

# Study of Current Software Trends of Logistics Service Providers with Feasibility of Cloud Computing as an Alternative

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## **Abstract:**

*Information Technology has been an enabling driver for supply chain management. The availability of software to manage logistics gives a competitive advantage to its users-especially to Logistics Service Providers(LSP). Logistics management software is now available in the guise of Software as a Service (SaaS)-for “Cloud” based operations. These are one of the first Cloud Computing based applications in the field of logistics and supply chain management. The following are the main objectives of the study:-*

- 1. To understand the impact of logistics software on its users*
- 2. To map the views and opinions of LSPs and other users on available logistics software solutions*
- 3. To gauge the views and opinions of LSPs and other users of logistics software solutions towards migrating to Cloud Computing*
- 4. Understand key drivers that govern decisions behind IT investments*
- 5. Preferred Logistics software of Logistics Service Providers*

*Secondary research was carried out to map the available functionalities in the different software solutions in the market and to gather information pertaining to Logistics Solutions software trends around the globe. Primary research was carried out in the form of a survey sent to major Logistics Service Providers and users of such software to understand their views on available software solutions, their preferences in choosing software and their openness to adopting cloud computing. In-depth interviews were carried out with the vendors of this software to understand the market from their perspective. Analysis of the data showed that though the market was dominated by a few large software vendors, each customer sought a customized set of IT applications that best fit their own processes. An interesting outcome was that Cloud-based logistics solutions haven't still caught up in “Advanced Logistics Hubs”-like Singapore and Dubai- in spite of being in vogue in North America- and having clear advantages of lower costs and reduced deployment times.*

**Keywords:** *Logistics, Supply Chain Management, Cloud Computing, Logistics Service Provider, IT, Logistics Solution Software, Software as a Service*

## **Introduction**

The paper is broken down into the following sections.

Section 1: Research methodology

Section 2: Overview of literature

Section 3: The findings& analysis: primary research

Section 4: Conclusion.

It is important to note at this juncture that Cloud Computing is still evolving as a field. Furthermore, the primary research was conducted in Singapore and in the United Arab Emirates (UAE) as separate surveys.

The survey that was carried out in Singapore focused on Third Party Logistics Providers (3PL). Singapore is a major logistics hub that is known for the maturity of its logistics industry and the early adoption of new technology- both software and hardware. The primary objective of this survey was to gauge the openness of the Singapore based 3PLs towards adopting a “Cloud” based Logistics Solutions. 8 valid responses were collected.

The survey carried out in the UAE was based on a structured quantitative survey. The objective of the survey was to understand the technology adoption trends in the UAE. As a part of this survey, respondents were also asked about their

opinion on Cloud based technology trends. A non-biased sampling of professionals from various hierarchy levels across different organizations and subsectors of the logistics and supply chain domain was used. The survey was rolled to over 100 companies from various industries. Valid responses were obtained from around 40 companies in the UAE.

## **Research Methodology**

### *Secondary Research*

Secondary research was carried out to map the available functionalities in the different software solutions in the market and to gather information pertaining to Logistics Solutions software trends around the globe.

Apart from the present solutions available in the market in the form of ASP (Application Specific Provider), the different aspects of Cloud Computing including its premises, advantages, issues, costs, licensing variations with an eye on comparison with present solutions were also reviewed to understand the drivers that may govern the decision of migrating to the cloud. This was carried out at a generic level to understand the structure of SaaS (Service as a Software) based solutions.

## Primary Research

Primary research was carried out in the form of a surveys sent to major Logistics Service Providers and users of Logistics and Supply Chain Management software in Singapore and Dubai respectively to understand their views on available software solutions, their preferences in choosing software and their openness to adopting cloud computing. Singapore and Dubai (UAE) were chosen for this study as they are the important logistics hubs in Asia. In-depth interviews were carried out with the vendors of this software to understand the market from their perspective.

## Limitations

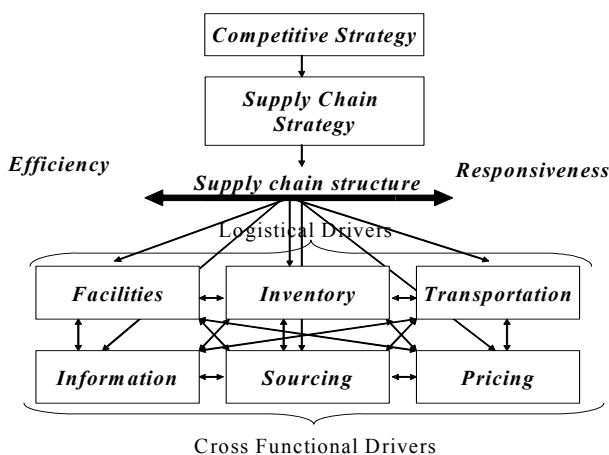
We have limited the objective of our survey to understanding the present logistics software trends and the willingness of logistics service providers and software users towards adopting cloud computing.

## Overview of Literature

### Supply Chain, Logistics Management-Drivers and role of IT

There are six drivers of supply chain performance (Chopra, Meindl, & Karla, 2010). These are Facilities, Inventory, Transportation, Information, Sourcing and Pricing.

Information as per the framework is a cross-functional driver. The authors mention that of the 6 drivers, Information is the most important. Of the different flows that make up the supply chain, information is the most critical. It is the information sharing across the supply chain that allows for visibility and in turn the co-ordination across its different stages. Without information flow, critical operational activities like planning, ordering, scheduling warehouse activities, transportation, production- to name a few would not be possible.



**Figure 1. Framework for Structuring Drivers.**(Chopra, Meindl, & Karla, 2010)

The advantage of added visibility allows a supply chain to become efficient and responsive at the same time. It enables better forecasting and aggregate planning in the push supply chains and is a pre-requisite in pull supply chains.

In this manner, Information and in-turn Information Technology plays a crucial role in the management of today's Logistics and Supply Chains.

Technologies that enable Information sharing include EDI (Electronic Data Interchange), Internet (Web 2.0), ERP (Enterprise Resource Planning systems, Supply Chain Management software including Customer Relationship Management (CRM) software, Supplier Relationship Management (SRM) software among many others.

In this paper, the focus is on ERP and Supply Chain and Logistics Management software.

## Application of IT in Logistics and Supply Chain Management

Logistics Management software may either be modules

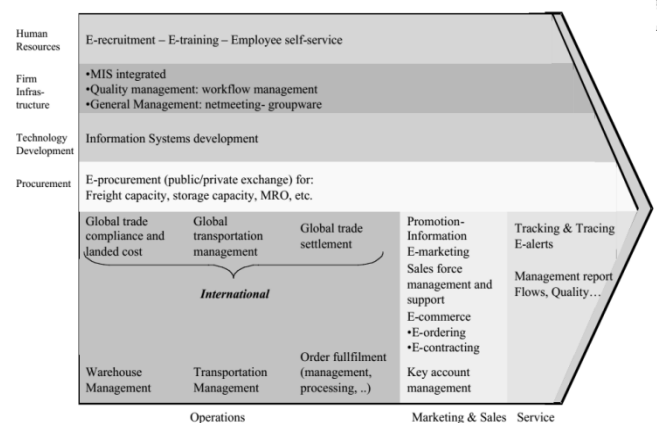
	Typical Applications	Application Focus	Contribution to Competitiveness
Transaction	<ul style="list-style-type: none"> <li>Enterprise Resource Planning (ERP)</li> <li>Warehouse Management Systems (WMS)</li> <li>Transportation Management Systems (TMS)</li> </ul>	<ul style="list-style-type: none"> <li>Accuracy</li> <li>Consistency</li> <li>Economies of scale</li> <li>Efficiency</li> </ul>	<ul style="list-style-type: none"> <li>Required to support business operations today</li> </ul>
Communication	<ul style="list-style-type: none"> <li>Supply Chain Event Management (SCEM)</li> <li>Radio-Frequency Identification (RFID)</li> <li>Collaborative Planning, Forecasting and Replenishment (CPFR)</li> </ul>	<ul style="list-style-type: none"> <li>Accuracy</li> <li>Coordination</li> <li>Speed of communication</li> <li>Visibility</li> </ul>	<ul style="list-style-type: none"> <li>May maintain position relative to competitors but will not be a sustainable competitive advantage</li> </ul>
Relationship Management	<ul style="list-style-type: none"> <li>Customer Relationship Management (CRM)</li> <li>Advanced Planning and Scheduling (APS)</li> </ul>	<ul style="list-style-type: none"> <li>Customer relevance</li> <li>Resource utilization</li> <li>Responsiveness</li> </ul>	<ul style="list-style-type: none"> <li>Can provide extended competitive advantage by achieving more precise customer service capability and better resource utilization</li> </ul>

**Table 1. Supply Chain Information Technology Applications.** (Closs, 2007)

available in ERP solutions that are applied across a supplier as stand-alone software developed by specialists. The second variety is also called "Best of Breed" software.

The logistics software being provided can be in the form of Warehouse Management Systems (WMS), Transportation Management Systems (TMS), Inventory Management Systems etc. Please refer to the Table 1 that illustrates the different kinds of IT solutions available to manage the various aspects of the supply chain.

Founou (2002) had created a framework for IT applications in the value chain of Logistics Service Providers (LSP). This framework is illustrated in the following figure:



**Figure 2. Contribution of Internet And Related Technologies to The LSPs' Value Chain.** (Founou, 2002)

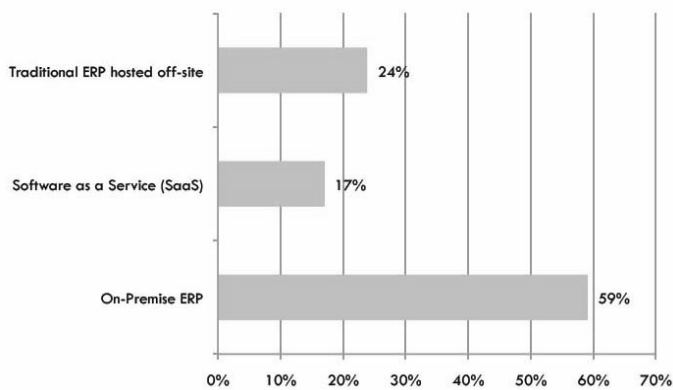
This figure highlights the use of internet for various aspects of the value chain of a Logistics Service Provider.

Presently, there exist a number of ERP solution providers. The popular of these include SAP, Oracle, Microsoft, Epicor software and Inforglobal Solutions.

From a licensing perspective, Logistics and Supply Chain Management software could either be a proprietary, open-source, on-demand licenses (SaaS) and those being hosted on premise.

### Growth of On-Demand and SaaS

Jacobson, Shepherd, D'Aquila, & Karen (2007) predicted that new methods of licensing and deployment of ERPs would gain momentum in the near future with major vendors developing on-demand and SaaS solutions.



**Figure 3. ERP Deployment Model- 2010.(Panorama Consulting Solutions, 2011)**

By 2010, users of SaaS based ERP solutions made up nearly 17 % of the total deployed solutions. In 2009, it was less than 6%.(Panorama Consulting Solutions, 2011)

### On-Demand and SaaS software

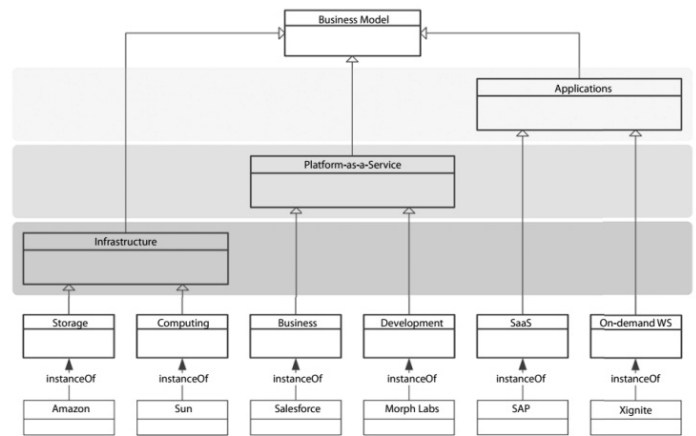
On-Demand/ SaaS (Software as a Service) are terms used to describe one of the categories of Cloud based solutions that are being offered. The other categories of Cloud based solutions being offered include Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

“The IaaS basically addresses the business of provisioning the physical architecture of the cloud in the form of storage capabilities and/ or computing power. They are organized as cluster like structures that facilitate virtualizing technologies.

PaaS addresses the availability of a platform for development of code and software for cloud based development and business platforms.

SaaS on the other hand is the aspect of cloud computing that represents the actual interface with the customer. SAP offers a B2B package in the form of BusinessByDesign- a service oriented business solution.” (Weinhardt et al.,2009)

These services may be pay-per-use, subscription type or of the dynamic pricing type



**Figure 4. Cloud Business Model Framework. (Weinhardt, et al., 2009)**

### Cloud Computing- Premise, Advantages, Issues, Costs

#### Premise

SaaS is an aspect of cloud computing. The advent of cloud computing required that “the following hardware requirements be fulfilled:-

1. Illusion of infinite computing resources available on demand.
2. Elimination of an up-front commitment by Cloud users.
3. Ability to pay for the use of computing resources on a short-term basis as needed.” (Armbust et. al, 2009).

All of these three are required to address the final effect of being to scale up and scale down the operations that are carried out as per the requirement as quickly as possible without any sort of hindrances and delays.

It is through this flexibility, that the economic benefits of cloud computing can be realized. The flexibility encompasses the “elasticity” and the “transference of risk”. The risk being mentioned being that due to over- or under-provisioning (Armbust, et al., 2009).

#### Advantages

Torbacki (2008) mentions that the “advantages of using SaaS based ERP solutions include:-

- Low initiating costs
- Big Initiating speed (quick start-up)
- Low subscription costs (as opposed to Licensing)
- No requirement to install specific software on workstations
- Online access from any location with internet access
- Eliminates license and upgrade costs
- Lower Total Cost of Ownership
- Continuous access to newest software versions compatible with existing law
- Access to newest business technologies
- Predictability of costs”

What this implies is that Cloud computing allows for lower costs and also a greater flexibility at the same time. Lower costs could be due to the fact that Cloud Computing does not require a client to setup a server or other hardware architecture specifically for the purpose. The minimum hardware requirements could be due to the fact that existing infrastructure would be enough to service the Cloud based

application. However, a pre-requisite would be the need for an internet connection. Another place where savings could occur would be those attributed to saving IT manpower. The onus of updates and upgrades to SaaS based applications is on the provider. The upgrades take place centrally and there is no need to shut-down the system for maintenance. The pay-as-you-go model which allows customers to pay only for those resources and modules they would use would further drive down the total cost of ownership. Moreover, licensing fees are taken care of in the subscription.

These advantages are attractive to Small and Medium Businesses who may in normal circumstances not be able to afford a full scale ERP implementation carried out on-premise. These organizations benefit from the advantage of being able to pay for only the specific module of the software being used either based on a pay-per-use model or the subscription model.

Apart from these advantages, the other aspects that cloud computing promises to offer includes better mobility for the user and better opportunities to collaborate. (Hayes, 2008). Issues Apart from the advantages that cloud computing offers, there are a few issues that it faces.

Hayes (2008) highlights that one of the major challenges of moving applications to the Cloud would be the complexity involved with respect to the languages used at the different levels of Cloud. Different languages would need to be used for the back-end, client side interface and the server application that interfaces between the two. To add to the complexity, another language would need to be used to exchange the information between the different layers.

Vouk (2008) mentions that cloud computing is based on the concepts of “virtualization, distributed computing, utility computing and networking, web and software services”. It utilizes a Service Oriented Architecture (SOA) framework whose key features include “componentization of its services, an ability to support a range of couplings among workflow building blocks, fault-tolerance in its data- and process-aware service-based delivery, and an ability to audit processes, data and results, i.e., collect and use provenance information.” The author mentions that the component based approach is highlighted by the reusability of elements in multiple work-flows, the substitutability of implementations, the extensibility and scalability of the system component pool with an architecture to match, customizability, the ability to create new more complex functional solutions, reliability, availability and security.

Taking into account these basic requirements and coupling them to those of the users, one can comprehend the complexity involved in creating and running a SaaS based solution.

The other challenges that are highlighted include privacy, security and reliability.

Different cloud computing deployment models mean different security challenges. Multi-tenancy is the back-bone of cloud computing. However, it makes data management

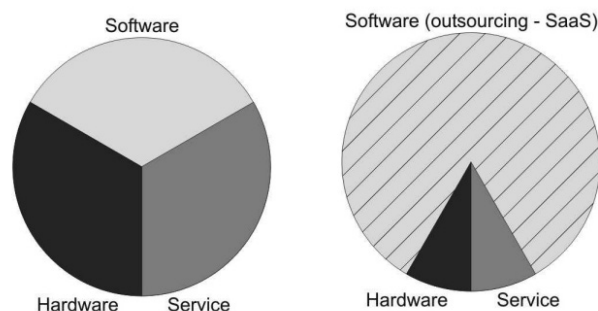
complex. Carlin and Curran (2011) mention that as cloud based services gain popularity, cloud service providers may face problems with the scalability of infrastructure. It will also be a challenge to store sensitive data and still comply with privacy regulations. Encryption and firewalls may reduce instances of unauthorized and/or accidental access to a customers’ data-but these methods are not fool proof. The needs of the hour are better security techniques apart from present solutions customized for cloud architecture and third party auditing of security measures.

The “obstacles to the adoption and growth of cloud computing include:-

- Availability of service
- Data Lock-in
- Data Confidentiality and Auditability
- Data Transfer Bottlenecks
- Performance Unpredictability
- Scalable storage
- Issues in large scale distributed systems
- Scaling quickly
- Reputation Fate Sharing
- Software licensing” (Armbrust, et al., 2009).

*Costs*

Torbacki (2008) gives the following symbolical representation of the source of costs associated with implementing and running a traditional ERP system versus one that is based on hiring a system in SaaS Mode.



**Figure 5. Distribution of Costs Borneby Company for Purchasing Traditional ERP/ MRP System License (Left) And Hiring ERP/ MRP System in SaasMode. (Torbacki, 2008)**

The lower hardware cost for an ERP offered in SaaS mode reflects the absence of the need for a specialized and dedicated implementation of hardware architecture on the customers end. It is assumed that the service costs will be lowered as the support associated would be the responsibility of the provider and thus there will not be many opportunities for support to be provided by the in-house IT staff. This presents itself as a saving in the form of lesser staff required to handle IT support.

In other words, SaaS solutions will only be attractive in terms of costs if the company foregoes hiring new IT staff to support the application, does not buy new hardware to support the software among others.



Dillion, Wu, & Chang (2010) mention that there is a trade-off between computation, communication and integration- which affect the costs associated with adoption. Cloud based solutions help reduce infrastructural costs however, “the cost of data communication increases”- as you pay per unit. The authors mention that On-demand computing would benefit jobs that are CPU intensive rather than transaction intensive applications like ERP or CRM as it would be more data intensive and expensive at the same time. They have also highlighted the time-cost aspect of splitting, storing and compiling data at different locations around the world and the associated data movement costs.

### On-Demand/ SaaS based ERP offerings

The major players in this market include Aplicor, Intacct, NetSuite, SAP, Workday and Oracle. (ERPsoftware360.com, 2012). The Small business ERP leaders include Intacct and NetSuite. The Middle market leaders include Aplicor. The Enterprise ERP leaders include SAP, Workday and Oracle.

### Deployment

A cloud deployment may be private, public or hybrid. “Public clouds are those whose infrastructure is owned by a third party- with the general public and the individual organizations being the consumers of this service. Private clouds are those where in the infrastructure is owned and/or managed by the same organization. Hybrid clouds are those in which the cloud infrastructure portfolio includes public and private clouds.” (Peng, et al., 2009)

Major ERP providers – Oracle, Microsoft and SAP offer solutions that can be deployed by more than one of the above methods. SAP solutions for ERPs can be deployed on Private and Hybrid Clouds (Kainulainen, 2012). Oracle provides services across all deployment modes. A number of third parties that own cloud infrastructure offer both Private, Public and Hybrid cloud based ERP solutions (Tribridge, 2012). Organizations may choose a public cloud based solutions maybe cheaper, however, some also prefer a private cloud based solutions as it offers more control on the movement and storage of data (ERP Software Blog Editors, 2010).

### Implementation

Wainwright (2009) suggests the following steps for the implementation and or migration of ERP to the Cloud through the SaaS route.

1. “Finalize the right decision framework that encompasses the baseline requirements, adaptability of the enterprise to the SaaS environment and the key parameters for measuring implementation success
2. Understand the “fit” between SaaS offerings in the market and company’s compliance, availability, performance and customizability requirements.
3. Understand the level of readiness of the enterprise from an economic, decision making, technology management and change management perspective.
4. Choose provider based on the parameters of integration and development capability, the service delivery infrastructure, technology delivery platforms, scope for scaling-up, financial resources of the provider and finally the commitment to SaaS.

5. Decide method of system deployment- including deployment based on geography, on an as-need basis, phased functional deployment and rapid parallel deployment.  
The management will also need to define the data integrity, security and authorization requirements. Further, standards for security and authorization, along with expectations of the availability, performance and compliance need to be set.
6. Manage the implementation- Specifically the data migration and integration and the design of prototyping and testing process. Training and preparation is essential to support the implementation and improve the organizational readiness.”

### Findings & Analysis

#### Primary Research

Survey: Users of Logistics and Supply Chain Management Software.

This was a structured quantitative survey. A non-biased sampling of professionals from various hierarchy levels across different organizations and subsectors of the logistics and supply chain domain was used. The survey was rolled to over 100 companies from various industries. Valid responses were obtained from around 40 companies in the UAE.

Around 30% of the responses were from companies involved in providing logistics services, 25% were from the FMCG and retail industries, 15% from the manufacturing industry, 5% from construction and engineering services firms and the rest came from other industries including supply chain technology providers, high-end luxury product manufacturers, pharmaceuticals, oil and gas firms, and an automotive wholesaler etc. 2% were from Supply Chain Management Technology Providers.

#### • Technology Investment Strategies

In the initial part of the survey, the respondents were asked about their readiness to adopt new technologies, their commitment to invest in them and the main driving factors behind the technology investment decisions.

There was an even divide between those who readily adopted new technology - to either stay ahead of the pack or to be on the forefront of technology, and those who were neutral towards technology or very cautious about it.

Though none of the companies saw themselves as technology averse, only 10% of the companies were technology savvy - companies who aggressively invested in new technology and took risks in order to stay ahead of competition. Around 40% of the respondents were technology friendly - they would adopt technology once it has proved to be a success. This they did to keep abreast with their competitors and remain in the race to be updated with the latest versions of technology. The rest of the respondents were evenly divided between being neutral- i.e. adopting new technologies if they were accepted by the industry as a best practice, and being cautious -i.e. adopting new technologies only when it makes real financial sense.

**• Benefits of investing in technologies:**

Around 65% of the respondents either strongly agreed or agreed that their investments in technology have helped their organizations to reduce costs. 20% were neutral, while none of them strongly disagreed. This goes to show that in majority of the cases, the advantages of enhanced visibility, better situational awareness and collaboration across the supply chain has helped to increase efficiencies and reduce wastes - and in turn costs, in spite of the large initial investment required.

Moreover, around 80% of the respondents agreed that their investment in new technology has given them a competitive edge over their competitors. This result shows that there are a number of respondents who do not adopt technology until it is a best practice and yet they perceive it as an option that gives them a competitive advantage over their rivals

**• Investment forecast for next 3 years:**

In the backdrop of uncertain outlook of global economy, and with the fact that a majority of the companies observe that their investment in technology has helped them reduce their costs and at the same time helped give them an edge over their competitors, one would argue that these companies will look to invest in new technologies in the near future too. This argument is well supported by the findings. Around 85% of the respondents indicated that their organizations were looking to invest in new technologies with more than half of them were looking at significant increase in technology investments.

Some of the areas in which the companies are planning to invest are:

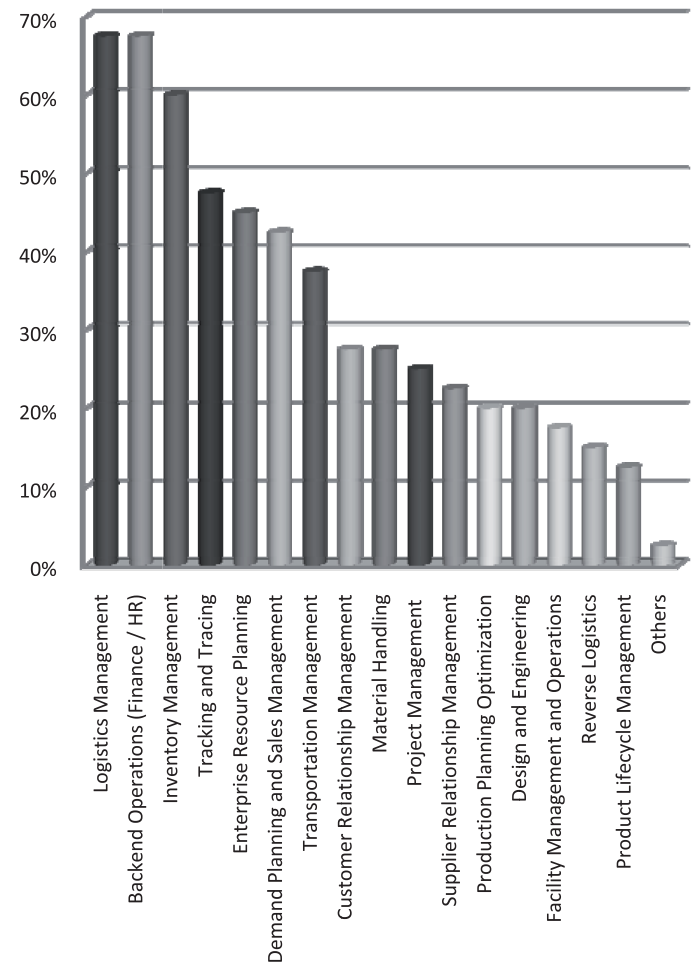
- ERP implementation and upgrades
- Warehouse Management System
- Warehouse Material Handling Equipment, Scanners- Bar Codes, RFIDs etc
- Transportation Management Systems
- Advanced Planning and Optimization software

Most of the respondents mentioned that they would be investing heavily in upgrading existing ERP systems, adding and integrating new modules and expanding its usage across a larger spread of their organization.

Information Technology (IT) is an enabling Driver of Supply Chains. This survey tried to get an idea of how and where it was being used to manage the different aspects of the supply chains across enterprises and the different operations being carried out every day. An attempt was made to understand in more depth the utilization of IT solutions in Logistics Management.

Logistics Management (67.5%), back-end operations (67.5%) and Inventory Management (60%), Tracking and Tracing (47.5%) and Enterprise Resource Planning software (45%) were the top applications of IT in the organizations surveyed. The details of the remaining applications are shown in Fig. 6.

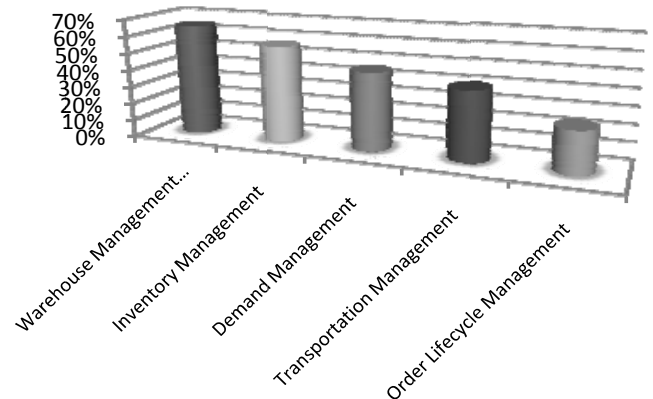
**• Operational areas where IT is used:**



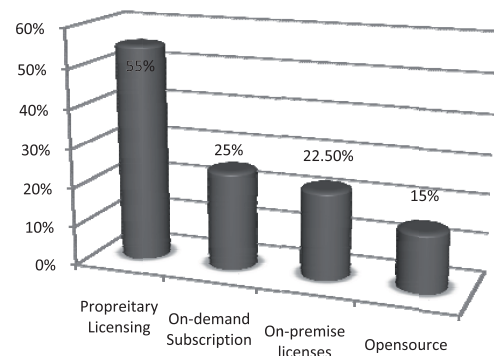
**Figure 6. Operational Areas in Which IT is Actively Used**

**• Adoption of ERP Systems:**

Around 70% of the surveyed organizations had implemented ERP solutions in their organizations.



**Figure 7. Uses of Application Specific Software (Best of Breed)**



**Figure 8. Licensing Agreements for Software Solutions**

Of these, 68% used Application Specific Software, 18.8% used excel based applications while 12% didn't use any IT based solution at all to integrate operations in their organizations.

Of the respondents surveyed, 64.9% use or plan to use Application Specific Software (Best of Breed) in Warehouse management systems. 56.8% for Inventory Management, 45.9% for Demand management, 40.5% for Transportation management, 24.3% for Order Lifecycle Management.

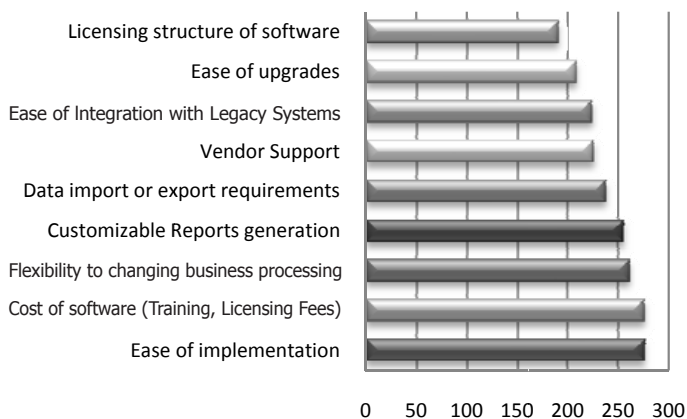
**• Top ERP Providers in UAE**

SAP (40%) and Oracle (30%) were the most popular Enterprise software providers. Other major ones being used included JDA (9%). The other ERP providers whose systems were in use included Microsoft, Baan, Epicor and DOS based systems.

**• Evaluation criteria for software selection:**

Respondents were asked to rate the criteria they used to select software solutions. The top 5 criteria included ease of Implementation, Cost of Software inclusive of training, license fees, Flexibility to changing business processes, Customizable Report Generation and data import and export requirements.

**Weighted Score based on survey rankings**



**Figure 9. Evaluation Criteria for Software Solutions**

When it came to the kind of licensing that was being used for the utilization of the different IT solutions, the most popular was using proprietary licensing (55%) followed by On-demand subscription (25%). Hosted on premise licenses accounted for 22.5% of the respondents while 15% used open-source software for these applications.

**• On-Demand software popularity:**

Users were asked regarding their outlook towards cloud-based services. 32.5% of them were unaware about cloud based setups. Of remaining who were aware, around 63% were not interested in utilizing this service for their logistics operations. This highlights a trend seen in other logistic hubs around the world, especially Singapore- where a large percentage of industry players are either not aware of cloud computing, and even if they are aware, are apprehensive to migrating to it.

Of those that were not willing to invest in cloud Computing based systems, the major reason for not opting for such a system was that the respondents were not willing to disrupt ongoing operations (47.4%). Security issues (42.1%) were the next largest concern. Other major concerns included Financial Concerns over new IT investment (15.8%).

There were a few who could have used cloud computing- but have not used the same because of non-availability of a suitable on- demand software for their requirement (15.8%).

*Survey: Users of Logistics and Supply Chain Management Software- Logistics Service Providers*

This survey was carried across 8 Third Party Logistics Providers (3PL) in Singapore.

**• Category of 3PLs**

3PLs can be categorized in different ways. One of them is based on ownership of assets in the form of fleets and warehouses. Those that do not own such assets or have the bare minimum of these are classified as asset light. Those who own them are classified as asset heavy. There are also cases when the asset light owners may also own a large asset in the form of warehouses.

37% of the respondents were asset light. 38% were asset heavy and 25% of them fell in between the two.

**• Preferred Back-office and Front-office Software**

Back-office software are those that are used by multiple departments across the company for enterprise operations planning along with different functions for Finance and HR.

Front office software may mean and refer to a number of software available to deal with the customer facing applications. In the context of this paper this will be limited to those used for logistics operations and management processes-like Warehouse management, Transportation Management, Inventory Planning etc.

The preferred back office ERP provider for 3PL companies in Singapore are SAP(50%), Oracle(37.5%) and JDA (12.5%). The preferred front office ERP providers are Manhattan and SAP (37.5% each) and Oracle (25%).

**• Evaluation Criteria in Selecting an ERP software**

There could be a number of criteria based on which a 3PL may take a decision to implement an ERP. These could be the cost of the software (inclusive of training costs, costs of implementation etc), the ease of implementation, the ability to generate customized reports, the ability to import and export data based in different formats and the software's inherent flexibility to changing business processes.

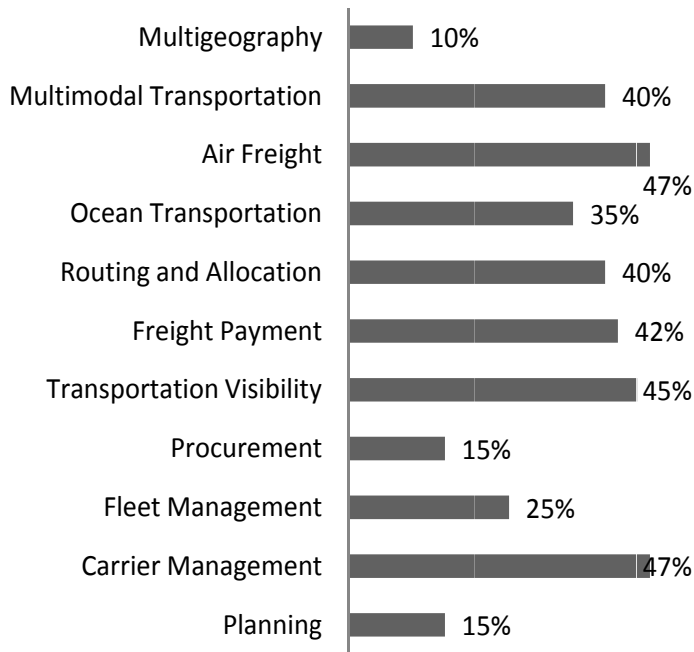
The foremost evaluation criteria that played a major role in decision making turned out to be the flexibility of software to handle changing business processes.

The decision regarding the selection of aERP was also found to be closely interlinked to the decision to buy and implement exclusive warehouse management software. Nearly 63% of

the respondents hadn't implemented Warehouse Management Software.

**• Comparison of importance of different processes for 3PLs**

The respondents were asked to rank the different processes in terms of their importance to their business. The responses were as below:-



**Figure 10. Importance of Business Processes in Logistics**

Carrier management and air-freight along with transportation visibility and multimodal transportation were the more important business processes. This would also reflect on the software that the 3PLs would select as processes associated with these processes would need to be supported.

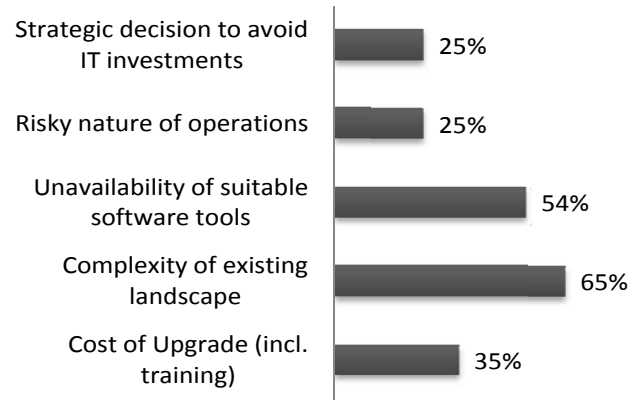
**• Usage of Logistics software and Upgrades.**

Logistics software was being used by the 3PL companies for a number of years. Around 13% of the respondents had started using them in the last 2 years, 63% for the period between 2 to 4 years and 25 % for a period between 4 to 6 years.

It is important to understand at this point that to maintain a competitive edge in a dynamic business environment using IT, it makes sense that their performance should be measured in a timely manner. At the same time, in order to improve efficiencies, upgrades and updates need to be carried out in a timely manner to avoid loss of performance due to obsolescence creeping in as new and new features get added to the software.

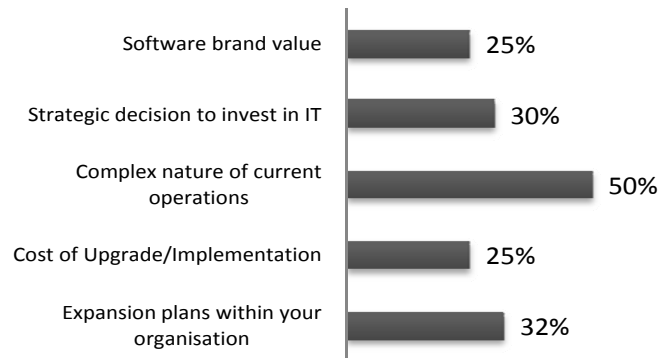
Around 38% of the survey respondents were looking forward to upgrade. Another chunk of around 38% mentioned that they were not planning to upgrade while the rest were still undecided.

Those companies who were not ready to upgrade were also asked to give the major reasons for not upgrading their software. Their responses were as below:-



**Figure 11. Major Reasons for not Up-grading the Logistics Software**

The major reason provided was the complexity of the existing landscape in terms of the business environment that they have to operate in was a setback. Moreover, the lack of fit between their present business processes and the software's capabilities was another major hurdle that would need to be overcome.



**Figure 12. Major Factors for Upgrading the Existing Logistics Software**

Those 3PLs that did however plan to upgrade surprisingly gave complexity of current operations as the prime reason that they wanted to upgrade. It is perceived that this upgrade would be in terms of different modules that would need to be implemented to handle a larger variety of business processes. This was supported by the fact that expansion plans and a strategic decision to invest in IT were the next two largest reasons to upgrade

**• On-Demand software for Logistics Operations**

Nearly 60% of the respondents were not aware of the "On-demand" software.

When asked whether they would be interested in migrating to on-demand software, only 38% were interested. The reasons for such a response could be the lack of understanding of the concept and the tendency to stick to tried and tested methods. The fear of the perceived threat of lower data security could also have caused this response.

Among respondents who were ready to migrate to "on-demand", the preferred logistics providers were IBM (37.5%), Manhattan (25%) & Red Prairie (25%).



## Interaction with Providers of Logistics Solutions Software

In an interaction with 3 major software providers in Singapore, all of them agreed that smaller 3PL providers were not mature enough in comparison to those in North America. Most of the 3PLs in Singapore still used small application specific software (BoB) instead of implementing enterprise-wide software and may still not have adopted upgraded software.

Moreover, many of the 3PLs regardless of size were not interested in migrating to Cloud Computing based Applications (On-demand/SaaS solutions). The risk averseness of the 3PLs was pointed out as one of the major reasons for this kind of behavior. It was also mentioned that the 3PL Industry in the United States of America was readily adopting cloud based solutions as an alternative to the traditional ones.

## Conclusion

- There is potential for implementing IT solutions in Transportation Management, Customer Relationship management, Project Management, Supplier Relationship Management and Production planning and optimization. Transport Management is one of the more popular options that respondents wanted to invest in the near future.
- Presently, ERP is more preferred over application specific software and other alternatives.
- Logistical software provided by IT vendors like SAP, Oracle and JDA were the preferred choice for most of the 3PL and other companies.
- A large percentage of respondents from both the surveys were unaware of “On-demand” software for logistics and supply chain management.
- Majority of the respondents who were aware were averse to migrating to the Cloud. Absence of mature IT infrastructure is cited as a major reason for this aversion.
- From both the surveys conducted it was observed that the leading factors that affected the choice for choosing logistics software were:-
  1. Ease of Implementation
  2. Cost of Software (Inclusive of training)
  3. Flexibility to changing business processes
  4. Customizable report generation and
  5. Data import and export requirements
- SaaS in its current state is easy to implement, has lower perceived costs and is flexible and customizable to a limited extent. In spite of these advantages, it has not been widely accepted.
- Limited to no adoption of SaaS in a relatively advanced logistics hub like Singapore by Small and Medium size 3PLs.

A proper understanding and awareness of the limitations and benefits of SaaS based Logistics Solutions is essential. The cognition of the inherent characteristics of the business model on which it is based by- the implementers can reap the benefits of lower costs and quicker implementation times vis-à-vis the traditional solutions. As more software providers enter the market, the number of options in terms of the available modules and customizability will also increase. The market share for these products is on the rise and will continue to increase as more and more businesses of all scales start to derive the benefits of such an offering.

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