

# Case Study of Empirical Big Data Analytic Operations for Small Trading Company

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## Abstract

Data driven supply chain management is an optimized system of supply chain data which improves inventory levels, lower costs, and reduced risks. Supply chain optimization is driven by the demand for efficient use of resources to maximize delivery while minimizing excess and obsolete inventories. By improving demand forecasting systems and integrating supply chain data, risks and costs are lowered. The research will explore the big data analytic method applied in the supply chain management of small trading company in Taiwan. The volume data of case company consists of inventory, sales, cost, logistic cost, product changing, and so on. The main findings are explored and policies are made. Findings: 1. Logistic cost is at least 11%. 2. Product change will be higher margin. 3. More sales in Taiwan & ASEAN countries. 4. Sales cost and labor cost is keeping stable even service business. 5. The business direction meets the government policy. 6. Outsourcing strategy is the right policy. From the findings we made our policies as the follows: 1. Investing IT system in SCM is more important issue. 2. Gross - margin is at least 30% and up. 3. In the small trading company, labor cost should be lower than 5%. 4. Managed service is higher margin. 5. USA, ASEAN countries are the main market in coming years.

**Keywords:** supply chain management, big data

## 1. Introduction

No doubt, analytics is the new competitive driver, surely, no field of business operations promises a more challenging contest of applied imagination than supply chain management. Visionary companies in many different industries are already deploying advanced supply chain analytics to gain an edge on their competitors. (Tobey, 2008) Many business operational are directly built big data analytics as in-line decision support resources for front-line personnel, rather than off-line, after-the-fact tools for management use alone.

More than 13 years operational data of small trading and channel corporate called JIT would use to analyze the facts of supply chain management and customers including cost variation, purchasing differences, locations, payment term, products, between products and customers, marketing strategies, and logistics operations.

## 2. Literature review

Data driven supply chain is an optimized system of supply chain data which improves inventory levels, lower costs, and reduced risks. Without proper integration in internal and external systems, supply chain analytics can be too complex or too costly to control. Supply chain optimization is driven by the demand for efficient use of resources to maximize delivery while minimizing excess and obsolete inventories. By improving demand forecasting systems and integrating supply chain data, risks and costs are lowered. As data volume and sources increase, a quality data system facilitates near real time analytics, reduces costs, and improves delivery. Informed decisions create efficiency in managing supply, SKUs, inventory, and other resources.<sup>1</sup>

Nada R. Sander explored that “big data is properly applied can profoundly influence the

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<sup>1</sup> Bill, T. (2008), “Assembling the data-driven supply chain: Integrated, quality-controlled data boosts operational supply chain analytics” *Teradata Magazine*, AR-5710

marketing, logistics, operations, and sourcing sectors of a supply chain. Marketing has the most developed analytics with the focus on customer demand and behavior; prices can be optimized and customer strategies can be adjusted dynamically. Logistics analytics optimize inventory and resource allocation, identify optimal distribution locations, and minimize transportation costs.”<sup>2</sup>

Digital data are collected by real time information about events in six primary elements which are who, what, when, where, why, and how. Some of events have multiple attributes for a given element, or no qualities at all for that element. (Sanders, 2016)

Proceeding the big data driven, sometimes we should overcome hurdles that one hurdle is “Analysis Paralysis,” a fear of starting to collect and analyze data because of the seemingly overwhelming amount of information. Another concern that occurs when there is too many metrics, and can be addressed by planning critically and consolidating to measure relevant performance. Then how to build a Framework is the key process. When applying big data, there is a general framework of segmenting, aligning, and measuring. What are segmenting that is to create optimal supply chain segments with clear attributes, defining focus and competitiveness in terms of flexibility, cost, quality, and time. Alignment is one of the key steps in introducing big data that is the horizontal integration of organizational functions to support segment attributes and competitive priorities rather than producing random, fragmented explorations. Last is measurement is important to develop the right performance indicator (KPI) metrics for segment analysis. (Sanders, 2016)

Another important issue is outsourcing of big data analytics. Big data is important for the health and improvement of a company, the reality these analytics are heavy investment. Companies want to adopt the technologies but many lack the capacity to do the analytical work required. Outsourcing is possible to be taken which an external party provides specialized software, additional data bases, or an analytics consultant. (Sanders, 2014)

Lewis (2014) mentioned “97 percent of executives reported having an understanding of how big data analytics can benefit their supply chain, but only 17 percent reported having already implemented analytics in one or more supply chain functions.”<sup>3</sup> Companies are now able to collect and amass a huge amount of data from many disparate sources since changes in technology and digital storage capabilities. How to develop and deploy the right data analysis tools and techniques to mine intelligence from that data, there are a few preliminary steps to gain visibility into your supply chain as the follows:

1. You must implement the proper controls needed to optimize all of the processes throughout your global network and you have to create a closed-loop process to gain insight into your operations.
2. You need to consider what type of business intelligence tool to implement to obtain the visibility you need to measure and monitor your business across multiple workflows. Many companies explore using a point solution to help with data analytics and day-to-day decision making, while others consider an enterprise-wide solution that enables you to capture, process, and deliver insights into key supply chain processes.
3. Understand that true supply chain visibility is an ongoing endeavor as most organizations are unable to see across the entire supply chain. The lack of visibility, or blind spots, is often due to specific events or lack of integration points with trading partners or suppliers. With these blind spots, organizations are unable to drive the proper metrics to manage day-to-day operations and generate significant business value. Collaborating with trading partners and effectively capturing critical data are key elements to the success of achieving your goal of end-to-end visibility.”

Big Data-centric architecture for SCM has been proposed that exploits the current state of the art technology of data management, analytics and visualization. The security and privacy requirements of a Big Data system have also been highlighted and several mechanisms have been discussed to implement these features in a real-world Big Data system deployment in the context of

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<sup>2</sup> Sanders, N. R. (2016). How to use big data to drive your supply chain. *California Management*, 58(3), 26-48.

<sup>3</sup> Levis, L. (2014). *How to use big data to improve supply chain visibility*. Talking Logistics with Andrian Gonzalez, <https://talkinglogistics.com/2014/09/18/use-big-data-improve-supply-chain-visibility/>

SCM. Some future scope of work has also been pointed out.<sup>5</sup>

### **3. Research design and methodology**

In order to obtain an insight into big data driven in supply chain management, an exploratory approach was adopted for this research. A case study was used for exploring the big data analytics to improve supply chain cost effective and to increase operational efficiency. Using a volume data of case-a small trading company called JIT is to explore her operational process of supply chain management and customer. Using the statistical software SPSS to analyze volume data then try to understand cost, logistic operation cost and efficiency, product change, their relationship, and etc. Big data consists of expense of sales, revenue, profit, logistic service cost, inventory cost, logistic time, procurement process and cost, products. The result will be used to make the right decision of supply chain process and best policies of supply chain management.

### **4. Analysis**

#### *4.1 Introduction to Research Firm*

Taiwan Just In Time Global Enterprise Co., Ltd. (JIT) is located at Kaohsiung Taiwan. Its business consists of international trade, logistics services and consultancy. JIT income was about one million from 3PL services and about seven and half millions every year created by 2-3 staffs.

#### (1) Core competence of JIT

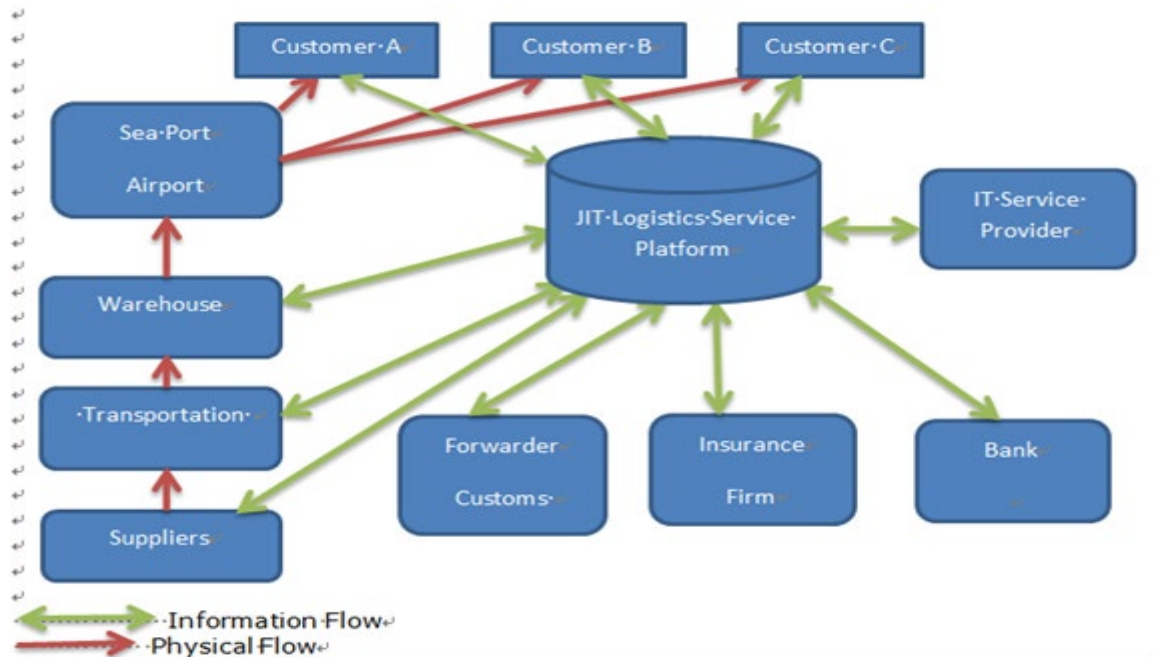
Well-qualified human resources and well-qualified value chain of logistics service such as customs broker, transportation, forwarder, warehouse, IT service provider, insurance, bank, and so on are JIT's partners. James Lee is the president of JIT who is an integrated international logistics specialist and a professional of international distribution management. All JIT's staffs have much and long experience in logistics service.

#### (2) JIT 3PL operational Model (Fig. 1)

JIT 3PL operational model, according to experience and in-house resources an operational model to provide great service for SMEs will be explained as the follow. Good IT system, experienced and integrated capability staffs, and experienced logistics service providers are basic team members in this operational model. Naturally, highly efficient & standard operation procedures being formulated are very important.

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<sup>5</sup> Biswas, S., & Sen, J. (2016). A proposed architecture for big data driven supply chain analytics. *International Journal of Supply Chain Management (IUP)*, 13(3), 7-34.



**Figure 1:**  
**JIT 3PL Operational Model**

4.2 Big data analysis

Using more than 16 years data consists of business revenue, product change of time series, logistic service fee, customers’ orders, location of customer, cost variation, so on. In this research, business transformation, cost of logistic service, and operational process will be exploring through the data analysis. The results will be display as the following charts.

(1) Product change

| Product | Electronic | Biotech | Logistics Service | Hardware | Commodity | Others (knowledge service) |
|---------|------------|---------|-------------------|----------|-----------|----------------------------|
| Year    |            |         |                   |          |           |                            |
| 2004    | 80%        | 0%      | 3%                | 10%      | 5%        | 2%                         |
| 2005    | 85%        | 0.2%    | 4.8%              | 6%       | 3%        | 1%                         |
| 2006    | 75%        | 3%      | 5%                | 12%      | 2%        | 3%                         |
| 2007    | 52%        | 5%      | 13%               | 8%       | 10%       | 12%                        |
| 2008    | 40%        | 12%     | 12%               | 5%       | 12%       | 13%                        |
| 2009    | 48%        | 11%     | 10%               | 11%      | 10%       | 10%                        |
| 2010    | 44%        | 15%     | 11%               | 10%      | 6%        | 14%                        |
| 2011    | 36%        | 19%     | 15%               | 10%      | 8%        | 12%                        |
| 2012    | 32%        | 20%     | 18%               | 8%       | 12%       | 10%                        |
| 2013    | 24%        | 32%     | 14%               | 10%      | 8%        | 12%                        |
| 2014    | 30%        | 35%     | 10%               | 5%       | 7%        | 13%                        |
| 2015    | 10%        | 42%     | 11%               | 8%       | 13%       | 16%                        |
| 2016    | 10%        | 45%     | 15%               | 5%       | 5%        | 20%                        |
| 2017    | 0%         | 20%     | 10%               | 5%       | 10%       | 55%                        |
| 2018    | 0%         | 15%     | 5%                | 5%       | 15%       | 60%                        |
| 2019    | 0%         | 20%     | 3%                | 3%       | 5%        | 69%                        |

Management & knowledge service is more important product, then biotech product. According to the statistics, we found that service products including logistic service, management service, training service, and etc. are more important business items since profit and assistance of SMEs and

creating a service team.

(2). Countries

| Countries | Taiwan | USA | Africa | Europe | ASEAN | Other<br>(South<br>America,...) |
|-----------|--------|-----|--------|--------|-------|---------------------------------|
| Year      |        |     |        |        |       |                                 |
| 2004      | 70%    | 2%  | 5%     | 3%     | 13%   | 7%                              |
| 2005      | 65%    | 5%  | 5%     | 5%     | 15%   | 5%                              |
| 2006      | 70%    | 6%  | 4%     | 7%     | 12%   | 5%                              |
| 2007      | 55%    | 10% | 3%     | 2%     | 18%   | 12%                             |
| 2008      | 45%    | 8%  | 7%     | 8%     | 20%   | 12%                             |
| 2009      | 40%    | 10% | 5%     | 5%     | 25%   | 15%                             |
| 2010      | 37%    | 15% | 8%     | 10%    | 28%   | 12%                             |
| 2011      | 30%    | 16% | 4%     | 12%    | 30%   | 8%                              |
| 2012      | 28%    | 12% | 5%     | 10%    | 35%   | 10%                             |
| 2013      | 25%    | 10% | 5%     | 10%    | 45%   | 5%                              |
| 2014      | 25%    | 8%  | 7%     | 12%    | 38%   | 10%                             |
| 2015      | 18%    | 20% | 4%     | 15%    | 40%   | 3%                              |
| 2016      | 15%    | 18% | 2%     | 15%    | 40%   | 10%                             |
| 2017      | 35%    | 10% | 0%     | 10%    | 30%   | 15%                             |
| 2018      | 45%    | 5%  | 0%     | 5%     | 35%   | 10%                             |
| 2019      | 50%    | 0%  | 0%     | 0%     | 40%   | 10%                             |

Taiwan and ASEAN countries are more and more since JIT provides more service products and Taiwanese government south bound policy. Taiwanese business sectors are more and more. Most of customers are Taiwanese companies in ASEAN countries. We consider the travel cost & times of consultants and real time service.

(3). Cost Analysis

| Cost | Logistic | Product | Sales<br>Expense | Human<br>Resource | Others (travel<br>cost, ...) | Gross<br>Profit |
|------|----------|---------|------------------|-------------------|------------------------------|-----------------|
| Year |          |         |                  |                   |                              |                 |
| 2004 | 17%      | 53%     | 5%               | 5%                | 1%                           | 19%             |
| 2005 | 17%      | 52%     | 4%               | 6%                | 1%                           | 20%             |
| 2006 | 16%      | 51%     | 4%               | 5%                | 2%                           | 22%             |
| 2007 | 15%      | 50%     | 5%               | 5%                | 1%                           | 24%             |
| 2008 | 15%      | 48%     | 4%               | 3%                | 2%                           | 28%             |
| 2009 | 14%      | 47%     | 4%               | 4%                | 2%                           | 29%             |
| 2010 | 14%      | 47%     | 4%               | 4%                | 1%                           | 30%             |
| 2011 | 13%      | 47%     | 4%               | 4%                | 2%                           | 30%             |
| 2012 | 13%      | 48%     | 4%               | 4%                | 2%                           | 29%             |
| 2013 | 12%      | 40%     | 4%               | 3%                | 2%                           | 35%             |
| 2014 | 12%      | 40%     | 3%               | 4%                | 3%                           | 38%             |
| 2015 | 11%      | 45%     | 4%               | 4%                | 2%                           | 34%             |
| 2016 | 11%      | 44%     | 4%               | 4%                | 2%                           | 35%             |
| 2017 | 15%      | 10%     | 5%               | 30%               | 10%                          | 30%             |
| 2018 | 10%      | 0%      | 10%              | 35%               | 10%                          | 35%             |
| 2019 | 5%       | 0%      | 5%               | 40%               | 10%                          | 40%             |

Logistic service cost is lower, product cost is lower, gross profit is higher. Business items are change to service, the man power expense is more and profit is increasing.

## 5. Conclusion

The main findings from analyzing the empirical data and the existing theory are in order to understand the practical current business status as the follows:

1. Logistic cost is at least 11%.
2. Product change will be higher margin.
3. More sales in Taiwan & ASEAN countries.
4. Sales cost and labor cost is keeping stable even service business.
5. The business direction meets the government policy.
6. Outsourcing strategy is the right policy.

From the findings we made our policies as the follows:

1. Investing IT system in SCM is more important issue.
2. Gross margin is at least 30% and up.
3. In the small trading company, labor cost should be lower more than 5%.
4. Managed service is higher margin.
5. USA, ASEAN countries are the main market in coming years.

To meet the above policies, we found that human quality, SCM capability, Outsource policy, the human relationship are the most important factors. The business of JIT is changed to the service including logistics and management diagnosis and assistance to SMEs. The relationship with government and business top management are the key issues now. In the meantime, the best service consultant team is also important successful factor for management business. Then the creation of service KPIs is the basic job of service business. The market research is the most important thing before kicking off the new business.

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