Executive Summary

An Analysis of Reverse Logistics Technology and Service for Hi-Tech Industry

by

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1. Research objective

This thesis answers how a hi-tech company makes decision on selecting reverse logistics software system or service. Many publications have come up with general ideas or best practice of reverse logistics management systems. However, little study has been done to answer the following three questions raised by leading companies that want to improve their reverse logistics management. The thesis explores the functionality a reverse logistics information system should have in order to be versatile. It analyzes the current reverse logistics software market and comes up with the criteria the companies should follow to compare those solutions and select the proper software system or service.

2. Thesis roadmap

Chapter 1 introduces the research objective. In Chapter 2, previous works on related topic are presented. The market is analyzed. The problem is identified. Chapter 3 introduces a methodology to evaluate reverse logistics software systems and services. The parameters are analyzed and set up. This chapter also discusses and synthesizes the results of the interviews with reverse logistics vendors. Chapter 4 gives a sample evaluation in a case study of the reverse logistics practice at a semi-conductor company. Research limits are pointed out. Chapter 5 concludes the research findings.

3. Research methodology and conclusion

By introducing a general flow of reverse logistics and previous literature works, the major characteristics of reverse logistics can be summarized as different product and packaging quality from multiple return points, various return reasons and unclear
processing methods, and complex cost structures. After market research, we found the trends in reverse logistics market are: (1) more companies begin to recognize the importance of reverse logistics; (2) business requirements for reverse logistics is more demanding; (3) reverse logistics software systems are becoming more advanced and (4) different competitors are providing more complicated services to enhance their competitiveness. With the increased complication of reverse logistics and the systems/services, it is getting harder to efficiently evaluate the systems/services and find out an ideal solution. The problem of a reasonable and efficient way to evaluate the market and find a proper system is presented.

As quantitative study is desired to be a supplementary tool to identify the better or even the best solutions, we developed an algorithm to calculate the “Evaluation Point”, which is used to indicate the value of the software system or service by computing its Functional Points total over its total cost (K$).

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\text{Evaluation Point} = \frac{\sum_{i=1}^{n} \text{Functionality Point}_i \times \text{Vendor Credit}_i \times \text{Business Point}_i + \text{Other Points}}{\text{Total Cost}}
\]

The denominator is the total costs for installing and implementing reverse logistics software or service. The numerator of the above equation consists of the sum of points for each function provided by the vendor plus any other service point. It is a weighted sum of vendor credit. The Business Point is a weigh factor. The left hand side of the equation can be understood as “how much performance we get for every thousand dollars we pay?”
Functionality Point indicates the desired functions to general reverse logistics management. For all the functions, it equals to 1. Vendor Credit is decided by the quality provided by a software system. We rate each functions provided by the vendors from 0 to 1. Business Point indicates the importance of the function under business requirements. Other Points corresponds to miscellaneous services that can’t be included in the list of functions. To Business Point and Other Points, we rate value 1 for functions that support basic return processing management, the fundamental function of the system, value 2 for cost saving and service control functions, and value 3 for inventory management and return forecast functions. The thesis also analyzes some special business situations under which the setting of Business Point either needs to be raised or be reduced to meet specific business requirement.

To better explain the above algorithm, a case study of a semi-conductor company is presented. Business Points are determined under the specific business environment. Four reverse logistics software or service vendors are selected and their Vendor Credit and Other Points are decided as well. Prices from the vendors are quoted.

We find that the Vendor who has the highest total Functional Points does not necessarily have the highest Evaluation Point because it may quote a higher total cost for the advanced functions. The selected vendor provides an optimal solution in terms of the performance of the software/service and expenses. The results provide reasonable suggestions in decision making for reverse logistics. However, when choosing reverse
logistics systems, companies should consider future business requirements and potential benefits brought by the more advanced software systems.

4. Research limits and future research

In the last part of the thesis, research limits are pointed out and future research are suggested. First, the resulted algorithm and rating point system need to be improved if more accurate evaluation is desired. Frequent updating of the rating points is necessary in light of the development of technology and reverse logistics study. Second, data accuracy of the study also needs to be improved. The parameters still need a more systematic procedure to decide. Vendor Credits need to be set up through inspections carried out by professional third parties. Consistent criteria are essential in determining the parameters. When setting up Other Points, specific business requirements need to be well understood. Consistent criteria should be established to justify those points. Third, prices quoted by the vendors need to be more detailed and well explained. Sensitivity analysis based on the range of those costs may better analyze the benefits over cost. A more dynamic evaluation system should consider the investment/cost and benefits over several years under potential business requirement changes.