Information Management and Business Review (ISSN 2220-3796)
Vol. 7, No. 4, pp. 64-73, August 2015

Logistics Information Systems (LIS) on the Go-Mobile Apps and Social Media

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Abstract: Logistics has evolved over the past few decades from transportation and warehousing to global Supply Chain Management (SCM). This requires the coordination of the flow of material, money and information. The velocity of doing business has increased and manual operations have been automated. Modern Logistic Information Systems (LIS) with all its logistics related sub systems are replacing muscle power with brain power and pencil and paper with smart phones and social media. The virtual aspect of logistics has become equally important to the physical realm of transportation and warehousing. Supply Chain Management (SCM) deals with getting the right stuff to the right people at the right time in the right amount. To accomplish this task there are a number of more or less integrated logistics software application. Demand forecasting models based on historical data from data marts and data warehouses with built in seasonality and pricing models. Load planning software to appropriately palletize, containerize and load trucks, trains and vessels. Route planning software with real time traffic and weather updates combined with Global Positioning Systems (GPS) to reduce transportation time and fuel costs. Warehouse Management Systems (WMS) to receive, put-away, store, receive and marshal the shipment. Electronic documents accompany the shipment from purchase order, letter of credit to customs clearing and back-haul charges. While these applications in the past have been mostly desktop applications used in the office at the management level, the move is to mobile applications. The footprint of LIS is getting smaller and is moving from the desktop to the Smartphone. At the core of any logistic information systems (LIS) is electronic communication. With the advent of the internet and social media personal communication has taken on other forms. With smart phones and tablets like the I-Phone and I-Pad e-commerce advanced to m-commerce. While technology enables the global supply chain, how do future logistics professionals feel about applying this cutting edge communication technology in their personal and professional lives? This quantitative study compares the aptitude of Thai logistics management students towards the use of social media and modern mobile telecommunication technology in their personal lives and in the context of professional use in connection with logistics information systems (LIS).

Keywords: *Logistics information systems (LIS); social media, supply chain management (SCM)*

1. Introduction

Logistics has changed over the past few decades and moved from transportation and warehousing to integrated logistics solutions which cover the entire life cycle of the supply chain starting with demand forecast and close with reverse logistics and recycling of the good created on the farm or factory which were received by the personal or industrial end users. Logistics as a profession moved from loading dock workers and teamsters to logistics management professionals. Where once physical labour dominated today the driving force which often is more critical than the movement of the goods itself is the electronic information flow. Having said that it is clear that today's logistics professional have to have a keen awareness of the capabilities of logistics information system (LIS) and how to apply them. In the old days computers were connected through a sneaker network carrying floppy disks from desktop to desktop and later through local network cables that often ran on the office floor before finding their way into the suspended ceiling. The internet changed all that and hard wired local area networks connected the office computers to each other and the rest of the world. The next step were wireless networks which not only allow smaller foot prints of devices to be used such as I-phones and I-pads but also allow computing 24/7 your space and place without being hard wired.

Logistics Information Systems (LIS) and its subsystems can be divided into the following categories:

- Electronic Data Interchange (EDI) introduced in the 1960s allows real-time data exchange mostly used back then among financial institutions and for commodity trading, EDI was the forerunner of the internet.
- Enterprise Resource Planning (ERP) deals with integrating the enterprise as a whole this applies in particular to third party logistics providers 3PL
- Supply Chain Management (SCM) deals with getting the right stuff to the right people at the right time in the right quantity
- Supplier Relationship Management (SRM) this software tries to accurately forecast the demand thereby reducing transportation and holding costs
- Transportation Management Systems (TMS) what equipment and staff to use to ship it the fastest way and most cost efficient, selecting the right mode of transportation (land, water, air) loading the box, the crate, the container and the vehicle the most efficient way.
- Fleet Management software for all types of land, air, water based vehicles monitoring and managing every aspect of the vehicle and overall fleet performance
- Marine Applications - shore based and vessel based, planning (cargo/vessel), chartering (voyage), operations (vessel/bunkers), post fixing (lay time, hire payable, claims)
- Aviation Applications - crew and equipment scheduling
- Global Positioning System (GPS) allow the real time tracking of shipments around the globe through inexpensive mounted in various transportation systems
- Warehouse Management Systems (WMS) how to manage warehouses of various forms and shapes with various special functions such as climate controlled warehouses, automated warehouses, as well as container yards, distribution centers and cross docking facilities.
- Automated Storage & Retrieval System (ASRS or AS/RS) consists of a variety of computer-controlled systems for automatically placing and retrieving very high volumes of loads from high density defined or variable storage locations. Man-aboard systems are not true AS/RS
- Radio Frequency Identification (RFID) and its various form factors Electronic Product Code (EPC) are replacing barcodes and allow the tracking of individual items - Stock Keeping Units (SKU), cartons, pallets, containers and movement vehicles (trailer, wagon/train, vessel)

Without a doubt the computer literacy of elementary and high school students and in particular incoming undergraduate logistics management students is higher than ever before. Since early childhood even before they could talk, Asian kids are playing electronic games seemingly independently of the income level of parents. The question remains how does generation-y feel about applying their more or less intrinsic computer and electronic communication skills beyond the personal roam to the professional setting and in particular in connection with logistics information systems (LIS). Social media in an extended sense for the discussion in this paper includes the following:

- E-mail
- Facebook
- Line
- Skype
- SMS
- Smart Phones
- Video Phones

2. Literature Review

The secondary research and literature review for this paper looked at four main bodies of literature: management information system (MIS) literature, logistics literature, logistics information system (LIS) literature and a new body of literature in communication that relates to social media. The logistics industry developed over centuries from a focus on transportation and warehousing to an integrated perspective on the flows of goods, money, documents and information. The global supply chain requires an integrated logistics management solution, which is technology enabled (Arnold, 2008). The scientific logistics information

systems (LIS) literature is still relatively limited as it is a new academic research. Even the trade magazines for computer software and logistics have limited information when it comes to logistics software. The secondary information resources could be found on the vendors' websites, one has to be careful to distinguish between fact and hype of the software vendors. We also looked at the various categories of logistics software, Supply Chain Management (SCM), Enterprise Resource Planning (ERP), Supplier Relationship Management (SRM), Transportation Management Systems (TMS), Global Positioning System (GPS), Warehouse Management Systems (WMS), Electronic Data Interchange (EDI), and Radio Frequency Identification (RFID) for applied and theoretical research relation to what is generally referred to as Logistics Information Systems (LIS) (Baumgartner, 2001). The literature related to ERP and supply chain management (SCM) software (Gammelgaard & Larson, 2001), was most fruitful both in terms of cases studies and limited theory basses (Anderson, 2003). There has been some finding that application software related to logistics applications lack the integration across the entire enterprise spectrum, the most integrated solution also in terms of communication technology is provided by the German company SAP, but SAP for logistics applications is very expensive both in terms of licensing as well as implementation costs. The management information system (MIS) literature deals with the issues of how individuals and corporations embrace technology and modify their business processes to best make use of the changing technology or adopt technology to fit their existing processes both paper based and digital documents and communication (Markus & Robey, 1988).

Besides the technology roadmap, and technology integration a major issue in MIS is the interaction of humans and technology (Alavi & Car1son 1992). The technical issues are addressed in depth by computer engineering and computer science, the mayor problem is not technology but the human factor. Computer systems implementations following industry best practices are always a change management issue. Most people naturally resist change to a certain degree or another. MIS deals less with the technical programming and hardware issues and more with the difficulties at stake integrating the enterprise, departments and the individual stakeholders. A stakeholder analysis also contributes not only to establish user requirements but also to make the users a part of the development and implementation process of this new social media. There have been numerous studies related to MIS and change management but there are limited studies related to the use and implementation of modern communication technology and social media in the logistics industry. The literature on social media can be divided between those articles looking at the usage of social media in a personal and a business setting. For definitions and the history of social networks and media we referred to Boyd & Ellison (2007). Ahn in 2011 looked at which students participate in social media and what role the digital divide plays. What are the Differences among users and non-users of social network sites (Hargittai, 2007)? Lenhart, Purcell, Smith and Zickuhr (2010) explored social media & mobile internet use among teens and young adults.

3. Methodology

This quantitative study surveyed undergraduate Thai logistics management students in who studied in international programs at a Thai university. The survey was web-enabled based on the Moodle e-learning system of the university and available to students 24/7. The principal investigator (PI) developed a five point Likert scale survey instrument. This research measured the perception of logistics management students in regards to the usage of various kinds of information technology and social media both in a personal and profession context. The logistics management students were exposed to various logistics information systems LIS and social media throughout their undergraduate studies. The students were using the various software applications throughout the curriculum and were very familiar with the various types of social media applications as they were using them on a daily if not hourly basis The type of platform varied with the students, the majority was using Apple technology either in form of I-phone or I-pad and I-pad min. Other smart phones using android technology were less frequent and mostly limited to the Samsung brand. Only one student was using a Nokia Lumina Windows phone. The participating students were in their second year of the logistics program. The percentage of male and female participants reflects the distribution in the logistics management workforce. There were 36 female respondents and 16 male, totalling 52 participants. The age distribution of the population was also representative of bachelor degree logistics management students. One quarter of the respondents 25% of the students were 20 years old, the majority 56% were 21

years old, and roughly 13% being 22 years of age, while only 6% were 23 years old. The data was analysed using excel and SPSS.

Table 1: Gender of Respondents

Gender of Respondents	Count	Frequency
Female	36	69.23%
Male	16	30.77%

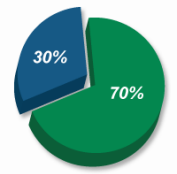


Table 2: Age of Respondents

Age of Respondents	Count	Frequency
20	13	25.00%
21	29	55.77%
22	7	13.46%
23	3	5.77%

4. Results

The results of the study can be summarized according to the following areas: i-phone ownership, i-pad ownership, and personal and business usage of e-mail, SMS, phone, video phone, Facebook, Google, LINE, Skype. It is important to point out that all participating students owned a smart-phone and or a tablet computer as well as a laptop computer and had access to WiFi.

I-Phone Ownership: The vast majority of the respondents (87%) owned an I-phone. Only 13% of the respondents did not own an I-phone. We did not ask what generation I-phone the respondents owned but from observations the majority owned the latest model I-phone 6 at the time of the survey. The rest of the I-phone owners only lacked one generation behind. I-phone owner ship is an important indicator how affluent and computer savvy the participating students were. It is obvious that access to smart phone technology was not a limiting factor and that the participants had sufficient hardware capacity to make ample use of the technologies and applications described in the following questions.

Table 3: I-Phone Ownership

I-Pad	I-Phone	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative. Efficiency
	yes	45	86.54 %	86.54 %	34.46 %	9.84 %	13.36 %
	no	7	13.46 %				

Ownership: I-pad ownership is still less frequent than I-phone ownership. There may be various reasons for it. Choosing the smaller footprint of the I-phone may be more a practical preference for size than a financial limitation. Some of the respondents simply preferred a smaller size hand held device, while others may like the larger screen. Some others also opt for a laptop or an Android tablets; even so the Android tablets are less popular among the participants, price was found to be less of an issue than form factor preference and the use of the i-pad as a status symbol, despite the limited function usage on the i-pad mostly for face book and e-mail as well as the number one function taking pictures namely selfies.

Table 4: I-Pad Ownership

I-Pad	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative. Efficiency
yes	28	.53.85 %	53.85%	50.34 %	31.27 %	40.79 %
No	24	46.15 %				

E-Mail: The usage of e-mail for business purposes surprisingly has more positive than negative responses, one explanation might be that other social media has replaced e-mailing in the personal realm. We will explore this hypothesis in the following questions more in detail. Roughly 45% of the respondents like to use e-mail for both personal and business purposes. Only 2-5% don't like to use e-mail either for personal or business e-mails, this may be due to the fact that they either do not like to type or write, the later may be more reasonable as most students are very fast in typing on even the smallest keyboard.

Table 5: Personal E-Mail Usage

For personal use do you like to use e-mail?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative. Efficiency
love it	8	15.38%	15.38 %	36.43 %	9.65 %	16.85 %
like it	23	44.23%				
Ok	17	32.69%				
don't like it	3	5.77%				
hate it	1	1.92%				

Table 6: Business E-Mail Usage

For business use do you like to use e-mail?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	12	23.08%	23.08%	42.54 %	30.47 %	48.25 %
like it	24	46.15%				
Ok	14	26.92%				
don't like it	1	1.92%				
hate it	1	1.92%				

Table 7: Personal SMS Usage

For personal use do you like to use SMS?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	7	13.46%	13.46%	34.46 %	22.13 %	41.51 %
like it	24	46.15%				
Ok	13	25.00%				
don't like it	7	13.46%				
hate it	1	1.92%				

SMS: Roughly 5% less respondents like to use SMS for business than for personal usage. This is across the board from loving to use SMS to hating using SMS. Again over 50% of the respondents love or like to use SMS for personal uses. Often the SMS are preferred in situation where sound would disturb and voice calls could not be made such as in-class or during meetings. Many of the participants have a phone subscription package that includes a limited or unlimited number of SMS each month. Many packages allow unlimited SMS to in-network recipients. Also SMS are very cost effective when it comes to international messages around the globe and often SMS communication in writing is more efficient than voice communication especially for non-native speakers.

Table 8: Business SMS Usage

For business use do you like to use SMS?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	5	9.62%	9.62 %	29.77 %	23.85 %	49.04 %
like it	22	42.31%				
Ok	15	28.85%				
don't like it	8	15.38%				
hate it	2	3.85%				

Line Usage: Roughly 17% less respondents like to use LINE for business compared to personal usage. There is also a strong negative overall feeling about using LINE for business. More respondents have negative than positive feelings about using LINE aside from personal use. LINE can severely reduce the communication expenses of logistics companies and can add images and even video to the business communication. Line with photos is especially useful for shipping applications, where images of the cargo help. In addition LINE is currently free of charge except for possible Wi-Fi or data communication charges. Maybe respondents are also less interested in the potential savings for the company.

Table 9: Personal Line Usage

For personal use do you like to use LINE?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	34	65.38%	65.38 %	48.04 %	36.70 %	45.39 %
like it	14	26.92%				
Ok	3	5.77%				
don't like it	1	1.92%				
hate it	0	0.00%				

Table 10: Business Line Usage

For business use do you like to use LINE?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	25	48.08%	48.08%	50.45 %	37.72 %	49.32 %
like it	19	36.54%				
Ok	5	9.62%				
don't like it	2	3.85%				
hate it	1	1.92%				

Facebook Usage: Facebook usage appears to be less popular in the business setting than in the private setting. Company Facebook accounts are usually managed by designated company personal. Corporate Facebook accounts need to be carefully managed and monitored of any negative type of postings, which are usually quickly cleaned up.

Table 11: Personal Facebook Usage

For personal use do you like to use Facebook?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	19	36.54%	36.54 %	48.62 %	23.09 %	31.84 %
like it	23	44.23%				
Ok	9	17.31%				
don't like it	1	1.92%				
hate it	0	0.00%				

Table 12: Business Facebook Usage

For business use do you like to use Facebook?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	12	23.08%	23.08%	42.54 %	26.41 %	41.42 %
like it	21	40.38%				
Ok	13	25.00%				
don't like it	5	9.62%				
hate it	1	1.92%				

Google Usage: Approximately 5% of the users across the board feel less enthusiastic about using Google in a business setting while almost 90% of the respondents like or love to use Google for personal and assumable educational purposes.

Table 13: Personal Google Usage

For Personal use do you like to use Google?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	26	50.00%	50.00%	50.49 %	26.23 %	34.82 %
like it	20	38.46%				
Ok	5	9.62%				
don't like it	1	1.92%				
hate it	0	0.00%				

Table 14: Business Google Usage

For business use do you like to use Google?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	24	46.15%	46.15%	50.34 %	9.98 %	13.27 %
like it	19	36.54%				
Ok	8	15.38%				
don't like it	1	1.92%				
hate it	0	0.00%				

Phone Usage: It appears that for business purposes phone usage is still preferred, both mobile phone as well as land line phones. The old line don't call us we call you still applies. Even in their personal live 75% of the respondents still like or love to use the phone. Maybe the sound quality still surpasses those of other alternatives such as LINE and or Skype.

Table 15: Personal Phone Usage

For personal use do you like to make phone calls?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	22	42.31%	42.31%	49.89.34 %	37.91 %	51.47 %
like it	18	34.62%				
Ok	12	23.08%				
don't like it	0	0.00%				
hate it	0	0.00%				

Table 16: Business Phone Usage

For business use do you like to make phone calls?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	23	44.23%	44.23%	50.15 %	31.67 %	42.50 %
like it	17	32.69%				
Ok	11	21.15%				
don't like it	1	1.92%				
hate it	0	0.00%				

Video Phone Usage: Video phone calls are more popular in the personal life than in the business life. But even in the personal setting under 50% of the participants like video calls. Most people don't want to be seen while they are making phone calls, either they are not happy with their appearance or the appearance of their surroundings. Future smart phone will allow the user to choose a backdrop for video calls. Video calls allow users share life images which are critical in a business environment for a correct situation assessment of the problem at hand. In the logistics business this allows to transmit vehicle accidents and breakdowns as well as condition of shipments at time of departure or arrival. Video calls can be made by using smart phones with line or What's UP or even Skype which brings us to the next topic.

Table 17: Personal Video Phone Usage

For personal use do you like to make video phone calls?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	10	19.23%	19.23%	39.80 %	32.63 %	55.27 %
like it	16	30.77%				
Ok	16	30.77%				
don't like it	8	15.38%				
hate it	2	3.85%				

Table 18: Business Video Phone Usage

For business use do you like to make video phone calls?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	8	15.38%	15.38%	36.43 %	26.39 %	47.93 %
like it	17	32.69%				
Ok	15	28.85%				
don't like it	11	21.15%				
hate it	1	1.92%				

Skype Usage: Skype usage is great for long distance communication. Skype is not as popular with the students as some other communication means. Skype is particular popular for communication between continents, countries and different cities. Skype is playing an increasing role in business communication, replacing travel and conference calls. Skype allows users from various locations join in a conference call. Business travel has decreased over the years since 9/11. Students have to get used to on-line interviews before being invited to an in-person on site interview.

Table 19: Personal Skype Usage

For personal use do you like to use Skype?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	10	19.23%	19.23%	39.80 %	35.25 %	60.47 %
like it	18	34.62%				
Ok	16	30.77%				
don't like it	7	13.46%				
hate it	1	1.92%				

Table 20: Business Skype Usage

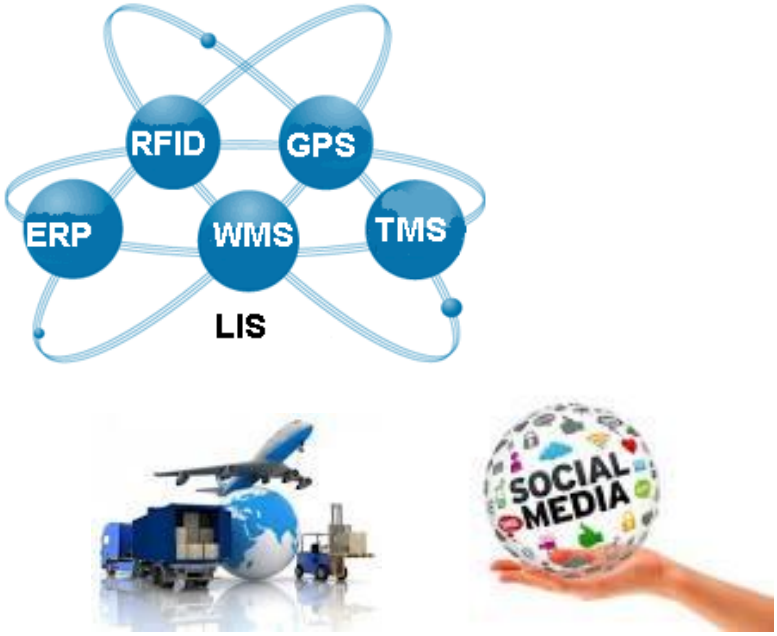
For business use do you like to use Skype?	Count	Frequency	Facility Index	SD	Discrimination Index	Discriminative Efficiency
love it	9	17.31%	17.31%	38.20 %	27.75 %	48.02 %
like it	17	32.69%				
Ok	15	28.85%				
don't like it	9	17.31%				
hate it	1	1.92%				

Discussion: The discussion of using social media outside the personal realm for business usage is continuing. Even so Generation-Y embraces communication technology and talk when and where they are not suppose to; they are less motivated to use the same technology for business use. This brings up a further discussion of to what an extent an employee is obligated to check and respond to electronic communication. In the old days employees could simple claim that they are out of the office, range or country, today everyone can be reached 24/7 anywhere around the world at least in theory. There are very few excuses why not to check or respond to e-mail and phone messages and social media in a timely fashion. This generation certainly looks at logistics information systems (LIS) differently than previous generations, and see it an integral part of the profession. Our virtual identify has taken on an important role, and it is almost more important who we are in this virtual reality than in person. So while today's logistics management students are busy managing their virtual identity and presence will they apply the same diligence in their professional lives and even increase the velocity of doing business more.

5. Conclusion

A simplified completion could be that people always do what they are not supposed to do. When in class they not suppose to use social media, when at work they should respond to calls and e-mail as well as social media for business usage. Across the board in every category about 5% less respondents like to use the various technologies for business purposes than for personal use. One could hypothesize that consistency may indicate that the 5% are the same respondents across all research questions. It certainly would be worthwhile to replicate the study with a larger population and also conduct a comparative study in terms of logistics professionals in various ASEAN countries as well as in Europe, Australia, Africa and America Web-enabled solutions which can be accessed either by PC, tablet, or smart phone are today's user preference, while desk top applications still dominate the Thai market. In conclusion the respondents still have to learn to embrace mobile communication and social media as part of Logistics Information Systems (LIS).

Fig. 1: Logistics Information Systems (LIS) & Social Media



Recommendations: It is recommended to follow-up this study with a larger population, and also over time as the students enters the profession and how their social media will change from personal to professional. It also would be interesting to see how other ASEAN countries compare. Also a comparison with European and US users would be of interest. It will be especially interesting to see what social media platforms will dominate the LIS market in the future.

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