Technology Adoption in Logistics Industry

As the first study of its kind in scope or depth, it offers a snapshot view of the state of IT adoption in the logistics industry by arriving at a single composite index for IT adoption— the TAIL™.
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Executive Summary

The Indian Logistics Industry is registering a CAGR of over 8-10%. This growth has attracted many new entrants and global players as well who have set up operations here. The changing nature of services required is imposing increased demands on logistics service providers.

However, the industry is bedeviled by proliferation of non-standard practices and processes and it is only lately that firms are seeing IT as an enabler to manage increased complexity of operations.

The Technology Adoption Index project seeks to establish a uniform, easily understood benchmark that will integrate all the various dimensions of IT Adoption. Each of these dimensions is broken down into factors that are measured against quantifiable parameters. Each parameter is assigned weights based on its importance in overall adoption. The outcome of this project is the TAIL™ score for logistics firms that indicate where a firm is placed as a whole with respect to industry peers on dimensions like penetration of IT, sophistication of use and maturity. The study also sought to determine perceptions of IT Criticality and unearth data on IT spends as these are closely related to technology adoption per-se. A total of 69 asset-based players and 166 non-asset based players were surveyed using structured questionnaires to establish measurable responses.

Interesting findings from the IT Criticality scores indicates that firms are a lot more tolerant of disruption in connectivity and technology than should be the case for logistics service providers. Also firms are yet to realize the full benefit of technology in handling complexity from increased range of services.

The TAIL™ measure places 15% of all non-asset based firms above the group average of 45.06 while over a third of asset-based firms made it above the average for these firms at 52.06 indicating a higher rate of adoption amongst larger firms. Study of TAIL™ measures in conjunction with various business parameters such as revenue, staff size, productivity, vintage of firm, scope of business, geographic coverage, IT spends and IT Criticality measures have established the close correlation of technology adoption with business performance.

Further studies on correlation have indicated that the TAIL™ measure has a strong fit with other business variables although not so with age of firm or Capex spends. This has vindicated the validity of the measure.

The TAIL™ measure has the potential to be refined further and become an industry benchmark for technology adoption. The study has established that technology adoption is an important driver of business growth and performance.
1.0 Abstract

This report presents the key findings and outcomes of the landmark study, "Technology Adoption in Indian Logistics Industry" conducted by Kale Consultants Ltd (KCL), Mumbai in 2009. As the first study of its kind in scope or depth, it offers a snapshot view of the state of IT adoption in the logistics industry by arriving at a single composite index for IT adoption - the TAIL™. TAIL™ combines the dimensions of IT penetration, sophistication and maturity of adoption into a simple, easy-to-use index that can be used by firms to benchmark their progress.

The study covers the entire gamut of logistics service providers and comes at a time when this industry is at a crucial inflection point. The exhaustive study has combined extensive field depth interviews, industry expert opinions and online survey results with rigorous statistical validation to arrive at a robust index of IT adoption - TAIL™. The study is designed such that all participants of it would have access to their own index ratings and KCL is willing to carry out studies at any other logistics organization on request.

2.0 Keywords

Technology adoption, TAIL™ index, Indian logistics industry, logistics service providers (LSPs) and IT.

3.0 Introduction

3.1.1 Indian Logistics Industry - Market size and growth rate

The Indian logistics industry contributes a mere 2% to the US $5000 billion global logistics industry. The Indian market size estimated at US $90 billion is forecasted to grow at 8-10% CAGR over next three to five years and reach a size of US $385 billion by 2015. The 3pl market which contributes 6% to the total market is expected to grow at a CAGR of 16% and thereby contribute 13% to the total logistics market by 2012.
3.1.2 Indian Logistics Industry - Composition and structure

The logistics industry consists of both asset based and non-asset based logistics service providers. The non-asset based LSPs range from pure play freight forwarders to 4pl, based on the level of value addition to their customers. The asset based LSPs are the shipping lines, airlines, railways, terminals, warehouses and container freight stations (CFS)/Inland container depots (ICDs). Apart from asset and non-asset based LSPs, there are also four specialized categories of service providers, who are transporters, express services, courier, and C&FA.

Levels of value addition among non-asset based LSPs

The levels of operation of LSPs vary geographically with one or two local offices to large multi-country operation with global offices.
3.1.3 Indian Logistics Industry - Key challenges and opportunities

The following are some of the challenges faced by the Indian logistics industry:

- Multiple tax rates across states
- The higher cost of warehousing is leading to lower automation levels and inferior warehouse management systems.
- Poor infrastructure facilities like road, rail, communication, and port handling leads to operational difficulties and thereby increased cost and time.
- Uncertainty due to disruptions by way of agitations, natural disasters and power breakdowns.

Following are few of the opportunities for growth:

- The use of IT services and products to reduce inventories can lead to reduced losses, optimization of transportation costs, reduced transaction costs and overall improved productivity.

- There is a great deal of opportunity in outsourcing higher percentage of work by the 3pl and 4pl service providers and thereby enhance their productivity.

3.1.4 Trends in use of technology

There is anecdotal evidence of basic IT facilities being implemented over last two years across LSPs by the way of shrink wrapped products and in-house developed systems.
4.0 Background of study

4.1 Need for study

In the Indian Logistics Industry, only less than 10% of work is outsourced by the shippers and here lies a huge potential for improving productivity and hence the growth. Even more, less than 1% of the industry is organized and there is lack of industry-wide standards, processes, and established technology solutions that creates an opportunity to establish the benefits of technology. The need for this study is more pronounced looking at the high logistics cost in India (4 to 5% of GDP) compared to the developed economies.

4.2 Challenges

The heterogeneous nature of the industry with both asset and non-asset based service providers and widely varying scale of operation makes the cross-comparisons difficult. Also, there is no clear definition of IT adoption since technology platforms and applications used by service providers vary widely and the nature of technology adoption too is industry-specific. The other challenge for the study is the lack of a reference standard for hardware equipment or application due to rapid evolution of technology and frequent change in their business models/scope of services by LSPs. Since most of the firms are not public, there is a challenge in securing privileged information on business metrics.

4.3 Design

We designed a stratified approach by separating asset and non-asset based service providers and arriving at dimensions of adoption capturing all parameters by factorizing individual parameters. The challenge of reference standard was overcome by considering national level fill-service 3pl service providers as reference point. We also sourced easily verifiable information that can be cross-checked and translated to performance metrics.
5.0 Research Methodology

5.1 Stated hypotheses

The following are the four stated hypotheses for this study:

1. Business and performance drivers for asset based and non-asset based businesses are different
2. There exist common dimensions of adaption that can be related to underlying parameters
3. Complexity in provider’s scope of business correlates with increased adoption of technology
4. Turnover, geographical spread, staff productivity and scope of services correlate positively with technology usage

5.2 Target audience

The following is the classification of target audience for this study.

**Asset based:**
- Shipping line
- Airlines
- Railways
- Terminals
- Warehouses
- CFS/ICD

**Non-Asset based:**
- Pure-play freight forwarders
- Pure-play CHAs (customs broking)
- Full service freight forwarders
  (Both air/sea freight forwarding, Exim documentation, customs clearance, NVOCC, consolidation, loading/unloading and associated activities)
- 3pl (Multimodal transport operator in addition to the above)
- Full service 3pl (Extends service to project handling, liquid cargo, bulk cargo, packaging, labeling, warehousing, and end-to-end solutions)
- 4pl (Additionally provides technology solutions and implementation)
- Special category LSPs (Transporters, express, courier, C&FA)

5.3 Piloting

Pilot project was carried out across LSPs in Mumbai and Chennai by the way of
- In depth interviews
- Expert interviews
- Structured questionnaire

The pilot was carried out with focus on the following as the defined business metrics
- Sales turnover – previous fiscal year ending
- Staffing – Non-contracted permanent staff
- Staff productivity – Sales turnover per head
- Number of locations covered – Owned locations (excluding associate offices)
- Scope of services and coverage – Stage of evolution
5.4 Sample size

The following sample size was used for the study

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Category</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Asset Based</td>
<td>69</td>
</tr>
<tr>
<td>2.</td>
<td>Non-Asset Based</td>
<td>166</td>
</tr>
</tbody>
</table>

5.5 Index contribution

A. Dimensions of adoption

The below figure depicts the three dimensions of IT adoption.
B. Rating Scale
Ratings are based on a 4-point scale and the levels for each parameter were based on the pilot study. The variations in score levels were adjusted to reflect level of effort, investment and progress in moving along the adoption scale.

C. Parameter Weightage
The following table shows weightage assigned for each factor against all the parameters.

<table>
<thead>
<tr>
<th>Dimensions/ Factors</th>
<th>Weight</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent of penetration- 30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>5</td>
<td>Locations covered</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Functions/ processes covered</td>
</tr>
<tr>
<td>Depth</td>
<td>10</td>
<td>% offline transaction</td>
</tr>
<tr>
<td>Intensity</td>
<td>5</td>
<td>KW:DTU ratio</td>
</tr>
<tr>
<td>Sophistication of deployment- 40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware configuration</td>
<td>5</td>
<td>Nature of architecture</td>
</tr>
<tr>
<td>Software complexity</td>
<td>5</td>
<td>Redundant connectivity</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Software configuration</td>
</tr>
<tr>
<td>Maturity- 30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management responsibility</td>
<td>10</td>
<td>IT function responsibility</td>
</tr>
<tr>
<td>Planning methods</td>
<td>10</td>
<td>Budgeting and review process</td>
</tr>
<tr>
<td>Management practices</td>
<td>10</td>
<td>Quality of practices</td>
</tr>
</tbody>
</table>
6.0 Analysis
6.1 Categories of firms surveyed

As mentioned before we surveyed both asset and non-asset based logistics service providers. In order that we had reasonable representation we adopted a stratified sampling to ensure that the firms surveyed were in rough proportion to their populations.

Breakdown of the sample surveyed in both categories are as under-

Non-asset based logistics firms in sample by scope of services

Asset based logistics firms by scope of services

For the purposes of this study, while large Clearing & forwarding agents who owned warehouses have been clubbed with warehouses as the numbers were small, CFS and ICD operators were classified separately based on the line of business indicated. Again while we interviewed one large transporter who owned trucks,

†Firms were surveyed in Mumbai and Chennai areas primarily as these two areas represent strong logistics bases in the country with Sea/ Air freight and a variety of user industries seeking value-added services

† Basis: Indian Logistics Industry survey commissioned in August 2008 by Kale Consultants Ltd.
6.2 Classification of firms by age

A total of 69 asset-based logistics companies and 166 non-asset based logistics service providers were surveyed. Firms varied widely in size (both revenue and staff size), age of firm, scope of business and geographical coverage. The study being India-centric, large global MNC players were excluded.

Asset based logistics service providers were spread out in vintage from the oldest firms 4 decades in the business, an average age of firm of over 13.5 yrs and a full spread of firms across age groups as under-

Asset based firms in sample classified by number of years in business

The sample appears to represent firms across the entire spectrum, with a few nascent firms, others in the growth phase or well-established veterans.

A quick snapshot of the non-asset based firms surveyed is as under—with the oldest at over a century old and 9 nascent firms set up within the last year or so with an average age of over 16 yrs.

Non-asset based firms in sample classified by number of years in business

Overall, there is evidence of new firms entering the logistics industry.

Overall, there is evidence of fresh new firms coming up even while older, established firms have grown and are able to hold their own.

Data gathered from survey of firms in Mumbai and Chennai areas primarily, as these two areas represent strong logistics bases in the country with Sea/ Air freight and a variety of user industries seeking value-added services.
6.3 Classification by revenue

Understandably asset-based logistics service providers in the sample averaged higher revenue than the non-asset based players. At average revenue of ~ Rs. 430 Crs. with a few mega-sized firms going down all the way to start-ups that are just setting up shop, the sample seems to include the full range of firms in the industry. What is important to note is that if the dispersion is representative of the industry, there are very few firms achieving turnover of over Rs. 250 Crs. and also very few exceeding Rs. 100 Crs. p.a.

Asset-based firms in sample classified by annual revenue

![Asset-based firms in sample classified by annual revenue](image)

The average revenue for non-asset based LSPs was a tenth of the above at ~ Rs. 42 Crs. p.a.

Non-asset based firms in sample classified by annual revenue

![Non-asset based firms in sample classified by annual revenue](image)

There is again a significant skew to the lower end that is probably reflective of the fact that this sector has a number of small players mushrooming.

- Based on declared turnover for fiscal year 2008-09; which were published in press reports or on company website’s, these have been verified and in other cases we have had to adopt the figure declared by the management.
6.4 Classification by staff strength

Firms surveyed also varied in size of staffing ranging from small outfits employing 10 or less individuals to large firms with large asset bases employing thousands. Staff strength as a business metric while relatively easy to procure has some caveats. In the case of mixed profiles of businesses that involved some assets and some non-asset based services, a fair number of contract labour were found involved on the asset side of the business. Also, it is important to note that in case of operations like loading/unloading, logistics service providers would employ staff on contract. The above numbers exclude such staff.

Average staff size at asset-based firms in the sample was around 750.

Asset based logistics service providers in sample - Classification by staff strength

The corresponding average staff size for non-asset based service providers was only 160 with a very large number of firms surveyed employing 100 or less staff and firms with less than 50 staff accounting for nearly half of the sample.

Non-asset based logistics service providers in sample – Classification by staff strength

† Firms were asked to specify permanent staff on rolls and exclude headcount of contract labour or temporary staff.
7.0 Findings
7.1 Criticality of IT and Automation

Firms were surveyed for their perception on various benefits that could be attributed to technology. Responses were noted on a 5 pt. scale with '5' indicating strong agreement on 8 different aspects as under-

- Reduction in cost of operations
- Capability to handle larger transaction volumes
- Improvement in efficiency of communication
- Superior customer service
- Capability to handle increased range of services
- Dependence on IT (as in ability to carry on in case of disruptions)
- Ability to project a professional image
- Delivery of competitive advantage

While the overall average score across all categories of logistics service providers both asset and non-asset based was at 3.77 indicating fairly strong agreement, the scores for asset-based providers was higher perhaps indicating a more positive disposition to technology adoption.

That technology is seen as indispensable, with over 90% of respondents scoring average responses well over 3.3 and more than a third indicating strong agreement with the benefits of IT, is heartening. Also only a miniscule number in the sample felt that they had either not been able to derive benefits from IT or did not perceive the benefits as being justifying the spends. Reduced costs of conveyance and courier charges for paper documents, dramatic improvements in staff productivity with no need for lower-paid staff that would normally be engaged in routine activities like reaching documents from one office to another and waiting for document to be processed at the desk of authorities in Customs, etc. In fact, freight forwarders and CHAs welcomed online filing of documents that has resulted in huge savings.

Size of firm definitely seemed to influence perceptions with larger firms tending to favour greater adoption of IT and seeing positive benefits flowing from technology.

There is near universal agreement that there is no returning to the older paper-based systems and the manual processes that involved less-skilled labour.

Reduction in costs related to lower spend on conveyance and courier charges as well as savings due to surplus labour engaged in manual activities
Breakdown of the responses indicate some interesting results as under-

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost reduction</td>
<td>4.2</td>
</tr>
<tr>
<td>Productivity (as in increased vol. of transactions handled)</td>
<td>4.0</td>
</tr>
<tr>
<td>Improved communication efficiency</td>
<td>3.8</td>
</tr>
<tr>
<td>Increased service response</td>
<td>4.0</td>
</tr>
<tr>
<td>Capability to handle complexity (as in wider range of services)</td>
<td>3.7</td>
</tr>
<tr>
<td>Dependency (as in being able to cope with a disruption)</td>
<td>2.7</td>
</tr>
<tr>
<td>Indication of a professional image</td>
<td>3.8</td>
</tr>
<tr>
<td>Delivery of competitive advantage</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**7.2 Implications of IT Criticality scores**

Participants in the survey recognize the productivity, cost, efficiency, service capability and image benefits of IT. Cost, productivity and efficiency ratings exhibited the lowest variations indicating strong convergence of opinion on these aspects amongst participants.

What is not so easily realized is the role of IT in enabling them handle a wider range of services that typically implies dealing with additional entities, processing different types of documents, accounting for income and expenditure of a more complex nature, all of which imply increased complexity and higher value-add.

There is no sharper indication of the relatively lower level of adoption amongst logistics service providers in the country than their lack of dependence on IT. We had specifically asked them their capability to cope with or manage a 4-hour disruption. Either that Indian shippers are not sufficiently demanding or the service providers have not realized in full the value of 24/7 connectivity in an industry like logistics!

This, more than anything else in the IT Criticality scores indicates that the industry as a whole has some distance to go before it matures and accepts the role of technology in improving business processes.

These results have some interesting implications when analyzing the degree of IT adoption.

- Figures are rounded off in the table to the first decimal
- As measured by standard deviation of scores across all responses
7.3 Spend on IT infrastructure

Technology adoption has an intimate relationship to investment in IT infrastructure. Results from responses received across logistics service providers indicates that while overall annual spend on IT is well below 1% of revenues across all categories of LSPs, in the case of asset-based providers, spends are only about 0.2% of revenue.

Considering that Capital expenditure tends to be lumpy and information on annual spend in the previous fiscal as a percentage of annual revenue cannot be used as an indication of propensity for spend on IT per-se. However, ratio of Opex spends to annual revenue should be a fair indicator of IT consumption.

Here again while the industry as a whole in the sample surveyed, averaged Operational spend on IT of just 0.33%, non-asset based firms registered a significantly higher average of 0.39% vs asset-based providers who seem to spend proportionately less at 0.12%.

7.4 Measurement of Operational expenses on IT/ Automation

Operational expense on IT must be read with caution as this could mean different things to different people. In our study, we excluded salaries and benefits paid to in-house employees dedicated to IT. In most cases such information was not available. However, in comparing spends, if fees paid to independent professional IT infrastructure managers, vendors and freelancers would have to be compared to wage bills of employees. We presume that as the logistics industry moves to greater adoption of technology solutions an inevitable outcome would be the emergence of suitable external support services to this industry that is still some distance away from being the standard practice.

This is evident from scores for IT management maturity as well that we will discuss later. This could alleviate some of the methodological difficulties in measurement of this metric.

Another distortion can arise from non-reflection of full costs of application development and maintenance where IT solutions are sourced from ‘closely-related’ technology firms that are either captive offshoots of the logistics business or associate businesses that might not charge the full extent of their costs to the logistics firm.

- Overall spend includes both Capex and Opex spends
- We were required to eliminate response data that were extreme outliers, inadequate or obviously in error. Hence the averages worked represent those for marginally less than the total sample surveyed. This is especially true of the analysis relating to the spends on IT and Automation
- Opex spends included AMCs, amounts spent on breakdown maintenance, IT infrastructure maintenance bills, associated broadband telecom costs and consumption spares expensed during the previous year.
7.5 Significance of Opex spends on IT

While it is certainly not correct to impute that asset-based firms are less inclined to technology spends, as they have registered higher IT criticality scores on perception of technology, it appears that their higher turnover drops the ratio significantly for them. Also in the case of the sample of non-asset based providers a few outliers have contributed to a higher average.

Thus while this demonstrates an efficiency of IT spend, with higher revenues allowing firms to accommodate marginally higher IT expenditure, it also perhaps reflects on a reluctance to invest in IT.

Certainly, some very small firms that were surveyed were suffering from lack of knowledge on how to leverage IT without even being able to adopt basic practices like sourcing professional mail services or choosing the right broadband telecom package that would minimize spends. This gap in understanding that implies a cost penalty is both the cause for high relative Opex spends at the lower end and this also translates into a reluctance to invest in technology solutions.

Many firms interviewed in the survey maintained that efficient technology solutions were just not available for logistics operations. There is a clear perception that no end-to-end solution or established readymade transaction processing software exists for operations like freight forwarding. This has resulted in a few large and mid-sized firms ‘in-sourcing’ ADM activity or getting non-standard systems developed. The danger in these non-standard solutions lies in the higher costs that will inevitably arise with the need for migration, scaling and upgradation of technology. These issues would actually come to the fore when the organization has to grow in scale and complexity requiring higher technology and service capabilities.

Using comparables from other industries such as manufacturing, airline services, travel and hospitality, the logistics industry as a whole registers fairly low levels of spend. While we have anecdotal evidence to indicate that the industry has started on the road to adoption around 2 years ago in a major way, we do believe that many firms seem to wait to grow to a certain size that would justify adoption of IT!

The detailed measurement of the technology adoption Index and its correlation with firm size and staff strength as is discussed later in this report seems to lend credence to this observation.
7.6 Technology Adoption Index- score dispersion

As mentioned earlier, technology adoption does have a close relationship with how critical is IT perceived to be. Technology adoption also manifests itself in the form of investments in IT spends. The Technology Adoption Index for Logistics or TAIL™ for short is an attempt to integrate the three dimensions of adoption namely, Penetration of IT, Sophistication of use and Maturity into one composite index that can be used as a tool for benchmarking. While the TAIL™ does not account for nature of business or scope of services offered and is independent of the same, we felt it might be useful to view the data for asset-based and non-asset based service providers separately. This allows for us to view the data with reference to the different nature of the businesses even while checking for overall fit and correlation.

TAIL™ Index dispersion for Asset-based service providers

From the dispersion figures on the left, what will immediately be apparent is that while the average score for asset-based firms is higher at 52.06 versus 45.05 for non-asset based firms, there is a markedly stronger skew to the top in the case of asset-based firms with over 25% in the TAIL™ > + 75.00 category. This is as opposed to just 5% for non-asset based firms in the same index category.

Also, using a common low index measure of 40.00, a full 55% of asset-based firms exceed this while only 32% of non-asset based firms cross this 'Rubicon' as it were. We would like to establish some caution here as we do not have an established inflection point for IT Adoption as yet.

Of the non-asset based firms 140 were below the group average and 26 above, while in the case of the asset-based firms 24 were above average and 45 below.
7.7 Analysis of the TAIL™ scores

Deconstructing the scores and comparing these with other relevant business parameters, IT criticality scores and Opex spends, we get some revealing results as under.

### Table 1. Asset based logistics service providers

<table>
<thead>
<tr>
<th>TAIL™</th>
<th>Avg. Rev. (Rs. Cr.)</th>
<th>Avg. Staff size</th>
<th>Avg. Rev/ head (Rs. L)</th>
<th>Avg. # Offices</th>
<th>Geo. coverage</th>
<th>Avg. Annual opex spend (Rs. L)</th>
<th>Avg. IT criticality rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30.00</td>
<td>1.5</td>
<td>20</td>
<td>8.4</td>
<td>5</td>
<td>N/a</td>
<td>0.23</td>
<td>2.50</td>
</tr>
<tr>
<td>&lt;35.00</td>
<td>4.1</td>
<td>24</td>
<td>19.0</td>
<td>3</td>
<td>N/a</td>
<td>0.56</td>
<td>3.55</td>
</tr>
<tr>
<td>&lt;40.00</td>
<td>28.9</td>
<td>183</td>
<td>23.3</td>
<td>23</td>
<td>N/a</td>
<td>3.86</td>
<td>3.61</td>
</tr>
<tr>
<td>&lt;45.00</td>
<td>35.0</td>
<td>204</td>
<td>23.4</td>
<td>19</td>
<td>N/a</td>
<td>3.88</td>
<td>3.75</td>
</tr>
<tr>
<td>&lt;50.00</td>
<td>41.8</td>
<td>207</td>
<td>29.9</td>
<td>17</td>
<td>N/a</td>
<td>3.76</td>
<td>3.76</td>
</tr>
<tr>
<td>≥52.00</td>
<td>1214.8</td>
<td>1758</td>
<td>72.3</td>
<td>35</td>
<td>N/a</td>
<td>3.19</td>
<td>3.98</td>
</tr>
<tr>
<td>≥60.00</td>
<td>1269.2</td>
<td>1834</td>
<td>74.7</td>
<td>39</td>
<td>N/a</td>
<td>3.31</td>
<td>3.98</td>
</tr>
<tr>
<td>≥70.00</td>
<td>1329.6</td>
<td>1946</td>
<td>80.9</td>
<td>39</td>
<td>N/a</td>
<td>3.54</td>
<td>4.04</td>
</tr>
<tr>
<td>≥75.00</td>
<td>1620.4</td>
<td>2269</td>
<td>92.5</td>
<td>42</td>
<td>N/a</td>
<td>3.13</td>
<td>4.20</td>
</tr>
</tbody>
</table>

Even if one was to attribute the higher average revenues for firms over the average TAIL™ mark of 52, the data indicates that there is a clear jump in productivity if nothing else with higher revenues per staff. At the top and bottom ends of the table, we would need to treat the data with more caution as the absolute numbers fall off. There is a clear increase in IT Criticality rating while age seems to have no relationship.

### Table 2. Non-asset based logistics service providers

<table>
<thead>
<tr>
<th>TAIL™</th>
<th>Avg. Rev. (Rs. Cr.)</th>
<th>Avg. Staff size</th>
<th>Avg. Rev/ head (Rs. L)</th>
<th>Avg. # Offices</th>
<th>Geo. coverage</th>
<th>Avg. Annual opex spend (Rs. L)</th>
<th>Avg. IT criticality rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30.00</td>
<td>6.35</td>
<td>22</td>
<td>17.2</td>
<td>6</td>
<td>N/a</td>
<td>0.28</td>
<td>3.14</td>
</tr>
<tr>
<td>&lt;35.00</td>
<td>3.72</td>
<td>20</td>
<td>14.9</td>
<td>3</td>
<td>N/a</td>
<td>0.40</td>
<td>3.49</td>
</tr>
<tr>
<td>&lt;40.00</td>
<td>8.90</td>
<td>33</td>
<td>14.1</td>
<td>4</td>
<td>N/a</td>
<td>1.10</td>
<td>3.66</td>
</tr>
<tr>
<td>&lt;45.00</td>
<td>25.57</td>
<td>73</td>
<td>25.3</td>
<td>15</td>
<td>N/a</td>
<td>6.00</td>
<td>3.68</td>
</tr>
<tr>
<td>≥45.00</td>
<td>130.96</td>
<td>631</td>
<td>58.5</td>
<td>34</td>
<td>Multi-reg. or national</td>
<td>6.28</td>
<td>3.89</td>
</tr>
<tr>
<td>≥50.00</td>
<td>158.85</td>
<td>863</td>
<td>61.5</td>
<td>48</td>
<td>Only natl</td>
<td>8.33</td>
<td>3.90</td>
</tr>
<tr>
<td>≥60.00</td>
<td>174.87</td>
<td>972</td>
<td>69.3</td>
<td>54</td>
<td>Only natl</td>
<td>9.24</td>
<td>3.90</td>
</tr>
<tr>
<td>≥70.00</td>
<td>191.21</td>
<td>1033</td>
<td>72.9</td>
<td>58</td>
<td>Only natl</td>
<td>9.53</td>
<td>3.98</td>
</tr>
<tr>
<td>≥75.00</td>
<td>247.10</td>
<td>1233</td>
<td>64.4</td>
<td>71</td>
<td>Only natl</td>
<td>10.03</td>
<td>3.80</td>
</tr>
<tr>
<td>≥80.00</td>
<td>372.80</td>
<td>2005</td>
<td>56.7</td>
<td>123</td>
<td>Only natl</td>
<td>13.20</td>
<td>3.85</td>
</tr>
</tbody>
</table>

Here again the average TAIL™ mark appears to be dividing firms clearly on some business metrics while age of firm appears to play no role. The IT Criticality rating is less strongly correlated though.
7.8 Relevance of the TAIL™ scores

Thus in both the case of asset-based and non-asset based firms the above tables indicate a kind of inflection point for the samples that seems to coincide with the respective group averages at 52 and 45 respectively. Across three parameters—revenue, staff size and productivity this definition is stark.

While for non-asset based firms one would expect a linearity of growth with increased staff resulting in higher revenues, the increase in staff productivity comes as a vindication of the validity of the TAIL™ measurement.

At least in the case of the non-asset based companies where we have established a progression of evolution from pure play freight forwarders or customs broking agents to full-service 3pl players and beyond we could look at whether increase TAIL™ scores that should logically be indicative of higher adoption permit wider scope of operations.

In our analysis of the IT Criticality scores we observed that firms were not able to perceive the advantages of IT in enabling wider range of services.

<table>
<thead>
<tr>
<th>Category of services provided</th>
<th>Geographic coverage</th>
<th>Average TAIL™ score</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; C (Value-added ftr. forwarder)</td>
<td>All categories</td>
<td>38.92</td>
</tr>
<tr>
<td>&lt; D (Full service ftr. forwarder)</td>
<td>All categories</td>
<td>39.27</td>
</tr>
<tr>
<td>≥ D (Full service ftr. forwarder)</td>
<td>≥ 3; At least multi-reg</td>
<td>45.20</td>
</tr>
<tr>
<td>≥ E (Full service 3pl provider)</td>
<td>≥ 4; At least National</td>
<td>46.29</td>
</tr>
<tr>
<td>≥ E (Full service 3pl provider)</td>
<td>≥ 4; At least National</td>
<td>49.90</td>
</tr>
</tbody>
</table>

Table 3 above gives some indication of the fact that with increased adoption of technology as evidenced by higher TAIL™ scores, firms—especially the non-asset based ones are able to offer a higher range of services and ensure greater geographic coverage. TAIL™ scores are clearly climbing with increased scope and coverage that imply greater complexity of operations. Of course as in the analysis of the scores earlier, we need to exercise greater caution when viewing the scores at the higher end as the numbers in the sample tend to drop.
7.9 Relevant Correlations

Working the numbers for the TAIL™ scores together with the business parameters as well as other relevant data on IT spends and perception scores on IT Criticality, we attempted to test the correlations amongst these various variables.

Quite clearly as is observed across tables 2–3, vintage (age of firm) and thereafter for obvious reasons of lumpiness of capital expenditure, neither age of firm nor Capex has any fit with technology adoption per-se.

Revenue, staff size, geographic coverage provided the strongest fit with TAIL™ yielding an adjusted R² value of 0.5. Using TAIL™ as a dependent variable, coefficients worked for various other independent parameters yielded the following equation:

\[
\text{TAIL™} = 0.14 \times \text{Revenue} + 0.82 \times \text{Staff strength} + 0.19 \times \text{Staff productivity} - 0.15 \times \text{No. of offices} + 0.15 \times \text{Scope of services} - 0.53 \times \text{Opex}
\]

We also attempted to use TAIL™ scores as a predictor variable (independent) in combination with a few other factors to yield dependent variables that would indicate improvement in business performance. While the quick tabulations earlier seemed to indicate a correlation with staff productivity, placing the burden of improved business performance solely on TAIL™ scores is not justified. This is especially when factors like staff motivation; well-directed marketing efforts and the appropriate strategic approach can have a positive impact on performance as well.

However, when overall staff strength, staff productivity and geographic coverage are taken together, the fit with the TAIL™ score, taken as an independent variable, is quite good at 0.40–0.37.

These correlations are taking asset-based and non-asset based providers together.

7.10 Implications of the analysis of the TAIL™ scores

Quite clearly the technology adoption positively influences a firm’s capability to grow in revenue and size, graduate to higher levels of productivity and offer more complex end-to-end solutions.

While a positive relationship of technology adoption with revenue and size could be ignored as being the natural consequence of higher affordability for IT for larger firms, the message from staff productivity that clearly goes up with increasing TAIL™ cannot be ignored. For non-asset based providers, the message is even more loud and clear.

Moving up along the value chain will require increased investments in IT and integrated solutions and graduating to higher levels of adoption that imply sophisticated systems and better maturity of planning and management practices. Moving up the value chain for non-asset based providers will require higher levels of technology adoption that imply greater sophistication and improved IT management practices.
7.11 Explanation of deviations

The results above indicate some degree of correlation that is source of satisfaction. Still, we believe that the deviations from ideal results expected do require some explanation. We estimate that the correlations above could have been higher but for certain unavoidable distortions in the data as under

- Distortions induced by some asset-based component in the non-asset based players and vice-versa. This would have affected comparisons within what might otherwise have been considered a homogenous group.

- Methodological difficulties in comparing staff strength and revenue as explained earlier. Revenue figures when clubbed with associated businesses other than logistics within the same firm can cause misreporting. Similarly, staff strength can get vitiated with contract and temporary staff reckoned differently by different players.

- Operational expense on IT in some cases might have been under-reported for the reasons mentioned earlier (services provided by closely related firms or in-house staff whose salaries would otherwise set-off third-party service fees, etc.) Information on expense on IT / Automation in some cases is not captured in an adequate manner in the books and this too could have led to misreporting.

- The nature of small and medium players in the logistics industry is such that many of these are private, family-owned enterprises that do not have statutory requirements for publishing data. Hence information shared with us on business parameters could be suspect in some cases, although we tried to avoid seeking sensitive data that normally would not be shared. Even otherwise we believe the data could be further refined by corrections, cross-verifications and comparisons. Encouraging small and medium enterprises to participate in such studies will have to be crucial component of future studies.

- Heterogeneity of the population due to varying business models is an issue we recognized earlier and that we partially corrected for

Despite the above we believe that the study has thrown up useful insights and can point to some useful conclusions.
8.0 Conclusion and recommendations

8.1 Summary conclusions

Based on the results of this study, we can draw the following conclusions with respect to the state of the logistics industry as well as the state of technology adoption-

- The Technology Adoption Index, TAIL™ has emerged as a reliable basis for measurement of the degree of technology adoption in logistics. The strongest evidence of this is its correlation with business metrics.

- Technology adoption per-se has important implications for business performance and increased technology adoption is a clear driver of growth. Instead of waiting to reach a certain size before IT can become affordable, players who push themselves ahead on technology adoption have a clear chance of success.

- As a whole the logistics industry suffers from some degree of under-investment in IT. The low dependence scores on IT Criticality measures further highlight the lack of the central role of technology as a business enabler.

- The industry as a whole is at a relatively early stage of technology adoption. This is evident from the fact that Capital expenditure is completely uncorrelated with adoption. In a mature scenario, fresh capex for replacement would be funded in large measure by depreciation leaving increases in net block of IT assets on account of scaling and upgradation requirements. It is possible that the industry is right in the early build phase of IT infrastructure that is resulting in lumpy investments that are spaced out over years.

- The Indian logistics industry needs to be educated on the benefits of technology in handling complexity of transactions.

- There is a clear message for players in the Indian IT industry to develop cost-effective technology products and solutions that are especially targeted at small and medium sized logistics service providers. This would propel adoption and bring about additional savings in the industry.

8.2 Recommendations for future

Logistics service providers will do well to realize that participating in such studies, benchmarking themselves to their peers will allow them to graduate in size and scope of operations. Active participation by industry will result in development of robust metrics that can be used to predict business outcomes and fuel adoption of standard best practices industry-wide.

The Indian logistics industry is at point in time where economic growth is fueling increased demand. Recognizing this, Global MNC players like CEVA, DHL, AFL Logistics, Expeditors, etc. have all set up shop. These firms are also bringing with them in addition to a global footprint and customer base, enhanced processes and technology solutions. It is possible that many of these solutions will have to be modified for the peculiarities of the Indian environment.

There is hence a strong case for development of home-grown solutions that fit the needs of Indian players, especially the small and medium sized firms.

Lastly, we do believe there is need for ongoing study in this area, both for refinement of the existing findings, improvement of the TAIL™ measure as well as for building additional data points for effective comparison by players in the industry with firms of similar profiles.
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Acronyms:
- LSP – logistics Service Providers
- TAIL – Technology Adoption Index for Logistics
- IT – Information technology
- MTO – Multimodal Service Provider
- CHA – Custom House Agent
- 3pl – Third Party Logistics
- 4pl – Fourth Party Logistics
- CFS – Container Freight Station
- ICD – Inland Container Depot
- C&FA – Clearing & Forwarding Agent
- CO – Cargo Operations
- WH – Warehouse
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Kale's Industry Solutions are driven by active partnerships with industry bodies and customers, and unparalleled domain knowledge. Kale’s Customised Approach in deploying these solutions supports clients with best fit solutions to match to their requirements.

Kale provides the following solutions to the Logistics Industry:

- CAPELLA™: Web based CFS management system
- FMS™: An enterprise-wide solution for the freight forwarders
- GALAXY™: Airport Cargo Community Portal for the Airport Cargo Custodian
- MERCURY®: Enterprise wide Cargo Handling System for the Cargo Terminal Operator and Cargo Ground Handlers
- WISE: Rule based warehouse management system