logistics Management Programme. The remaining 83(45.9%) of the respondents were from Bachelor of Art in Supply Chain Operations Management.

Table 1
Sample Characteristics

Characteristics	Frequency	Percentage
Gender		
Male	86	47.5
Female	95	52.5
Age		
20-21	74	40.9
22-23	95	52.5
24 and above	12	6.6
Programme		
Bachelor of art in logistics management	98	54.2
Bachelor of art in supply chain operations management	83	45.9

3.2 Variable Measurements

3.2.1 Independent Variables: System Quality (SQ), Information Quality (IQ) and User Satisfaction (US)

The measure was based on the three dimensions of IS success model (DeLone & McLean, 1992; 2003; 2004) with appropriate changes to make the items more relevant to the present study. Changes included adding the term 'IS Module' and deleting items which were not relevant to the study. The three dimensions which consist of 19 items were US, SQ and IQ. Sample items included "The IS Module adequately meets the information knowledge needs of academic" (US); "The IS Module is easy to understand" (SQ) and "The learning outcome is presented in meaningful chapters" (IQ). Response to these were made on a five-point Likert scale which ranged from 1 = "strongly disagree" to 5 = "strongly agree". Two items, one from US and one from IQ dimensions, were dropped due to contribute low reliability. The internal consistency reliability coefficient (Cronbach's alpha) for the remaining scale in all the dimensions was above .7 (US = .76; IQ = 0.83) except SQ dimension. The reliability for SQ was .68.

3.2.2 Dependent Variable: Intention to Use (ITU)

Intention to Use (ITU) was operationalised by a three-item scale adapted from the Technology Acceptance Model (TAM) (Davis, 1989; Davis et al., 1989; Norshidah, 2008). Each items requires the respondents to indicate their likely or unlikely on a five-point scale ranging from 1 = "very unlikely" to 5 = "very likely". Sample item is "I intend to study IS module which benefits my future career in logistics". The internal consistency reliability coefficient for the scale was .81.

4. ANALYSIS OF DATA

The Statistical Package for Social Science (SPSS) was used for the questionnaire data analysis. User satisfaction, system quality and information quality were regressed against intention to use. The regression analyses confirmed for significance of the independent and dependent variables.

4.1 Results of the Survey

The reliability coefficients of each dimension were as follows: US (76%); SQ (68%); IQ (83%) and ITU (81%). The reliability coefficients of all the dimensions were adequately meeting the standards for such research (Nunnally & Bernstein, 1994). The results for descriptive statistical analysis of all the dimensions are shown in Table 2. Respondents perceived SQ (M = 3.90, SD = .44) to be the most influence dimension in the IS model. IQ (M = 3.77, SD = .46) was identified as the lowest mean score.

Table 2
Reliability of User Satisfaction, System Quality, Information Quality and Intention to Use

Dimension	*N*	Final number of items	Reliability	Mean	*SD*
User satisfaction (US)	181	3	.76	3.90	.44
System quality (SQ)	181	5	.68	3.81	.65
Information quality (IQ)	181	9	.83	3.77	.46
Intention to use (ITU)	181	3	.81	3.89	.61

4.2 Simple Regression Analysis

A simple regression analysis was conducted to examine the significance of the causal relationship between dimensions of IS module and ITU. As explained in Table 3, IS module dimensions of SQ and US significantly accounted for .22 (i.e. *R* Square) of the variance in ITU. The *F* statistics yielded for 16.5 in intention to use at the 95% confidence level. Results of regression analysis supported hypotheses H1 and H3 but not hypothesis H2. HI and H3 posited a positive causal relationship (H1: β = .28, $p < .001$; H3: β = .19, p = .05). Dimension of IQ was indicated as not significance towards ITU.

Table 3
Results of Regression Analysis

	Sum of squares	*df*	Mean square	*F*	Sig.
Regression	14.53	3	4.84	16.50	< .000*
Residual	51.93	177	.29		
Total	66.46	180			

R Square = .22; Adjusted *R* Square = .21.

Independent Variables	Standardized Coefficients	*t*	Sig.
System Quality (SQ)	.28	3.37	.001*
Information Quality (IQ)	.09	1.09	.275
User Satisfaction (US)	.19	2.53	.012*

Note. * significance at p = 0.05 level (2-tailed).

DISCUSSION

The main objective in this study is to investigate the three dimensions in the IS Module (SQ, IQ and US) and their relationship with ITU. The results showed that SQ and US were positively significant related to ITU. This study revealed that the SQ and US were able to predict intention for the undergraduate logistics/supply chain students to study the IS modules. These results support the findings from previous studies conducted by Vlachos and Vrechopoulos (2008) and Lu, Kuo and Lee (2010), which found that SQ did predict people intention behaviour on a technology. Furthermore, previous studies from Lin and Hsieh (2007) and Meuter, Ostrom, Bitner and Roundtree (2003) supported this finding in demonstrating on how US positively influenced ITU.

The results also pointed out that SQ was perceived as dominant independent variable followed by US. Previous studies found SQ had a direct impact on satisfaction (Bai, Law, & Wen, 2008; Ahn, Ryu, & Han, 2007). Results from Bai et al. (2008) indicated that website quality has a direct and positive impact on customer satisfaction. Ahn et al. (2007) investigated the effect of playfulness on user acceptance of online retailing and tested the relationship between Web quality factors and user acceptance behavior. The results showed that the contents of the IS modules had a significant impact on the perceived ease to study as a part of logistics / supply chain undergraduate curriculum.

Interestingly, IQ was the only IS module dimension that indicated non-significant result. This finding is generally consistent with a study by Nicolaou and McKnight (2006) who stated that IQ only acts as indirect effect between system design and intention to use the technology. Furthermore, Nicolaou and McKnight demonstrated that a construct called "control transparency" had a significant influence on IQ. They also indicated that IQ should not be taken as final consideration factor in assessing user's ITU the technology. Certainly, further research is needed to confirm this finding particularly in the area of logistics education.

The findings stressed the importance of SQ and US as critical factors in encouraging logistics and supply chain undergraduate students to learn IS module. It is therefore can be used to improve the content of the IS syllabus by focusing on the elements of SQ and US. Poor SQ and US factors may cause user reluctant to explore and learn the IS module. In addition to this, the recent and future students are from the Y-generation group. In relation to Y-generation group, they are more skewed towards Internet use (Reisenwitz & Iyer, 2009) and more consider the employment immediately after graduation (Broadbridge, Maxwell, & Ogden, 2009). The Y-generation is a group of people whose have birth dates ranging from the mid 1970s to the early 2000s (Gardner, 2006; Wilson & Gerber, 2008). As shown in Table 1, the age groups indicate that respondents were all from the Y-generation. As this generation prefers to use the Internet and other IT tools (Reisenwitz & Iyer, 2009), it can conclude that they perceived SQ and US as agreeable factors for them to learn IS module in an effective manner.

LIMITATIONS AND FUTURE RESEARCH

There are some limitations that must be considered in future research. Firstly, a major limitation of this study is the small sample size (N = 181). Therefore, the power of the test is weaker. Secondly, the findings are based on the use of self-reported survey data, which the issue of response rate may arise. Thirdly, a cross-sectional analysis cannot confirm the direction of causality implied in this research, so it is important to be cautious in providing conclusions regarding independent and dependent variables.

For future research, using the same methodology and variables, a study could be done to determine the relationship between the SQ, IQ, US and ITU among respondents in other target population such as public universities in Malaysia or post-graduate students who are pursuing logistics and supply chain programs in Malaysia. Finally, the measure of ITU for the IS module comprises only a small number of items which depended on the IS Model; therefore this is a considerable biased view of this study. Future research may be more valid if items and measures are developed in relation to this outcome variable.

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