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# Third Party Logistics Service Providers: Current Trends in Acquiring Information Systems Capabilities

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in partial fulfillment of the requirements for the degree of

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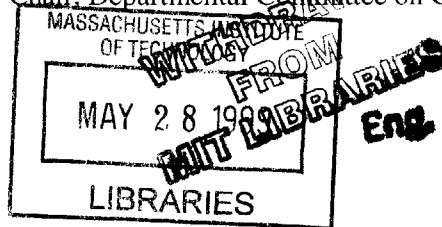
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To my parents  
& my husband Naveen

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## **ABSTRACT:**

Changing technology, empowered customers and globalization has made information systems so complex that no single company has all the necessary knowledge about different technologies and systems used, to completely design and integrate them in-house. As a result most companies are dependent on a number of software vendors to provide the necessary expertise to keep their customers happy. This study investigated the challenge of making these choices rationally in the context of information systems provided by third-party logistics service providers, given the fact that information and operations systems for logistics management will continue to be vitally important in leveraging logistics to achieve a competitive advantage.

3PLs continually invest in logistics systems to support their core business. The primary goal of the study was to examine the current trends in outsourcing of information systems by the third party logistics service providers. It started in an effort to explore whether the "3PLs Practice what they Preach" with regard to outsourcing the internal information systems functions to IS specialists. In other words, this research had the objective of identifying the information systems capabilities in the third-party logistics providers and their current strategy of adopting these capabilities. At the same time, the study does not investigate the outsourcing of information systems for organizing the internal IS function or IS activities performed by the logistics providers. It also does not focus on manual information systems but on systems that contain hardware and software as well as people,

data and procedures. The research addresses the outsourcing of planning, development, implementation, maintenance, customization, integration and the operation of information systems that are used by the customer's organization. Some of the questions addressed by the current study are: Is it possible to establish a relationship between the firm's usage of IS outsourcing based on their past IS spending or the number information systems supported offerings? How can IS outsourcing by 3PLs be explained by Transaction Cost Theory and Competitive Strategy Model? It contains the drivers in favor of internalization or outsourcing that have affected the decision making of companies participating in the study. The study can be of use by third-party logistics companies that are considering IS outsourcing and those that have outsourced and want to reevaluate their outsourcing decision.

In summary, practitioners facing the issues of acquiring information technology would find the study insightful as this gives actual practice being adopted in the industry rather than providing only the theoretical assumptions. Above all, the ability to think through and continually revisit the outsourcing decision appears to be the best policy, which is currently lacking in the third party logistics industry.

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## TABLE OF CONTENTS

<b>ABSTRACT:</b> .....	<b>3</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>5</b>
<b>LIST OF FIGURES</b> .....	<b>8</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>9</b>
<b>CHAPTER 1. INTRODUCTION:</b> .....	<b>10</b>
1.10 RESEARCH OVERVIEW .....	11
1.11 Research Problem .....	11
1.12 Hypotheses.....	13
1.13 Methodology.....	15
1.14 Sample .....	15
1.20 LIMITATIONS OF THE RESEARCH .....	16
1.30 CONTRIBUTIONS OF THE RESEARCH.....	16
1.40 THESIS ORGANIZATION .....	17
<b>CHAPTER 2. LITERATURE REVIEW</b> .....	<b>18</b>
2.10 THIRD-PARTY LOGISTICS INDUSTRY .....	18
2.11 Structure of Third-party Logistics Industry .....	19
2.12 Main Players.....	22
2.13 Current Users of 3PLs .....	22
2.14 Industry & Technology Trends.....	26
2.20 OUTSOURCING.....	30
2.21 IS Function and Outsourcing .....	32
2.22 Information Systems Capabilities of 3PLs .....	34
2.23 Role of IT in the Operations of 3PLs.....	36
2.30 THEORETICAL PERSPECTIVE.....	37
2.31 Competitive Strategy .....	37
2.32 Division of Labor.....	43
2.33 Transaction Cost Theory.....	44
<b>CHAPTER 3. METHODOLOGY</b> .....	<b>48</b>
3.1 RESEARCH OBJECTIVES.....	48
3.2 HYPOTHESES.....	49
3.3 DATA COLLECTION .....	51
3.4 QUESTIONNAIRE DESIGN.....	53
3.5 SAMPLE SELECTION .....	53
3.6 SUMMARY.....	54
<b>CHAPTER 4. RESULTS</b> .....	<b>55</b>
4.10 TESTING OF HYPOTHESIS.....	55
4.11 Results of Hypothesis 1 .....	55
4.12 Results of Hypothesis 2 .....	55
4.13 Results of Hypothesis 3 .....	55
4.14 Results for Hypothesis 4.....	61
4.15 Results for Hypothesis 5.....	62
4.20 OTHER FINDINGS.....	65
4.21 Identifying the Drivers and Motives for Outsourcing/Insourcing.....	65
4.22 Industry & Technology Trends.....	68
4.23 SUMMARY.....	69

**CHAPTER 5. SUMMARY AND CONCLUSION..... 71**

    5.10 THESIS SUMMARY ..... 71

        5.11 Research Design ..... 72

        5.12 Results of Hypothesis tests ..... 73

    5.2 CONCLUSIONS ..... 75

    5.3 FURTHER RESEARCH..... 76

**APPENDICES ..... 78**

    1. GLOSSARY ..... 78

    2. SAMPLE QUESTIONNAIRE..... 82

    3. INFORMATION SYSTEM SUPPORTED OFFERINGS ..... 84

    4. SOME OF THE THIRD PARTY LOGISTICS SERVICE PROVIDERS..... 87

**BIBLIOGRAPHY ..... 88**

# LIST OF FIGURES

FIGURE 1: ACQUISITION STRATEGIES .....	12
FIGURE 2: TYPES OF SERVICES .....	21
FIGURE 3: COMPETITIVE FORCES .....	39
FIGURE 4: INTEGRAL-MODULAR DYNAMICS .....	42
FIGURE 5: TRANSACTION COSTS .....	47
FIGURE 6: IS EMPLOYEE & GROSS REVENUE.....	56
FIGURE 7: IT SPENDING & GROSS REVENUE.....	57
FIGURE 8: USE OF IT CONSULTANTS .....	58
FIGURE 9: IT EMPLOYEES & GROSS REVENUE FOR ASSET BASED COMPANIES .....	58
FIGURE 10: IT EMPLOYEES & GROSS REVENUE FOR NON-ASSET BASED COMPANIES .....	59
FIGURE 11: IT EMPLOYEES & GROSS REVENUE (HIGH OUTSOURCING POLICY).....	60
FIGURE 12: IT EMPLOYEES & GROSS REVENUE (MEDIUM OUTSOURCING POLICY) .....	60
FIGURE 13: IT EMPLOYEES & GROSS REVENUE (LOW OUTSOURCING POLICY).....	61



# **LIST OF ABBREVIATIONS**

1. 3PLs: Third-Party Logistics service providers
2. H/W: Hardware
3. IT: Information Technology
4. IS: Information Systems
5. KPI: Key Performance Indicators
6. OS: Operating System
7. S/W: Software
8. TCA: Transaction Cost Analysis
9. TMS: Transportation Management System
10. WMS: Warehouse Management System

## 1.0 INTRODUCTION:

The fiercely competitive business world requires firms to devote their full attention to their core competencies and turn to outside service providers for fulfilling their other business needs. It is of no surprise that the use of purchased software has dramatically increased in recent years. Changing technology, empowered customers and globalization has made information systems so complex that no single company has all the necessary knowledge about different technologies and systems used to completely design and integrate them in-house. As a result many companies are increasingly<sup>1</sup> depending on a number of software vendors to provide the necessary expertise to keep their customers happy. The decision to contract with an IS<sup>2</sup> vendor is a critical strategic choice for the firm. Typically, however companies have some choice as to whom and what skills and competencies make them dependent upon outside suppliers. There are hardly any companies who still have the policy of "doing it all,"<sup>3</sup> most have strategic choices of corporate identity and what businesses to be in. This study investigated the challenge of making these choices rationally in the context of how and why third-party logistics companies acquire information systems capabilities.

The question "to make or to buy" has been raised time and time again by many scholars and practitioners. Similar companies select make-or-buy patterns in very different ways, resulting in very different and complex patterns of interdependencies and relationships among companies. Adam Smith accorded great importance to the division of labor and holds it responsible for increase in productivity. Alfred Weber's (1930s) suggested the general (factor-availability) and special factors (environment) for making these decisions. The idea of a transaction cost was introduced by Coase and developed principally by

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1 Clark, T. and Zmud, R. and McCray, G. "The Outsourcing of Information Services: Transforming the Nature of Business in the Information Industry", 1998.

2 IT and IS have been used interchangeable in this study.

3 Bowman, Robert J., "Logistics Companies Practice What they Preach On Outsourcing", June 1998.

Williamson (1970s). Ronald Coase (1930s) questioned the rationale of the firm itself and came to the conclusion that companies are formed to minimize the cost of certain functions by internalization. Transaction cost was viewed as explanation for vertical integration for various functions. According to Michael Porter, the policies of vertical integration by a firm is influenced by the five forces namely the buyer's power, supplier power, barriers to entry and exit, existence of substitute products and rivalry among the existing firms in a particular industry. This study used competitive strategy, division of labor and transaction cost analysis to investigate the outsourcing policy.

### **1.10 Research Overview**

#### **1.11 Research Problem**

This study is an effort to explore whether the 3PLs "Practice what they Preach" with regard to outsourcing their internal information systems functions to IS specialists. The research problem addressed was the current trends in acquiring information systems capabilities by the third party logistics service providers. In other words, this research had the objective of identifying the information systems capabilities provided to the customers by third-party logistics providers and their current strategy of acquiring these information systems capabilities. This research was designed to aid in the understanding of economic and strategic influences which drive firms to either internalize their IS activities or to outsource them to fulfill the needs of their customers. It also tries to identify the drivers and enablers that had helped them in formulating their ruling strategy.

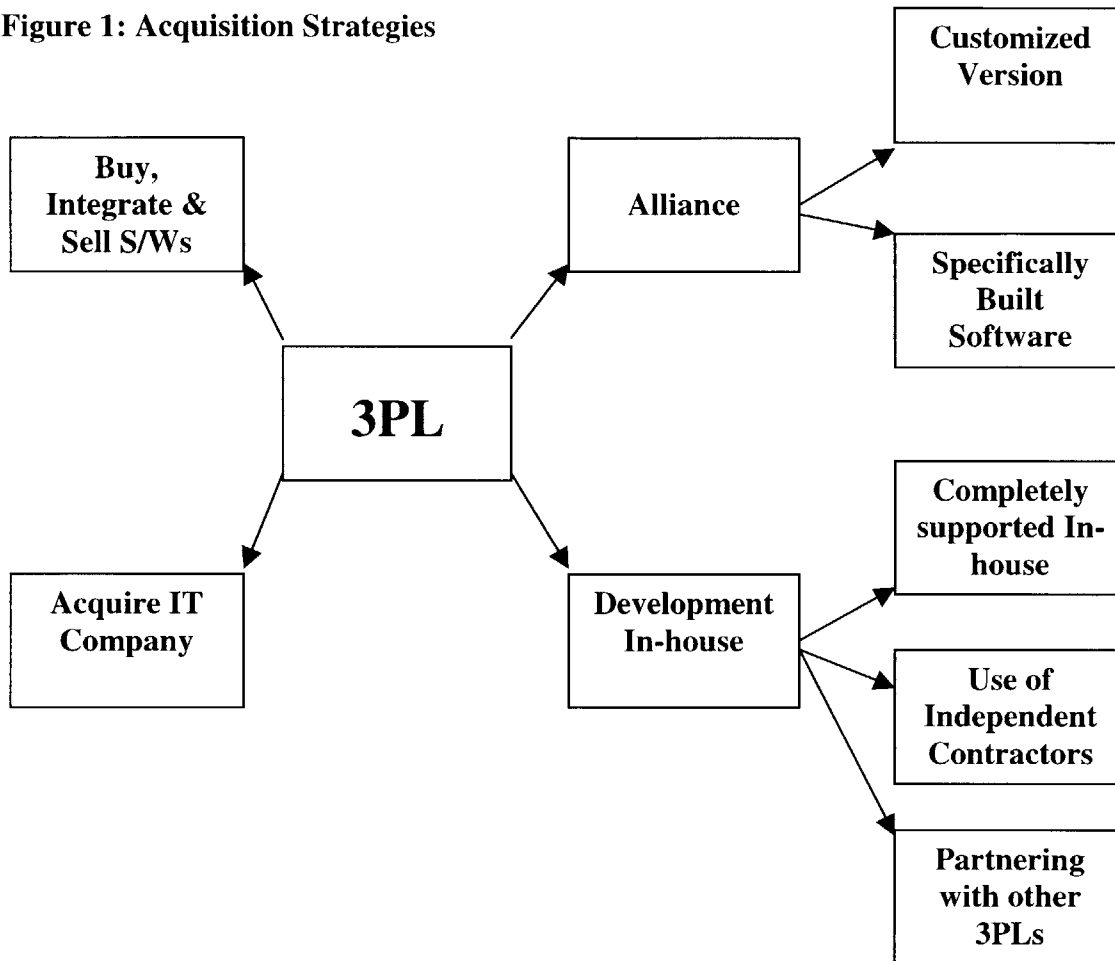
The specific research questions were as follows:

1. Is it possible to predict the likelihood of firm's usage of IS outsourcing based on the size of the company (revenue) and the category of 3PL provider the firm belongs to?
2. Is it possible to establish a relationship between the firm's usage of IS outsourcing based on their past IS spending or the number information systems supported offerings?
3. How can IS outsourcing by 3PLs be explained by Transaction Cost Theory, division of labor and Competitive Strategy Model?

4. How important are the roles that industry and technology trends play in the shaping of the current strategy? How do the challenges shape their current strategy in favor/disfavor of outsourcing?

The diagram below depicts the framework used to explore the strategy for acquiring IT capabilities by 3PLs.

**Figure 1: Acquisition Strategies**



1. Buy and sell available software in the market or in other words, have marketing rights to the software developed by an IT provider.
2. Have an alliance or partnership with IT providers. There can be various degree of alliance
  - Enhancement of the existing software with maintenance, or

- Specifically built Software by the IT providers for the 3PL.
3. Acquiring IT companies to become a part of their organization so as to fulfill the technological need of the company.
  4. Developing the software in-house:
    - Completely by themselves, or
    - Using independent Contractors and Consultants to help with development, or
    - Partnering with other 3PLs to reduce the capital investment required for IT.

The total IT outsourcing is the contract in which the vendor is in total charge of the control of the IS function to the IS provider. Some describe this kind of outsourcing as turning over the "keys to the kingdom."<sup>4</sup> This kind of outsourcing was not included in the framework, as it was not conceived of as an option adopted currently by 3PLs nor seen in the near future.

The result of this research identifies the determinants of IS outsourcing. It identifies the factors that influence the making vs. buying decision-making process for software. It contains the drivers in favor of internalization of outsourcing that have affected the decision making of companies participating in the survey conducted by the researcher. The survey of the 3PLs was adopted as the research methodology for the quest of the aforementioned variables that motivated the study. It can be of use by third-party logistics companies that are considering IS outsourcing and those that have outsourced and want to reevaluate their outsourcing decision.

## **1.12 Hypotheses**

Hypothesis 1: The firms are steadily moving away from in-house development to outsourcing their IS needs, though with caution.

Hypothesis 2: Most of the 3PLs do some kind of development work in-house whether it is development, customization or integration of various software/OS.

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<sup>4</sup> Lacity, Mary C. and Hirscheim, Rudy, " Information Systems Outsourcing, Myths, Metaphors, and Realities", 1993.

The first and second hypotheses are based on Porter's competitive strategy where he claims that number of suppliers determine the relative power of the suppliers over the buyers. Since now the number of IS suppliers that can meet the needs of the 3PLs is increasing, they are becoming more comfortable outsourcing IS activities. At the same time, 3PLs do some kind of development work in-house as vertical integration increases their bargaining power significantly.

Hypothesis 3: The firm's gross revenue and information technology spending will be negatively related to the degree of IS outsourcing.

The cost associated with IS outlay is large and since outsourcing can free up some capital investment and save operating cost, it is fair to hypothesize that a firm's revenue and information systems spending are crucial determinants of IS outsourcing. This is based on the theory of division of labor, which states that there are economies of labor specialization associated with increased division of labor.

Hypothesis 4: The companies where the IT for logistics division is not separate tend to do more in-house software development than the companies where logistics division operates independently.

This hypothesis is generated using principles of Transaction Cost Analysis. The companies where the IT department for logistics division is not separate tend to do more in-house software development due to the financial leverage than the companies where logistics division operates separately. The high cost of transaction, coordination and complexity of integration has a tremendous amount of inertia that keeps the first kind of companies away from outsourcing the IT activities.

Hypothesis 5: *The probability of IS outsourcing will decrease as the complexity of integration increases.*

This hypothesis draws from the dynamic instability of industries identified by Charles Fine and Daniel Whitney. Currently, the forces in the third party logistics industry are driving the companies from vertical industry structure with integral-architecture products to horizontal industry structures with modular-architecture products. When the forces of complexity will supercede the forces that are driving modularity they will be back to vertical integration again.

### **1.13 Methodology**

Research for this study was conducted in three phases:

- Review of the existing literature relevant to the present study so as to explore whether other researchers had done some study in this area.
- Formulation of the questionnaire as a preparation for the third phase.
- Interviews were conducted to get the insight on IS outsourcing policies and procedures from the corporate executives

Chapter 3 discusses how and why these phases were designed and will present some facts about how the design was executed.

### **1.14 Sample**

The primary goal of the study was to examine the current trends in outsourcing of information systems for the third party logistics service providers. In order to uncover the trends and how and why questions related to acquiring Information Systems capabilities by the 3PLs, twenty in-depth interviews with executives were conducted. The sample questionnaire that was used during the discussion is attached in Appendix 2 of this document. Interviews were conducted over a period of three months and telephone was used as the communication medium. The interviews were held with the Chief Information officers (CIOs) or other senior information systems executives within the firm. The duration of the interview varied from 45 minutes to 90 minutes. In a few cases, if sufficient information could not be gained through the interview, other officials in the company were corresponded through emails to fill the gaps.

### ***1.20 Limitations of the Research***

The most important limitation of this study resulted from the use of survey data. Only a limited number of firms participated in this research due to time constraint and from the fact that some companies were not comfortable participating in the survey. Some companies have even adopted the policy not to participate in any kind of survey as far as possible. All participants were privy to the details of the outsourcing decision in their respective companies especially with regards to the financial information. So applying these results to other companies may not be appropriate. The results are based on the findings from the big companies while smaller companies were not included in the study. Thus, the exclusion of the small companies may have adversely affected the results and interpretations.

Another concern with the survey methodology is the validity of the data provided by the interviewee, since obtaining multiple informants was not feasible. Special effort was made to make the questions clear, avoid using terms unfamiliar to the interviewee and refrain from the use of leading questions.

This research is not per se aimed at outsourcing of information systems for organizing the internal IS function or IS activities performed by the logistics providers. An example in this respect can be the use of IS vendor's software for financial control. It also does not focus on manual information systems but on systems that contain hardware and software as well as people, data and procedures. The research only addresses the outsourcing of planning, development, implementation, maintenance, customization, integration and the operation of information systems that are used by the customer's organization. Since this was an exploratory research at one particular period of time, it is important that the validity of the results be checked before applying it to other situations.

### ***1.30 Contributions of the Research***

The issue of make-or-buy decisions has been studied both in the academic world and in the business world. This research is thus useful both for academic logisticians and the logistics practitioners. It studied the application of theoretical models like Transaction



Cost Analysis, Division of Labor and Competitive Strategy in the making of IS outsourcing decisions. Since the research explored the factors like the IT cost structure and size of company on the IS outsourcing policy, it provides 3PLs some decision variables to consider while making the IS outsourcing decisions. The study also provides current industry trends so that companies can find where they stand in reference to other third party logistics providers.

#### ***1.40 Thesis Organization***

The thesis is organized into five chapters and two appendices. The second chapter contains the literature review including the theoretical background used for the study. It also contains the structure of the third-party logistics industry and what services they provide to their customers. Chapter 3 discusses the research design. It comprises the method adopted for the research and why it was chosen. It gives an overview of the execution process including both successes and failures. The questionnaire responses are discussed in the fourth chapter. Also the hypotheses are revisited in the light of the participant's responses. The last chapter (5) contains the summary and recommendations for future research based on this study. Appendix 1 contains the glossary of terms used in the writing of the thesis. A copy of the questionnaire comprises Appendix 2. Appendix 3 contains the list of some of the information systems supported offerings by 3PLs and Appendix 4 comprises of some of names of the 3PLs and their logistics revenue.

## 2.0 LITERATURE REVIEW

The objectives of the literature survey were to (1) Get information about the third-party logistics industry, (2) examine previous work in the area, (3) provide background information for the construction of the questionnaire and (4) identify potential companies and candidates to participate in the study.

### ***2.10 Third-party Logistics Industry***

The concept of third-party logistics services and the need for them is not revolutionary. It has been in existence for many years, taking roots and maintaining its strongest presence in the East and Europe as "trading houses". It usually focuses on such areas as order fulfillment, transportation, warehouse operations, inventory management and logistics information systems. In the 1980's, "early adopters"<sup>5</sup> such as General Motors and Hewlett Packard pioneered the use of third parties to perform integrated logistics operations. These projects were very different from traditional outsourcing of transportation and warehousing operations. It included integrated logistics operations like design and development of logistics information system and management of operations. Considerable<sup>6</sup> impetus for the move to subcontracting had resulted from deregulation of the motor freight industry, the increased sophistication of many of the warehouse/transportation suppliers and the significant progress made by users and providers toward readily exchanging key logistics and the market information. Later in 1990s the success of these projects led the other shippers to embrace outsourcing and focus more on their core capabilities. Many<sup>7</sup> contract logistics companies report annual growth rates of nearly fifty percent. A few companies did not perfectly evaluate the

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5 Escott, Thomas I., Ramsey James and Warnke, Dale G., "The Keys to Success Utilizing Third Party Logistics Providers", Annual Conference proceedings, Council of Logistics management, October, 1997

6 Gardner, R. William and Johnson, C. Lee, "Third-Party Logistics", The logistics handbook.

7 Dornier, Philippe, Ernst, Ricardo, Fender, Michel and Kouvelis Panos, "Global Operations and Logistics".

outsourcing value perspective which led to some messy end of contracts with the 3PLs. Though<sup>8</sup> the number of contract terminations continues to grow, a North American survey reported that 43% of 3PL users identified in 1998 had canceled at least one contract.

## **2.11 Structure of Third-party Logistics Industry**

Logistics service industry can be divided into:

1. Carriers
2. Warehouse operators
3. Software vendors: An alternative<sup>8</sup> to outsourcing logistics functions is to develop supply chain management capability within one's own company. The vendors of computer software for logistics management normally provide a significant amount of consulting for implementation and extensive support. Logistics software vendors have merged at a rapid pace over the last two years. Demand is high for software that covers forecasting and planning, warehouse management, transportation planning and execution. Some of the market leaders are I2 Technologies that acquired ITLS, major transportation management Software Company, EXE Technologies known for their WMS, and CAPS Logistics known for their network optimization toolkit. Other major software vendors are Manugistics, Logility, Haushahn and Optum.
4. *Third party Logistics providers*: A Company<sup>9</sup> that performs all or portions of a shipper's supply chain logistics activities under contract and for a fee, providing value to a customer by supplying bundled or combined services. These services can be operational or administrative or both but must include more than traditional common or contract carriage. Outsourcing, contract logistics, and third-party logistics are often used interchangeably.
5. Internet Clearing houses
6. Brokers/Forwarders

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8 "Mercer Survey Finds Third-party Logistics Industry having another Strong year", Mercer management consulting press Release, New York, October 19, 1998.

9 Logistics Management, July 1997

7. Shipment Tracking
8. Trade Financing
9. Fleet Management
10. Insurance
11. Other services
  - Systems Modeling
  - National transportation Exchange
  - Park-n-view

The boundary is getting blurred as all of them are stepping into each other's domain.

3PLs provide a wide variety of services including warehousing, transportation, logistics information services, inventory management, carrier selection, international logistics, packaging and dedicated fleet operation. Many of the large 3PLs have their roots in either transportation or warehousing. They are often associated with a parent that operates a motor carrier or public warehouse. Other traditional backgrounds include property brokerage, freight forwarding and banking.

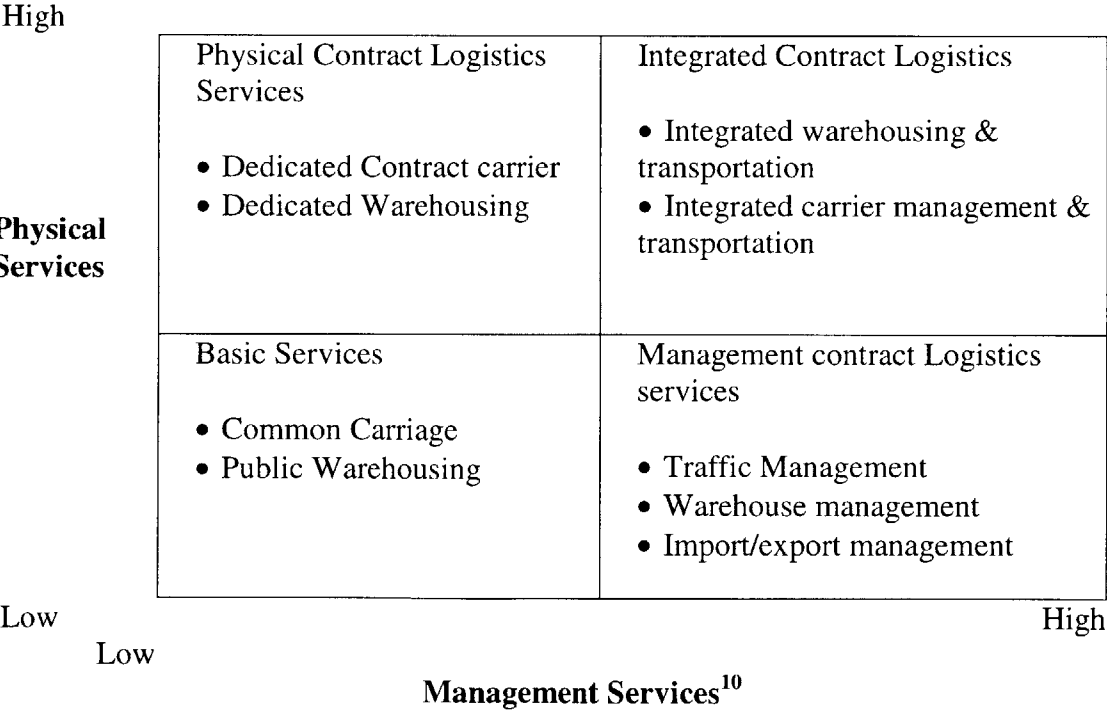
Third party providers typically fall into the category of asset-based or non-asset-based. The focus of asset-based providers tends toward increased utilization of the third party's fleet (for e.g. trucks and trailing equipment) and distribution facilities. Non-asset-based providers approach outsourcing as an objective party making management decisions based on the client's requirements and objectives. Apart from the two categories there are companies that take the approach of asset-based for one part of the business and non-asset based for the other part of the business. Their approach is typically governed by the original business of the parent company. There are some companies that are medium-asset based but are moving towards being low-asset based.

3PLs can also be divided in terms of the services they provide to the shippers. The services provided fall into the framework that combines both physical (i.e. warehousing and transportation) and management services. As the complexity and customization

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requirements of the shippers increase, the companies that offer integrated logistics service also increases. The figure below gives an insight to the types of services offered by the 3PLs. The four services are: basic services, physical contract logistics services, management contract logistics services and integrated contract logistics. Basic services do not require major coordination, such as U-Haul services. Physical contract logistics services allow for outsourcing of some of the physical services while shippers still maintain control of the management. Management contract logistics services are those that subcontract the management of an existing warehouse or transportation fleet. Integrated logistics services incorporate both the physical services and managerial functions under the logistics provider. Generally, logistics providers have strength in certain types of services. Yet, it is difficult to distinguish providers clearly on the basis of services provided as the boundaries are getting blurry. In many cases, 3PLs provide special services to their key customers.

**Figure 2: Types of Services**



<sup>10</sup> Source: J.M. Africk and C.S. Calkins, Transportation and Distribution, 1994.

Another way of categorizing the 3PLs can be in terms of the market area they primarily focus on. The market area of focus can be international like that of Airborne Logistics, North America like that of DSC Logistics or United States of America like that of Werner logistics. Apart from these there are second tier<sup>11</sup> or regional 3PLs like Bender Warehouses Co. and Genco Distribution system. There are also International Logistics Services providers<sup>12</sup> who own offices in some countries and operate in other countries through agents or alliances with other 3PLs or Freight Forwarders like Kuehne & Nagel.

It is possible to distinguish 3PLs on the industries they primarily serve. The major industries that 3PLs serve are Automotive (For e.g. Cat Logistics), High-Tech or Computer, Electronics & Technology (For e.g. UPS WW Logistics) and Consumer Products (For e.g. Americold).

## **2.12 Main Players**

According to Armstrong & Associates, the total market for contract logistics services in 1997 was \$34.2 billion. It identified Ryder as the leader among US based third-party logistics service providers. Inbound logistics surveyed its readers and identified Ryder as the leader too. The other top logistics providers are C.H. Robinson, Menlo Logistics, Caliber Logistics, Penske logistics, UPS Worldwide and FedEx LEC&C. Appendix 4 gives some of the major players and their 1998 gross revenues for integrated logistics services.

## **2.13 Current Users of 3PLs**

According to the study done in 1998 by Ernst & Young LLP<sup>13</sup>, the University of Tennessee's Center for Logistics Research and Exel Logistics Americas, 3PL services are primarily utilized in the consumer product and chemical industries. The results also

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11 "Who's Who In Logistics?", Armstrong Guide to third party Logistics Service providers, Volume 1, Sixth Edition.

12 "Who's Who In Logistics?", Armstrong Guide to third party Logistics Service providers, Volume 2, Sixth Edition.

showed that utilization is increasing modestly among firms in consumer product and automotive, and decreasing among firms in the peripheral industries.

Other industries using the services of 3PLs are:

- Food and Beverage industry
- Pharmaceuticals
- High-tech industry
- Retail
- Manufacturing

There are many reasons these companies consider outsourcing logistics and supply chain activities. Strategic operating issues are among the most prevalent reasons for considering outsourcing. The constant factors in logistics management are the desired end results: customer satisfaction and lower overall system cost. Below these objectives are infrastructures of facilities, systems and organizations which are intimately tied to profitability. The following points often lead to an evaluation of the logistics-outsourcing alternative:

**Overall Cost Reduction:** Traditional fixed costs, such as warehouse facilities, transportation and material handling equipment, computer systems and corporate staff are assumed by the third party provider. In the private logistics network, each of these factors is fully incorporated in the asset and expense structure.

**Workforce Capacity Management:** By managing capacity, third party logistics companies can reduce the total cost per unit. Economics of scale can result as volume increases are handled without incurring expenses due to proportional increase in labor or equipment.

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13 Thomson, Richard and Oldham, Edward and Manrodt, Karl, "Supply Chain Management- the Race is on, Trends and Issues in Transportation and Logistics", 1998.

**Market Access:** A firm experiencing growth may want to have local market presence. In this case, the firm would view third party warehousing as a lower cost alternative compared to construction of private facilities. At the same time, the growing company is not as likely to have a fully staffed logistics department, capable of assimilating all the data related to current logistics operations. In these scenarios, third party logistics can provide a quick way to develop local presence in a growing market. During the evaluation of distribution network structure, decisions made regarding facility placement, size and product mix has to be made. Each scenario carries a trade-off which typically reduces freight cost as the number of warehouses increases. Third party warehouses exist in almost all the markets in the United States allowing a full analysis of network combinations.

**Greater Flexibility<sup>14</sup>:** Third party logistics can provide greater market access with proportionately lower cost than private warehousing. Volume fluctuations can be absorbed and the 3PLs can better handle manpower balance issues. If the decision is made to leave a third party warehouse for any reason, even the exit costs could be less than the privately held facilities. Also with the changes in distribution channels, many logistical reconfigurations are taking place and more and more firm could be looking to 3PLs to help with these changes.

**Freedom to Focus on Core Business:** Companies that attempt to do every function internally ultimately have to compromise their success in some of their core activities. Due to the factors like increased<sup>15</sup> government safety, environmental, and health regulations and liability headaches, outsourcing can return value as companies can focus better on their core activities.

**Technological Advancement:** Many logistics companies invest heavily in information systems technology. Advanced applications for Radio Frequency Identification and Bar

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14 Gooley, Toby B., "The Best of both Worlds", Logistics management and distribution report, October 1998

15 "Handing over the Keys", Logistics Management and Distribution Report, March 1998



Coding are common in many of the third party warehouses. Efforts are continuing to integrate customer data with third party systems via EDI linkages for order entry, inventory control and load tendering. Closely related to strategic operating issues, cost considerations often lead to the evaluation of third party logistics companies to access the state-of-the-art information systems<sup>16</sup>.

**Improved Customer service:** 3PLs can provide customer<sup>17</sup> service improvements by enhancing order taking, invoicing, telemarketing, fulfillment, inventory tracking and delivery service options. The outsourcing arrangements make management of inventory faster, easier and more accurate. Tight control over operating procedures, expertise in information technology and a shared commitment of excellence make the deliveries very smooth. Leading<sup>4</sup> edge firms seek to use logistical competency to gain and maintain competitive superiority.

**Improved expertise and access to performance data:** The logistics measurements established must be monitored and shared with all operating personnel in the company. This becomes very important for the attainment of high service level for customers. Management generally lays more focus on the attainment of their goal rather than measuring performance data for logistical activities. These data could become more accessible with the help of third party logistics providers.

**Transition from Fixed costs to Variable costs:** Outsourcing can change the balance sheet for asset management. Shippers can avoid direct liability in real property and equipment by letting the 3PL make use of his own financial resources to buy or lease property. Fixed costs in that case get converted to variable costs. The changing business volumes and market conditions largely affect variable costs not fixed costs. So outsourcing can be a true competitive advantage in volatile industries. Some firms even

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16 Harrington, Lisa H., "Quality and the outsourcing decision", Reprinted from the Distribution magazine.

17 "Mastering the Logistics Labyrinth", International Logistics Magazine, January 1994

leverage their assets by forming strategic alliances with service suppliers.

All the cost saving programs and strategic imperatives mentioned above would be useless if customer satisfaction is not achieved in logistics operations - whether internal or outsourced logistics professionals are sensitive to the service requirements outlined by manufacturers. Working under routinely high-pressure situations, distribution personnel understand the activities and controls which guide logistics operations. In the age of inventory reduction, shortened order cycles and streamlined organizations, third party service providers succeed through innovation and sound management practice. Ongoing success is though dependent on open communication, mutual trusts and review of annual plan and objectives. Undoubtedly, the use of 3PLs has numerous potential advantages to companies, but it is not risk-free either. Some of the risks have been stated below:

**Strategic<sup>2</sup> Risk:** A company having the competitive advantage, for example having the ability to deliver in less than a day would lose this advantage when working with a 3PL firm. The 3PLs can sell the same service to the company's competitors to achieve economies of scale.

**Commercial Risk:** Since 3PL face the ultimate customer, the company faces the risk of the linkage of its image to the 3PL.

Using a third-party logistics provider does not mean that shippers can afford to abandon all interest and responsibility in logistics. The third-party logistics company and the shipper need to design their incentive and performance measurement metrics effectively to continue having a strong relationship, beneficial both to the shipper and the logistics provider.

## **2.14 Industry & Technology Trends**

A survey<sup>18</sup> of international shippers by Gerard Klauer Matison & Company, Inc. estimates that the 3PL industry will grow by 19 percent annually for the next five years. At the same

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18 "Outsourcing Gains Momentum", Logistics Management, January 1999.

time, shippers are employing lesser number of 3PLs compared to the earlier years. The users are looking for a single provider that can do the whole thing for them. This has led to the expansion of service offerings by providers. The functions most commonly outsourced are transportation services followed by warehouse management and shipment consolidation.

Future trends point toward finding an equitable balance between the responsibilities of the third party and the client. As the industry matures, clients will more comfortably relinquish control of vital aspects of the supply chain to the third party. At the same time, clients will maintain a stake in the management of logistics functions and make structural and procedural changes to maximize return on investment in the third party relationship. Some of the industry trends are listed below:

- Globalization<sup>19</sup> has been around for 500 years, but right now we are surely witnessing the most tumultuous part of an ancient drama because what we call globalization is driven above all by technology. That force, especially information technology is transforming itself and the world with extraordinary speed. More contracts now are international in scope as firms expand overseas and consolidate their international logistics operations. This identifies the need for 3PLs to focus their efforts on supply chain integration and seamless integration of the corresponding information systems. The fact remains that the manufacturers<sup>20</sup> still complain of lack of logistics providers with real pan-European reach.
- Extensive use of Information Technology to create value for the customer. Industry trends show the continuing development of information systems on part of the providers and the entry of new providers into the logistics market. The Internet is triggering business-to-business solutions. A study funded jointly by Exel Logistics and Ernst & Young identifies that one of the most important information services

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19 Joffe, Josef, "One Dollar One Value", Extract from "The Lexus and the Olive Tree", written by Thomas L. Friedman.

20 Bowman, Robert J., "Manufacturers complain of a Lack of Logistics providers with real Pan-European reach", Global Sites and Logistics, March 1999.

demand by shippers is shipment tracking. Many<sup>21</sup> firms are expanding their Internet offerings further establishing the Web as their key to their transition from delivery companies (Trucking, AirFreight) to providers of logistics-management services. Some of the most common examples are FDX, UPS and APL.

- Broad service offerings through alliance with 4PLs (subcontractors to 3PLs like software companies, forwarders, carriers etc.): The members of the maturing 3PL industry are now acknowledging that they are better off focussing on their core strengths and forging close alliances with outsiders for additional services. Collaboration and cooperation is increasing among trading partners who were formerly adversaries. Providers today sound more realistic about their capabilities. They have come to believe that the whole idea of alliance is to supply the customer with the most cost-competitive solutions possible. The very nature of 3PLs has guaranteed that they will seek alliances. The need to provide one-stop solution is the driving force behind many alliances. Surprisingly enough, many of the alliances were created without a particular shipper in mind.
- Unlike the past, there is rapid growth in the acceptance of 3PLs. The reasons seem to be the proven expertise of 3PLs in managing logistics operations over the years and difficulty in finding resources including human resources. Also companies are beginning to realize the benefits like independence, flexibility and economies of scale associated with 3PL relationships. Risk management is a challenge for some companies, and the driver shortage has had serious effects on the industry.
- After years of experimentation, third-party logistics is beginning to settle down.<sup>22</sup> Users and providers have raised the stakes, leading to predictions of a shakeout among big players.

According to a recent survey<sup>23</sup> conducted by the New York-based Outsourcing Institute, 55 percent of third-party partnerships fail within five years. Due to these messy and costly

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21 Caldwell, Bruce, "Logistics Via the Web", Information Week, April 12, 1999.

22 Bonney, Joseph, " Shakeout in 3<sup>rd</sup>-Party Logistics", American Shipper, December 1994.

23 "Lessons Learned", Logistics Management and Distribution Report, April 1999

divorces of the shippers and 3PLs, Prof. Robert Lieb of Northeastern University predicts that the providers in the future will seek longer contracts than the three-year pacts commonly signed today. "The providers are going to look for clients who want longer term relationships. As contracts broaden in terms of services offered and geographic regions covered, the costs incurred by users in canceling such a contract are going to increase," Lieb says. He adds that both parties will have greater incentives to "get it right" and develop longer-term relationships. Randall from Mercer Management Consulting says that users have an increased experience and realism about what can be achieved and what cannot. "Many users see improvements, but, in many cases, not to the extent they had hoped," he says, while adding; "providers must keep working to deliver a better product.

The 3PL industry has become a highly visible component of the logistics community. It is attracting a number of participants from other industries like investment bankers and software developers. It has undergone major changes with the increase in the number of providers, broadening of the customer base and the expansion of services they provide. Increasing interest of the customers in one-stop-shopping<sup>24</sup> is facilitating alliances with other third party and forwarders for additional services and geographical coverage. 3PL are abandoning the notion of "doing it all" and seeking out for alliances to help them focus on their core strengths. Customers are looking for a combination of access to assets, logistics knowledge and system capabilities. The asset-based requirements include warehouses, transportation equipment and capital. Alliances and partnerships can provide all of these in some way or another. As far as operational and strategic planning capability is concerned, consulting groups and acquisitions come handy. The most challenging requirement for the 3PLs are the information system capabilities. With continued globalization and integration of supply-chain activities, logistics information systems are increasingly becoming one of the most important services. As a result, 3PLs are devoting huge resources for IT systems design, development and maintenance and of course staying abreast with new technology.

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24 Lieb, Robert and Maltz, Arnold, "The Future of the U.S. Third Party Logistics Industry", College of Business administration at Northeastern University.

## **2.20 Outsourcing**

Outsourcing is not a new phenomenon. Leonard (1992) commented that: "Facilities management arrangements have been used...since the 1960s and the other types of outsourcing are very common". A new day is dawning for outsourcing as the practice moves beyond cost containment and into position as a tool for corporate strategy. Today companies across the world are taking a hard look at their operations and at least are considering outsourcing some of their functions. Some firms<sup>25</sup> are even taking the giant leap of outsourcing a portion of what has been considered their core competency work. Outsourcing of all types of services has experienced strong growth in recent years including facilities management, transportation and information technology. The total<sup>26</sup> US market for outsourcing services will increase from the 1996 level of \$100 billion to over \$300 billion in the year 2001 -- a 218% increase over the 5 year period.

Some of the potential reasons for outsourcing are listed below:

- Companies sometimes outsource because of lack of required resources within the company. In those cases, outsourcing becomes a viable alternative to build the needed capability by using outside capacity. Especially, new organizations,<sup>27</sup> spin-offs, companies expanding into new countries or starting to use new technology benefit from outsourcing.
- By outsourcing, companies can free up some human and material resources that can be used for some other important purposes. Also, using the expertise of the other company can help the client organization to focus better on developing and refining their core competencies.

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25 Samuel, Peter B., "The Brave New World of Outsourcing ", *The Journal for Strategic Outsourcing Information*, May 1998.

26 Antonucci, Yvonne and Tucker, James J., " IT Outsourcing Current Trends, benefits, and Risks", *Information Strategy: The Executive's Journal*, Winter 1998.

27 Source: Survey of Current and Potential Outsourcing End-Users, *The Outsourcing Institute Membership*, 1998

- Reduce or at least control operating costs<sup>28</sup>: Many times, vendors serve multiple users simultaneously. As the knowledge, skills and capacity can be pooled across different customers, there can be benefits of economies of scale and scope which can help the company to "get the job done".
- Cutting-edge capabilities: The wide variety of projects undertaken by the vendors permits the reaping of economies of scope and access to world class capabilities.
- The years of hard-earned experience and insights of the vendors can help in accelerating some of the benefits supposed to accrue from reengineering efforts.
- Some of the functions are difficult to manage internally due to employee conflicts or otherwise are out of control. In those cases, outside help can benefit the organization.
- Make capital funds available (Cash Infusion)
- Outsourcing can help companies share the capital risk as new services or new markets are added to the existing business portfolio.

Some of the potential reasons for not outsourcing are:

- Though outsourcing can help in reducing expenses, at the same time, increased administrative and transaction costs can result from outsourcing.
- Insecurities in the work place can also result due to outsourcing.
- Many times, there can be conflicting objectives between the purchaser and provider of the services. In those cases, it might be better to pool internal resources to complete the task undertaken.
- Irreversibility of the outsourcing decision<sup>29</sup> and vendor lock-in can be a big danger for the client company.
- If the client does not have control over the outsourced functions, there can be endemic<sup>30</sup> uncertainty of operations and development, which can affect customer relations.

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28 Kirschbaum, Les, "Success In The Workplace, Outsourcing and accounts receivable represent ideal coupling in many cases", Business First, May 5, 1997

29 Jurison, Jack, "A Risk-Return Model for IT Outsourcing Decisions".

30 Earl, Michael J., "The Risks of Outsourcing", Sloan Management Review, Spring 1996.

- If the outsourcing decision were taken due to lack of knowledge in a field, then the organization would always be devoid of the learning, which can pose dangers in cases of market unavailability.

## **2.21 IS Function and Outsourcing**

“The IS function of an organization is the aggregate of activities and the associated human and other resources needed to establish and sustain the IS needed by the organization”.  
(Derived from Brussard 1992)

IT/IS outsourcing<sup>31</sup> is the significant contribution by external vendors of the physical and/or human resources associated with the entire or specific components of the IT infrastructure in the user organization. Elam (1988) suggested the possible use of three forms of cooperative arrangement (i.e. full-equity ownership, partial ownership and no ownership) involving external vendors that can be used for the joint development of corporate information systems. Lacity and Hirscheim (1995) called this kind of cooperative arrangement as total versus selective outsourcing. This is important to know as almost none of the companies do outsource their entire function or none. There is always a part (whether it be big or small) of the IS function that is outsourced.

The concept of selective outsourcing makes us look at the various parts within this functional area that can be outsourced. The IS function<sup>32</sup> can be classified in terms of the information systems the IS function provides, components that make IS, and activities necessary to establish and sustain the IS. IS can be divided functionally into primary and secondary services. Primary activities would be those that are directly servicing the customers e.g. activities involving site selection for a new distribution center for a shipper. Secondary activities are those that support the primary functions like Human Resources

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31 Loh Lawrence and Venkatraman N., "Diffusion of the Information Technology Outsourcing: Influence Sources and the Kodak", Working paper, Sloan School of Management.

32 Leoff, L.A. de, "IS Outsourcing Decision-making: A Managerial Approach", Idea Group Publishing.



and Finance. The present study deals only with the primary activities of 3PLs. IS components can be classified into hardware, software, people, procedures and data. IS activities can be planning, development, implementation, maintenance of the system and actual operation.

The degree of IT outsourcing is dependent on two factors:

1. Degree of internalization of physical resources by the 3PLs
2. Degree of internalization of human resources by the 3PLs

Internalization<sup>8</sup> here means the ownership of the computer assets or the employment of the system personnel. The different modes in the IT infrastructure that have been commonly outsourced by firms are application development, data center, systems integration, systems design/planning, telecommunications/network and timesharing. The various modes of IT outsourcing also differ in the domain of influence within the corporation. Domain of influence refers to the extent to which IT is inherent in the business processes as well as the administrative and functional coordination of the organization. For instance, an application development outsourcing arrangement ordinarily affects a specific domain of the firm, while telecommunications/network may affect a more general domain of the firm. An outsourcing arrangement differs in terms of the contractual mode. For instance, a systems design/planning task may be project based; while data center operations may be period based.

Information systems have moved from being a support function and have assumed a central role in almost all business operations. Information system is the area where <sup>33</sup>breakthroughs in cost savings can be achieved, but one cannot be master of all technologies, one needs help from alliances. Outsourcing is an omnipresent fact of today's business environment. According to the logistics director of a major retail company<sup>34</sup>, "Essentially, with outsourcing, I believe you get better service as a customer than you did

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33 Gulisano, Vincent F., "The Role of 3<sup>rd</sup> Party Logistics in Reengineering the healthcare Supply Chain", Annual Conference proceedings, Council of Logistics management, October, 1997

34 Willocks, Leslie P. and Lacity, Mary C., "Strategic Sourcing of Information Systems", 1998.

as a boss; I can think about the strategy objective, and not worry about the day-to-day work.” It offers the efficient utilization of capital resources, access to specialized expertise and the creation of the agile organization. The recourse for a 3PL can be to adopt a strategic plan to best understand how IT outsourcing can enhance and optimize its own business processes by using some of the top IT providers like: I2 Technologies/ITLS, Optum/Metasys, Manugistics, EXE Technologies and CAP Logistics (now a part of Baan) or others.

The times ahead seem to be exciting ones. Increasing comfort with technology outsourcing is enabling companies to reshape their operations in innovative ways. New alliances and new ways of partnering are creating increasingly complex relationships. Examples could be the formation of UPS Logistics Group and FDX Corporation where different companies came under a common umbrella to share the logistics expertise and technological innovations among themselves. Sometimes the groups have a technology member that helps all the other companies like in case of UPS logistics group. Eventually in this situation, the leaders will be the 3PLs that will be able to establish trust-based environments with flexibility and clear dialogue as the key to their relationship. Before trying to understand the strategy of 3PLs to adopt IT capabilities, it is important to review some of their current IT Capabilities.

## **2.22 Information Systems Capabilities of 3PLs**

Information technology is a key element in the worldwide logistics productivity improvements as technology continues to improve at an amazing rate. This will allow the well-equipped companies to achieve high levels of channel integration required to gain a big share of the global market place. The adoption of information system will also help them in having strategic relationship with their customers. The challenge in front of them is to vision and build these systems in the most cost-effective way.

Information and operations systems for logistics management will continue to be vitally important in leveraging logistics to achieve a competitive advantage. Within the last

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decade there has been a direct positive correlation between the role of information systems in improving logistics programs and the increasingly important role of third party providers. 3PLs continually invest in logistics systems to support their core business. This in fact allows shippers to avoid information systems development efforts by tapping into the existing infrastructure of 3PLs. Many large companies do not have big information technology budgets, particularly not budget for logistics information systems which are mostly well down the priority list for corporate information systems investments. 3PLs in turn provides expert advice based on real-world implementation. They offer systems perspective grounded in experience. They can help to bring in logistics systems that have same or equivalent resource allocation as the other enterprise functional areas like finance, marketing and manufacturing systems. Despite some of the side effects of the "information systems pill", (technology is sometimes viewed as the "systems pill"<sup>35</sup> that can help companies solve the business problems and allow them to get a good night's sleep), 3PLs long experience in implementation can help in mitigating some of the system risks. Since 3PLs are accountable for profitably meeting agreed-upon service levels in logistics, it drives them to adopt and implement technologies that deliver an attractive ROI and reduce risk.

3PLs provide a myriad of information systems supported logistics services to their customers including customization, maintenance and updating. There were many services that were identified as main information systems supported offerings by the 3PLs during the course of the interviews. Some of them are listed below.

- Optimal routines for load consolidation: Loads for many shippers are made into one big load, shipped to one common place and then distributed to the individual customers. The consolidation of shipments enables shippers to reap the benefits of shared costs, quick one-stop delivery, and enhanced customer satisfaction.
- Optimal route generation for cost-effective, fast and reliable delivery of goods.
- Carrier assignment in cases where the shipper uses multiple carriers.
- Continuous move identification

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35 Auray, Robert R., " Embrace Technology To Maximize Supply Chain Efficiency; But Beware the Systems Pill", [http://www.usco.com/Embrace\\_Technology.htm](http://www.usco.com/Embrace_Technology.htm)

- Complete visibility of the shipment to the shipper through tracking and tracing capabilities.
- Reverse logistics or the process of collecting, moving, and storing used, damaged, or outdated products and/or packaging from end users.

### **2.23 Role of IT in the Operations of 3PLs**

Information is increasingly becoming central to the logistics operation. Below are listed some of the reasons why IT plays an important part in the logistics.

**Service Level Improvements:** Customer service has always been and will remain to be a central component of any business. In a competitive marketplace, the company that provides the highest customer service value will succeed and thus annul the possibilities of extinction. Maintaining a level of excellence requires that transportation and logistics managers continually evaluate the performance of their operation and assess whether they are getting products to their customers in a usable form, in a timely fashion and at an acceptable price.

**Transportation & Logistics Decisions:** Transportation and Logistics managers could use the data from their systems technology to evaluate whether, on a day-to-day basis, their company is making the most intelligent and cost effective decisions. For example, information can be analyzed to determine whether an operation has too many vehicles sitting idle or if inventory levels are too high.

**On-board Computers:** Serving as a mini-nerve center, vehicle-based computers allow management to measure, analyze and improve driver and vehicle performance. More advanced systems are driver focused, providing easy touch-screen interaction with operation control systems to download trip plans and load data. The computers also eliminate significant paperwork and provide quality data for on-time performance reporting from receipt to shipping<sup>36</sup>. By tracking driver performance, on-board computers

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36 “Panelists foresee an end to storage”, Logistics Management and distribution report, June 1998

can help management promote safety and reduce costs. Many 3PLs like USF logistics and Arnold logistics provide this functionality.

**Routing & Scheduling Systems:** Computer based route design systems can have the advantage of quickly determining shipping requirements and helps identify the most efficient way to schedule vehicles. Factors such as driving time, distance, business hours and government regulations are weighed by most systems, which then quickly generate routing and scheduling alternatives.

**Operations Control & Utilization Analysis:** At the heart of these systems lies the control and analysis system which supports key day-to-day functions such as dispatching, driver payroll and freight billing. Control and analysis systems are tools management uses to evaluate transportation and logistics decision. From this ongoing process, benchmarks are devised to measure service quality as well as overall performance.

**Technology Will Respond to Market Needs:** Driven by the demands of a highly competitive marketplace, computer technology to support information needs is expected to continue improving rapidly. As a result, businesses will need flexible, adaptable and scalable systems in order to keep up with growing customer demands and the rapid rate of technological change. For instance, the user of Electronic Data Interchange (EDI) as a means of linking vendors, suppliers and customers is expected to continue to grow as all parties realize the value associated with timely transmission of data.

### ***2.30 Theoretical Perspective***

The question of whether or not to outsource is the subject of various economic and organizational theories. Three theories have been analyzed in this chapter and elements that appear to be applicable are adapted to the study of IS outsourcing for 3PLs.

### **2.31 Competitive Strategy**

There are large differences in the ways organizations operate and behave. A substantial<sup>37</sup> portion of the behavior engaged in by organizations is the result of deliberate strategic planning. A strategy is a commitment to undertake one set of actions rather than another and this commitment necessarily describes an allocation of resources. A number of organizational theories focus on strategies for organizations and organizational units to compete for power, market share and continuity.

One way of investigating the organizational competitiveness and strategies is by Porter's (1980) five-force model. The IS outsourcing decision can effect all parts of an organization and can be a source of competitive advantage or differentiation. At the same time market of the suppliers is also competitive which might benefit its customers significantly. As said by Chamberlin, "Where the possibility of differentiation exists, however, sales depend upon the skill with which the good is distinguished from others and made to appeal to a particular group of buyers. The 'product' may be improved, deteriorated, or merely changed, and with or without a readjustment or price. It, as well as the price, will be chosen with reference to rendering the profits of the seller a maximum." This gives an insight to Porter's strategy of competitive differentiation.

Prahalad and Hamel (1990) focussed on core competencies of the organizations as to improve the competitive position.

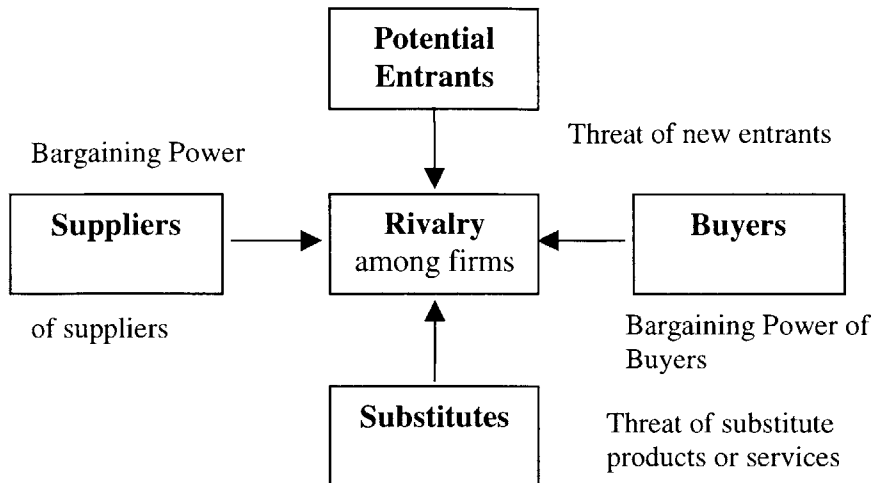
### **Outline of Competitive Strategy**

Figure 3 shows the Five Forces model developed by Michael Porter. The rivalry among the existing firms depends on the number of firms, power or concentration of firms, products or services and cost leadership. The threats due to new entrants mainly depend on the barriers to entry and exit the industry. Bargaining power of the buyers depends on the number of buyers and the distribution of their purchases. The larger the number of buyers and smaller their individual purchases, the lesser power they have. The more open

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37 Oster, Sharon M., "Industry Analysis, Modern Competitive Analysis", Oxford University Press, 1994.

**Figure 3: Competitive Forces**



the transactions are, the more power buyers have, in part because this reduces their costs of search among producers. Characteristics of the product like standardization also determine the buyer power. The threat of the substitute products or services depends on whether products or services exist or may arise that can be used to perform the same function for buyers. In highly competitive markets, the substitute products play a very modest role. The same way powerful buyers can squeeze profits by putting downward pressure on prices, suppliers can reduce profit margin by increasing input costs. Threat to backward integration will reduce the supplier power. The intensity of these five forces determines the level of competition in an industry.

### **Application of Competitive Strategy to acquiring IS capabilities**

The relative power of IS supplier over the client organization or vice versa determines the strategy of whether or not to outsource the IS function. The power of the IS supplier depends upon the size of the function being outsourced, the number and strength of other suppliers being used by the client. The higher the competition among the IS suppliers, the more attractive does the outsourcing option become. The power of the IS suppliers

depends on the switching cost of the IS supplier; in other words, the cost that will be incurred by the company to switch to some other IS supplier. High barriers to entry and exit in the IS industry decreases competition in that segment and make outsourcing less attractive for the company in question. With information more readily available these days, many times the client organizations demand some specific kind of information system to fulfill the functions. In those cases, the company does not have a choice but to go with a particular supplier. This reflects the relative power of the buyer over the company. Many companies vertically integrate with processes like IS functions to create barriers to new entrants in that industry.

### **Core Competence Perspective**

The core<sup>38</sup> competence perspective is not a natural one in most companies. Companies are generally aligned around their strategic business units or operational units. It is necessary to have a product or service focus, but it is equally important to have an explicit core competence focus. A competence is a bundle of skills and technologies rather than a single discrete skill or technology. A core competence is a source of competitive advantage for a company, but not all the competitive advantage of the company qualify as its core competence.

Every firm bumps up against the limits to vertical integration at some point. The pitfalls of over-integrating are: Although IT design can ease coordination significantly, it may be very costly to acquire the assets (human and equipment) required to support this activity. This may be responsible for very low return on the investment. It is very difficult to find those kind of qualified people. This is one of the difficulties faced by 3PLs and the industry. Even if they do find these people, the range of skills required may not be synergistic in terms of the management skills required to use them effectively, once the system has been developed. This creates diseconomies of scope. Acquiring key people and having them focus on supporting internal needs may insulate them from changing technology and market needs, leading to complacency in technological improvement.

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38 Hamel, Gary and Prahalad, C.K., "Competing for the Future", Harvard Business School Press, Boston, MA, 1994.



Acquisition of an IT company due to criticality at some point of time may become obsolete by some technological breakthrough. They would not have continuous access to the latest computer technology.

To argue it the other way, companies that produce their own software can tailor it to their company culture and design procedures permitting more seamless data sharing with a family of design tools that can access, modify, check, and distribute that information. Companies that outsource systems design face the need to fund firm-specific development projects at a supplier who may re-package proprietary knowledge for other 3PLs or in fact their customers themselves as logistics information systems are increasingly becoming a big part of the services they offer. Due to business cycle volatility and high employee turnover typically experienced by the IT industry, 3PLs will have less control of how deeply the firm will cut into the expertise that serves as a technical and business memory essential for supporting previously developed systems and designing new ones.

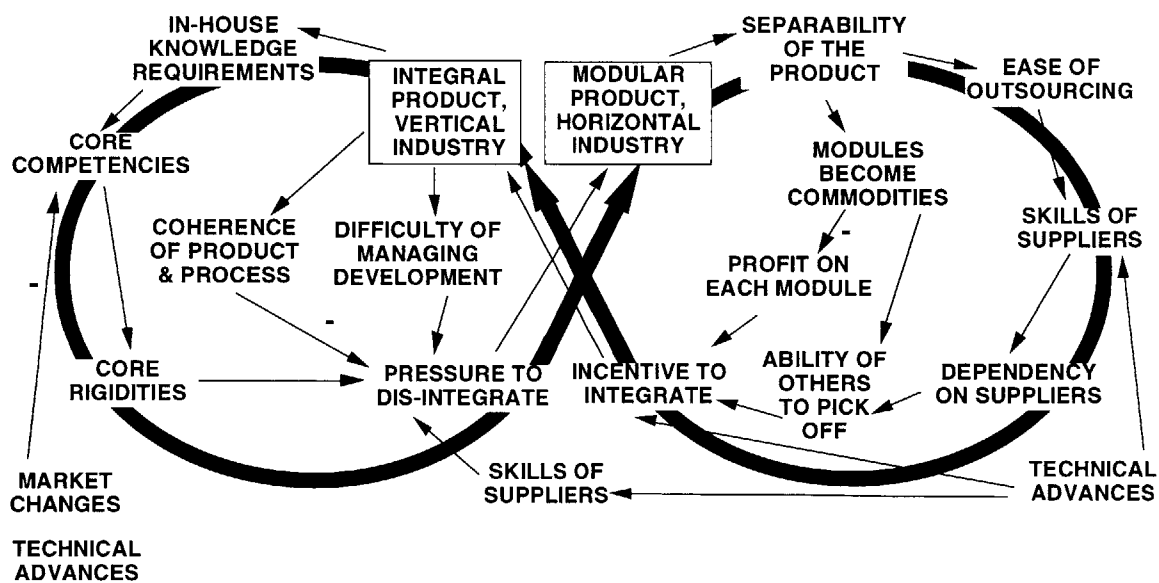
### **Dynamic Instability of Core Competencies**

Charles Fine and Daniel Whitney identified the dynamic instability of industries. In their paper, "Is the Make-Buy Decision Process a Core Competence", they used the computer industry to illustrate this instability. In the early 1970s and 1980s, the computer industry had a strong vertical structure with each competitor offering products with fairly integral architectures. This structure survived for some time, but the leaders were constantly under attack, as they had to maintain competencies over a broad array of technologies. They then chose to break the tradition to use a modular architecture. Since then, the computer industry has been dominated by highly modular systems, and companies competed against its own category of companies like Microsoft competing with Apple. The modular structure also proved to be quite unstable. Once a firm dominated its own kind of company, it started looking for ways to gain more market power by expanding vertically. The vertical integration was accompanied by offering a proprietary system rather than a modular component. Alternately, a member of a highly competitive industry segment may find itself with low profit margins because it provides merely a commodity module in

architecture designed by someone else. This circumstance can also drive a firm to increase its vertical integration.

The figure below represents this dynamic instability by illustrating the forces that drive the cycles from vertical industry structures with integral-architecture products to horizontal industry structures with modular-architecture products and then back to vertical again.

**Figure 4: Integral-Modular Dynamics**



Influence<sup>39</sup> Diagram of Integral-Modular Dynamics.

### IS as a Core Competence

IS is generally not part of the core business of a company. It is seen as a tool to achieve the other goals of the company. Since outsourcing IT is thought to reduce the company's expenses in terms of number of employees and increases flexibility, it becomes the ideal candidate for outsourcing. Also, a company cannot be a master of all its processes in today's fast-changing technology. In order to keep pace with the technology, IT can be

39 Whitney, Daniel E. and Fine, Charles H., "Is the make-buy decision process A Core Competence?", MIT Center for Technology, Policy and Industrial Development, Feb 1996.

orchestrated through outsourcing that can help in guaranteeing the successful completion of integral duties.

Looking from the core business perspective all the activities like HR, finance and marketing qualify for outsourcing, as they do not directly contribute to revenue generation for the third-party logistics providers. It is only the logistics assets and services that generate revenue and profit for the company. Information systems is so much integrated into their whole business and services that the core processes and competencies start depending on the information systems of the company. On top of all this, IT can provide competitive advantage over other competitors. Because of all these factors, IT is gaining significant attention from the top management over the past few years and considered to be different from other technologies used by companies.

### **2.32 Division of Labor**

Division of labor is a fact of life. Social thinkers from the earliest time saw the importance of division of labor. It<sup>40</sup> was in the eighteenth century that social cognizance was taken of the principle, though until then unwitting submission had been rendered to it. It has its influence on almost all fields and functions of society whether it is political, social, economic, administrative, aesthetic or scientific. Men<sup>41</sup> working in the sciences have become increasingly more specialized.

Adam Smith was the first economist to put it in theory. According to him Division of Labor affects productivity to a great extent. Division of labor refers to the splitting of composite tasks into their component parts and having these parts performed separately.<sup>42</sup> There is a learning curve associated with a kind of work and thus economies of labor can be gained through specialization. After learning the execution of work, people start devoting more attention to improving the performance whether it is quality of work or

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40 Durkheim, Emile, "The Division of Labor In Society", Translated By George Simpson, 1947.

41 Candolle, De, "Histoire des Sciences et des Savants", 2<sup>nd</sup> edition.

42 Loeff, Leon de, "Information Systems Outsourcing Decision Making: A Managerial Approach", 1997.

time devoted to the task. Currently an increased globalized economy and developments in information technology create new uncertainties for enterprises and a search for flexibility - a new division of labor based predominantly on the service sector.

### **Application of Division of Labor to IS Outsourcing**

Outsourcing can be called to be a form of division of labor which occurs between the firm requiring IS services and the IS providers. According to Leon de Looff, outsourcing is beneficial if suppliers have more economies of scale than the client does, if there is sufficient market pressure, and if the client organization retains control. Economies of scale depend on the scale and similarity of activities, the inherent possibilities for economies of scale, and the presence or absence of barriers to re-use. Here arises the issue of asset specificity. The more specific the needs of the client there will be lesser re-use of technology and in turn will not justify economies of scale.

The more the supplier can re-use the technology and knowledge with other 3PLs, the more it justifies outsourcing of IS activities. The off-the-shelf-solutions in its original form with little or no customization can achieve economies of scale. Even with specially designed software, if the specification is sufficiently elaborate about the business processes, in formulating the specifications, there is no need for special skills and knowledge for the development purposes. So it makes more sense for the clients to use lesser number of IS suppliers both from the business knowledge and integration perspective. Close monitoring of the supplier's work can help retain control by the client.

### **2.33 Transaction Cost Theory**

This is one of the dominant theories that have been used by various researchers to explain the phenomenon of outsourcing. The idea of a transaction cost was introduced by Coase and developed principally by Williamson. Other academicians like Lacity and Hirschheim, Beath and others have proposed it to be a framework to explain IS outsourcing.

## **Outline of TCA**

Transaction cost theory holds that firm considering outsourcing will behave in a cost-economizing way, and this will involve consideration of two kinds of cost: production and transaction cost. Production costs are those that directly associated with handling of the task and “transaction cost occurs when a good or service is transferred across a technologically separate interface” (Williamson, 1981).

Transaction cost is affected by five factors namely, asset specificity, frequency, number of suppliers, bounded rationality and uncertainty or complexity. Asset specificity is defined as the degree of customization of the transaction, i.e. if other companies cannot use the transaction due to physical asset specificity, human asset specificity or site asset specificity. High asset specific transactions require specialized physical and/or human skills, which cannot be replicated for other firms. Asset specificity increases production costs and the economies of scale can no longer be leveraged. Transactions involve some degree of uncertainty as perfect information is nearly impossible. As uncertainty increases, the tendency to shift to insourcing increases. Companies are also unable to foresee the complexity of the involving the outsourcing decision which turns outsourcing not in their favor. Frequency refers to how often the customer needs to initiate the transaction. The transaction cost increases as the frequency of two parties coming together increases.

The concept of bounded rationality is based on two principles<sup>43</sup>. (1) Individuals or groups of individuals, have inevitable limits on their abilities to process or use information that is available. (2) It is equally implausible to suggest that all possible states of the world and all relevant cause-effect relationships can be identified, following which, probabilities can be calculated presumably on the basis of previous occurrence. If the parties are perfectly rational, every conceivable transaction can be safeguarded by a complete contract, which does not happen in the real world.

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43 Dietrich, Michael, "Transaction Cost economics and Beyond, towards a new economics of the firm", 1994.

According to Williamson, opportunistic behavior might occur when there are small number of suppliers because the buyer has limited choices. The transaction cost becomes more significant during contract renewal. The condition of the market changes comparing the time when the buyer first enters the market and when the buyer enters the market again after the end of first contract. During this period the contractor has gained significant knowledge of the buyer's business processes and has a clear advantage over other suppliers.

### **Application of TCA to IS Outsourcing**

IS Outsourcing leads to smaller production costs but higher transaction cost. Smaller production cost is primarily due to economies of scale enjoyed by the IS provider and also the learning curve associated with development of various functions.

Asset specificity in the context of IS outsourcing refers to the uniqueness of the firms hardware and/or software architecture and skill set of IS employees. It can also refer to the degree of customization of the software. Such peculiar investment, may increase the transaction cost with the IT vendor. According to Aubert, Rivard and Patry (1994), who studied the effect of asset specificity and uncertainty on IS outsourcing by a survey of 250 Canadian firms, found that software development activities requiring significant business and organizational knowledge were kept in-house.

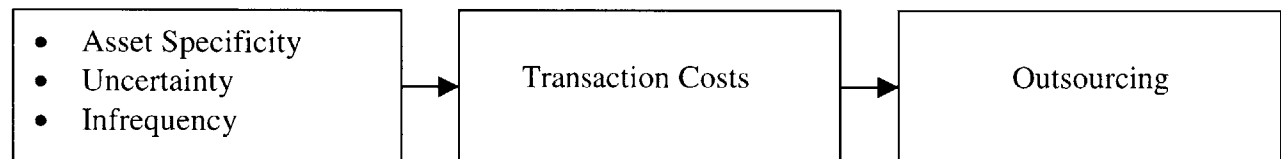
Frequency in IS outsourcing may increase due to renewal, change or termination of contract due to new technologies. The organizations study done by Aubert, Rivard and Patry showed a tendency to keep their work force at a stable level and rely on external assistance to manage spikes in business through independent contractors or IT consultants. So these are a few times when the frequency of transactions due to external help significantly increases.

IS Transactions are uncertain if they involve products or services which are under development. Rapidly changing technology and changes in the specification due to the changing role of 3PLs and their ever-increasing spectrum of services can cause

uncertainty. Complexity is high if the IS supports complex business processes and the technical complexity of the underlying concepts are very high. As " the number of control constructs grows and as the size in the number of modules grows", the complexity<sup>44</sup> of a software system is said to increase. As the number of software being used within a company increases and the number of platforms increases, it is not only hard to develop interface between them; there is difficulty in maintaining the system as well.

The figure<sup>45</sup> below indicates the relationships among transaction costs, their determinants, and outsourcing.

**Figure 5: Transaction Costs**



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44 Banker, Rajiv D. and Datar, Srikant M. and Kemerer, Chris F. and Zweig, Dani, "Software Complexity and Software Maintenance Costs", Working Paper, Sloan School of Management, 1990.

45 Grover, Varun and Teng, James T. C., and Cheon, Myun J., "Towards A Theoretically-Based Contingency Model".

## **3.0 METHODOLOGY**

In this chapter, the research design is elaborated with the outline on each of the steps used to carry out the study. It lays emphasis on research objectives, hypothesis, data collection and formulation of questionnaire. The process of the interview has also been described. The participants have been assigned pseudonyms to protect the identities of the participants as well as make them more free to discuss the issues openly.

### **3.1 RESEARCH OBJECTIVES**

The literature review did not show what decision variables the third-party logistics consider when making decision about whether or not to outsource a part or whole of their IS function. The objective of this research was to fulfill this need. The objectives are:

- Start with identifying the current trends in acquiring Information systems capabilities by 3PLs
- Use the above information for determining the relation between the degree of outsourcing and the size and IT cost structure of various 3PLs
- Compare the differences in strategy between Asset and Non-asset based providers
- Identify the drivers that motivate or force companies to adopt the current strategy
- Further identify main information systems supported offerings by 3PLs
- Use the above information to find the relation between revenue of the 3PLs and the number of information systems supported offerings.
- Identify the relation between degree of IT outsourcing and the number of information systems supported offerings.

In short, the objective of this research was designed to aid in the understanding of economic and strategic influences which drive firms to either internalize their IS activities or to outsource them to fulfill the needs of their customers. The results of the study can be of use by third-party logistics companies that are considering IS outsourcing and those that have outsourced and want to reevaluate their outsourcing decision.



### **3.2 Hypotheses**

Hypothesis 1: *The firms are steadily moving away from in-house development to outsourcing their IS needs, though with caution.*

In the early stages of an industry or in countries with lower levels of technological development, scarcity of qualified information system suppliers who can support the business needs is typical. Even the few suppliers that are available have a lot of power over their buyers. Thus, firms are forced to be their own suppliers. This happened with 3PL industry too. As the 3PL industry is maturing, they are abandoning the notion of doing it all and are steadily shifting away from developing in-house to partnership modes that involve external software vendors. This hypothesis is based on Porter's competitive strategy where he claims that number of suppliers determine the relative power of the suppliers over the buyers. Since now the number of IS suppliers that can meet the needs of the 3PLs is increasing, they are becoming more comfortable outsourcing IS activities.

Hypothesis 2: *Most of the 3PLs do some kind of development work in-house whether it is development, customization or integration of various software/OS.*

3PLs are now realizing that IS function is not the best way for competing in the marketplace, it is rather the business model that can give them a real edge over their competitors. Yet, most of the 3PLs do some kind of development work in-house whether it be efforts in the area of enabling Internet to help their business, developing interfaces for integration for various software/OS or customization of the purchased software. These exclude the efforts involved in design and analysis for their customers, which were assumed to be normally supported by the logistics provider for the purpose of this study. This was implicit in the earlier hypothesis that said that they are steadily and cautiously moving away from in-house development keeping the control in their hands. The current hypothesis is also based on the Porter's competitive strategy where he points out that when buyers can integrate backward or vertically, producing goods for themselves, it increases their bargaining power significantly.

*Hypothesis 3: The firm's gross revenue and information technology spending will be negatively related to the degree of IS outsourcing.*

A firm's cost structure is a significant source of business competence given its role in explaining business profitability. Given the nature of IS that pervades the entire process of transforming inputs into outputs, the costs associated with IS governance include the direct technology costs and the indirect cost of supporting the administration of the enterprise. Overall the cost associated with IS outlay is large. Since outsourcing can free up some capital investment and save operating cost, it is fair to hypothesize that a firm's revenue and information systems spending are crucial determinants of IS outsourcing. Bigger companies tend to develop their own software whereas the smaller companies tend to avoid the investment required in developing software. They either buy off-the-shelf software/applications or have partnership with other IS providers and have marketing rights to their software. This is based on the theory of division of labor, which states that there are economies of labor specialization associated with increased division of labor.

*Hypothesis 4: The companies where the IT for logistics division is not separate tend to do more in-house software development than the companies where IT for logistics division operates independently.*

This hypothesis is generated using principles from Transaction Cost Analysis. The companies where the IT department for logistics division is not separate tend to do more in-house software development than the companies where logistics division operates separately. One of the reason is they have the financial leverage along with people resources and hardware support from the parent company to take care of the risks involved whereas other companies look forward to their software vendor to share the risk with them. The other important reason is that the number of software and platforms being used within a company is very large in these companies, and the complexity increases as they start buying different software from the market or outsource certain IT activities. The high cost of transaction, coordination and complexity has a tremendous amount of inertia that keeps these companies away from outsourcing the IS activities.

Hypothesis 5: *The probability of IS outsourcing will decrease as the complexity of integration increases.*

At the present time, most of the third party logistics providers are going towards increased outsourcing due to various factors such as tight labor market, changing technology and rapid development required by their customers. 3PLs are increasingly facing immense complexity to achieve seamless integration among various software being used by the third party and its customers. This seamless integration is what the third parties are trying to achieve to become a lead logistics provider in a time when there is no clear leader in the industry. This hypothesis is in congruence with the dynamic instability theory illustrated before. The forces are presently driving the companies from vertical industry structure with integral-architecture products to horizontal industry structures with modular-architecture products. When the forces of complexity will supercede the forces that are driving modularity they will be back to vertical integration again. Only the firms that can manage their vendors effectively will be able to avoid the dynamic instability.

### **3.3 Data Collection**

Data for this research was obtained through telephone interviews of the top management in the IS department of various 3PLs. None of the participants were at the user level or those who did not have a say in the strategic decision making process of the company.

This method was chosen as the research methodology as it received the highest rating for its appropriateness in conducting logistics research among the three methods, namely the mail survey, telephone survey and face-to-face interview method. This data collecting technique enables the interviewer to meet the challenges of Seven Rs of logistics research. The challenge of contacting the *right* person<sup>46</sup> with the *right* information at the *right* time in order to ask the *right* questions using the *right* instrument for the collection of the *right*

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46 Walton, Lisa Williams, Telephone survey: Answering the Seven Rs to Logistics Research", Journal of Business Logistics, Vol. 18, No. 1, 1997

data at the *right* cost. In fact it received almost twice the rating of the mail survey and seven points higher than the face-to-face interview method.

Telephone interviews do not impose strict limits on the length of the interview, though it usually does not last longer than an hour. All the other advantages of personal interview except the ability to use visual aids are inherent in telephone surveys, including the interviewer's ability to probe for more details in case the answers are vague. It has distinct cost advantages over face-to-face interview.

Mailing survey was not identified as an effective method of data collection. The terminology is not clear in those surveys whereas in case of interviews, interviewer can check the interpretation of the terms. Especially in third party logistics industry use of terminology is not consistent. Changing technology makes it even harder to maintain consistency in terminology used. The experimental approach was not adopted as IS outsourcing of a company cannot be manipulated.

Researcher took a passive voice versus an active role in the present study. Active role is that in which researcher has say in the decision making and at the same time investigates the questions. This kind of active role was not possible for the researcher. Interviewees were free to elaborate on each subject unless there was a time constraint imposed by the interviewee. Additional and modified questions were asked by the interviewer to get the relevant information on the subject of outsourcing. The time of the interview ranged from 45 minutes to 90 minutes. The conversation was not taped, though notes were taken. The notes of each interview were then transcribed into a document. Though the actual interviews have not been included due to confidentiality constraints, the results and analysis have been summarized in chapter four and five. Sample size and sample characteristics have been described in "Sample Design".

To explore the IT capabilities of the participant companies, a list of information system capabilities was emailed to the participants. The list is shown in Appendix 3. The list is

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not very exhaustive but tries to cover all the major areas such as order management, warehouse management and transportation management. The overall response was poor for this part of the study.

### ***3.4 Questionnaire Design***

The questionnaire focussed on the current trends among 3PLs to acquire information system capabilities. The questions were focussed on getting the opinion of the participants towards IS outsourcing and identify the drivers and enablers that helped the company formulate the current strategy. The questionnaire also tried to explore the future industry and technology trends, which were the affecting the IT outsourcing decision at present. A set of questions attempted to explore how the strategy had evolved over time with emphasis on how trends have shaped their policies and procedures in the past and are likely to change in the future. During initial interview sessions, the interviewees were asked to comment on the questionnaire. All the participants agreed that the questionnaire was relevant to the subject undertaken and is understandable. One of them added that the questions were penetrating and probing while another commented they were wide-reaching. Some of the questions were modified later according to the feedback given by the participants. The complete list of questions asked during the interview session is included in Appendix 2.

### ***3.5 Sample Selection***

The target companies were first identified with the help of the web pages on the Internet. Almost all the big 3PL companies and medium sized were included in this list. The person responsible for the IT division of the logistics business was then identified by calling all the companies. If this did not work, then the CLM member directory was used to identify some of these individuals. Individual emails were sent to all of them describing the research study and the researcher's background. The email contained all the information but was kept small intentionally so that it can be read at first go. If the email got a response within one week then interview time was scheduled otherwise the person was called to get an appointment. Some of the participants were good at responding and made

the whole process easier. Out of those that were called, only 20% agreed to schedule an interview, while the others did not participate due to lack of time or else passed the information to somebody else who did not take interest. The total positive response was around 40% but again 40% of those interviews had to be cancelled later. The individuals interviewed comprised of only 25% of those contacted. The number of participants interviewed were 20, though those used for some of the result were around 19 in the event of lack of proper information for the rest.

### ***3.6 Summary***

This chapter described the research design at length. Hypotheses were formulated and were generalized using the theories of Competitive Strategy, Division of Labor and Transaction Cost Analysis. The chosen data collection procedure was elaborated and issues concerning questionnaire design were addressed.

## **4.0 RESULTS**

### ***4.10 Testing of Hypothesis***

#### **4.11 Results of Hypothesis 1**

Out of 20 participants, 15 said that the company's policy for acquiring information systems capabilities has changed over the period of the past 5 years. In the past companies developed all the information systems related functionalities in-house according to the notion that this would be the real differentiator to win more customers. Now the philosophy has completely changed with the proliferation of technology, applications and functionality. It is difficult to keep pace with the technology and as a result companies are moving towards outsourcing. Though currently companies are moving away from in-house application development, this trend might not continue in the future. Out of these 15 companies favoring outsourcing only six of them said that the trend of more outsourcing would continue in the future. Whereas the other 9 of them said they might see more outsourcing but mostly it will either remain the same or decrease in the future. This supports the first hypothesis, which says that 3PLs are steadily moving away from in-house development to outsourcing their IS needs, though with caution.

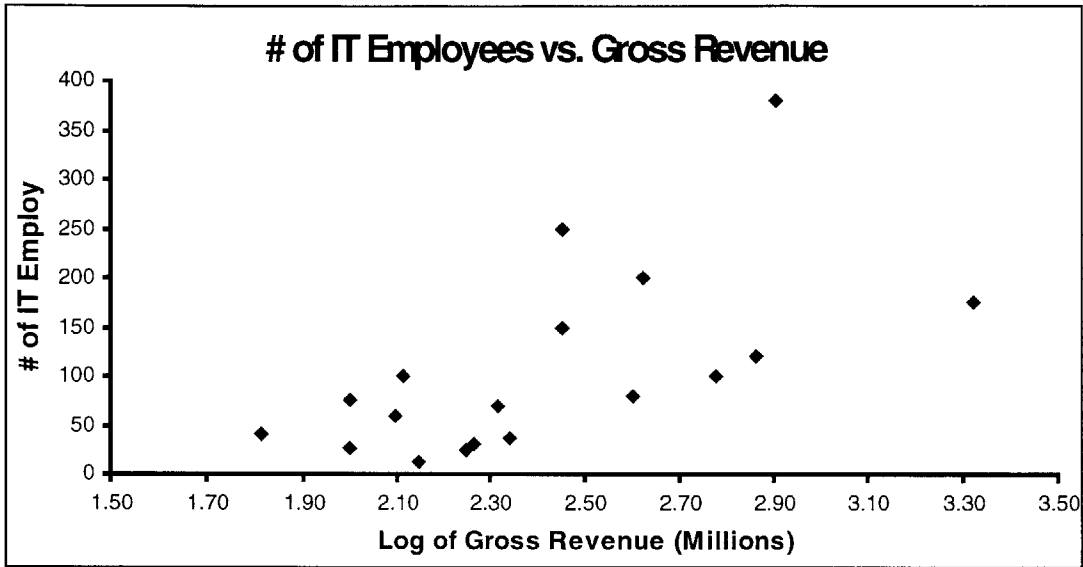
#### **4.12 Results of Hypothesis 2**

Out of the 20 participants only three of them do not carry out any application development work in-house. Even these three companies does some integration and customization work in-house. This proves the second hypothesis that most of the 3PLs do some kind of development work in-house whether it is development, customization or integration of various software/OS.

#### **Results of Hypothesis 3**

As shown in the graph below, log of Gross revenue (in millions, for the year 1998) of the companies was plotted against number of information technology employees the company supports. In some cases the companies do not publicly break down the revenue figures for the logistics division. In those cases, the Armstrong Guide for Third-Party Logistics

**Figure 6: IS Employee & Gross Revenue**

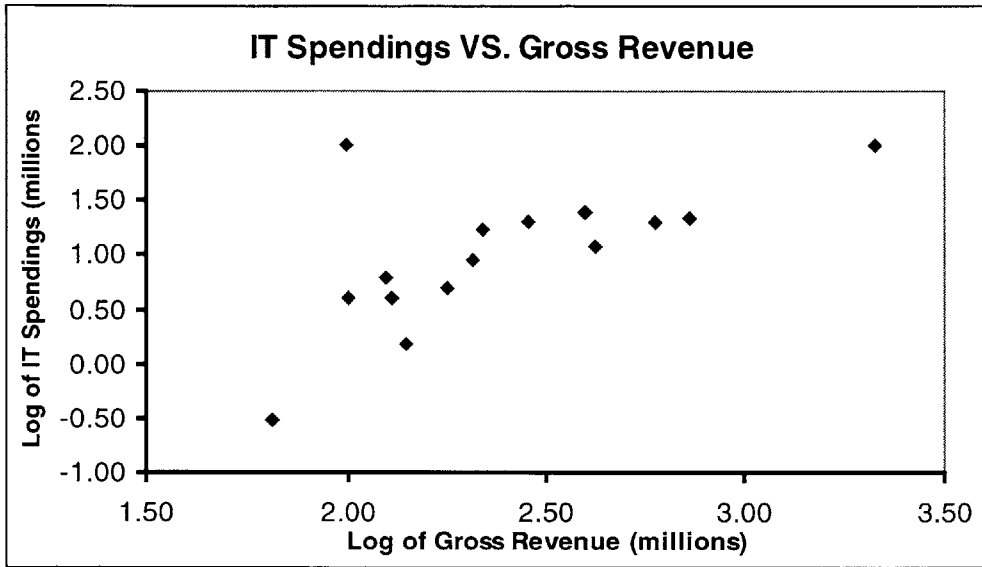


company was used to get the revenue for 1997 and then the value was incremented by the revenue growth to get the approximate revenue for 1998.

The plot is against the number of employees as it is assumed that more or less, the spending of the company on the compensation and benefit of IS employee is proportional to this number, which makes this number important. To verify this, the IT spending was plotted against number of IT employees of the companies, for the small number of data available in this category. The plot is shown below and it shows positive correlation between IT spending and number of IT employees supported by the company. Also in this era of tight labor markets, more the number of IT employees needed for the company, more will be the resources of the company spent on hiring, training and retaining the technical employees. The employees in some cases include the independent contractors and IT consultants, but these employees are taken as a part of the company. This is because either they have been working for the company for a prolonged period of time or these number of employees (even if they are not the same but have comparable salaries) are continuously on the company's account. There have been cases where companies do not have a separate IS division for logistics as part of the business.



**Figure 7: IT Spending & Gross Revenue**



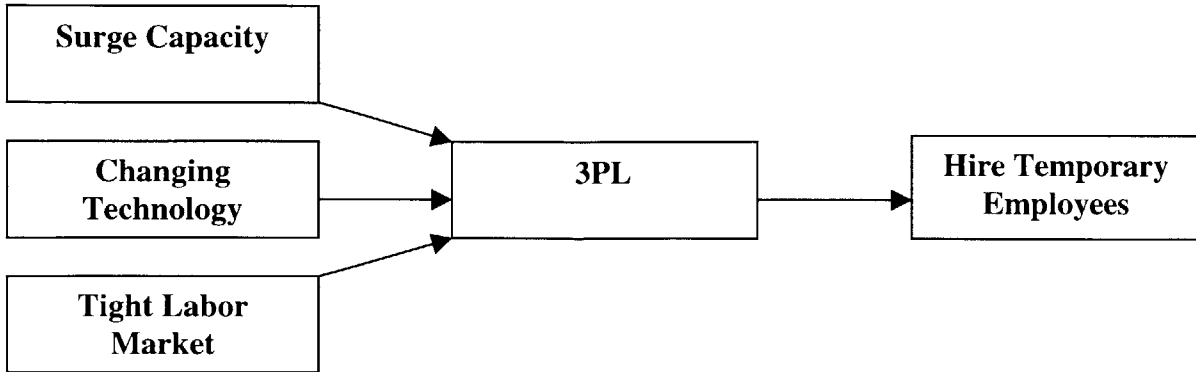
In those cases again an approximation was made. In other words, the company needs these number of people for IS support and have hired them on temporary basis for these reasons:

- 3PLs are not sure whether they will need these employees in the future.
- Due to tight labor market they are not able to hire
- They do not want to support the accompanied training with the fast changing technology, but still would like to have appropriate skills for the support.
- On customer demand, they are using a technology that they do not use normally. Also there does not seem to be a big market demand for this technology.

All the companies that participated in the current study use some help from IT consultants due to one or more of the factors mentioned.

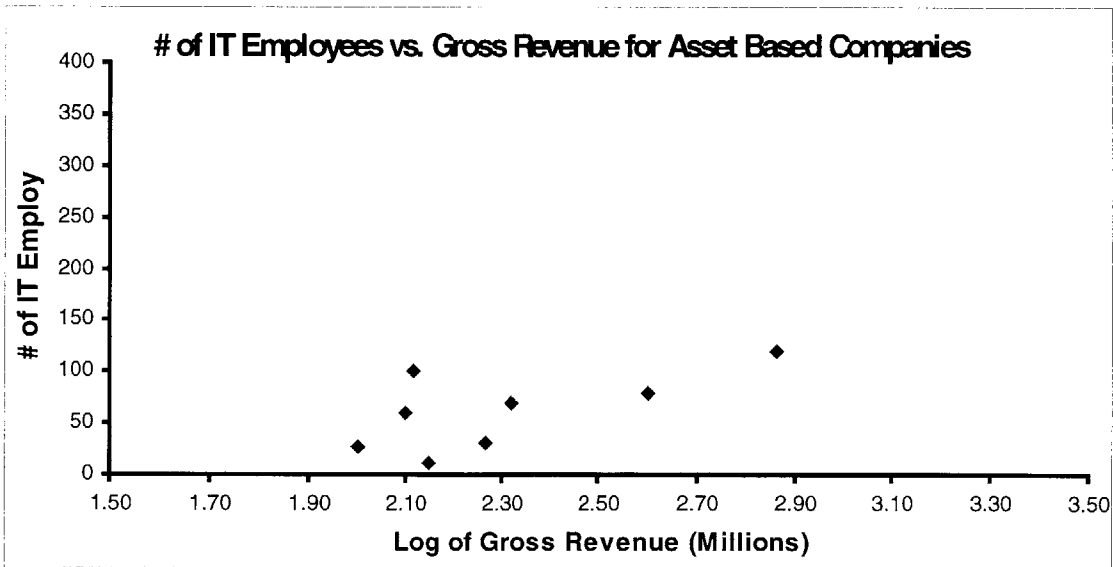
From figure 6, there is positive correlation between the number of IT employees and Gross Revenue. In other words, as the revenue is increasing, the number of IT employee is increasing. This might be a logical conclusion, though it is not obvious which is evident from the weak correlation between the two factors. Even for a large company the number of IS employees might be lesser than a smaller company, if a large part of the software development, maintenance and customization has been outsourced.

**Figure 8: Use of IT Consultants**

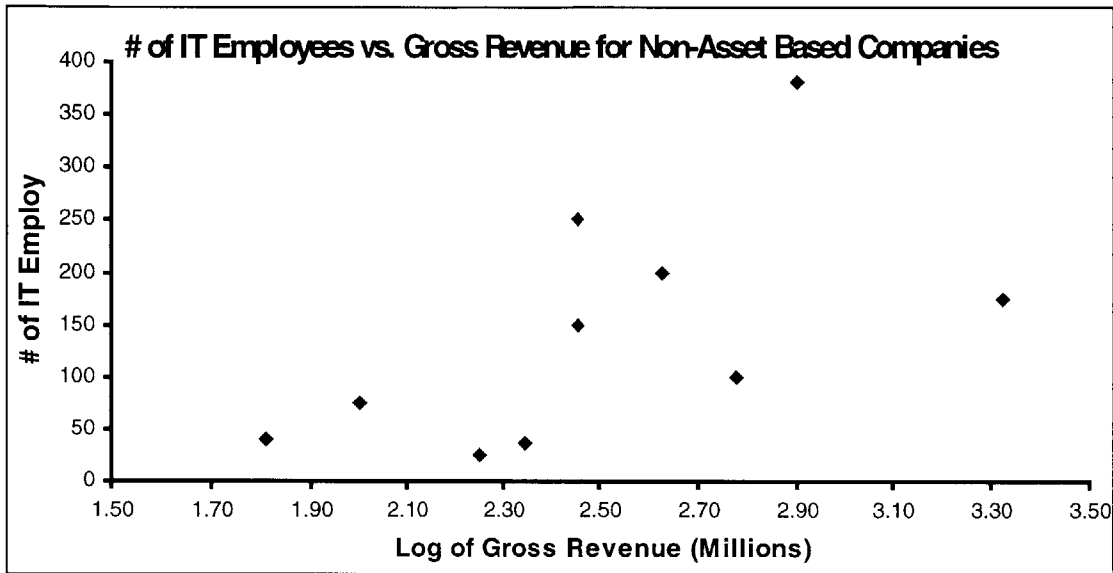


Then the data was also plotted for two categories namely, Asset and Non-asset companies.

**Figure 9: IT Employees & Gross Revenue for Asset Based Companies**



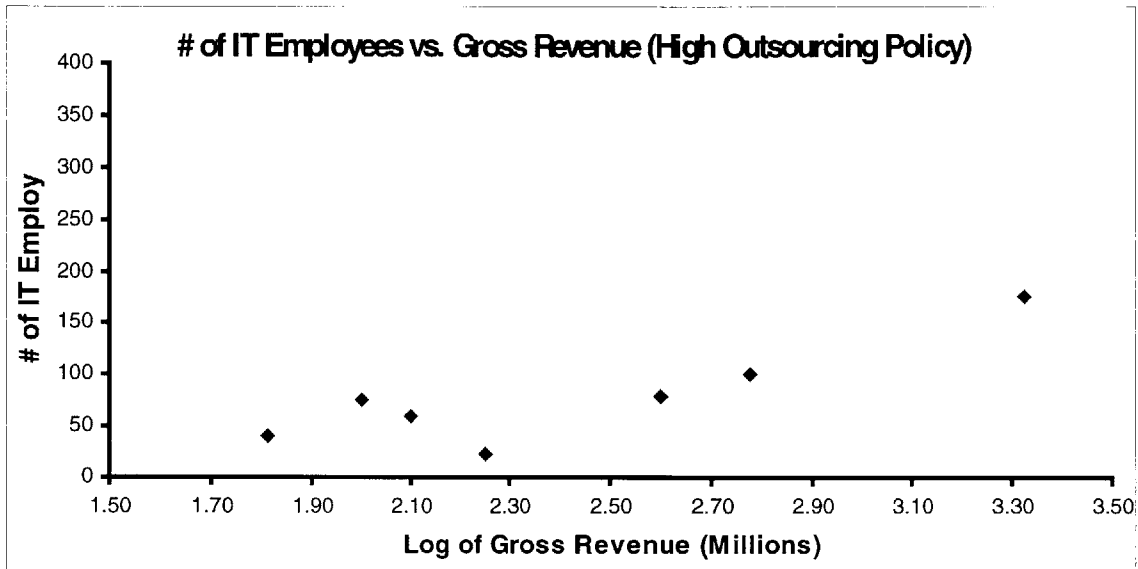
**Figure 10: IT Employees & Gross Revenue for Non-Asset Based Companies**



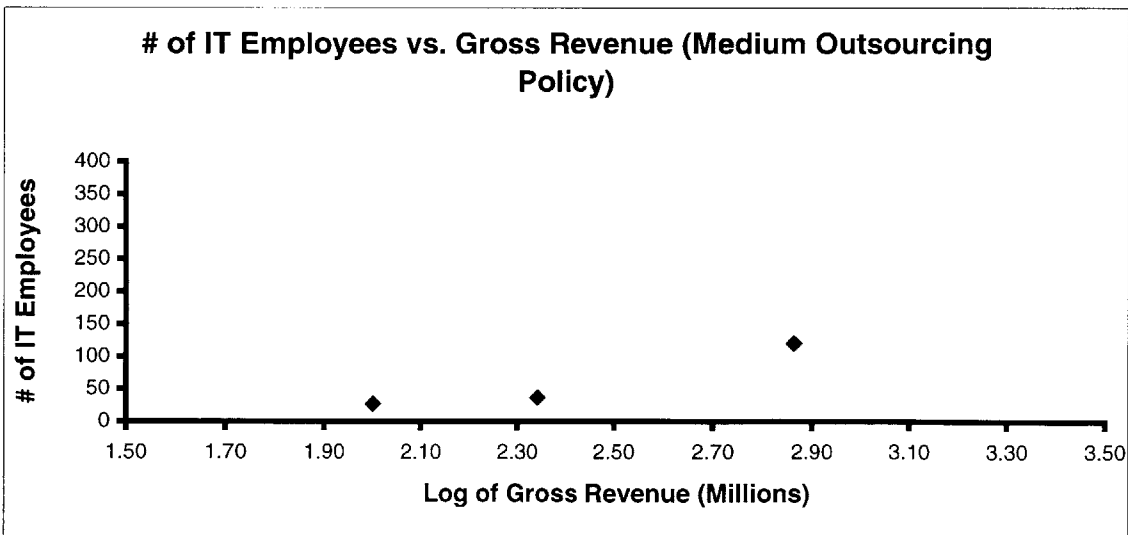
than the asset-based companies. For figure 9, the data point that has the most deviation does not have a separate IT division for logistics services and the number depicts the number of employee employed by all the divisions combined (e.g. truck rental). Also in figure 10, the data point that has the most deviation does not have a separate IT division for logistics services. The data that showed the most deviation had only 10% of the development outsourced. The graphs are not conclusive because of the small sample data, but there is a big scope of exploring this data further.

The data was again plotted separately for three categories namely, for High Outsourcing, Medium outsourcing and low outsourcing companies. Here outsourcing refers to the percentage of software used by the company, which were proprietary versus purchased or outsourced software. The data point was included in highly outsourced category if the number of applications purchased or outsourced were equal to or greater than 70%. Similarly, medium outsourcing would be between 35% to 70% and low would be between 0% and 35%.

**Figure 11: IT Employees & Gross Revenue (High Outsourcing Policy)**



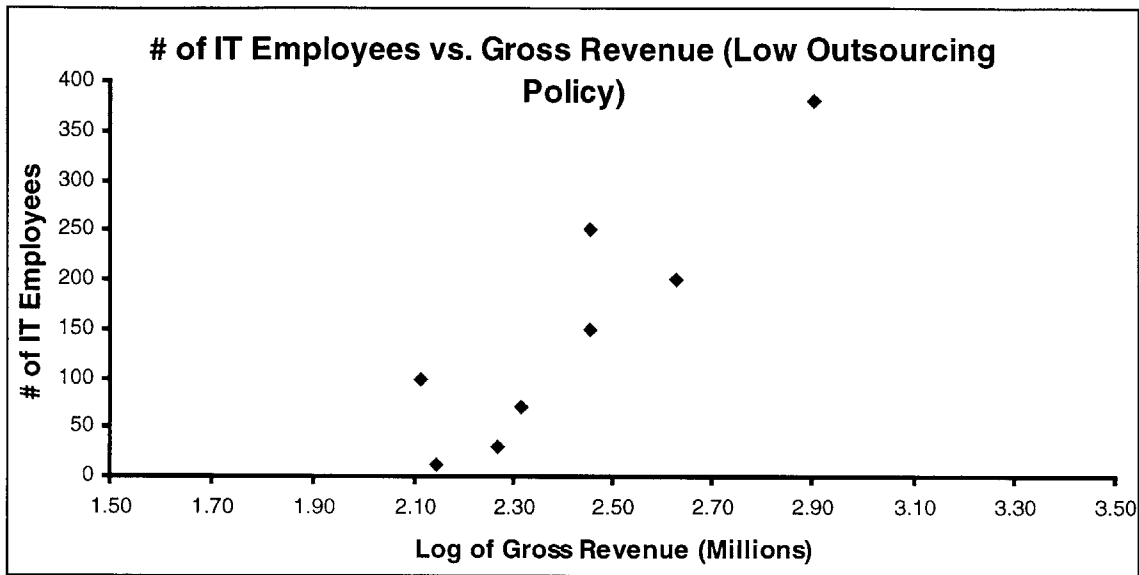
**Figure 12: IT Employees & Gross Revenue (Medium Outsourcing Policy)**



The figures 11, 12 & 13 show better correlation than figures 7,9 & 10. So it seems that the number of IT employee depends on the outsourcing strategy of the company. Also, comparing the figures 11, 12 & 13, it becomes clear that the number of IS employees for

companies that mainly insource IT development work is higher than that of Medium and highly outsourced companies. Due to the small number of data points for medium

**Figure 13: IT Employees & Gross Revenue (Low Outsourcing Policy)**



outsourced companies, the comparison between medium and heavily outsourced companies could not be made. This analysis supports the third Hypothesis that firm's gross revenue and information technology spending will be negatively related to the degree of IS outsourcing.

#### **4.14 Results for Hypothesis 4**

This hypothesis tries to focus on the 3PLs where the Parent Corporation (e.g. transportation, brokerage) not only owns the company, but also controls some of its operations. In those cases, the IT division do not operate independently regardless of the fact that the IT requirements might be different from the parent organization's needs. In some cases, the division is still in the formative years and is not big enough to sustain the investments required for developing the appropriate IT capabilities. Hence, they use the

resources of the parent company to satisfy the needs of its customers. Again, this is not applicable in all the cases.

The companies where the IT department for logistics division is not separate tend to do more in-house software development than the companies where the logistics division operates separately. One of the reasons is they have the financial leverage along with people and hardware support from the parent company to take care of the risks involved whereas other companies look to their software vendor to share the risk with them. The other important reason is that the number of software and platforms being used within a company is very large in these companies and the complexity increases as they start buying different software from the market or outsource certain IT activities. The high cost of transaction, coordination and complexity has a tremendous amount of inertia that keeps them away from outsourcing the IS activities. Sometimes, the bigger and older companies have a long response time to change, and it might take them a long time before they get over the idea of vertical integration to remain a dominant player in the industry.

During the interviews it was found that 6 of the 20 companies did not have a separate IT division for logistics as part of the business. It was interesting to explore that 5 of those companies had the policy of keeping the IT development mostly in-house and outsource or purchase software only on rare occasions. An example of this rare occasion can be a situation in which a 3PL is in the middle of a project with a big client and need a functionality which does not exist in-house and cannot be developed within the time frame specified by the client.

#### **4.15 Results for Hypothesis 5**

Today, the US jobless rate is 4.4%, but some economists see it heading below 4% soon. "In four or five months, we'll have a 3.8 % jobless rate. It's back to the 60s again," predicts James Smith, chief economist at the National Association of Realtors. This means more trouble for employers already grappling with the tight labor market. Bidding for and retaining good people could increasingly become tough issues for top management.

Every employer is having trouble hiring young talent despite surging immigration in US. There is no surprise that third-party logistics providers are having trouble hiring and retaining young talent. The high employee turnover problem is common but is exaggerated in the IS departments. The exaggeration is predictable; since the skills needed to run a modern and responsive IS department is in short supply. To increase the severity of the problems, they do not only need technical knowledge to be an Information technology professional in their IT department but they need basic knowledge of the functional area too. While talking to the executives the researcher realized that there are various skills they are looking for. In fact only a handful of companies responded to the question saying that they need only some basic skills and then they train them according to their business needs. The skills the 3PLs are looking for in their IT employees have been listed below.

1. Project management skills
2. Analytical skills
3. Good people skills
4. Good Work ethic
5. Motivation
6. Sound business knowledge to be able to understand the problems of the clients and able to make decisions based on their requirements.
7. Application know-how
8. Consulting experience
9. Business Process know-how
10. Exposure to business processes and industry trends
11. Technical skills like
  - Development tools for Internet
  - Client / server knowledge
  - Mainframe applications
  - Infrastructure knowledge
  - Understanding of the multiple layers of integration
  - Communication linking capabilities

- Hardware and software reporting ability

This doesn't mean that they require all of these skills from one employee. They all had one thing in common though, "understanding of the business process." Among the popular technical skills was knowledge of development tools for Internet and the understanding of the multiple layers of integration.

Firms have access to the same technology. Differences in performance turn on the people involved in running and maintaining those. As demand for IS production increases, so does the money-enticed turnover among the most able employees. Turnover causes direct and indirect costs including interview, advertising, finder fee, relocation expenses and training. There are also learning curve productivity losses associated with bringing a new person on-board.

To overcome this problem many 3PLs are adopting the short run approach of hiring contractors to minimize the cost. This does not solve the long-term problem but according to the respondents helps the companies to meet the surge capacity problem or to avoid the training required for a specific skill for one customer. All the companies that participated in the study took some help from IS consultants on an ongoing basis. The companies (seven out of nine) that use mostly proprietary applications (under the low outsourced category) feel the challenge of retaining employee the most. These companies are looking towards increased outsourcing in the future as compared to what they are doing today. Basically they are moving towards modular architecture.

The companies that use many purchased solutions and outsource their IT solutions (six out of seven, under the high outsourcing category) face the problem of integration more than meeting the staffing needs of the organization. Two of the participants even commented that they would be going towards less outsourcing in the future to avoid the complexity arising due to an issue of integration. Three others agreed that due to increasing complexity they are planning to keep the level of outsourcing at the current level for the near future. This completes the whole cycle of dynamic instability shown in figure 4. In



other words, from vertical industry structures with integral-architecture products to horizontal industry structures with modular-architecture products and then back to vertical again.

#### **4.20 Other Findings**

##### **4.21 Identifying the Drivers and Motives for Outsourcing/Insourcing**

IT outsourcing<sup>47</sup> can be dependent on several factors across multiple levels. At the level of the economy, the temporal effects of trends and cycles may motivate firms to rationalize the management of the IT infrastructure through arrangements like outsourcing. At the industry level, competitive pressures may induce firms to go for outsourcing. At the company level, the lack of resources may force them to put the development into the hands of outside vendors.

The participants that do not consider outsourcing as an option gave the logic that the market solutions are not flexible enough to meet the customer's requirements. They feel that the solutions available are not able to handle their large customer base and huge volumes, or it is difficult to find such IT providers. If they start outsourcing, there will be the whole issue of dealing with multiple providers and then integrating them all. They do not want to deal with the complexity of integration. Only two of the participants wanted to retain the development work in-house so as to sustain core-competency and gain competitive advantage. This clearly shows that there is a lack of IT providers that can provide a whole suit of solutions that are well integrated, and change in one part of system is reflected in all the others. There has been some consolidation among the IT providers, and this seems to continue. There lies a large scope among the IT providers to give the 3PLs an integrated solution. There is also a lack of warehouse management system that can handle very large volumes of the shippers. There are many providers, but none of them can handle the volume of the largest shippers. The 3PLs end up either integrating

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47 Loh, Lawrence and Venkatraman, N., "Determinants of Information Technology Outsourcing: A Cross-Sectional Analysis", Working paper, Sloan School of Management.

two to three available packages or still maintaining their proprietary systems. The other area worth looking at is Reverse Logistics, which is gaining tremendous momentum during the past year. A recent study done by Reverse Logistics Executive Council indicates that reverse-logistics costs may exceed \$35 billion a year for US companies. The dearth of software products in this area forces 3PLs to custom-build software to manage the process of handling goods. In this Internet era, reverse logistics can be particularly crucial.

Among the companies that had a more aggressive attitude towards outsourcing or purchasing software, the survey identified the following drivers that led them to change their strategy from insourcing to outsourcing.

1. Available solutions are more cost-effective than if developed in-house, as the professional service continues to become more expensive
2. The packages available in the market are more robust as they undergo constant changes and have been tested by many users. It is easier to get the updates to those solutions.
3. Technology is more flexible making it easier to accommodate the customer's changes.
4. The breadth of solutions requirement has increased considerably and the time to market and deliver has shortened considerably. Companies try to adopt a Rapid Development approach but often fail in their efforts. It is a kind of learning curve, which they perfect as they go along. They might take a long time and fail to keep pace with the technological development especially in the arena of the Internet. IT providers help 3PLs in decreasing the demand to fulfillment cycle time.
5. Some areas like transportation management and warehouse management are becoming very competitive and it is difficult for 3PLs to keep up with that competition.
6. It is hard to keep pace with changing technology and the complexity of operating systems that a company uses.
7. It helps to focus on reusable technology so that the one core software code can be used for different but architecturally similar applications.
8. The Logistics Information System continues to be a differentiator in the 3PL industry and it is important to be at the cutting edge with the state-of-art technology.

9. 3PLs increasingly face resource constraints driving them towards more outsourcing.
10. The availability of off-the-shelf software has increased tremendously in the past years.
11. The customer is more aware of the solutions available and demands specific solutions to be implemented for managing their supply chain and logistics activities.

### **IT Supported Systems Offerings**

3PLs continuously invest in logistics information systems to support their core business. This helps shippers to avoid systems development efforts by using the existing infrastructure. They offer a broad range of offerings from order management, order fulfillment, procurement, warehousing to shipping needs of their customers. Appendix 3 gives a listing of some of the information systems supported offerings by 3PLs.

During the present study an effort was made to explore the IT capabilities of some of the 3PLs. The list in Appendix 3 was sent to around 30 participants, though only 14 of them responded. The intent was to see the wide range of offerings different companies provide and determine the relation between the size of the company and the range of IS supported systems offerings. The underlying logic being that since IT capabilities require a substantial amount of investment, bigger companies would be better equipped to offer a broader range to its customers than would a smaller company.

No relation could be found between the gross revenue and the range of service offerings by the 3PLs. Surprisingly, the number of IT employee supporting the IT department of 3PLs had no relation to the service offerings either. The companies were divided into two categories namely asset and non-asset based companies, still no relation could be deciphered. Two things are possible; one, that this was too small a sample size to determine any kind of relation, or there is no relation between the variables chosen for the present study. It would be worth while to find the differences of information systems supported offerings by small players and compare it with the bigger companies. This would give a better insight of the relation explored. Also gap analysis of what customers want and what 3PLs are able to provide will help the 3PLs to focus better on those IT capabilities.

Apart from the facts mentioned above, shippers have to understand that third party logistics providers cannot make a decision for them, neither can they do implementation of software at the corporate level. The strength of the 3PLs lie in the execution phase. Only after the decisions are made, can 3PLs make the plans a reality.

#### **4.22 Industry & Technology Trends**

Some of the industry and technology covered in the literature review were further explored during the course of the interview conducted for the present study. It was interesting to find that interviewees found some of the industry trends to be driving their information technology outsourcing strategies. These trends have been listed below:

- The Internet is triggering business-to-business solutions. Collaborative systems using Internet interface will be used to support product forecasting, and facilitate communication along the supply chain. This will lead to more complex network of trading partners that will need the visibility provided by 3PLs. Fifteen out of twenty participants emphasized the growing importance of Internet solutions in logistics business.
- Eleven participants suggested that their contracts are becoming global in nature and the effect of that reflecting in the information technology solutions. They also pointed out that as the scope of contracts continues to expand they would see more partnerships, mergers and acquisitions within the industry. One of the respondents pointed out that though their policy has been to develop all their IT capabilities in-house, they had to outsource some of the IS services when they started operating in Europe.
- Providers today sound more realistic about their capabilities. They have come to believe that the whole idea of alliance is to supply the customer with the most cost-competitive solutions possible. Three of the providers mentioned that they are moving towards being a 4PL rather than a 3PL.
- Shippers are beginning to realize the benefits like independence, flexibility and economies of scale associated with 3PL relationship. Four participants agreed that

there is rapid growth in the acceptance of 3PLs which is driving many other industry and technology trends.

- Five companies mentioned that many shippers are focussing on implementing enterprise wide solutions (ERP). At this time there is a tremendous opportunity for 3PLs to fill the gaps like managing the systems supporting transportation management, warehousing management and other logistics systems.
- Users and providers have raised the stakes, leading to predictions of a shakeout among big players. The observation of a shakeout expected in the industry was confirmed by one of the senior executives at 3PL during the course of the interview. He added that he expects shakeout from about 100 firms today. There will be fewer larger and financially sound companies with the expertise of handling large and complex global supply chains of the customers. To add to that, acquisitions, mergers and alliances continue in this industry.

All of the above trends point towards more outsourcing by third party logistics providers. With more and more global assignments, there is more emphasis on web applications and use of outside IT providers to meet the local needs of the customers. Some of the participants agreed to the use of outside IT providers for meeting European and Asian logistics information systems needs due to language problems. Also, use of different operating system and integration issues prompted them to use outside vendors. The amount of customization needed makes it more economically feasible for outsourcing.

#### **4.23 Summary**

In the words of Charles Fine and Daniel Whitney,

"In the face of dynamic instability, the challenge is to keep the core competencies from becoming rigidities, and choosing the make/ buy as a competency. Management of the outsourcing process is a core competence in itself. Outsourcing is an element that appears repeatedly in various shapes in other activities, the main one being the product development process itself. In that activity, outsourcing appears in the act of flowing down requirements

and determining how they should be accomplished. The skills required to do outsourcing competently are precisely the skills of system engineering. These skills duplicate the act of decomposing systems into subsystems and defining their requirements. Once a clean decomposition has been found, the item can be outsourced if desired or necessary."

The fewer IS providers the 3PLs use, the less they have to worry about the complexity arising due to integration. In this case they will only need employees with project management skills and systems design and analysis skills and let the IS providers worry about changing technologies. This can help 3PLs to concentrate on their core business, understand what and provide good service to fulfill the customer's business needs rather than solve their IS problems. They will also not be biased with providing the proprietary solution, but rather the optimal solution.

## **5.0 SUMMARY AND CONCLUSION**

### ***5.10 Thesis Summary***

In today's increasingly competitive environment, it has become more and more difficult for a business to set itself apart from other companies. However, using top-of-the line systems technology is one way to improve service levels and compete. The introduction of more affordable and powerful computers and communication devices has revolutionized the way business is done. Companies can now collect and analyze pertinent information to determine effective ways to reduce costs, maximize productivity and improve customer service.

3PLs continually invest in logistics systems to support their core business. 3PLs face a big challenge in selecting the right software and customizing the existing system to meet the specific needs of the customers. In many cases they end up devoting a large amount of time and effort in customization. If the functionality is not available they end up buying the functionality available in the market. Then comes the bigger challenge of integration with the existing software available both at the customers' site and with their own software. Even if that goes well, the software they bought might provide a solid short-term solution but may not adapt to future needs of their customers. To avoid such a situation they must carefully assess the functionality required to allow the company to grow over time and adapt to changing logistics requirements.

The primary goal of the study had the objective of identifying the information systems capabilities in the third-party logistics providers and their current strategy of adopting these capabilities. It contains the drivers in favor of internalization or outsourcing that have affected the decision making of companies participating in the survey. The study can be of use by third-party logistics companies that are considering IS outsourcing and those that have outsourced and want to reevaluate their outsourcing decision.

In short, practitioners facing the issues of acquiring information technology would find the study useful as this gives actual practice being adopted in the industry rather than providing only the theoretical assumptions.

### **5.11 Research Design**

The objective of this research required the design and implementation of a survey instrument to gather relevant data from corporate executives. The study was done in three phases namely, literature review, formulation of the questionnaire and conducting interviews.

Telephone interviews was chosen as the research methodology as it received the highest rating for its appropriateness in conducting logistics research among the three methods, namely the mail survey, telephone survey and face-to-face interview method. The number of participants interviewed were 20, though those used for results were around 19 in the event of lack of proper information in the rest.

Telephone interviews were then conducted with the top management in the IS department of various 3PLs. None of the participants were at the user level or those who did not have a say in the strategic decision making process of the company. Interviewees were free to elaborate on each subject unless there was a time constraint imposed by the interviewee. Additional and modified questions were asked by the interviewer to get the relevant information on the subject of outsourcing. The time of the interview ranged from 45 minutes to 90 minutes. The conversation was not taped, though notes were taken. The notes of each interview were then transcribed into a document. Though the actual interviews have not been included due to confidentiality constraints, the results and analysis have been summarized in chapter four and five.

The questionnaire focussed on what was the current trend among 3PLs to acquire information system capabilities. The questions were focussed on getting the opinion of the participants towards IS outsourcing and identify the drivers and enablers that helped the company formulate the current strategy. The questionnaire also tried to explore the future industry and technology trends, which were the affecting the IT outsourcing decision at



present. A set of questions attempted to explore how the strategy has evolved over time with emphasis on how trends have shaped their policies and procedures in the past and are likely to change from in the future. Some of the questions were modified later according to the feedback given by the participants. The complete list of questions asked during the interview session is included in Appendix 2.

To explore the IT capabilities of the participant companies, a list of information system capabilities was emailed to the participants. The list is shown in Appendix 3. The list is not very exhaustive but tries to cover all the areas like order management, warehouse management and transportation management. The overall response was very poor for this part of the study.

### **5.12 Results of Hypothesis tests**

Data analysis showed support for the hypothesis formulated for this study. Hypothesis 1 states that 3PLs are steadily moving away from in-house development to outsourcing their IS needs, though with caution. According to the data collected from the telephone interviews, out of 20 participants, 15 said that the company's policy for acquiring information systems capabilities has changed over the period of past 5 years. In the past companies developed all the information systems related functionalities in-house according to the notion that this would be the real differentiator to win more customers. Now the philosophy has completely changed with the proliferation of technology, applications and functionality. Though currently companies are moving away from in-house application development, this trend might not continue in the future. Out of these 15 companies favoring outsourcing only six of them said that the trend of more outsourcing would continue in the future. Whereas the other 9 of them said they might see more outsourcing but mostly it will either remain the same or decrease in the future.

Hypothesis 2 states that most of the 3PLs do some kind of development work in-house whether it is development, customization or integration of various software/OS. Out of the 20 participants only three of them do not carry out any application development work in-house. Even these three companies do some integration and customization work in-house.

The third Hypothesis suggests that company's gross revenue and information technology spending will be negatively related to the degree of IS outsourcing. For testing this hypothesis, gross revenue for various companies were plotted against number of Information technology employees the company supports. For the present study, it was assumed that more or less, the spending of the company on the compensation and benefit of IS employee is proportional to the number of It employees in the company. The various plots showed that that number of IT employee depended on the outsourcing strategy of the company. Also, comparing the figures it was clear that the number of IS employees for company that mainly insource IT development work has on an average more number of employees than that of medium and highly outsourced companies.

The fourth hypothesis states that the companies where the IT for logistics division is not separate tend to do more in-house software development than the companies where logistics division operates independently. During the interviews it was found out that 6 of the 20 companies did not have a separate IT division for logistics part of the business. It was interesting to explore that 5 of those companies had the policy of keeping the IT development mostly in-house and outsource or purchase software only on rare occasions.

Hypothesis 5 suggests that the probability of IS outsourcing will decrease as the complexity of integration increases. All the companies that participated in the study took some help from IS consultants on an ongoing basis. The companies (seven out of nine) that use mostly proprietary applications (under the low outsourced category) felt the challenge of retaining employee the most. These companies are looking towards increased outsourcing in the future as compared to what they are doing today. The companies that uses a lot of purchased solutions and outsource their IT solutions (six out of seven, under the high outsourcing category) face the problem of integration more than meeting the staffing needs of the organization. In other words, from vertical industry structures with integral-architecture products to horizontal industry structures with modular-architecture products and then back to vertical again.

## **5.2 Conclusions**

In the logistics industry the name of the companies changes as the scope of the business expands. The saying "What's in a name?"<sup>48</sup> That which we call a rose by another name would smell as sweet", doesn't hold true for businesses. The sweet<sup>49</sup> smell of success might elude a company if it has a wrong name. In this growing industry, it is very important for the companies to adopt the right strategy to go forward with. Not only adopting the right strategy is crucial but reviewing and reassessing it continuously with the changing market dynamics is important too. If the market and time demands, the old strategy might have to be changed, while at the same time not losing track of the goal of the company. Every act of the company can either take it towards profitability or away from it. In other words, Information Systems strategy is not an unimportant policy of a company and no one denies it. Understanding the importance is not the end of it; it needs to be acted upon. The study was undertaken to understand the current trends in acquiring information system capabilities by third party logistics providers. Not only were the current trends studied, but also in the process different variables were identified that could play a major role in shaping different policies and procedures within a company. The various variables can help the companies in the outsourcing decision making process, and can help rethink their strategy if they are considering outsourcing, want to increase/decrease outsourcing or are not in favor of outsourcing of their IS function.

The IT providers are not experts in the business processes they are trying to support. This holds true even if the 3PLs have their own IT teams and especially if they are outsourcing. Additionally, tools available to develop software may limit the range of solutions a developer can provide and, therefore, not permit the application to be developed exactly as the process occurs manually or in an existing system. This results in gaps, or differences between desired and actual software performance. Newly developed software can have logic errors and therefore, not operate as effectively as designed. The net result would be

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48 Shakespeare, William, "Romeo and Juliet", Act II, Scene 2.

49 "MSAS gets new Name, Logo and Game Plan for Capturing Logistics Business", Global Sites and Logistics, March 1999.

software that is of less than optimal value to a company. As important it is to understand the functional and technical ability and ease of use of software, it is equally important to assess the value software adds to a company. Therefore, performance measurement is essential both for purchased software and internally developed software.

There is no best outsourcing policy. A policy that seems suitable at a given time is unlikely to remain suitable indefinitely due to economic, sociological and technological changes. The ability to think through and continually revisit the outsourcing decision appears to be the best policy, which is currently lacking in the third party logistics industry. It is absolutely necessary to clearly define objectives, establish clear lines of communication and then commit to the outsourcing agreement. In short, they should look at their long-term goals and align their IT function to achieve those goals.

### ***5.3 Further Research***

There are many areas for further research regarding the decision of outsourcing Information Systems in the context of third party logistics service providers. Some of the relevant avenues have been discussed below.

Many researchers have studied make vs. buy issues during the past twenty years, especially in area of information systems. The studies by the various researchers have been anchored with various theories including transaction cost theory, economic perspective, political model, division of labor, competitive strategy and agency theory. Some of the theories that have been used in the current study are transaction cost theory, division of labor and competitive strategy. Though a more focussed study needs to be done from TCA perspective since only the complexity and uncertainty was covered in the present study. The other variables that can be investigated form TCA are asset specificity and frequency. Agency theory which has not been discussed in the study, emphasizes incentive payment and goal alignment as a way to get an insight on IS outsourcing.

Political model can be investigated with regards to two main constructs<sup>50</sup>, power and politics, which play an important role in the decision-making within an organization.

The question of core competence can be studied by interviewing other influential people in the firms. It can be compared to the other functional areas of the firm, which can reflect the overall decision process. It is also important to investigate how important the information system function is to the operations of third party logistics from the perspective of someone not in-charge of the IS department.

A long-term longitudinal study of the chosen 3PLs can be initiated and the outcome of the outsourcing decision can be recorded at each step. The effect on the service at each point can be studied by interviewing the shippers. In the present study the impact of outsourcing on the customers was not covered which remains an important part of the research. In other words, the relationship between IT outsourcing and IT performance and the relative advantage/disadvantage of a firm due to outsourcing/insourcing can be examined. This will give a good insight of how the information systems outsourcing decision effect the performance of firms.

The study was done mainly for US based third-party logistics companies. It would be worth while to extend the research to international service providers and study the trends in Europe and Asia-Pacific. Such an extension to this study become especially important in this age of globalization where businesses in one part of the world have started affecting businesses in many other parts of the world.

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50 Lacity, Mary C. and Hirschheim, Rudy, " Information Systems Outsourcing: Myths Metaphors and Realities", 1993

# APPENDICES

## 1. GLOSSARY

1. **Back Order** - Product ordered but could not be fulfilled as it was out of stock and has been promised to ship later.
2. **Backhaul** - The return movement of a vehicle from its original destination to its original point of origin, especially when carrying goods back over all or part of the same route.
3. **Bar Code** - A symbol consisting of a series of printed bars representing values. A system of optical character reading, scanning, and tracking of units by reading a series of printed bars for translation into a numeric or alphanumeric identification code.
4. **Benchmarking** - The process of comparing performance against the practices of other leading companies or practices within a company for the purpose of improving performance.
5. **Carrier** - A firm which transports goods or people.
6. **Consolidation** - Combining two or more shipments in order to realize lower transportation rates. Inbound consolidation from vendors is called make-bulk consolidation; outbound consolidation to customers is called break-bulk consolidation.
7. **Core Competency** - One of a company's primary functions, which is considered essential to its success.
8. **Cross-Docking** - The direct flow of merchandise from the receiving function to the shipping function, eliminating any additional steps in between, including the need for storage.
9. **Customization**: The flexibility to meet the demands of a customer base whose needs are diverse and/or changing. (Source: Distribution, January 1996)
10. **Cycle Time** - The amount of time it takes to complete a business process.
11. **Dedicated Contract Carriage** - A third-party service that dedicates equipment (vehicles) and drivers to a single customer for its exclusive use on a contractual basis.
12. **Distribution** - Outbound logistics, from the end of the production line to the end user.
13. **Distribution Center** - A post-production warehouse for finished goods.

14. **Drayage:** Transporting freight by truck, primarily in local cartage. (Source: Inbound Logistics, January 1992)
15. **Electronic Data Interchange (EDI)** - The paperless exchange of standard business transactions or information by electronic computer-to-computer transfer, generally requiring little or no human intervention like interpretation or retyping. (Source: Distribution, January 1996)
16. **Finished Goods Inventory (FGI)** - Products completely manufactured, packaged, stored, and ready for distribution from an industry.
17. **Globalization** - The process of making something worldwide in scope or application.
18. **Handling Costs** - The cost involved in moving, transferring, preparing, and otherwise handling inventory.
19. **Inbound Logistics** - The movement of materials from suppliers and vendors into production processes or storage facilities.
20. **Integrated Logistics** - A comprehensive, system-wide view of the entire supply chain as a single process, from raw materials supply through finished goods distribution. All functions that make up the supply chain are managed as a single entity, rather than managing individual functions separately.
21. **Intermodal Transportation** - Transporting freight by using two or more transportation modes.
22. **Inventory** - Raw materials, work in process, finished goods and supplies required for creation of a company's goods and services.
23. **Inventory Carrying Costs** - A financial measurement that calculates all the costs associated with holding goods in storage, usually expressed as a percentage of the inventory value. It includes inventory-in-storage, warehousing, obsolescence, deterioration or spoilage, insurance, taxes, depreciation, and handling costs.
24. **Information system (IS)** Managing the flow of data in an organization in a systematic, structured way to assist in planning, implementing, and controlling
25. **Inventory Turns** - The cost of goods sold divided by the average level of inventory on hand. This ratio measures how many times a company's inventory has been sold during a period of time. Operationally, inventory turns are measured as total throughput divided by average level of inventory for a given period.

26. **Logistics** - According to the Council of Logistics Management (CLM), logistics is the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements.
27. **Materials Handling** - The physical handling of products and materials between procurement and shipping.
28. **Materials Management** - Inbound logistics from suppliers through the production process. The movement and management of materials and products from procurement through production.
29. **Optimization** - The process of making something as good or as effective as possible with given resources and constraints.
30. **Order Cycle** - The time and process involved from the placement of an order to the receipt of the shipment.
31. **Order Processing** - Activities associated with filling customer orders.
32. **Outbound Logistics** - The process related to the movement and storage of products from the end of the production line to the end user.
33. **Outsource** - To utilize the services of a third party provider for services previously performed in-house.
34. **Putaway** – Unused production component materials.
35. **Reengineering** - A fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in performance.
36. **Replenishment** - The process of moving or re-supplying inventory from a reserve storage location to a primary picking location, or to another mode of storage in which picking is performed.
37. **Reverse Logistics** - A segment of logistics focusing on the movement and management of products and resources after the sale and delivery to the customer e.g. for recycling materials.
38. **Safety Stock** - The inventory a company holds above cycle stock as a buffer against uncertainty in supply chain.
39. **Shipper** - The party which tenders goods for transportation.



40. **Supply Chain Management (SCM)** - The management and control of all materials, funds, and related information in the logistics process from the acquisition of raw materials to the delivery of finished products to the end user. The supply chain includes all vendors, service providers, customers, and intermediaries.
41. **Throughput** - A measure of warehousing output volume (weight, number of units). Also, the total amount of units received plus the total amount of units shipped, divided by two.
42. **Tracking & Tracing** - Monitoring and recording shipment movements from origin to destination.
43. **Traffic Management** - The management and controlling of transportation modes, carriers and services.
44. **Visibility** - The ability to access or view pertinent data or information as it relates to logistics and the supply chain.
45. **Warehousing** - The storage of goods.
46. **Work-in-Process (WIP)** - Parts and subassemblies in the process of becoming completed finished goods.

## **2. SAMPLE QUESTIONNAIRE**

1. What is your official title? For how many years have you been with the company?  
Whom do you report to? Your KPI?
2. Does the logistics division have a separate IT department? How many IT employees are there?
3. How would you describe the structure of the 3PL industry? Are there any broad categories or groups that you can identify? If yes, where does your company fit?
4. What are some of the future industry & technology trends that are noticeable? The future of the industry from your perspective (or your company's).
5. What are the most profitable logistics services that you provide to your customers?
6. What are some of the main information system offerings by your company?
7. How are your system offerings different from your competitors? What are some of your unique capabilities?
8. Are you thinking of expanding your IT capabilities anytime soon? If yes, then what is the functionality you are going after?
9. What is the current strategy of your company in order to develop these capabilities? What did you do in the past? What are the detailed policies and processes by which the company makes choices? What is the ratio?
10. Has your organization's attitude toward IT outsourcing changed in the past years? (more/less)
11. Why did you choose the current strategy? The drivers and enablers
12. Who led (position) the current changes in strategy?
13. Are IT supported systems offerings one of your core-competence?
14. If you design and develop systems in-house
  - Do you have independent contractors or consultants from other IT companies working for you? Are any of your physical resources outsourced? (I mean computers, servers, communication technologies (EDI))
  - How do you keep updated with new technologies?
  - If you do not have the capability for a certain task, would you not outsource it? How would you define the company's "exit points"?

- Would you rather have the systems design done in-house with not the latest technology or have it outsourced? What is the tolerance? Will customer requirements guide your decision?
15. If you outsource then (% outsourced)
- What do you outsource? H/W, S/W, maintenance, customization, integration, architecture design
  - How do you evaluate your IT providers? How do you evaluate different bids for the same thing?
  - Can you name some of your IS vendors?
  - How do you formulate the specifications on which software suppliers will bid? How are the needs of the product designers reflected in the specifications? Are these specs different in content or timing if the supplier is in-house rather than a different company?
  - Do you reassess the scope of these activities after a certain period?
  - Would you like to comment on satisfaction, flexibility, scalability, quality and lead time?
  - What would you do if certain functionality is not available in the market and your customer is demanding it?
16. What do you think your competitors are doing? Did they have any influence in the decision?
17. What are the current challenges you are facing? Have the challenges in the past changed the policies or procedures that you used to follow?
18. Is it true that the IS utilization by your customers is low in spite of strong need among the customers for most systems-supported offerings?
19. To hire IT professionals, do you see a combination of skills? Distinguishing factors for your choice.
20. How much have your company's investment been for the planning, development, implementation, maintenance, operation and update of IS activities over the past year? (Or as a % of your revenue). Does it include the investments on IS components like hardware, software, people, procedures and data?

### 3. Information System Supported Offerings

#### Order Management

Features	Yes/No)
Blanket order entry	<input type="checkbox"/>
Electronic order entry	<input type="checkbox"/>
Service measurement	<input type="checkbox"/>
Order Editing	<input type="checkbox"/>
Order Status Inquiry	<input type="checkbox"/>
Promotion Checking	<input type="checkbox"/>
Returns Processing	<input type="checkbox"/>
Credit checking	<input type="checkbox"/>
Inventory Availability check	<input type="checkbox"/>
Order acknowledgement	<input type="checkbox"/>
Order Modification	<input type="checkbox"/>
Price & Discount Extensions	<input type="checkbox"/>
Reassignment of order source	<input type="checkbox"/>

#### Order Processing

Create back order	<input type="checkbox"/>
Generate invoice	<input type="checkbox"/>
Generate picking documents	<input type="checkbox"/>
Reserve inventory	<input type="checkbox"/>
Process back order	<input type="checkbox"/>
Reassign order source	<input type="checkbox"/>
Release reserved inventory	<input type="checkbox"/>
Release blanket order	<input type="checkbox"/>
Verify Shipment	<input type="checkbox"/>

#### Distribution Operations

Assignment of storage locations	<input type="checkbox"/>
Cycle Counting	<input type="checkbox"/>
Inventory control	<input type="checkbox"/>
Labor Scheduling	<input type="checkbox"/>
Lot Control	<input type="checkbox"/>
Performance measurement	<input type="checkbox"/>
Picking replenishment	<input type="checkbox"/>
Receiving	<input type="checkbox"/>
Stock storage & retrieval	<input type="checkbox"/>
Tracking of storage locations	<input type="checkbox"/>

## Inventory Management

Forecast Analysis & modeling	<input type="checkbox"/>
Forecast data maintenance	<input type="checkbox"/>
Forecast Data update	<input type="checkbox"/>
Forecast parameter selection	<input type="checkbox"/>
Forecast technique selection	<input type="checkbox"/>
Inventory parameter calculation	<input type="checkbox"/>
Inventory simulation	<input type="checkbox"/>
Inventory requirement plan	<input type="checkbox"/>
Promotion data integration	<input type="checkbox"/>
Replenishment order build	<input type="checkbox"/>
Replenishment order release	<input type="checkbox"/>
Replenishment order schedule	<input type="checkbox"/>
Service objective establishment	<input type="checkbox"/>
Cross-Docking	<input type="checkbox"/>
Putaway	<input type="checkbox"/>

## Transportation & Shipping

Carrier Selection	<input type="checkbox"/>
Carrier Scheduling	<input type="checkbox"/>
Dispatching	<input type="checkbox"/>
Document Preparation	<input type="checkbox"/>
Freight Payment	<input type="checkbox"/>
Performance Measurement	<input type="checkbox"/>
Shipment consolidation	<input type="checkbox"/>
Routing	<input type="checkbox"/>
Shipment Rating	<input type="checkbox"/>
Shipment Scheduling	<input type="checkbox"/>
Shipment Tracing	<input type="checkbox"/>
Expedition	<input type="checkbox"/>
Vehicle Loading	<input type="checkbox"/>
Optimization	<input type="checkbox"/>
Reverse Logistics	<input type="checkbox"/>
Merge In _transit	<input type="checkbox"/>
Mode Assignment	<input type="checkbox"/>

## Procurement

Match & pay	<input type="checkbox"/>
Open order review	<input type="checkbox"/>

Purchase order entry	<input type="checkbox"/>
Purchase order maintenance	<input type="checkbox"/>
Purchase order receipt	<input type="checkbox"/>
Purchase order status	<input type="checkbox"/>
Quote request	<input type="checkbox"/>
Requirements communication	<input type="checkbox"/>
Schedule receipt appointment	<input type="checkbox"/>
Supplier history	<input type="checkbox"/>

**Logistics Design**

Productivity & Staffing	<input type="checkbox"/>
Distribution Center Design	<input type="checkbox"/>
Simulation Models	<input type="checkbox"/>
Budgeting	<input type="checkbox"/>
Site Selection	<input type="checkbox"/>
Route Selection & Design	<input type="checkbox"/>
Load Planning	<input type="checkbox"/>
Historical Assessments	<input type="checkbox"/>

**Communication Technology**

Bar Coding	<input type="checkbox"/>
EDI	<input type="checkbox"/>
Radio Frequency	<input type="checkbox"/>
On Board Computers	<input type="checkbox"/>
Satellite tracking	<input type="checkbox"/>

#### 4. *Some of the Third Party Logistics Service Providers*

No.	Company Names	Gross Revenue (in millions)
1	Airborne Logistics Services	\$ 140.000
2	Americold Corp	\$ 500.000
3	Associated Distribution Logistics	\$ 110.000
4	Axis Group, Inc.	\$ 258.000
5	Burnham Corp.	\$ 220.000
6	C.H. Robinson	\$ 2,038.000
7	Caliber Logistics	\$ 600.000
8	Caterpillar Logistics	\$ 286.000
9	Circle International Group, Inc.	\$ 650.000
10	Customized Transportation Inc.(CTI)	\$ 389.000
11	DSC Logistics	\$ 208.000
12	Emery Global Logistics	\$ 100.000
13	Exel logistics	\$ 423.000
14	Expedito's Int'l of Washington, Inc.	\$ 954.000
15	FedEx Logistics & Electronic Commerce	\$ 100.000
16	Fritz Companies, Inc.	\$ 1,157.000
17	GATX Logistics	\$ 256.000
18	Hub Group Distribution Services	\$ 82.000
19	J.B. Hunt Dedicated Contract Services	\$ 185.000
20	J.B. Hunt logistics	\$ 286.000
21	Kenco	\$ 110.000
22	Landstar Logistics	\$ 209.000
23	Mark VII Worldwide Logistics, Inc.	\$ 724.900
24	Menlo Logistics	\$ 586.800
25	MS Logistics	\$ 65.000
26	Penske Logistics	\$ 730.000
27	Pittsburgh Logistics Systems, Inc.	\$ 190.000
28	Rollins Logistics Inc.	\$ 130.000
29	Ruan Transportation Management Systems	\$ 180.000
30	Ryder Integrated Logistics	\$ 2,104.000
31	Schneider Logistics	\$ 800.000
32	Skyway Systems Inc.	\$ 160.000
33	TNT Logistics Canada	\$ 115.000
34	UPS Logistics Group	\$ 400.000
35	USCO	\$ 125.000
36	USF Logistics	\$ 300.000
37	Werner Logistics Services	\$ 400.000

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