

The Role of MIS to Supply Chain Management in the Oil Marketing Companies of Ghana

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Abstract

In the pursuit of every business venture, be it profit or non-profit, there is a complementary product of relationship. That is to say that once there is the creation of value targeted at people or the organization, there has also been created a need for information flow. Most large oil companies are known as being "integrated" because they combine upstream activities, which include exploration and production, with downstream operations. Some prefer to divide downstream operations into mid and downstream, with the refining process taking place midstream and the distribution occurring in the downstream phase. Businesses of oil companies run in a chain and the flow of information is deemed important. Oil Marketing Companies (OMCs) in Ghana operated as a loose organization for many years. However, in October 2003 an Association of Oil Marketing Companies (AOMCs) was registered with the adoption of a Constitution by all its Members (Association of Oil Marketing Companies of Ghana, 2011). The formation of the association has improved the level of integration since one of its main duties is to provide coordination between the Association and all the major Stakeholders in the Oil Industry, the Ministries and other Government Agencies.

The marketing and distribution of petroleum products takes place on a vast, global scale as hundreds of millions of companies and individuals buy these products. In Ghana alone, the association of oil marketing companies of Ghana has at least 51 members as at the beginning of the year 2013 and they believe communication and information sharing amongst members can improve their operations (GNA, 2013). Information flow is seen to be the corner stone upon which organizational activities completely rest and if ignored or misused would be destructive (Mason-Jones et al, 1998). In the downstream or oil marketing industry, particularly the established companies, there seems to be an awareness of the need to devote attention to organizational communication and information flow. Relative to most industries, OMCs require dedicated attention to the stages in production since there is a wide range of specifications, technical language, literal multiples in quantity produced and strict deadlines (Mitchell, 2012). Distortion in information flow, either by the source or receiver, can be very costly, both to the client or service provider and this has given way to the use of information systems in most industries in the world (Larson et al, 1996).

It is clear that the application of information systems in the supply chain management process use technology to more effectively manage information flow (Subramani, 2003). It is vital that modern businesses including OMCs in Ghana will adopt or continue to use emerging technologies that can help improve their operations but can it be said that OMCs in Ghana feel motivated to use information systems in their day to day operations? Some organisations apart from the OMCs believe it is not necessary to even use information systems due to some perceived ideologies. They are challenged by the problem of the level of influence such technologies has on its productivity. Others believe it must be weighed to ascertain whether such technologies can even be improved whiles the company sees growth in its operations.

The use and usefulness of information systems vary in many ways. Previous research has attempted to establish causal relations between prerequisites for use, such as technical quality, information quality, and use and user satisfaction (DeLone & McLean, 1992). Others have concentrated on the relationship between user participation and use, or other indicators of system success but it will be important to also know the influence the role of information systems play in supply chain management especially in the operations of OMCs.

I. INTRODUCTION

According to Cohen et al. (1998) the meaning of “information systems” has been growing in diversity and complexity. Information systems could not stay alive without information but yet still information has no clear definition (Mingers, 1997). Normally information has been defined as “interpreted data” and the same data might cause different interpretations as different persons might associate different meanings to the same data. An interpretation is by its own nature subjective, which is related to a subject, a mind, ego, or agent of whatever sort that sustains or assumes the form of thought or consciousness. The information systems (IS) history only span five decades as by the mid-sixties information system was already eating its way into business mainstream. The use of computer in organizations usually started off in the accounting departments as it was assumed that this area would know the most about using numerical machines and the falling short of understanding in how important databases could be in other areas of the business.

During the mid-eighties which was the time most manufacturing companies had started to shift to information system to forecast sales, take orders, and manage distribution of products. While computers stayed out of reach for most businesses, telecommunications made its mark with the telex machine. In 1932, the Telex Service was introduced in Great Britain for administrative use by the British post office. As reported by Kimberlin (1986), telex machine is a [character printer connected](#) to a [telegraph](#) that [operates](#) like a [typewriter](#). This step taken by businesses gave organizations the ability to communicate within and anywhere in the world at any time and effectively pass instructions and information. By this period a number of business school began developing Management Information System (MIS) programs to meet the growing need of IS managers. The World Wide Web was developed by Barnes-Lee in 1989 and the protocol HTML used over the existing Internets that had been constructed opened up a new age of EDI the world had never seen. In the mid-1990's it became apparent that there is no way for a corporation to competently do business without a solid functioning IS setup inside its own walls as well as connected with its supply-chain vendors and distributors. EDI as it was once known as Electronic Data Processing (EDP) have now brought profit margins so low that any business that does not prepare itself will be out of business in the next five years.

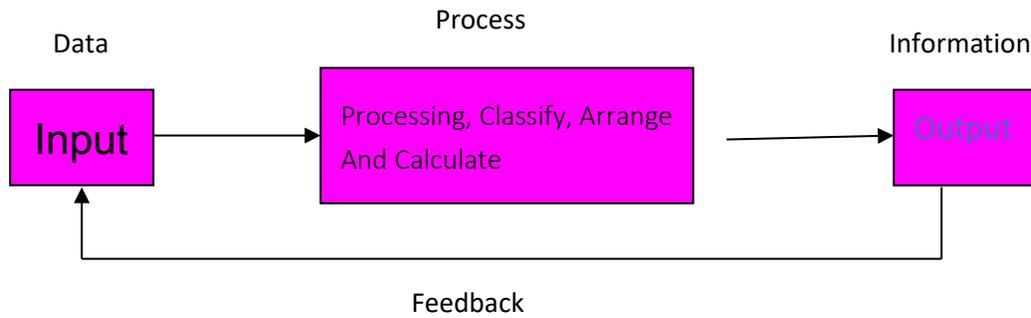
Information systems are technology driven system which currently without it, business would not be what it is today. It has seen developments over the past fifty years to being the back bone of business, yet the simple application rules created in the 1960s and 1970s are still very relevant in any application where data or information is transferred in whatever business model it is applied to no matter the intricacy. In a research by Huston University (2012) it was concluded that the commencement of information system has done more to enlarge business and industry into global markets than any other convention in history. Today the backbone of information system is now the World Wide Web, Internet, or with a business a Local Area Network, along with lists of acronym buzz word; EDI, EIS, ERP, SCM and host of others to describe new ways in which information system can be employed to grow business.

A. Information System Defined

According to the UK Academy for Information System, information systems are the means by which people and organisations utilising technologies gather, process, store, use and disseminate information. The encyclopaedia Britannica (2013) defines information system as an integrated set of components for collecting, storing, and processing data and for delivering [information](#), knowledge, and digital products. The Institute of Electrical and Electronics Engineering (IEEE) defined Information systems (IS) as sets of components that are organized in a way that supports the execution of some functions (IEEE 1990). According to Nickerson (2000) I.S does not limit the mechanisms to being only technical, that is computers and code but also sees that the people, the processes, and the information are also part of an information system. Information technology (IT) is defined as the equipments and methods used for involuntary information processing and transferring as well as the knowledge of using these equipments and methods (The Finnish Terminology Centre TSK, 1993).

Wognum et al. (2004) shared a similar opinion about the fact that information systems drive is to support user organizations in their information needs. For examples, information systems investigated in this thesis are Enterprise Resource Planning (ERP) systems, Product Data Management (PDM) systems, Customer Relationship Management (CRM) systems, Supply Chain Management (SCM) systems, project follow-up systems, other document handling systems and other tools that impact the way of working in some part of an organization.

Figure 2.2 Data and Information



Source: Laudon and Laudon, (2004).

II. INFORMATION TECHNOLOGY AND INFORMATION SYSTEMS

Information technology and information systems are two closely related fields of study that people find very confusing to differentiate between (Olivia, 2011). Despite all the similarities there are differences that need to be highlighted. Information technology can be considered as a subset of information systems. It deals with the technology part of any information system, and as such deals with hardware, servers, operating systems and software. As clearly defined already information system is concerned with the information that computer systems can provide to aid a company, non-profit or governmental organization in defining and achieving its goals. It is also concerned with the processes that an enterprise can implement and improve using information technology.

A. Information System Structure in Organisations

Information systems and organizations influence one another (Petter, 2008). Information systems are built by managers to serve the interests of the business firm. At the same time, the organization must be aware of and open to the influences of information systems to benefit from new technologies (Hussein et al. 2007). Information systems consist of three layers which are operational support, support of knowledge work, and management support. Operational support forms the base of an information system and contains various transaction processing systems for designing, marketing, producing, and delivering products and services. Support of knowledge work forms the middle layer; it contains subsystems for sharing information within an organization. Management support, forming the top layer, contains subsystems for managing and evaluating an organization's resources and goals.

Fig 2.3 Information Systems Structure



Source: Encyclopædia Britannica, Inc. (2012).

A. Implementation of Information Systems

Nowadays, companies are in the race for improving their organizational competitiveness in order to compete in the 21st century global market. This market is electronically connected and dynamic in nature. Therefore, companies are trying to perk up their quickness level with the objective of being flexible and responsive to meet the changing market requirements. Information systems can do much particularly in completing the processes and the handling of information. Li (2003) argues that ERP systems have made business greatly effectual since they offer everybody with seamless access to information needed. Similarly, as deliberated by Smith (2004) PDM systems can enable

information sharing. Information technology in general has made new organizational forms and new ways of working and collaborating possible (Mukherji, 2002). Davenport (1998) reports that information systems have been used to align operating practices between the companies' units. In fact, information systems will almost unavoidably reshape the ways of working in an organization (Davenport 1998) and not the other way around. It is true that information systems are good but the cost of implementation has never been great. Lately, organizations are investing a lot in information technology and information systems. This is not surprising as markets are getting more competitive and companies simply have to be swift in adopting new technology to keep up the pace of the changing environment (Kadiyala, 2005). This heavy act of investing is confirmed by the European Commission's statistic (Eurostat 2007) which shows that the expenditure on information technology is about 2.7 % of GDP in Europe and 3.3 % in USA. The expenditure in Finland is about 3.2 % of GDP. PDM systems are believed to be important and investments in them have increased continuously (Crnkovic et al 2002).

B. Benefits of Information Systems

Nickerson (2001) argued about the possible benefits of IS. Better information serves as the basis for more accurate decision making. Another is an improved service for both the customers and the employees. Moving forward, one other benefit is an increase in productivity since people can execute their duties much more efficiently. Again, Shang and Seddon (2000 cited in Al-Mashari et al 2003) for example set the benefits of ERP systems in operational, managerial, strategic, IT infrastructure, and organizational. These same benefits can also be results of other information systems but as also Nickerson (2001) points out benefits will not be realized simply with installing the application but most especially the organization has to adapt the system and include it in the processes. This aspect is completely imperative to remember in information system projects. Organizations invest greatly in information systems and naturally assume them to bring about a lot of economical and organizational benefits (Hallikainen 2003). But the truth is that most organizations fail to get the likely enhanced business value from an information system investment (Cameron & Green 2004). Daniels (1998) explains that information systems do aid organizations in automating processes and information storage that is, they advance efficiency, but their actual impact on strategic upgrading is questionable. Daniels believes that the only way to advance this is to appreciate how the information best support the corporate and competitive strategy.

Thorp (1998) has also concluded that notwithstanding the not so good performance record of new systems, organizations continue to invest in IT. This phenomenon was something that Pozzebon et al (2006) looked into more carefully by asking why companies are continually ready to invest in newly launched systems although the experience of the old ones is often not satisfying. An explanation using the rhetoric closure theories by Bijker which says that some problem is or will be solved because a relevant group of people think it is solved, while, in fact, it is not really solved (Pozzebon et al 2006). Pozzebon et al use this theory to suggest that new information systems etc. are simply adopted because all parties decide and convince each other that the system will indeed resolve central managerial problems. Organizations encounter problems in the area of information management but can be in a fluctuating amount. Kim and Oh (2000) found it astonishing that although the systems are important and can be expensive for all organizations, the systems are exploited in very erratic degrees. Many organizations still have a long way to go as explained by what Salazar and Sawyer (2007) are saying that in a typical organization 90% of the information is still on paper and information systems are still not even close to being entirely combined. The heaviness for companies to introduce information systems and get cohesive with also the surrounding stakeholders comes from the collaborative nature of the business environment of today (Ho & Lin 2004).

Kadiyala (2005) notes organizations should not rush into the use of new IS implementation endeavors but should prudently analyze the costs and benefits. Information systems investments can be an expensive project. As confirmed and reported by Al-Mashari et al (2003) companies that go for a basic IS implementation spend up to three times as much money on the services example customization done by consultants than on the system itself. Therefore it is important to carefully decide on the level of customization etc. Crnkovic et al (2002) has additionally noted that it is indeed services that account for the greatest part of PDM system project costs.

C. Impact of Information Systems

A careful investigation as to how IT impacts and its characteristics in an organization have been looked into by Dewett and Jones (2000). In the model they present, IT functions as moderator between the organizational characteristics (e.g. size and culture) and organizational outcomes. They argue that this moderating effect of IT is due to the fact that IT generates information efficiencies and information synergies. Information efficiencies are the possible cost and time savings that can be achieved if IT enables employees to work more efficiently. Information synergies are the

performance gains that can be achieved if IT enhances collaboration and cooperation possibilities. These two ideas are benefits in themselves but it is also said to lead to five more concrete organizational outcomes. They are IT links and enables employees, IT increases boundary spanning, IT codifies the knowledge base, IT promotes efficiency, and IT promotes innovation (Dewett and Jones 2000). The first is claimed to be the most basic. IT links and helps people to communicate and collaborate over the borders of divisions and functions in any business. Two things are worth noting which merely a technical link is not enough, the communication needs to be supported with organizational methods as well and secondly, increased communication also means increased amounts of unnecessary and unusable information sharing. But on the whole, increased communication and possibility to communicate is the most important effect IT can have on the organization. (Dewett and Jones 2000). The second outcome that IT codifies the knowledge base means that IT is a facilitator in knowledge distribution and capturing. Hence, IT is a tool in a company's knowledge management. The third result that IT increases boundary spanning is related to the first outcome but focus is on the tools that IT creates for searching new information from e.g. other organizational units. This means that e.g. information needed to solve some problem can be taken from another division that has had the same kind of problem. The fourth outcome means that IT promotes efficiency in the way that IT enables more efficient ways of working in e.g. decision making, communication, information storing, and information retrieving. (Dewett and Jones 2000) The last outcome is that IT promotes innovation as the result of all the above mentioned outcomes. IT promotes innovation through enabling virtual organizations and other new organization forms and through enhancing monitoring of project progress and through making information seeking easier. Dewett and Jones further argue that this effect of IT should get more attention in the discussion on how its effect on an organization is measured; they claim that focus is now very much on efficiency-enhancing properties while IT's ability to build up the organization through promoting innovation should be more noted. (Dewett and Jones 2000). The discussion above clearly presents the fact that information systems have a notable impact on an organization. Hence, implementation should not be regarded as a project that concerns only the IT department. Slowly organizations are realizing this. IT and information systems are more and more viewed as an important part of the organization's business and not only as an expense. Similarly, companies are constantly putting effort on developing their information management and IT-processes. Despite this it has been reported that Finnish companies still have a long way to go in order to master their IT efforts. (IT Service Management Forum in SMF Finland, 2008)

D. The strategic importance of information systems

According to Shupe et al. (2006), literature is clear about the fact that the IT strategy and information systems plans of an organization need to be in line with the business strategy. The actual strategic value of IT itself is still subject for debate (Oh & Pinsonneault 2007). To start with, Hallikainen (2003) notes that lately information system projects are often means in larger strategic expansion and change projects which would indicate that their strategic importance is quite notable. Likewise, Lee et al (2006) claim that a global business must not only have a global business strategy but the strategy must be backed up by information systems in line with the strategy. But there are different opinions about the shape of the strategic impact. To begin with, not all information systems have a strategic role. The management has to be able to evaluate how and in what extent an information system contributes to the organization's strategy in order to decide upon the amount of attention that the IS project needs. This is yet another reason for business and information management to work together. (Cameron & Green, 2004)

Considering the second, there are different aspects to the strategic value of IT which was discussed by Oh and Pinsonneault (2007). They investigated two approaches to assessing strategic value of IT and they categorized them as the resource-centered perspective and the contingency-based. The first approach was that IT is a strategic resource in itself and that IT in combination with other strategic resources influences business. The second approach says that the strategic value of IT is only realized if it is planned to support the main strategy that is, IT in itself has no strategic value, but when managed to support the general strategy its strategic role is realized. The findings that Oh and Pinsonneault report point out that both approaches should be used as they are actually complementary rather than competing approaches, though the authors do slightly lean towards the contingency-base approach. Furthermore, they report one concrete finding which is that using IT to reduce costs rather than to increase revenue somehow can be said to be more beneficial for the organization. The later can be seen to have implications on how to address the issue of information systems implementation that is, information systems should be a strategic instrument mainly used to create savings for the company (Oh & Pinsonneault 2007).

In conclusion it can be said that the strategic impact of information systems varies depending majorly on the characteristics of the system. This possible strategic role of IT and information systems implies that business management must consider also the information systems when creating the business strategy and that these systems

will have a tone on the business and these are not merely technical efforts. Nickerson (2001), presents a term for such systems that have a strategic role which is Strategic Information Systems (SIS). It can be put on record that Crnkovic et al (2002) reported that many companies are considering PDM system to be of strategic importance for the company.

E. Information Systems and Competitive Advantage

A frequent debate has been about the topic of whether or not ISs enhances a company’s competitive advantage. This question is very relevant since IS investments need a lot of resources both in financial and human terms. It seems that although ISs and IT in general is playing a rather significant role in companies the result of IT on performance is still something of a mystery (Dehning & Richardson 2002). Hence we would need to underline the can in the claim of Nickerson (2001) that information systems can provide a competitive advantage for a business. In a research by Williams and Williams (2007), they note that many researchers have found that IT in general is nowadays an essential part in a company’s competitiveness. Similarly, Mabert et al (2003) noted that ERP has an important role in an organization advancing its competitive advantage, but only if the organization has ability enough to get the full power out of an ERP system. Cameron and Green (2004) noted that it has also been proposed that since IT is no longer a scarcity in business and easily available it is not something that creates a competitive edge for a company. Furthermore, Fisher and Kenny (2000) argue that the choice to invest in and put into practice an IS must always be taken by first asking whether the system will progress the company’s competitiveness or not. The IS must also support business goals and objectives. This would mean that ISs basically must contribute to increased competitive advantage since that would be the reason why they are even implemented in the first place. On the other hand Hallikainen (2003) draws the conclusion that some IS investments are seen as sources of competitive advantage while others are simply a means in carrying out of basic business processes. A framework created by Piccoli and Ives (2005) which is based on previous research that shed light on how strategic IT investments can impact the competitive advantage of a company. They concluded that there is an appreciable possibility to use IT investments to gain competitive advantage. In all, the framework identified four barriers that require to be crossed to attain competitive advantage with the help of IT. The first is the IT resource barrier which implies that a company with superior IT resources can gain competitive advantage in a way that cannot be replicated by a company with less greater IT resources. The second barrier that was noted is the complementary resource barrier which is similar to the first one, although now the non-technical resources are in question that is personnel, organizational attributes etc. The third barrier is the IT project barrier which implies that the more time consuming, expensive, and complicated the project execution is the higher is this barrier to gaining competitive advantage. The last barrier outlined is the pre-emption barrier; competitive advantage cannot be achieved if successfully imitating a competitor since this competitor holds the spot of the leader and hence, has a sort of power to preempt the access to customers. (Piccoli & Ives 2005)

Table 2.1 Barriers to achieving competitive advantage through IT investments

 <p>IT Resource Barrier</p>	
 <p>Complementary Resource Barrier</p>	
 <p>IT Project Barrier</p>	
 <p>Pre-empting Barrier</p>	

Source: Piccoli & Ives, (2005)

Again three important areas were further identified as that which will need to be focused on to gain competitive advantage by Piccoli and Ives (2005). These are differentiation, efficiency improvements, and channel domination. According to the authors this is a widely accepted conclusion in the research on this field. And hence, it can be concluded that it indeed is possible to gain competitive advantage with the help of information systems and IT in general. It is just a matter of doing things right.

F. Measuring Information Systems Success

Kanaracus (2008) notes that organizations continue to increase spending on information technology (IT) and their budgets continue to rise, even in the face of potential economic downturns. Logically, it can be said that organizations are interested in knowing the return on the investments they make on their asserts but it is vital to know that the impact of IT is often indirect and influenced by human, organizational, and environmental factors therefore, measurement of information systems (IS) success is both intricate and misleading. It is obvious that ISs are developed using IT to aid an individual in performing a task. Given the rather short life-span of the IS field, it is quite remarkable the number and variety of applications and systems that have been deployed. There are IS that range from hedonic, developed for contentment and enjoyment, to utilitarian, developed to improve individual and organizational performance (van der Heijden, 2004). Organizations center on developing, using, and evaluating utilitarian IS. There is a excess of utilitarian IS used in organizations, such as decision support systems, computer-mediated communications, e-commerce, knowledge management systems, as well as many others (European Journal of Information Systems, 2008).

According to Rubin (2004), to calculate the success of these various IS, organizations are moving away from traditional financial measures, such as return on investment. In an attempt to better understand the tangible and intangible payback of their IS, organizations have turned to methods such as balanced scorecards (Kaplan & Norton, 1996) and benchmarking (Seddon et al. 2002). Some researchers have created models for success (Ballantine et al. 1997), emphasizing the need for better and more consistent success metrics. As a field, we have made substantial strides towards understanding the nature of IS success. For example, the widely cited DeLone and McLean model of IS success (1992) was restructured a decade later based on a review of the empirical and conceptual literature on IS success that was published during this period (DeLone & McLean, 2003). Furthermore, other researchers have synthesized the literature by probing into the relationships in the D&M IS success model using the quantitative technique of meta-analysis (Sabherwal et al. 2006) to develop a better understanding of success. Again, others have started to develop standardized measures that can be used to evaluate the various dimensions of IS success as specified by D&M (Sedera et al. 2004). This research done some time back has helped the field better understand IS success, but it is obvious that more needs to be done. The qualitative literature review identified three objectives for improving the current understanding of the literature in this domain. First, the D&M model was examined in two different contexts which were the individual level of analysis and the organizational level of analysis in order to identify if the unit of analysis under study is a boundary condition for measuring success. Secondly, unlike other literature reviews or meta-analyses that have only reviewed some of the relationships in the original D&M model, this review investigated all relationships in the updated IS success model (DeLone & McLean, 2003). Finally, the specific measures used by researchers for each of the constructs that comprise the D&M model were examined. In both the original and updated models, D&M strongly advocated the need for consistent and appropriate measures for IS success. This review seeks to determine whether researchers have heeded this call.

III. INFORMATION ON SUPPLIERS FOR THE OMCS

Section two of the questionnaire administered was to find out some information about the suppliers used by the OMCs. According to the business dictionary (2013), a [party](#) that [supplies goods](#) or [services](#) defines the word supplier. It goes on to explain that a supplier may be distinguished from a [contractor](#) or [subcontractor](#), who commonly adds specialized [input](#) to [deliverables](#) and sometimes also [called vendor](#). To survive in the intensely competitive global economy, it is critically prudent that organizations get suppliers who can provide goods and services for their operations whiles they can look on to focusing on their core business.

In the petroleum industry most oil companies are faced with dealing with issues relating to the core functions and so tend to employ various suppliers. Some of these suppliers have gone ahead to form associations both locally and internationally. They include the Petroleum Equipment Suppliers Association (PESA), based in the USA. This association in particular comprises equipment manufacturers, wellsite service companies and supply companies serving the drilling and production segments of the petroleum industry. Founded in 1933 as the American Petroleum Equipment Suppliers Association, its role then was to assist the federal government in preparing a fair practice code for the oilfield equipment industry (<http://www.pesa.org/index.php/page/c/history/>). This situation is not different in

Ghana as the government wishes to encourage partnership in the petroleum industry as a result of the oil explorations in the country. An event was organised with the objective to create an environment that supports and promoted supply chain development with the view of harnessing and utilising the capabilities of local suppliers and related service providers (Ghanalogistics.com, 2012). OMCs are not left out in this aspect too as the researcher noticed that such petroleum industry players also do partner suppliers. Research question 2.1 sought to find out if the OMCs use any kind of supplier(s)?

Table 4.5 Findings relating to supplier usage by the OMCs

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	50	100.0	100.0	100.0

Source: Field Survey, 2013.

The above table (Table 4.5) is the findings for the research question 2.1 which sought to find out if the sampled OMCs in the Kumasi metropolis use any kind of supplier in their operations. Analysis of findings shows that 100% of the sampled OMCs in this study use suppliers within their operations. The follow up question (Research question 2.2) sort to find out what particularly does the supplier(s) provide. It was revealed that the suppliers provide a wide range of both goods and services as may be required by the OMCs. Again the researcher understood that the suppliers are given special attention in the discharge of their duties in order to ensure efficiency in their deliveries. The supplier relationship has become so integral in effective business management that the business system supply chain management has evolved in the early 21st century (Kokemuller, 2013). As the core business of every OMC, petroleum products should always be available to customers in order to keep business tires going. In that sense, the OMCs in the Kumasi metropolis engage various suppliers who can be broadly place into two categories; international and local suppliers who either import or manufacture petroleum products. At first sight the term 'local or international supplier' may be defined simply in terms of geographical distance. They make available to the OMCS all that they need for onward distributions at their fuel stations or organisations they do business with.

It was revealed that most of the trucks used by these OMCs are not all owned by the company. There are truck owners who on the other hand also serve as suppliers to these OMCs. They have contracts with the OMCs to ensure that they pick up suppliers from BDCs as they will be directed to. The OMCs will have to pay for the cost of the consignment and the deliveries made at their fuel stations or to organisations. At most of the OMCs visited there were shops normally referred to as "Shopping Marts." At these shops various items are sold. During my interview with most of the fuel station managers it was revealed that all items in the shop have respective suppliers. What they do is that, requests are made to most of these suppliers once the station is in need of them. Some of the items supplied are bakery items, household items, fragrances, provisions, etc. Apart from suppliers who provide for these marts, they have other suppliers who provide lubricants, vehicle accessories, etc to the stations but some of these suppliers have a direct contract with the OMC.

A. Order Placement Methods

Research question 2.3 was to find out how orders are made by the OMCs. There are various means by which one can place an order. Order placing methods have evolved from a manually intensive process to a technology enabled, electronic platform lately (Burns et al., 2005). The researcher has highlighted a few of the possible methods that may relate more to the respondents. Table 4.6 and Figure 4.2 as seen below shows the results obtained from respondents for the methods the OMCs use for order placements.

Table 4.6 Method(s) for Order Placement.

METHOD OF ORDER PLACEMENT	PERCENTAGE (%)					Total No. of Respondents
	Below 20	20-40	41-60	61-80	81-100	
Fax	39	8	1	0	0	48
E-Mail	2	3	20	17	8	50
Phone	3	4	9	25	9	50
Mail (Postal)	44	3	0	0	0	47
Internet	2	8	14	19	7	50

EDI (Electronic Data Interchange)	5	9	11	21	4	50
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Source: Field Survey, 2013.

The above table and the graph affirm the fact that most OMCs place orders by using phones. The use of E-Mails, Internet, EDIs, Fax and Postal follows in that order. In a world where phones lately can be used for so many things, it is not too surprising to find it as the highest method by which OMCs in the Kumasi metropolis use in making orders to their suppliers.

Furthermore, it was gathered that the mode of request is dependent on which supplier is being dealt with. Most international supplier request are made via e-mails, internet and EDIs. In other cases, EDIs are used to raise various requests to suppliers within the chain of the operations irrespective of their location and if they are hooked on the same system. Some of the EDIs used by some of these OMCs include Soft Act and J.D. Edwards. Again some of the OMCs revealed that they use simple internet based software like Microsoft outlook to share both internal and external correspondence between suppliers and fellow colleagues. It so happens that most of the indigenous OMCs visited rely so much on their phones to make their request whereas the multinational OMCs will either use the phone majority for reminders and not hugely for making requests or orders. It was evident that most of these OMCs make less use of the Postal service lately as most scored below 20% usage for their method of placing order. A further probing into why OMCs are not using the later was due to the slow nature of its operations and the primitive ways some OMCs believe they are still operating. Again it was evident as per the respondent's results that Fax machines are also fading away as a tool for communication with the availability of scanners. It is interesting to note that apart from what was stated by the researcher, the organisations did not state any other mode by which they make orders from their supplier. Research question 2.4 sort to find out the reason(s) for the choice made in the earlier question. Most of the OMCs believe their reason for their method for order placement was due to the fact that it assures them of information accuracy and cost prudence.

B. Use of Information System by OMCs

Information system has been defined in terms of two standpoints one linking to its function and the other linking to its structure. From a functional point of view an information system is a technologically executed medium for the purpose of recording, storing, and disseminating linguistic expressions as well as for the supporting of inference making. From a structural point of view, an information system consists of a collection of people, processes, data, models, technology and partly formalized language, forming a cohesive structure which serves some organizational purpose or function. (Magalhaes, 1999). Results of research question 3.1 have been clearly displayed in Table 4.7 and Figure 4.3 respectively as seen below. The question sort to find out which of the stated information system is used by the sampled OMCs in the Kumasi metropolis.

Table 4.7 Results for the information systems used by the OMCs

Information System	Frequency (Yes)	Percentage (Yes)	Frequency No	Percentage (No)
SMS Alerts	36	72	14	28
EDI (Electronic Data Interchange)	45	90	5	10
Fleet Monitoring / Tracking systems	16	32	34	68
Web Track and Trace of Consignments	17	34	33	66
In-Cab Communication system	3	6	47	94
Electronic Proof of Delivery systems (e-PoD)	10	20	40	80
		100%		100%

Source: Field Survey, 2013.

The above figure (Fig. 4.3) and table (Tab. 4.6) shows the results that were received from fifty (50) successful respondents. It was revealed that 90 % as against 10% of the OMCs make use of EDIs which represents 45 as against 5 respondents who responded successfully. 72% as against 28% of the OMCs use SMS alerts while 34% as against 66% web track and trace of consignments. Also, 32% as against 68% use fleet monitoring or tracking systems, 20% as against 80% use electronic proof of delivery systems (e-PoD) and finally 6% as against 94% use In-cab communication system which in all these information systems help save or communicate various information to all those who matter in the supply chain of the OMCs.

It is evident that respondents sampled from the indigenous OMCs that are Jusbro Petroleum, Ghana Oil Co. Ltd. (GOIL) and Modex Oil Co. Ltd had little use for information systems as compared to the multinational OMCs which were Total Ghana limited and Shell Ghana Ltd. For instance, the technology of oil transportation has evolved alongside the oil industry (Mitchell et al., 2012) High amounts of oil are normally transported in vessels but mostly OMCs transport their oil products in trucks when consignments are picked from the BDCs. To ensure security, even though most trucks used by these multinational OMCs are not theirs they have clear guidelines as to requirements needed by their truck vendors before they can assign consignment pick-ups to them. They pay for installation of vehicle tracking devices that helps them to track the whereabouts of such trucks. A vehicle tracking system combines the installation of an electronic device in a vehicle, or fleet of vehicles, with purpose-designed computer software to enable the owner or a third party to track the vehicle's location, collecting data in the process (Kodavati et al., 2008). Modern vehicle tracking systems commonly use [GPS](#) or other related technologies for locating the vehicle (Narayana, 2011).

Apart from that, the constant use of internet helps them in web tracking and trace of consignments that they may be expecting from their international agents. It is obvious that most of these OMCs use courier or logistics companies such as the likes of FedEx, UPS, DHL, etc to courier some items across the globe. Most of these suppliers all have various means by which their customers can check the whereabouts of their parcels.

Again with installed systems at their various stations OMCs can easily communicate and monitor proceedings, stock levels of their products and many more. The use of information systems is so common with the multinationals whereas the indigenous OMCs have their own reservations for its dominant use in their day to day operations. Research question 3.2 was to find out what information is generally captured by the various information systems used by these OMCs. From the various respondents some of the information captured by the information system they use includes the following;

- Progress of requests made to suppliers.
- The exact location of trucks.
- Stock levels of petroleum products at respective filling stations.
- Delivery reports
- Over speeding of trucks or company fleet.
- Various prompts via text messages of an occurrence

C. Research Objectives

The researcher sort to attain some things through this research and in view of that there was four objectives set for this research.

D. Objective One: Examine the motivation for the use of IS in the SCM by the organization.

The first objective of this research was to examine the motivation for the use of information system in the supply chain management of the sampled OMCs. As already revealed, the sampled OMCs use information systems within their supply chain but the unanswered question is what may be their motivation for using information systems like EDIs, fleet monitoring or tracking systems, e-PoDs, etc. According to Lai (2011), motivation refers to reasons that underlie behavior that is characterized by willingness and volition. Also Broussard et al. (2004), broadly defined motivation as the attribute that moves us to do or not to do something. Considering the later definition, out of 50 respondents who attempted answering research question 3.3, 47 successfully answered the question which represents 94% which means the percentage that abstained was 6% which represents 3 respondents.

Apart from the above results, the researcher noticed that 54% of the total respondents acknowledged that their motivation was because of the time they get to save when they use information systems. Generally a lot of human activities are avoided when an information system is in use which indirectly helps one to save some energy for other

activities within the chain. A station manager shares an experience regarding how in the past he will have to stand long hours to manually check his stocks every morning. Currently this is not so because once fuel is supplied at the station they take measurements of what they have in stock, stock left and daily sales can easily be known due to the availability of an information system that tracks purchases.

Others also feel motivated due to the efficiency that is created. Some respondents claim their motivation has been the ability to expand domestic and international operations simply by the use of information systems. Some OMCs have found it easy to deal with either local and international partners or some of their suppliers because of their adaptation of information systems within their operations. According to Laudon and Laudon (2006), information systems can help companies extend their reach to faraway locations, offer new products and services, reshape jobs and work flows and perhaps profoundly change the way they conduct business that helps to improve profit.

Some acknowledged that apart from information systems leading them to get some clients it has also created and enhanced their relationship with some of their partners. Suppliers who do business with some of these sampled OMCs who have embraced the use of IS in some regards mostly have a reference matter they can look to since most of the communications are well saved as data for any future auditing or clarifications. This helps in resolving conflicts or any ambiguity that may arise.

Finally some respondents have been motivated since the use of information systems has helped fundamentally to reduce the cost of doing business or reduce the costs of business processes and to lower the costs of customers or suppliers. Gone were the days when the cost of transportation in monitoring activities of tanker drivers was a problem to some of these OMCs. Currently their investment in information systems like vehicle tracking has helped in that regard.

E. Objective Two: Examine whether IS in SCM must evolve as the company grows or otherwise.

The second objective of the researcher was to examine whether information system in SCM must evolve as the OMC grows or otherwise. In meeting this objective a direct question was asked to the respondents to find out their view. As seen from the above figure, most of the respondents who answered research question 3.6 believe they foresee changes made to the kind of information systems their current organizations are using. In all 48 respondents chose "YES" which represents the 96% while 2 respondents chose "NO" which also represents 4% as seen above in figure 4.5. Both respondents who belong to multinational or indigenous OMCs all affirmed their desire to see the information system used within their supply chain evolve with time. The researcher noticed that the two respondents who abstained from answering the question belong to an indigenous OMC.

Furthermore, one of the reasons stated by some couple of respondents was that they know that information systems is a technological invention and once manufacturers or designers of such system may wish to improve and bring new versions of the software then an upgrade should be welcomed too by the users. Some respondents claim that they have witnessed some system upgrades with the information systems they use even though it was not a complete change but rather it came with new and improved platforms. These comments were revealed in some informal interviews with some of the respondents. Finally, it was revealed that the act of IS evolving within the SCM of the OMCs sampled can help in the continuous course of the success of the organization.

F. Objective Three: Evaluate the influence of IS in SCM for the selected organization.

The next object of this research was to evaluate the influence of information system in SCM for the sampled OMCs. According to the researcher, influence in this research means the determining factor that has led the OMCs into choosing and using information system within their supply chain management. To help in this evaluation the researcher had to look at both internal and external factors that may cause the influence of the use of information system. Even though there was a direct question in the questionnaire (research question 3.5), the researcher adopted some informal interview questions that also helped in this regard.

a. Internal Factors

Internal factors can play huge roles in the implementation of any organizational change. Internal factors are those that exist within case organizations (Irani et al., 2008). Some of the OMCs expressed their influence under these internal factors.

Project Value: It was evident that most decisions taken regarding the use of information systems in multinational OMCs for example comes from their mother companies. This is so because such systems can be expensive and may need external approval before funds are released for its installation. During the researcher’s interview with some managers of the sampled OMCs, they revealed the extent by which the monetary value for the purchase and installation of information system can influence its implementation. From one area manager of a multinational OMC sampled, it took their OMC over six months before they could make a decision on a system to use in their regional offices. Whereas he believes if the project value fell within regional threshold value they would have acted on their own.

Preceding Experience with a System: During the study the researcher understood that some of the respondents have had an experience with information systems before. Apart from that, some departments within some of these OMCs might have exclusively used certain IS before and depending on the impact of such IS one can be influenced in their act of choosing another. If it so happens that the experience was good in a way it may influence the use of other future systems in the organization. Some users of information systems within the sampled OMCs did talk about their first time experience of which many will wish not to remember since it seems embarrassing.

Position of the Project Initiator: Being part of a bureaucratic organization, one will realize that it can be frustrating to deal with several chains of command, which makes getting things done quickly all but impossible (Desmarais, 2012). During some of the informal interviews the researcher sort to find out if the above is also an influencing factor when it comes to the adaptation of information system within an OMC. Interviewees from some sampled OMCs believed that they have had the experience were their ideas or suggestions have been thrown overboard looking at their position in the company whereas others have seen their suggestions implemented due to their respective level in the organization. The implication of dishonoring the brilliant suggestions of colleague workers because they may not be part of initiators or decision makers in the organization will cause initiatives that may change the face of the operations to be dragged.

b. External Factors

OMC Situation on the Market: In most OMCs the local market has an impact. Interviewees stated that their inability of not fully using information system is because of their current level in the OMC market. Some believe they are not yet there to implement some of these systems as used by some of the multinational OMCs.

Business Partners: Other OMCs believe they have been influenced to use information systems due to the other business partners their organization is engaged in doing business with. Some suppliers will willingly install some information systems since they wish to do business with another organization.

IT Trends and Fashions: Another factor that was identified was the IT trends. Lately new technologies are springing up and some organizations have just jumped on. Some OMCs agree to the fact that the use of Microsoft Outlook Express is widely used in their offices as a platform for sharing correspondences whereas other OMCs are using their personal mailing account to share correspondences. The later is very common with some of the sampled indigenous OMCs. The above explains some of the internal and external factors that have propelled the use of information system within the supply chain management of sampled OMCs in the Kumasi metropolitan assembly. Apart from the above factors the researcher also gathered that the introduction of information system within the SCM of these sampled OMCs is influencing their general operations and because of that some of the OMCs have been using it for some time now. The table below (Table 4.8) which is the findings for research question 3.6 can be juxtaposed to this objective.

Table 4.8 Results showing findings of how long OMCs have been using I.S.

	Years of Usage	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 1yr	5	10.2	10.2	10.2
	1 -3yrs	16	32.62	32.62	42.82
	3- 5yrs	4	8.16	8.16	50.98
	5- 7yrs	6	12.24	12.24	63.22
	7yrs and Above	18	36.73	36.73	99.95
	Total	49	99.95	99.95	

Source: Field Survey, 2013.

As seen from the above table, in all 49 respondents responded to this question and analysis of findings shows that 10.20% have been using these systems for less than a year now. 32.62% represents respondents of OMCs who have used I.S from 1 to 3 years, 8.16% represents respondents of OMCs who have used I.S for 3 to 5 years, 12.24% represents respondents of OMCs who have used I.S for 5 to 7 years and 36.73% represents respondents of OMCs who have used I.S for above 7 years as OMC workers.

A careful assessment of the results shows that most of the multinational OMCs have been using their information systems for long. That is Total Ghana limited and Shell Ghana Ltd. On the other hand the indigenous OMCs which are Jusbro Petroleum, Ghana Oil Co. Ltd. (GOIL) and Modex Oil Co. Ltd have not had extensive use of information systems. Majority of the respondents who are active users of information systems agree to the fact that information systems are generally useful and some concluded that they are very influential in their day to day operations looking at what they are able to achieve due to these systems. Other findings by the researcher tally's with [Bacha](#) (2012), who believes the influence of an information system once well introduced into an organisation is an innovation that has the potential to increase levels of monitoring and control in the organisation. Again the researcher deduced that directly, human activity system has experienced significant gain in efficiency and effectiveness with the introduction of IS in some of these OMCs

Some respondents also concluded that it was still influential even though there are some few challenges associated to its use but looking at the number of years such respondents claim they have been using I.Ss it came as a no surprise to such comments. This assertion was easily made because when assessment was made of the comments penned down in research question 3.5 as against answers given in 3.4 it was relative. The researcher was able to match the ages of those sampled as against the number of years they have been using information systems and that has been exhibited in the figure below.

As seen in the above 49% of respondents who are between the ages of 31 to 40 have been using information systems for a long time as per the OMCs sampled. Age periods 20 -30 representing 42.5, 41- 50 which represents a usage of 9 %, ages below 20 and age period 51 years and above all scored 0%. It is believed the youth have highly embraced IT (Carroll, 2002) but in this scenario the working experience of staff members of the OMCs gives another trend to the use of information system.

G. Objective Four: Evaluate the effectiveness of the chosen information system and the competitive advantage it presents for the selected firms as well as its disadvantages.

According to Cyrus (1991), measuring the effectiveness of information systems (IS) is an issue that has generated debate among academics and practitioners. She moves on to suggest that there are numerous and various approaches to measuring IS effectiveness. She considered six approaches which were user satisfaction, system usage, performance or usefulness, productivity, value analysis and cost-benefit. The researcher in answering the last objective of this study considered the following to help evaluate the effectiveness of the chosen information system as may be applicable to the sampled OMCs. They were user satisfaction, usefulness, productivity and system usage.

a. User Satisfaction

Satisfaction comes in many forms ([Egan](#), 2013). The fulfilment or gratification of a desire, need, or appetite generally explains the word satisfaction. Among the OMCs sampled it was evident that over half of them are satisfied with the current information systems they use. If this was not the situation the researcher will not have an overwhelming 54% of respondents who feel highly motivated to use information system. Again, it was revealed that most of the OMCs have been using their information systems for over seven years now which represented 36.73% of the total sample size (This information can be seen in table 4.8). During the interviews with some station managers and other supervisors it was revealed that monitoring of daily operations even though can be improved seem satisfactory at the moment due to the use of current information systems. Indeed there is no doubt as to the level of satisfaction users have enjoyed by the use of information systems within the SCM of their respective OMCs.

b. Usefulness

Currently, business organizations are described as a changing entity that is largely driven by the implementation of modern information systems which becomes an inevitable concern that can deliver valuable benefits (Al-adaileh, 2009). Paying attention to some of the above findings which has already been discussed, it is easy to say that some of the OMCs are still using information systems because they find it useful for their operations. To cite a few, table 4.8 shows how long some of these sampled OMCs have used IS. Again, figure 4.5 which shows the findings of how the

respondents of the sampled OMCs will wish to see IS evolve as their company grows is another example that can be used to affirm usefulness of IS to these sampled OMCs.

c. Productivity

A well implemented information system should improve productivity to some level in any organization. According to Parham (2007), productivity is a measure of the pace at which outputs of goods and services are formed per unit of input. Productivity also depends on several factors which includes motivation, talent, training, work environment, support from others, time management, etc but when everything lines up, things get done. In the case of the sampled OMCs the level of motivation that may assure productivity has been well discussed as an objective and if it is anything to go by then the researcher can conclude on the effectiveness of the IS chosen by the OMCs in this regard. It was revealed through interviews by some of the respondents that they never found it easy using the IS the first time but upon undergoing some training and by the kind support of some colleagues they are using the systems with some little or no challenge currently. For example, the investment of buying tracking devices for trucks by some of the OMCs has helped to ensure that deliveries are calculated and the act of panic highly erased. Per the above activities, it is clear that the OMCs are aspiring for some level of productivity and that is why they will go to such extents of ensuring that all team members familiarize themselves with the use of the IS at their office. The result of such an action is possible to ensure productivity as the output of their action can equal their input (Parham, 2007).

d. System Usage

A significant research stream in information systems (IS) is predicting and explaining technology acceptance among users (Chesney, 2008). Lack of user acceptance has long been an impediment to the success of new information systems (Davis, 1993). Most organizational based information systems are installed to help improve performance on the job. Unfortunately, performance impacts are lost whenever systems are rejected by users. It is wise to mention that user acceptance is often the pivotal factor determining the success or failure of an information system (Davis, 1993). Acceptance, however, is not equivalent to success, although acceptance of an information system is a necessary precondition to success (Petter et al., 2008). Without user acceptance the whole issue of effectiveness of a chosen IS is lost. With this study the researcher realized that 73% of the respondents joined the company after the IS had been implemented and so they had to accept it. 20% of the respondents found themselves present while some of the IS were introduced and even though they claim acceptance did not come easily among some of their colleagues they begun to appreciate the need and gradually accepted it. The implication of these respondents having embraced the use of IS in their respective OMCs will ensure some level of productivity or help in meeting the target for the adaptation of IS within their operations. In summary, right from the findings of how order placement is done and the total number of respondents who responded to the research questions 3.4, 3.5 and 3.6 there is a sense of acceptance of IS by these OMCs. It is obvious that the OMCs find the use of information system within their supply chain effective.

IV. FINDINGS

The purpose of this study was to examine the influential role of information system within the supply chain with major emphasis on OMCs in the Kumasi metropolis. The findings of the study can be summarized as follows: That 100% of sampled OMCs in this study have one time or the other used an information system. Among the respondents 75% agree to the fact that information systems are very influential in their operations and this finding can be linked to objective three of the study. This assertion was received from most of the multinational OMCs that were sampled.

In line with objective two of the study, 100% of the sampled OMCs believe that once technology is not static they will welcome the evolving of the information system used by their organizations once funds are there to purchase and ensure their successful implementation.

There was unanimous agreement amongst all respondents that they are in involvement with various suppliers in their operations. About 46% agree that the major means of placing orders from their suppliers was by phone as others used e-mails, EDIs, etc.

The issue of what information was captured by these information system was (70%) dominated by tracking information of requested supplies of petroleum products. Furthermore, in meeting objective one of the study, (68%) feel motivated by the use of information systems because it improves efficiency, saves time and helps to cut some operational cost.

V. CONCLUSION

The Petroleum sector is currently one sector in the Ghanaian economy which has gained a lot of media attention. The discovery of oil coupled with the numerous benefits it brings to the Ghanaian economy as well as its impact on the Ghanaian environment is perhaps some of the reasons for its attention.

This research has confirmed that the amount of information flow in OMC operations is heavily increasing and it is vitally important to efficiently manage and share information inside and among suppliers in the chain of the organizations operation. The invention and availability of information systems is to help ensure that organizations just like the OMCs found in the Kumasi metropolis or elsewhere make use of them to attain greater efficiency.

It is vital for OMCs, BDCs and the NPA to improve their support for each other to ensure that they all live up to their mandate and also grow positively. Information systems can have a great influence within the supply chain of any business when implemented and OMCs are better placed to adopt the recommendations of this study.

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