

LOGISTICS INFORMATION SYSTEMS IN MACEDONIAN FIRMS: CURRENT SITUATION AND FUTURE PROSPECTS

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Abstract

This study aims to explore the current status and future patterns of Logistics Information Systems [LIS] of organizations in Macedonia. Basically the aim and objectives of this research are threefold: 1) *To identify the major challenges and developments of Logistics Information Systems by firms' in Macedonia*, 2) *To assess the current state and future policies of LIS* 3) *To clarify the need of LIS efficiency and effectiveness to organizations strategies*. Grounded methodology is adopted in order to analyze the data collected as well as other sources of information. However, the questionnaire used in this research was adopted from the study developed by Ketikidis et al. (2008) but again changes were incorporated. The data collected from 65 companies are analyzed by the employment of descriptive statistics by utilizing 'Statistical Package for Social Sciences' (SPSS) software in order to test the collected data. The findings, nevertheless recommend that organizations face common challenges in general, majority of the respondents state that they are emphasizing more into closer partnership with suppliers and Just In Time (JIT) supply rather than concentrating on customer service. Thus, findings suggest that firms in Macedonia are not ready yet to play an important role in the South-East European supply chains or in global supply chains. The present obstacles that embrace the abilities of developing relationships with the forward links, weak organizational strategic planning and low level of infrastructure as well as low level of Logistics and Supply Chains Management education are the main drawbacks for this country. Indeed changing managerial mentalities within these companies is gradually progressing and in the future it is expected for better Logistics and Supply Chain knowledge.

Keywords: Macedonia, Logistics information systems, Firms, Supply chain, Information sharing.

1. INTRODUCTION

In today's business environment a good starting point of understanding the right pattern of developing logistics concepts and strategic alliances emphasizes on appreciating the inter-organizational technology adoption decisions. The contemporary notion of global economy is to stimulate the demand for the usage of new systems, technologies, tools & techniques, methodologies and other frameworks in organizations for Logistics Information Systems [LIS]. Firms extend their nodes and links continually, therefore it is stated that the competition is run through supply chain that organizations do adopt rather than the execution of their generic strategies (Walton and Miller, 1995).

The emergent of LIS provides firms with an advantages to be more dynamic to manage the collaboration and the relationship with the suppliers, suppliers' supplier, customers and even in many

cases collaboration with the competitors, sharing information and knowledge offers the chance to develop a collaborative logistics and supply chain strategies in order to break the asymmetric barriers of the markets or of a particular industry. Yet, developing and sustaining such logistics strategies in organizations located in Macedonia is very difficult, but this does not mean that is not possible.

However, Gunasekaran et al. (2007) note that logistics function incorporates the smooth flow of materials, products and information throughout the organizations supply chain that must be supported by Information Systems [IS]. The excess of literature regarding Material Resource Planning [MRP] - (Koh, 2004), Manufacturing Resource Planning [MRP II] - (Koh et al., 2002; Loh et al., 2006), Enterprise Resource Planning [ERP] - (Min et al., 2005), Extended Enterprise Resource Planning [ERP II] - (Hughes and Love,2004), Supplier Relationship Management [SRM] - (Min et al., 2005), Customer Relationship Management [CRM] - (Tanner et al., 2005), many more IS are respected which aim to improve the state of logistics performance. On the other hand, advanced information technologies have been recently applied to manufacturing, services, logistics providers and retail sector. The main distinguished advanced technologies are Global Positioning Satellites [GPS] - (Hughes and Love, 2004), Radio Frequency Identifications [RFID] - (Whitaker et al.,2007), Wireless and mobile technology (Hughes and Love,2004). The ability to trace and track the products throughout the supply chain process with an increased effectiveness and efficiency in the information processing and security as well as improved control of the suppliers and customer relationship is known to work properly in the developed countries with high rate of infrastructure in place (Koh, 2004).

According to Ketikidis et al. (2008) the lack of information sharing is noted to be the main bottleneck for maximizing the organizations profit. Thus, different LIS and technologies have been adopted to manage accurately their logistics operation. Certainly adopting LIS could provide an organization a competitive advantage in order to differentiate in the industry it competes.

2. LITERATURE REVIEW

The main purpose of LIS is to collect, retain and manipulate data within an organization in order to make decision that can be categorized from strategic level to operational level (Liang, 2008). This can provide and facilitate better transactions regarding the business. Moreover, many large computers have huge memory space, quick computing as well as high access to information in organization from an enterprise-wide IS as it is Oracle, SAP, Bean, have the ability to improve the platform for sending or transmitting information via Electronic Data Interchange [EDI], or other Information and Communication

Technologies (ICT) have created the chance for organizations to share quick and more reliable information in an inexpensive manner throughout the integrated logistics chain (McLaren et al., 2004).

2.1. Vital issues of information sharing in the Logistics Information Management

There is no doubt that information sharing is a prerequisite for operation of the logistics success. The crucial issues of Information Technologies [IT] in the logistics are facts of reducing the costs, provide strategic planning approaches. Therefore, information must be available to all organizations in their LIS and other business processes should be in a way structured so they make use of it whenever and wherever needed (Chiu, 1995; McLaren et al., 2004; Lau and Lee, 2000).

Yet, it must be mentioned that the use of IT, networks e-business are not alone a sufficient to provide benefits sharing information leads to improvements and to better coordination of activates. It should be claimed though that Internet itself reduces certain costs; however utilization of strategic information sharing is the most important achiever for desired business coordinator (Chiu, 1995; McLaren et al., 2004).

2.2. Achieving LIS fit in organizations

The capabilities of LIS match demands for supporting business unit's competitive strategy. Thus, the alignment of LIS involves a fit between IS strategy, competitive strategy, organization's processes and infrastructure. For this reason, achieving LIS requires for a degree of communication and collaboration in the whole extended logistics partners; this means that an organization must have a strong knowledge of the internal and external environment (Lau and Lee, 2000).

3. THE USE OF INFORMATION SYSTEMS IN LOGISTICS MANAGEMENT

It is worthy to mention that logistics management emphasizes on the formation of essential network, which mainly consists of functional entities that must provide information and resources in order to achieve the objectives. The Business-to-Business [B2B] environment requires for suppliers to be able to provide delivery properly and be compatible with the customers' demand (Ketikidis et al., 2008). Thus, required delivery performance should be approached in effective and efficient employment of an ERP system that provides accurate flow of information within an organization with skilled employees (Min et al., 2005). However, this is also applicable and beneficial to Business-to-Customer [B2C] industries, where the demand chain is seeking to meet delivery of the customer performance. The constrains of this kind are services, which can be outsourced to logistics providers as are the Third Party Logistics [3PL] and Forth Party Logistics [4PL] (Bhatnagar et al., 2000).

Basically, an ERP system integrates the departments, management and supervision in an organization. Indeed ERP systems have been developed for the fragmentation of information within an enterprise's business in order to integrate both intra-enterprise and inter-enterprise information. On the other hand, there is a bottleneck of integration of an ERP system in the whole Supply Chain Management [SCM] because it depends on what ERP system the suppliers and customers have adopted and this makes it incompatible. The solution of this problem has been approached with the adoption of an ERP II system, which creates a link between different ERP systems to be integrated in one regarding the whole chain (Whitaker et al., 2007).

Moreover, an organization must not rely on an ERP system for managing its LIS, because its limitation is due to its uncertainty. Other systems must be incorporated as well, such as RFID, wireless and mobile technologies that will assist products tracking and tracing in the whole logistics processes. To this end, this can reduce the uncertainty since an updated flow of orders, parts and materials can be monitored (Ketikidis et al., 2008). Furthermore Gunasekaran et al. (2007) argues that an "*intelligent agent-based knowledge management system*" can be used in conjunction with other advanced technologies and can drastically reduce the uncertainty obstacles in the production logistics.

There are a wide range of ERP and ERP II systems for sale in the market but they are expensive and not every organization can afford them. Therefore, its recommended to adopt and MRP or MRP II since they are still well known in the manufacturing organizations, they are used mainly in the production planning, while inventory control is managed with the use of a Warehouse Management System [WMS] - (Koh, 2004; Koh and Saad, 2002). Nevertheless, LIS notion is to integrate with the suppliers and customer, thus SRM and CRM have been widely adopted so organizations can merge such systems for better performance (Tanner et al., 2005; Gore and Kess, 2007).

As mentioned earlier EDI's are used for transferring information among suppliers and customers, whereas Bar coding is still accepted as one of the most effective tools for ensuring parts and for tracing products (Ketikidis et al., 2008). Such technologies are not expensive when comparing to RFID tags even though it is expected to be reduced in the near future. It is suggested that RFID's should considered as transformational event rather than as innovative technologies (Ketikidis et al., 2008; Whitaker et al., 2007). The RFID technologies, from the security context can offer great economic advantage to organizations and customers, but it is still an issue that threatens customers' privacy since it is thought to be one of the invasive surveillance technologies (Whitaker et al., 2007).

4. METHODOLOGY

The aims and objectives of this research paper are threefold:

- *To identify the major challenges and developments of Logistics Information Systems by organization in Macedonia.*
- *To assess the current state and future policy of LIS.*
- *To clarify the need of LIS efficiency and effectiveness to organizations policy in Macedonia.*

The study adopts Grounded Theory [GT] in order to analyze the primary and secondary data. According to, Mello and Flint (2009) GT emerges from deep and contemplative analysis of data that are obtained from the conducted research rather than assumptions developed before the research is conducted. Thus, GT offers the ability to employ exploratory research since it embraces both qualitative and quantitative data. The qualitative data in this study will be used for enhancement of the findings.

However, the primary data was collected by the use of a questionnaire and interviews later were conducted in order to make sure that the surveys were truly answered and are reliable. The questionnaire used in this research was adopted from the questionnaire developed by Ketikidis et al. (2008) with their permission, yet minor changes were made.

5. FINDINGS

The survey was delivered to more than 300 organizations via e-mail, fax and personally handed for a period of 18 months, however only 65 responses from different cities located in Macedonia could be collected for this period. As can be noted from the table below, the majority of the respondents belong to manufacturing sector that mainly gained 40 percent, whereas other represented only 7.7 percent.

TABLE 1 – SECTOR TYPE

Industry	Frequency	Percent
Manufacturing	26	40.0
Services	23	35.4
Commercial	11	16.9
Other	5	7.7
Total	65	100

The majority of respondent employee 100 to 500 people as represented with 50.8 percent and only one firm employees between 1001-5000 which 1,5 percent and this is not surprising for such a small country.

TABLE 2 – SIZE OF ORGANIZATIONS

Number of employees	Frequency	Percent
51-100	19	29.2
101-500	33	50.8
501-1000	12	18.5
1001-5000	1	1.5
Total	65	100

However, an interesting point is that firms in Macedonia manage their supply chain through close partnership with suppliers that are 32.3 percent of the sample and by the use of JIT supply which is represented with 26.2 percent. According to the information gained in the visits, it was stated that close partnership helps them with the accounts payable and can be prolonged if a strong relationship is developed and also in some cases was stated that helps about new product development. Unfortunately other logistics tools are not used much insofar.

TABLE 3 – SUPPLY CHAIN TOOLS CURRENTLY IN USE

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Close partnership with suppliers	21	32.3	32.3	32.3
Close partnership with customers	3	4.6	4.6	36.9
JIT supply	17	26.2	26.2	63.1
e-procurement	2	3.1	3.1	66.2
EDI	2	3.1	3.1	69.2
Outsourcing	1	1.5	1.5	70.8
Subcontracting	1	1.5	1.5	72.3
3PL	4	6.2	6.2	78.5
Plan startegically	3	4.6	4.6	83.1
Supply Chain Benchmarking	4	6.2	6.2	89.2
Verical integration	2	3.1	3.1	92.3
Few suppliers	2	3.1	3.1	95.4
Many suppliers	1	1.5	1.5	96.9
Use external consultants	1	1.5	1.5	98.5
Other	1	1.5	1.5	100.0
Total	65	100.0	100.0	

Furthermore, the respondents provided reliable feedbacks since 75.4 percent of organizations stated that are somewhat successful in managing their logistics and only 10 of the surveyed organizations or 15.5 percent believe that are successful in managing their logistics.

TABLE 4 – MANAGING LOGISTICS SUCCESSFULLY

Managing logistics successfully	Frequency	Percent
Not successful	4	6.2
Somewhat successful	49	75.4
Successful	10	15.4
Very successful	2	3.1
Total	65	100

Moreover, table 5 below shows organizations in FYROM that have separate logistics department.73.8 percent if the respondents stated that they do not have a separate logistics department.

TABLE 5 – SEPARATE LOGISTICS DEPARTMENT

Separate logistics department	Frequency	Percent
Yes	17	26.2
No	48	73.8
Total	65	100

TABLE 6 – CURRENT SYSTEMS AND FUTURE IMPLEMENTATION

Current Systems and future implementation	Current Systems/ Frequency	Current Systems/ Percent	Future Systems/ Frequency	Future Systems/ Percent
Material Requirement Planning (MRP)	4	6.2	2	3.1
Material Resource Planning (MRP II)	2	3.1	5	7.7
Enterprise Resource Planning (ERP)	8	12.3	17	26.2
Warehouse Management System (WMS)	4	6.2	7	10.8
Supply Chain Management (SCM)	16	24.6	19	29.2
Customer Relationship Management (CRM)	1	1.5	8	12.3
Supplier Relationship Management (SRM)	4	6.2	0	0
Just In Time (JIT)	15	23.1	4	4.6
Theory of Constrains (TOC)	2	3.1	0	0
E-commerce	3	4.6	0	0
E-business	3	4.6	0	0
Decision Support/expert system	1	1.5	3	6.2
Electronic Data Interchange (EDI)	1	1.5	0	0
Bar Coding	1	1.	0	0
Total	65	100	65	100

The table above portrays the current systems that are used and the intended ones planned to be implementing in future by organizations in Macedonia. Therefore the most current used systems are SCM with 24.6 percent, JIT with 23.1 percent and ERP 12.3 percent respectively. On the other hand, 29.2 from the sample stated that plan to implement SCM in the future and 26.2 plan on implementing an ERP system. Indeed other system did not get that much attention by the organizations, some of them which are contemporary these as is e-business, e-commerce were not planned at all for future implementation regarding the sample. Therefore, according to these findings it can be noted that organizations are more focused on backward chain rather than customer chain orientation.

TABLE 7 – GAINED BENEFITS OF USING THESE SYSTEMS

	N	Mean	Std. Deviation	Std. Error Mean
How much did you actually benefit from using these systems?	65	3.54	.99	.12
Better quality of information	65	3.74	.82	.10
Better quantity of information	65	4.11	.85	.11
Flexibility	65	4.29	.80	9.98E-02
Reducing lead-time in production	65	4.31	.88	.11
Cost saving	65	4.35	.78	9.67E-02
Forecasting	64	4.17	.88	.11
Resource planning	65	4.57	.71	8.76E-02
Better operational efficiency	65	4.42	.79	9.78E-02
Reduce inventory level	65	4.57	.64	7.90E-02
More accurate planning	65	4.48	.77	9.58E-02
Increased coordination between departments	65	4.29	.76	9.49E-02
Increased coordination with suppliers	65	4.29	.72	8.97E-02
Increased coordination with customers	65	4.40	.77	9.51E-02
Increased sales	64	4.38	.75	9.32E-02

As can be noticed benefits gained are oh high importance, most of the benefits are above 4. Such information is surprising, since organizations can clarify their strategies through the use LIS in an effective and efficient manner. To sum up, according to these findings it urged to firms in Macedonia for adopting the right LIS that fits their strategy in order to generate more benefits.

6. CONCLUSION

According to the findings firms in Macedonia manage their supply chain through close partnership with their suppliers and the use of JIT supply even though most of them do have a separate logistics department. Indeed they are not so much focused on their on serving better their customer, the backward chain has more power for them currently. The limited ability to develop forward valuable ability is very low and causes them to loss sales generations and building relationships with their valuable key accounts, this is one of the main bottlenecks of not being satisfied with their logistics management.

Yet, SCM, JIT and ERP systems are currently used more accordingly, while in the future they plan also to concentrate on implementing similar systems as SCM, ERP and CRM systems. The benefits gained from such systems is noted be of high importance as can be the findings and this can have a great impact on their long term strategy. To conclude, firms in Macedonia in general concentrate more in the backward chain and less on their forward links.

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