The Use of Internet Applications in Managing Logistics Activities Among Palm Oil Industry Participants

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ABSTRACT

With the advancement of Internet technologies, many companies have adopted the use of the technologies to improve the efficiency and effectiveness of their activities. This paper aims to investigate the utilization of Internet technologies in the Malaysian Palm Oil Industry (MPOI) and explore how the technologies have been exploited by the palm oil industry participants to manage their logistics activities. The respondents of the study were the MPOI participants involved in Internet-based activities. The findings revealed that Internet applications were still new and at an early stage. Many participants did not realise the potential of advanced Internet technologies in managing their business activities. Lack of understanding of advanced Internet technologies explains the low level of utilization of these technologies among the MPOI participants. Most of the participants were comfortable with conventional ways of managing their logistics activities.

Keywords: Internet, E-Commerce, Logistics Activities, E-Logistics

INTRODUCTION

The Malaysian palm oil industry (MPOI) has developed into an important agricultural-based economic sector contributing significantly to the national economy. Based on palm oil statistics published by the Malaysian Palm Oil Board (MPOB) in 2008, Malaysia is reported to be the second largest producer of palm oil in the world and accounts for approximately 42.0% of world palm oil production.

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Palm oil products such as crude palm oil (CPO) and processed palm oil (PPO) are exported to more than 120 countries worldwide. Palm oil forms approximately 30.0% of the global production of edible vegetable oils, second only to soybean. In 2007, Indonesia overtook Malaysia as the world's top palm oil producer due to dramatically increased planting areas of oil palm in the country (MPOB, 2008).

To remain as one of the world major producers of palm oil, various challenges are faced by the MPOI in meeting the rising demand for edible vegetable oils and fats including aggressive competition from rival producers such as Indonesia. One of the key areas that could assist the MPOI to increase its competitiveness is by dramatically improving its business processes and the efficiency of its business logistics activities. Due to its current position as the second world largest producer of palm oil production, the MPOI should ensure the industry is not lagging behind in adopting new business tools and technologies to remain competitive. The MPOI participants should therefore ensure their production activities are efficiently managed so palm oil products such as fresh fruit bunches (FFBs), crude palm oil (CPO) and processed palm oil (PPO) can be reliably supplied to other palm oil supply chain players and so that the customers' demand for a good quality and an attractive price for palm oil products can be met. Pressure from overseas customers has also been a major factor for the MPOI in ensuring efficient business transactions of palm oil products.

Internet technologies such as e-commerce have the potential to provide Malaysian companies with the means and tools to better handle and manage their business activities (Juliana *et al.*, (2009); Khatibi *et al.*, (2007); and Sondoh Jr. and Tanakinjal (2002)). Although e-commerce offers many benefits to its adopters, many constraints have been discovered by some companies towards the adoption of the technology. As reported by the SMI Association of Malaysia, e-commerce has received less attention from small to medium-sized enterprises (SMEs) than large companies. This is shown by low online business activities in SMEs and conventional business transactions are still extensively used in the market where the companies operate. The SMI Association of Malaysia also reported in its 2004 published report that e-commerce had contributed only 5.0% (USD451.6 million or RM1,592.6 million) of the business-to-business (B2B) market of Malaysia. This clearly shows that e-commerce activities have remained slow to be adopted. There are also critical factors leading companies not to utilize e-commerce technologies. Factors such as insufficient Internet facilities leading to slow speed of Internet connection, resistance to change regular business methods, 'wait and see' attitude among companies and the issue of Internet security and trust are among drawbacks that have been discovered and discussed in many e-commerce studies. Indeed, evidence has revealed that most companies in Malaysia are still comfortable with their old ways and rather slow to adopt and adapt e-commerce as a tool to better manage their business (Le and Koh (2002); Liew (2002); Mohd Zulkifli (2001); Sulaiman (2000); and Suraya (2005)). These constraints, in the push towards

e-commerce in Malaysia, need to be overcome before e-commerce tools and technologies are adopted by companies to a greater extent.

Since the development of Multimedia Super Corridor (MSC) and recent advances in e-commerce tools and technologies in the Malaysian market, many companies are being offered more efficient ways of managing business supply chain activities. The traditional ways of managing supply chain activities which are often claimed to lack real-time information and to experience the high cost of face-to-face interaction are starting to be replaced by Internet technologies. The growing application of Internet-based systems like Enterprise Resource Planning (e-ERP); Maintenance, Repair and Operations (e-MRO); Materials Requirements Planning (e-MRP); Electronic Data Interchange (e-EDI); e-procurement and e-auctions in various parts of the world has shown that the Internet can help to provide efficiency in supply chain activities to improve the competitiveness of the companies involved (Bendoly and Schoenherr (2005); Davila *et al.,* (2003); Hartley *et al.,* (2004); Kheng and Al-Hawamdeh (2002); Muffatto and Payaro (2004); Paterson (2005); Presutti (2003); Puschmann and Alt (2005); Singer (2003); and Yang *et al.,* (2007)).

In the Malaysian agriculture sector specifically, Internet applications including e-commerce, e-marketing, e-systems, e-portals are available in the market that offer online technologies and services to agriculture participants. E-portals for example have been developed to offer an Internet-based commerce infrastructure for the participants. To name a few of Malaysian e-agriculture portals are AgriBazaar, TaniNet, FamaXchange and Oil Palm World. The objectives of these portals in general are to enhance the productivity and competitiveness of the agriculture communities through better planning and management of their activities and businesses. According to Ahmad *et al.*, (2008) these portals have been found to be successful in connecting agriculture communities locally and globally. The authors further suggested that the percentage of usage of Internet applications could be increased if they were made more competitive. Thus, more companies would be expected to utilize the technologies. However, the extent to which Internet technologies would contribute to companies' competitiveness has been questioned. In response to the encouragement of the Malaysian government for companies in agriculture sector to adopt Internet technologies and the drawbacks that have been highlighted, this study seeks to investigate the use of Internet in the MPOI and to explore how Internet applications have been exploited by MPOI participants in managing their logistics activities. Further, this study also investigates the effect of Internet use on logistics activities in the MPOI.

LITERATURE REVIEW

E-commerce has become a catalyst for changes in business logistics activities and has assisted companies to carry out logistics activities electronically, which is relatively cheap and in an easily accessible form. E-commerce provides real-

time information which is essential for companies to reduce the costs related to logistics activities such as distributing, storing and retrieving products (Hidalgo, 2000). By providing information related to logistics and other activities in real time; it helps customers to reduce costs related to logistics as well as search costs and costs of product offered. E-commerce has created 'new channels' for information flow, goods flow and new partnerships across distribution channels (Rabah and Mahmassani, 2002). The 'new channels' provide customers with an easy access to companies so that relevant logistics activities and information related to the activities could easily be traced and managed.

Apart from being a tool to provide companies with relevant information on logistics activities, e-commerce also assists companies to improve the integration of information among supply chain players. Elliff (2001) described the importance of the integration of information among supply chain players. The author claimed that the application of e-commerce will affect all elements in the supply chain that rely on data flow to improve efficiency. Since global trade is increasing, the physical flow of goods and flow of information will probably become even more complex in the future. Therefore, the integration of information among supply chain players is essential to improve and provide the efficiency of delivery activities along the supply chain. On top of that, according to Elliff (2001), e-commerce provides many firms with more flexible transportation and logistics functions and capabilities that had been too expensive and simply out of reach for all but the largest company, to every company, whether it is big or small. This is one of the benefits offered by e-commerce to help companies to increase the efficiency of logistics activities.

The smooth integration of information among business players as said by Hultkrantz and Lumsden (2001) is crucial. According to the authors, the demand for a smooth integration of the flow of information will increase in the future, from being a competitive advantage to a necessity. From the viewpoint of Hultkrantz and Lumsden (2001), this shows that the smooth integration of information flow is essential as a tool to increase competitive advantage. Thompson *et al.*, (2000) asserted that the benefit of smooth integration of information is that it provides companies with more valuable information to help companies to make a decision on whether to move from traditional logistics to electronic logistics (e-logistics). Besides, Thompson *et al*., (2000) concluded in their study that when businesses transformed their traditional logistics operations to e-logistics, benefits are arising largely in the area of speed-to-market. This transformation as addressed by Thompson *et al*., (2000) occurred because of the digital market is creating a shift from predictable, scheduled, bulk type shipments to variable, real-time, smaller lot shipments that, for most companies, is driving significant change and complexity in their logistics operations. The authors have also summarized other shifts that could be obtained from e-logistics (Table 1).

Table 1 The shift of traditional logistics operations to electronic logistics

Process	Traditional logistics	Electronic logistics (E-logistics)
1. Orders	Predictable	Variable
2. Order cycle time	Weekly	Daily or hourly
3. Customers	Strategic	Broader base
4. Customers service	Reactive, rigid	Responsive, flexible
5. Replenishment	Scheduled	Real-time
6. Distribution model	Supply-driven (push)	Demand-driven (pull)
7. Demand	Stable, consistent	More cyclical
8. Shipment type	Bulk	Smaller lots
9. Destinations	Concentrated	More dispersion
10. Warehouse reconfiguration	Weekly or monthly	Continual, rules-based
11. International trade compliance	Manual	Automated

Source: Adapted from Thompson *et al.*, (2000)

The impact of using e-commerce technologies on distribution activities is often related to how fast the activities could be carried out by companies. The speed of distribution activities could be improved with the use of e-commerce compared to when they were conducted using conventional tools. E-commerce provides companies with related information on the flow of goods and the status of orders which helps the companies to conduct prompt delivery using the most reliable mode of distribution across the distribution channels. By using an effective e-commerce tool to manage distribution channels and logistics infrastructure, companies are in a good position to successfully exploit opportunities on digital platforms (Garãu *et al.,* 2001). Besides, for some companies, their expectations of what logistics activities can be accomplished in the physical distribution of goods have risen with rapid adoption of e-commerce. Lewis (2001) explained that some companies have restructured their physical distribution of goods to take the advantage of increased efficiencies in e-commerce particularly to improve communication and information sharing between companies and other players in the supply chain. Besides, an improvement in information sharing among supply chain players helps to open an entirely new market for the players in the supply chain (Hultkrantz and Lumsden, 2001). Chapman *et al.,* (2002) also described that e-commerce significantly affects logistics activities and changes them from being purely stirring or moving activities into information business activities. Indeed, e-commerce helps to speed the process of the flow of information to facilitate the flow of goods in order to satisfy and fulfil customers' needs.

The sharing information of demand, sales and delivery status data with e-commerce systems enables further integration with other business partners where they can access the same computerized databases. According to Rutner *et al.,* (2003), implementation of e-commerce provides higher levels of support for the integration of logistics operations by improving the access to diverse types of information of

business partners that are important to logistics functions. In addition, Prahalad and Hamel (1990) asserted that Internet technologies offered businesses significant benefits such as decreases in inventory and intermediary related costs, increases in supply chain efficiency, simplicity and transparency in order placement, delivery, procurement, and management of suppliers and customers, and an ability to stay focused on their core competencies. All of these factors contributed to making the businesses more competitive in the market where they operate.

Elliff (2001) emphasised that e-commerce helps to increase the efficiency of logistics activities such as warehousing, inventory management, picking and assembling orders, and transportation operations. Despite that, the widespread adoption of e-commerce in logistics activities according to Benjamin and Wigand (1995) will reduce physical distribution costs partially through the elimination of intermediaries if companies choose not to outsource their logistics activities. E-commerce indeed can be a tool to change logistics activities from being a passive, cost-absorbing function into a strategic one. However, it is argued that when adopting e-commerce technologies in logistics activities, companies need faster, more responsive and demand-driven distribution operations in order to fulfil customers' needs. Companies would need to take into account all factors such as good Internet facilities, compatible systems and sufficient human resources that could affect the success of developing e-logistics within the companies. Therefore, all elements for efficient e-logistics activities namely logistics facilities and infrastructure, logistics systems and human resources have to be in a good form to exploit the advantage of e-commerce. As claimed by Garãu *et al.,* (2001) companies who used effective physical logistics systems, structures and infrastructure are in a good position to successfully exploit the opportunities of Internet and e-commerce technologies.

The application of Internet technologies in agriculture sector has opened up more opportunities for agriculture participants to expand their business locally and internationally. According to Fritz and Hansen (2008) e-commerce in agriculture sector has evolved accordingly to suit the needs of agriculture participants. E-commerce helps to integrate key agriculture activities such as warehousing, transport and marketing of producers, marketers and consumers that may lead to lower transactions costs between them. E-commerce has the capability to help agriculture sector to build market networks of agriculture participants and interconnects former market places of trading companies and wholesalers and marketing platforms of individual farms (Schiefer, 2002). Roumana *et al.,* (2002) also indicated the benefits derived from e-commerce in agriculture including market reach improvement, convenient, reduced business transactions costs, transparency of market conditions, increase of productivity and efficiency and coordination of supply chain. Vlachos (2002) explained the application of Internet technologies in food-based industry is to achieve objectives such as to create an efficient physical flow of goods and products by minimizing logistics expenses and reducing delivery

times, and to operate an effective value chain by safeguarding gains of all members of the chain, developing trust between buyers and suppliers, and preserving quality for the end users.

Karestos *et al.,* (2002); Roumana *et al.,* (2002); Schiefer (2002); Vlachos (2002); and Vlachopoulou and Manthou (2002) conducted studies on advanced Internet applications in agriculture sector. Karestos *et al.,* (2002) for example studied the use of intelligent agents for e-agribusiness environment and proposed a secure agent-based architecture of a Virtual Agricultural Market (VAM) system consists of eight types of agents namely customer, provider, marketing, information brokering, negotiating and contracting, financial, scheduling and security. Another advanced Internet application in agriculture sector which has received a great attention from agriculture participants are e-agribusiness portals. As these portals are developed, more companies are starting to join the portals to receive the benefits of being involved in an online environment. An e-agribusiness portal is important to support and facilitate the agricultural sector with information distribution, input supply, commodity trading floor, marketing and logistics management (Vlachopoulou and Manthou, 2002). Apart from that, the portal is used for information search and dissemination, interactive communication and discussion, education and training, consulting services, e-agents, e-brokers, e-marketplaces and e-auctions**.** Furthermore, Warnert (2000) indicated that the use of e-agribusiness portals can keep track of precision farming information, better and faster service to buyers and at the same time provide a quick access to accurate market prices.

Although the application of e-commerce, e-portals and e-systems in agriculture sector offer unprecedented opportunities for information and communication activities, a number of issues have impeded the participants to receive and achieve the full potential and benefits of the Internet. Issues such as lack of awareness and skills, low level of understanding of computers and Internet connection, the linguistic diversity, feeling the lack of privacy and security, issues of the secure payment, preference for established relationships with trusted partners, and unwillingness to pay for on-line services were revealed in Nedyalkov and Borisova (2005); Roumana *et al.,* (2002); Vlachopoulou and Manthou (2002); and Warnert (2000). As indicated by Roumana *et al.,* (2002) drawbacks of e-commerce in agriculture sector including the lack of high-speed Internet access, the prohibitive cost of implementation of e-commerce technology and a low level of computer literacy of farmers. Warnert (2000) revealed issues in agriculture sector were related to uncertainty about the ability of Internet application to boost agriculture participants' profits and the willingness of the participants to forsake person-to-person contact, perform a new way of doing business, trust Internet security and share pricing information. Whether agriculture participants will employ advanced Internet technologies will actually depend on their willingness to cope with these issues.

METHODOLOGY

A structured questionnaire (self-administered questionnaire) was used as a research instrument. Most of the questions in the questionnaire were closed-ended questions where a Likert-scale was used. The main respondents were the palm oil industry participants who were mainly involved in the downstream activities such as millers, refiners, oleochemical plants and exporters/manufacturers and most of these respondents have Internet connections. The participants were regarded as a representative sample of the MPOI participants being involved in Internet-based activities. Only a few plantations that have an Internet access were included in this study to represent participants from the upstream activities. A small number of participants who were thought to be non-Internet users were also included. After making a careful selection of these palm oil participants whose addresses were gathered from several Malaysian palm oil companies directories namely Directory of Malaysian Oil Palm Industry (2003); Malaysia Palm Oil Directory (2003-2004); FMM Directory (2002); and FMM Industries Directory (2002) eventually 316 companies were identified to be target respondents. Table 2 shows the number of the target respondents based on their usage of the Internet.

Table 2 No of target respondents by internet usage

Target Respondent	Number in Sample
Internet Users:	
Plantations	15
Palm Oil Mills	70
Palm Oil Refiners	41
Oleochemical Plants	17
Exporters/Manufacturers	158
Non-Internet Users:	
Plantations	9
Palm Oil Mills	1
Palm Oil Refiners	2
Exporters/Manufacturers	3
Total	316

To achieve the validity of the questionnaire, a pilot survey was carried out where questionnaires were sent to different companies before the actual survey was carried out. The purpose of conducting the pilot survey is to ascertain feedback and information from the respondents and to scrutinize the weakness of the questions so as to increase the validity of the questionnaire. In the actual survey, 316 questionnaires were sent to the target respondents. A total of 58 (18.4%) completed questionnaires were eventually returned and used for the analyses. The data were analysed using descriptive statistics including frequencies, mean, and standard

deviation to describe the key features of the data. Mean and standard deviation were used to find answers concerning the application of Internet technologies on the logistics activities. Crosstabulation analysis was employed to investigate the relationship between level of Internet use and its effect on perceived benefits of logistics activities.

ANALYSIS AND DISCUSSION

Internet Usage

A total of 58 out of 316 (18.4%) questionnaires were returned and used for the analysis. The result from the questionnaire survey reveals that 49 (84.0%) of the respondents have used the Internet whereas 9 (16.0%) of the respondents have not (Figure 1).
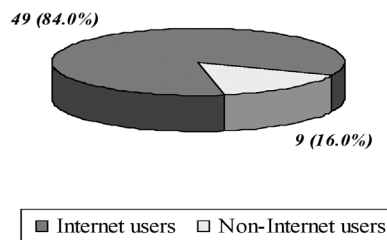

Figure 1 Internet users

All the Internet users (49 companies) utilized e-mail to communicate with their clients and counterpart (Table 3). From the same table, 32 companies have their own websites. The result also indicates that only 29.0% of the companies have intranet facilities however none of them were connected to an extranet. Lockett and Brown (2001) classified the complexity of Internet applications into five categories namely very low, low, medium, high and very high complexity. The classification explains a low level of complexity corresponds to basic Internet users whereas a high level of complexity requires advanced Internet users. This study uses only three categories namely low, medium, and high complexity as shown in Table 3.

Most of the MPOI participants (105 companies) in this study were low-level users who used basic Internet applications such as e-mails, web sites and Intranet for their business activities. Sixteen companies were categorised as medium-level Internet users while 15 companies were high-level users who used more complex applications such as online order monitoring systems, online trading and tracing, e-trading, and e-procurement. None of the companies used e-auctions for online business transactions.

Table 3 Types and level of internet application complexity

Types of Application	Level of Application Complexity	No of Response	
		Utilize	Not Utilize
1. E-Mail	Low	49	0
2. Own website		32	17
3. Intranet		14	35
4. Third Party Website		10	39
5. Internet EDI	Medium	8	41
6. Sell-Side E-Commerce		3	46
7. Buy-Side E-Commerce		3	47
8. E-Banking		2	47
9. Extranet		0	49
10. E-Trading	High	6	43
11. Online Order Monitoring System		3	45
12. E-Procurement		3	46
13. Online Trading and Tracing		3	46
14. E-Auction		0	49

Note: N = 49

Perceived Benefits of Utilizing Internet

The result from Table 4 indicates that 47 companies described the perceived benefits of utilizing Internet technologies were that they were able to have more accurate and timely information whereas 45 companies were able to have better communication and connections with their business partners, customers and suppliers. With fast growing Internet technologies and their applications, real-time information becomes an essential element to assist business organizations to perform online transactions with business partners, customers and suppliers. This suggests that the Internet so far has helped the MPOI participants to be able to communicate through online systems and helped the companies to provide real-time information for business dealings.

Another major benefit stated by 43 companies was that they were able to provide information about their companies to the customers and suppliers. This would probably help the customers and suppliers to reduce cost related to information searching. The MPOI participants have also improved promotion strategy (37 companies) and customer service (37 companies) with the utilization of Internet technologies within their business. As information could easily be accessed by most of the customers and suppliers via the Internet, this has assisted the MPOI participants (33 companies) to keep ahead of competitors. The companies were able to provide accurate information, thus improving the competitiveness of their business. A total of 31 companies stated that with Internet technologies they were able to select suppliers faster and globally whereas another 35 companies were able to reach a wide range of new customers. On the other hand, 34 companies

described that Internet technologies have not assisted them to receive faster approval from government agencies while another 26 companies were unable to keep track on status of orders, production and distribution of their companies. The palm oil participants were also unable to gain benefit of online ordering and online payments using the Internet which were described by 25 companies respectively.

Table 4 Perceived benefits of utilizing internet

Statement	No of Response	
	Benefit	**Not a Benefit**
1. More accurate and timely information	47	2
2. Better communication and connection links	45	4
3. Provide information	43	6
4. Improve promotion strategy	37	12
5. Improve customer service	37	12
6. Reach a wider range of new customers	35	14
7. Keep ahead of competitors	33	16
8. Exchange business process data	32	17
9. Submit business transactions and applications	32	17
10. Select suppliers faster and globally	31	18
11. Online ordering	24	25
12. Online payment	24	25
13. Keep track status of orders, production and distribution	23	26
14. Receive approval from government agencies faster	15	34

Note: N = 49

Application of Internet Technologies to Assist Logistics Activities

Table 5 presents the respondents' perception on the application of Internet in their logistics activities. The result reveals the application of Internet in their logistics activities was still minimal; hence its impact was limited. As depicted in Table 5, on average the greatest effects were to be seen in reducing the planning time for freight transport (mean score of 2.71), and distribution costs (mean score of 2.63) and the number of on-time deliveries has been increased (mean score of 2.71). The respondents also indicated that with the use of Internet technologies, product delivery time has been reduced and fulfilment rate of the delivery has been increased with mean score of 2.59 and 2.55 respectively. For other logistics activities with mean score below than 2.5 indicating that the activities have not improved with the use of Internet technologies.

It appears that Internet technologies have not been fully utilized by the MPOI participants to assist them in carrying out effective logistics activities. Most of logistics activities among the MPOI participants were carried out through conventional business applications and communication tools. However, in certain

circumstances, as shown earlier, Internet technologies have helped the MPOI participants to exchange information on logistics activities quickly through e-mails to their customers or suppliers. This increases timely arrival of goods to the customers. This statement can be further described based on Hesse (2002) that due to high expectation of fast distribution from global customers, it often required that companies conduct higher delivery frequencies and based on that e-commerce can be a tool to facilitate those processes and at the same time increases the efficiency of other operations. Besides, through improved efficiency in logistics operations, companies could achieve faster response times, lower inventory levels, improved order accuracy, better information management, and cost savings (Rabah and Mahmassani, 2002). The Internet could be used in logistics activities as a means for online communication with freight forwarders, carriers and surveyors and to inform these parties about the latest information as well as to manage and monitor logistics activities.

From the results, it can be concluded that Internet technologies have not yet greatly helped the MPOI participants to manage their logistics activities efficiently and the results reveal that the majority of the MPOI participants were still relying on conventional business applications.

Table 5 Perceived benefits of internet technologies on logistics activities

Logistics activities	Mean*	Standard Deviation
15. Increase number of on-time deliveries	2.71	1.242
16. Reduce planning time for freight transport	2.71	1.242
17. Reduce distribution costs	2.63	1.220
18. Increase fulfilment rate	2.59	1.153
19. Reduce product delivery time	2.55	1.259
20. Ability to monitor and keep track of the progress of distribution activities	2.49	1.325
	2.39	1.115
21. Reduce inventory costs	2.24	1.146
22. Increase flexibility to offer different order sizes	2.22	1.123
23. Reduce inventory levels	2.16	1.067
24. Increase vehicle fill percentage	1.96	1.060
25. Reduce product returns		

Note: * 1 = Not at all, 2 = To a very small extent, 3 = To a small extent, 4 = To a great extent, 5 = To a very great extent

Relationship between Level of Internet Use and Perceived Benefits of Logistics Activities

Crosstabulation analysis was employed to further investigate the level of Internet use and its effect on logistics activities. Table 6 shows the effect of logistics activities based on the level of Internet use by the MPOI participants. The Chi-Square test

(0.286) shows that there was no relationship between the level of Internet use and perceived benefits of logistics activities. This indicates that the level of Internet use has no effect on the effectiveness of logistics activities regardless of the level of applications among the participants. This finding could lead to an understanding that the application of Internet technologies was not really meant for logistics activities, but the application was mainly for general activities such as to gain timely information and to have better communication and connection links. This finding is consistent with the earlier results that most of the participants used Internet applications for general purposes.

Table 6 The effect of internet use on logistics activities

Level of Internet Use***	Perceived Benefits of Logistics Activities**			Total
	Low	**Medium**	**High**	
Low	11	15	9	35
	(22.4%)	(30.6%)	(18.4%)	(71.4%)
Medium	2	1	1	4
	(4.1%)	(2.0%)	(2.0%)	(8.2%)
High	2	2	6	10
	(4.1%)	(4.1%)	(12.2%)	(20.4%)
Total	15	18	16	49
	(30.6%)	(36.7%)	(32.7%)	(100.0%)
Chi-Square		0.286*		

Note: * Not significant at 5%
** Low (mean score ≤ 2), Medium (mean score $2 < x \leq 3.5$), High (mean score > 3.5)
Mean is calculated based on 11 logistics activities (as shown in Table 5)
*** Based on Internet applications complexity (as shown in Table 3)

CONCLUDING REMARKS

Internet technologies particularly e-commerce applications were still new and at an early stage in the MPOI. Many MPOI participants in this study were unclear about the benefits of using Internet technologies. They did not realise the potential of advanced Internet technologies in their business activities, thus the application of Internet technologies in the MPOI were mainly for general activities. There is evidence that the issue of lack of understanding about Internet technologies is one of the key reasons to explain the low requirement for online transactions among the MPOI participants. This finding confirmed the statement made by Chaffey (2002) about poor understanding of the benefits of Internet technologies among some companies which reduces the success of conducting online transactions. There is also evidence to support that most MPOI participants were still comfortable with their old ways of doing business and rather slow to adopt and adapt e-commerce as a tool to better manage their logistics activities.

This paper concludes that to achieve the efficiency and effectiveness in logistics activities, the MPOI participants would need to adopt and implement advanced Internet technologies and encourage other palm oil participants to make the same effort. With the support by all participants, the MPOI would increase its competitiveness and be at par with other oils and fats industries. Intensive support from the Government of Malaysia to promote and encourage companies to adopt Internet technologies would help the palm oil industry participants to achieve a better level of adoption. This is a key way to maintain long-term survival of the palm oil business operations. Thus, an understanding of the application of advanced Internet technologies should be at the forefront of every palm oil participant and the technologies must be given precedence over conventional business applications to increase the MPOI competitiveness.

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