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EDC China Operations and Evaluation

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EDC CHINA OPERATIONS AND EVALUATION

A Major Qualifying Project Report:

submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

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ABSTRACT

This report presents the development of a global retailer's China export distribution center's Key Performance Indicators (KPI). A 3PL has been selected for managing the main processes of the retailer's global supply chain. After learning about the supply chain processes and the associated timeline, the team developed measurements to evaluate the 3PL's performance in managing the vendors, inventory, and carriers. Possible implementation methods as well as a set of spreadsheets for calculating the identified KPI are also developed.

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1.0 INTRODUCTION

1.1 PROBLEM STATEMENT

Recently, the Retailer hired a Third-Party Logistics Provider (3PL) to operate an Export Distribution Center (EDC). The purpose of the partnership was to improve the efficiency of the supply chain's processes; specifically from the time that the retailer releases the Purchase Order (PO) to the time that 3PL delivers the cargo to China's terminal port. While integrating an EDC into the retailer's supply chain the sponsor needed a measurement system to evaluate and track the performance of the 3PL. The goal of the project is to develop Key Performance Indicators (KPI) that capture the 3PL's performance in key responsibilities. The Retailer's ultimate goals for the supply chain process include delivering the cargo efficiently to all the Retailer's business units, lowering minimum order quantity, shortening manufacturing cycle time through consistent demand planning with the business units and vendors, and developing a flexible and efficient international supply chain that drives the growth of the Retailer's products.

1.2 PROBLEM RESOLUTION STRATEGY

To capture all the areas of the process timeline in which the 3PL holds responsibilities, the supply chain was divided into three main categories: "Vendor Management" (VM), "Inventory Management", and "Carrier and On Time Shipping Management" (CM). Three teams, each consisting of an American and a Chinese student, were thus formed. They are set-up as follow:

Vendor Management

- Colyer Sigety
- Li Jing (Jane)

Inventory Management

- Jake Loitherstein
- Mao Lizhou (Joe)

Carrier Management

- George Michael Raad
- Cheng Shuo (Jerry)

After the supply chain division, the team chronologically examined the responsibilities of the main parties involved in the supply chain, namely those of the retailer, vendors (i.e. suppliers), 3PL, and carriers. Based on this analysis, the team developed the 3PL's KPIs. After finding the key performance areas, the next logical step was to formulate metrics, which are easily calculable and traceable. Data availability was verified, and the team modified the indicators according to the information availability and traceability. Finally, the team developed Excel spreadsheets to calculate the value of the KPIs and proposed a set of recommendations to improve the operations of the Retailer and the 3PL.

2.0 LITERATURE REVIEW

2.1 THIRD PARTY LOGISTICS (3PL)

2.1.1 Definition

To put forward some standard definitions, the team will adopt the definition of 3PL found in the Council of Supply Chain Management Professionals glossary, which reads as follows:

"A firm [that] provides multiple logistics services for use by customers.

Preferably, these services are integrated, or "bundled" together, by the provider. Among the services 3PLs provide are transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding."

The 3PL is usually associated with the offering of multiple, bundled services, rather than just isolated transport or warehousing functions. (Leahy, Murphy & Poist 1995, p5-13) Contemporary 3PL arrangements are based on formal (both short- and long-term) contractual relations as opposed to spot purchases of logistics services. (Leahy, Murphy & Poist 1995, p5-13) In recent years, the term fourth party logistics (4PL) has also emerged to describe more advanced contracting arrangements. Van Hoek and Chong define 4PL as:

"... a supply chain service provider that participates rather in supply chain coordination than operational services. It is highly information based and co-ordinates multiple asset-based players on behalf of its clients." (Van Hoek & Chong 2001, p463-8)

It is also noteworthy that some authors provide broad definitions of the 3PL industry, including freight forwarders and shipping lines. (Rao 1994, p 11-19) Overall, it appears that the 3PL terminology is overlapping and fails to take into account the shippers' industry-specific characteristics.

2.2 METHOD

The analysis of literature is based on multiple dimensions. Following Croom *et al.*, both content and method-oriented criteria are used. (Croom & Giannakis 2000, p 67-83) The papers were firstly classified according to their research purpose (descriptive vs. normative) and nature (empirical vs. conceptual). The results indicate that most 3PL studies (60 per cent) are empirical-descriptive in nature.

	Empirical	Conceptual
Descriptive	60%	9%
Normative	24%	7%

Figure 1: Classification of 3PL literature in terms of research purpose and nature
In terms of the methods employed, although case-based research has also been

conducted, the majority (50 per cent – see Table below) are based on surveys, which reflects the positivistic research tradition within logistics. (Ellram 1996. P 93-138)

Methodology	Per cent	
Surveys (58)	51	Table I. 3PL research methods – frequency and percentages
Case studies (17)	15	
Other secondary data (e.g. internet research) (13)	11.5	
Literature review (10)	9	
Multi-method research (9)	8	
Other (7)	5.5	

Figure 2: 3PL Research Methods

The studies of 3PL are weakly theorized, with 69 per cent of the papers having no theoretical foundation and simply describing trends in the industry. This confirms others' views that logistics research lacks a theoretical basis. (Kent & Flint 1997, p. 15-29)

The level of analysis of 3PL research is also examined (Figure 5). In line with Harland Hakansson and Snehota studies are classified in terms of three levels:

1. The Firm
2. The Dyadic
3. The Network

Level of analysis	Percentage of studies	Indicative topics	
Firm	67	Outsourcing decision; selection criteria; 3PL growth	Table II. Analytical level of 3PL research
Dyad	27	3PL success factors; contracting; performance measurement	
Network	6	Logistics triads; horizontal networks	

Figure 3: Level of 3PL Research

The majority of studies (67 per cent) focus on the firm level, examining issues from either the shipper's or the LSP's viewpoint (e.g. outsourcing decision). Regarding the dyadic level, the literature concentrates on different aspects of the LSP-client relationship (e.g. contracting). Very few studies (6 per cent) exist at the network level (e.g. logistics triads). (Harland 1996, p.63-80; Hakansson & Snehota 1995)

2.2.1 An integrative framework for 3PL research

An integrative framework for 3PL research is proposed (Figure 6) based on the identification of main themes within this area of study. Existing studies are classified according to their research purpose and level of analysis. The framework offers taxonomy of past and current 3PL research and also helps in identifying gaps that need to be addressed in the future. A detailed discussion of the relevant literature is presented in the following.

	Firm	Dyad	Network
Table III. An integrative framework for 3PL research	Descriptive	Benefits/risks of outsourcing Service offerings and usage 3PL selection criteria Growth strategies	Formation and evolution of 3PL relations Managing 3PL relations Contracts Information exchange Performance measurement 3PL success factors Partnership models
	Normative	Outsourcing decision Purchasing 3PL services 3PL services marketing	Logistics triads 4PL/LLP

Figure 4: Framework for 3PL Research

2.2.2 Directions for future research

Reviews above provide a conceptual map of 3PL studies which helps in identifying further research opportunities. Five generic propositions regarding future 3PL research are formulated and elaborated upon in the following:

1. Focus on network research
2. Focus on normative research
3. Focus on theory-based research
4. Focus on empirical research in 3PL design/implementation
5. Focus on qualitative methods and triangulation

Elaboration for each part is omitted here as it is not the focus.

2.3 DISTRIBUTION CENTERS AND THIRD-PARTY LOGISTICS

Simchi-Levi and Kamiskey described supply chain management as a set of approaches utilized to efficiently integrate suppliers(i.e. vendors), manufactures, warehouses, wholesales, and retails, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide cost while satisfying customer service level.

Referred to description of (Department of Commerce 1995), distribution center (DC) is designed to link function between suppliers and retails. Transportation is different from distribution. Suppliers transport products to distribution centers in batches, then a distribution center performs additional activities, such as receiving, storing, picking, value-added servicing, packing and dispatching to retailers in broken-down batches. Due to the common transportation method of large batches from supplier to DC, satisfying the frequent and instant distribution requirements from DC to retailers reduces the total cost and increases the competitive capabilities of every corporation within the supply chain.

Nowadays, each corporation should focus on its own core business and outsource extra activities to another party. Thus, Third Party Logistics (3PL) companies have become one of the top alternatives for increasing corporate competitive advantage. Evaluating the performance of a 3PL is a critical step towards fully integrating another party into the corporate supply chain.

The optimization of the logistics governing the distribution process of products and services has gradually become recognized as a medium for a company to gain a competitive advantage over its rivals. Distribution centers are expanding their role and their contribution to the product delivery process. They are taking charge of activities that

would traditionally been performed in the production plant, such as packaging (customized and standard), kitting, minor assembly, and labeling. The “reinvented warehouse” has thus become a key player in a company’s success, and a promising area to concentrate on for developing a competitive advantage. (Copacino 1997, p.117-119)

During the early 20th century, implementing a “vertical supply chain” was the rule. In this paradigm, the manufacturer has full control of the operations and processes of the product creation, from acquiring the raw material to assembling the good, and very often was in charge of distribution to the end customers (e.g. the retailer). However, the price of total control was the responsibility of the costs (as well as the risk) associated with the operations. The high investment of time and money inhibits the company from focusing its energy on product development and process improvement. That said, a shift from “vertical supply chain” to “horizontal supply chain” occurred as a result. In this novel paradigm, the manufacturer divests himself of non-core upstream and downstream activities. Instead, activities such as shipping, warehousing and transporting are subcontracted to specialists. (Varia, n.d.)

A rapid growth in the industry of logistics services has occurred as a result. Many contract logistics companies report annual growth rates of nearly 50 percent. It is not surprising that the logistics service firms presently constitute a significant branch of the business, and companies prefer subcontracting the service because of the difference in cost in comparison to the same service in-house. There are two main advantages to outsourcing the logistical activities, such as freight operations, storage, order preparation, and final delivery. First, it provides the company with flexibility and better inventory management, hence leading to greater availability of products and ultimately improving

service levels. Second, it provides the company with leverage to reduce cost. (Dornier 1998, p.183-186)

Distributors add value to the process by providing efficient physical distribution and efficient selling, market development, and account servicing. According to Copacino, by focusing their efforts on strengthening their expertise in these areas, distributors can maximize their service as providers. (Copacino 1997)

Along with the growth of 3PL businesses comes a debate regarding the value they add to the operations of a company. The use of the 3PL service providers promotes a company's penetration of new market, and the reduction of the financial risks that accompany a company owning logistics assets such as trucks and warehouses. It also allows a company to efficiently coordinate the operations between producers and suppliers. Finally, the use of 3PL service providers can provide a company with novel technologies and innovative solution to logistics problems.

However, there are disadvantages of using the services of a 3PL provider, namely that the collaboration entails risk. First, a "strategic risk" is involved. For example, if a company had competitive advantage in its internal logistics operations runs the risk of losing the advantage by subsidizing its work to a 3PL. In fact, it is possible that the 3PL provider provides the same service to a firm as it does to that company's rival, hence eliminating the competitive advantage. Second, there is a "commercial risk" involved because the image of the manufacturer will inevitably be linked to that of the service firm. Finally, there is a "Management risk", for the cost and the real level of service provided must be visible for both the producer and the service provider. (Dornier 1998, p.183-18)

2.4 KEY PERFORMANCE INDICATORS (KPI)

Key Performance Indicators, hereafter referred to as KPI, are tools used to measure the performance of certain key operations within a company or supply chain to assess the value or success it has achieved. The team is developing key performance indicators for the 3PL, the third party logistics provider that has begun working with the Retailer.

“Once an organization has analyzed its mission, identified all its stakeholders, and defined its goals, it needs a way to measure progress toward those goals. Key Performance Indicators are those measurements.”(Reh 2010)

Specifically, the project is mainly concerned with developing Key Performance Indicators for the newly established Export Distribution Center (EDC) hosted by the 3PL. The next section will introduce the perspectives of several scholars on how to create KPI.

Many performance measures have been used to evaluate systems such as the distribution and inventory systems, which makes the performance measure selection difficult (Beamon 1999). But there are some common characteristics that make a performance measurement system effective including: inclusiveness (measurement of all related aspects), universality (allow for comparison under various operating conditions), measurability (data required are measurable) and consistency (measures consistency with organizational goals). (Cheng-Chuang Hon *et al.*) Much work has been done by Neely *et al.* on categorizing the large number of available performance measures. Neely *et al.* pointed out that, although several performance measurement systems have been developed, no generally applicable framework on performance measurement has been introduced. In addition, each performance measurement system is developed based on the needs and characteristics of the specific company or supply chain. (Hon, Hou & Tang n.d. : Neely, Gregory & Platts 1995, p. 80-116)

Operational performance includes the measurable aspects of the outcomes of an organization processes, such as reliability, production cycle time, and inventory turns. (Neely, Gregory & Platts 1995) Operational performance can be also thought as internal performance, or process performance. (Caplice & Sheffi 1995, p. 61-73) To measure process performance, the measurement system should consist of performance indicators that can measure “product flow” processes (Schwichtenberg 2000). These processes include receiving/inspection, put-away/storage, product maintenance, order picking, staging, dispatching and returns. The operational performance measurement could be linked with process value analysis.

Several scholars have adopted different methods on evaluating the performance of a DC. For example, Cheng-Chuang Hon and his colleagues (2005) implemented Delphe and AHP. Chin-Wen Ou and Shuo-Yan Chou developed a weighted factor rating system for the evaluation. Other available methods include principal component analysis; neural network can also be implemented on this aspect. However, an effective evaluation method should always be the combination of both the theoretic analysis and the practical situation. (Hon, Hou & Tang 2005)

2.4.1 General Guidelines for Performance Measurement

Performance measurements are an important component of managing a business function and particularly the logistics of a process. Not only do they set the standard for employees in the organization, but, more importantly, they can be used to promote performance improvements. According to Copacino, there does not exist one universal set of criteria that can be used for every organization, rather the measures must be tailored according to the organization’s strategy, operating environment, employees, and

customers' needs. Copacino suggests four guidelines to help in the development of performance measures:

1. Keep it simple. The variables must be easy-to-track and intuitively understandable.
2. Tailor the measures to what is controllable and important to the individuals or functions being measured. It is crucial to understand how the organization will react to a measure as it tries to improve its operations according to the measure. The challenge is to create a performance measure that can be controlled by an individual, but does not hurt overall logistics performance for improved performance in one particular area.
3. Develop a variety of logistics measures. Ensure that the measures span various categories, such as "Customer Service Measures", "Macro-Productivity Measures", and "Micro-Productivity Measures".
4. Performance measures should be assessed against a trend that occurs over time (the use of graphs as a function of time are often useful). Ultimately, the goal is continuous improvement (Copacino 1997).

2.4.2 Improvement of Organizational Departments

Developing the KPIs may include an emphasis on the operations of human resources, sales, marketing, production, purchasing, financial, and accounting KPIs.

1. Human Resources: Employees feeling comfortable in their workplace, good relations with labor unions, recruiting a positive workforce, and well trained employees that can be more effective in the working environment.
2. Sales: Good sales representatives, possible hybrid channels including contact by telephone, shops, and supermarkets, and also customer loyalty.

3. Marketing: Having good relations with the public, positive promotion of your product or service, and superior advertising to get what you want out to the public.
4. Production: Maintenance, employee productivity, management productivity, quality of product, and material management.
5. Purchasing: On time delivery to please customers, larger quantities purchases, purchasing cost and cost per unit, and the rating from your suppliers.
6. Financial: Assessment of management, and a measurement of your assets.
7. Accounting: AP management and AR management.

2.4.3 Focus on Cost, Time, Consistency, Inventory

One of the crucial parts of evaluating the performance of a supply chain is to set a valid indicator system, namely to set up a KPI system. Those indicators should place extra emphasis on a part of the supply chain, such as logistics or the responsibility of certain parties. For example, the team could place extra emphasis on logistics, purchases or the organizations' structure. The indicators can be divided into four portions, cost, time, consistency and inventory. Every portion will contain several indicators to evaluate the supply chain.

Time portion

1. OTD (on-time delivery) : This indicator is used to evaluate the quality of delivery serve.
2. Time to solve customer complaints: This indicator reflects the quality of serve.
3. Product output cycle time: This indicator tells the quality of QR (quick response) of the supply chain.
4. Lead time of order fulfillment: This indicator reflects the ability of QR.

5. Supply chain response time: This indicator is used to measure the flexibility of the supply chain.

Cost portion

1. Reaching rate of target cost: This indicator points out how much has been done in terms of reducing cost.
2. Total transport cost: This indicator reflects the cost of transportation logistics.
3. Total inventory cost: This indicator reflects the expenses related to the inventory model and stocks.
4. Communication cost: This indicator reflects the cost related to information exchange, including IT.
5. Total management cost: This indicator tells us whether it is necessary to streamline the organs.
6. Profit rate of cost: This indicator shows the efficiency of profit.
7. Reverse logistics cost: This indicator shows the quality of products and the situation of recycling.

Consistency portion

1. Logistics visibility: This indicator reflects whether the physical products and the information are traceable in the supply chain.
2. Total order fulfillment time: This indicator reflects whether the companies in the supply chain cooperate well.
3. Supply rate between companies: This indicator tells whether the demand of the main company has been satisfied by the subordinate company.

Inventory portion

1. Sales output ratio in a period: This indicator reflects how much products have not been sold out and became part of inventory.
2. Overstocked products: This indicator shows how much overstock items there are.

Benchmarking management is used to try to give exact numbers for those indicators. Each indicator should have two numbers. The first one is an internal number and the second one an external number. The internal number comes from the best historical data of company. This number reflects the best that people have reached. The external number comes from the best data in the same industry. This second number shows the level that rival companies have reached and also indicates the company's rank in comparison to that of competitors.

The problem purportedly within the Supply Chain industry is that inventory may be discussed much, but in reality companies are not cutting back on inventory. Dan Gilmore discusses this in more detail, while broaching inventory numbers from 2004-2008, and mentioning 2009 potential effects. Many companies seemed to have maintained a consistent inventory while attempting to cut down on inventory. This could in part be due to the overall sales ratios rising, but the recent financial crash in the market may affect the 2009 inventory statistics. Some companies have discovered that stocking multiple SKU may not be a viable economic option. Consumers have been wavering toward lower priced items rather than purchasing their preferred product, which may run at a higher price. Due to this consumer behavior, many companies are choosing to stock lower priced items and are finding that consumers are not becoming disappointed. This

may be a key factor in the 3PL's Supply Chain strategy in helping the Retailer reduce inventory by not stocking large amounts of SKU. (Supply Chain Digest)

For example, Novelis, an Aluminum recycling plant, ran out of Oswego and has been able to speed up its processing activities within manufacturing by concentrating on flexibility in the production floor. With batches coming in out they discovered that the more reliable the line was the less that there was backlog. By keeping batches of similar quantity and type the system flowed better. Sometimes this involved removing certain batches due to their size so as not to interrupt the flow. As long as these delays were managed intelligently the process grew faster and they were able to process larger batches during down times and ultimately increased productivity. This is more manufacturing based than Supply Chain oriented but the idea behind the change may still be key. The Retailer can use flexibility as a motto so that when materials are being pushed through the system, it is important to maintain perspective on what is the more important material or more urgent. (Supply and Demand Chain Executive)

2.4.4 Qualitative Performance Measurement

According to Murphy in a paper published in the Journal of Supply Chain Management, Financial and quantitative measures are not enough to assess performance, for they are too abstract and indirect for operational managers to become acquainted with. Further direct and qualitative tools are needed to get a more complete picture of the operations. Moreover, ongoing measures as opposed to the temporary financial ones are useful. (Van Hoek 2010)

There are three main factors in measuring the performance of third-party logistics according to Murphy: operations performance, channel performance, and asset reduction. There are 10 items that are used to measure the operations performance, but Murphy only

names a few, “improved logistics system responsiveness”, “achievement of logistics cost reductions”, “improved information technology”, and “increased logistics expertise”. These items focus on the, as Murphy calls them, “inward-looking measures of performance”. There are three items used to measure channel performance, but Murphy only names “help integrating the supply chain”, “increased post-sale customer support” and “expanded geographic coverage”. As opposed to the focus of the items in the operations performance, the items reflect an external focus. There are only two items that are used in measuring the asset reduction, which are “reduction of owned assets” and “reduction of the user’s employee base”. Clearly, the focus here is to decrease the cost associated with the physical and tangible assets and resources.

Now, we move to how to achieve these three items. Before doing so, however, it is useful define the trust between the buyer (supplier) and the seller (third-party). Success in implementing a 3PL in the operations is strongly reliant on the relationship between the buyer and the seller, and there must be a long-term commitment in order for the partnership to be fruitful (because integrating a 3PL in the operations implies changing the paradigm of how the process functions). Consequently, while not being the sole criteria for success, trust seems to be a cornerstone for successful logistics outsourcing. The following diagram found in Murphy’s paper illustrates the hypothetical relationship between various criteria that seem to promote trust, and how they relate to the measurement of a 3PL’s performance: (Knemeyer & Murphy 2004)

THEORETICAL MODEL OF 3PL PERFORMANCE

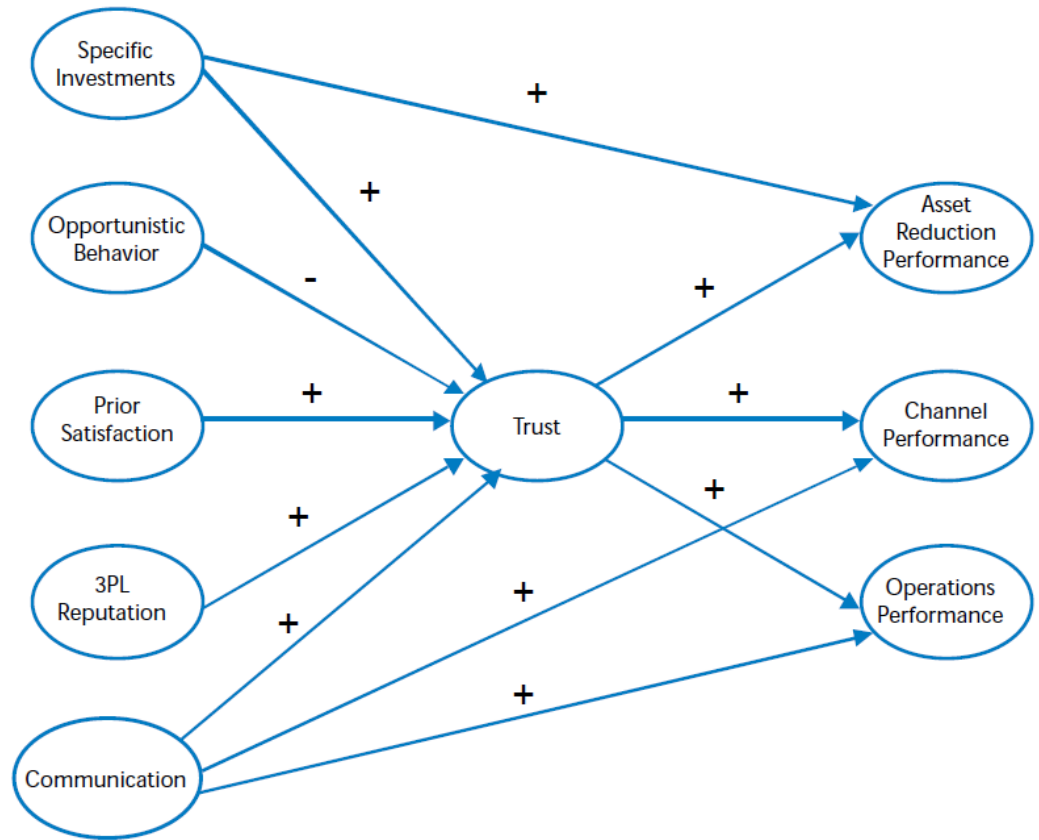


Figure 5: Trust between Supplier and 3PL

3.0 METHODOLOGY

3.1 CHRONOLOGY AND DIVISION OF LABOR

Location: Preparatory Qualifying Project at Home University.

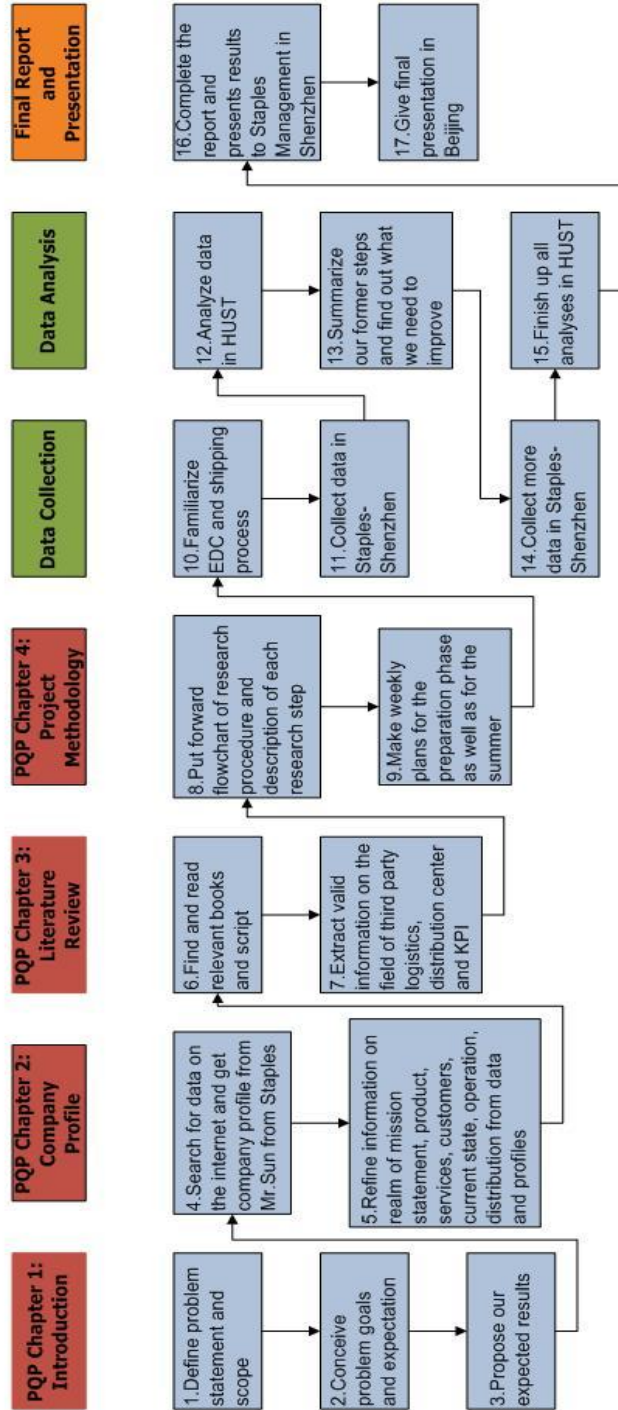
April 2010 to June 2010

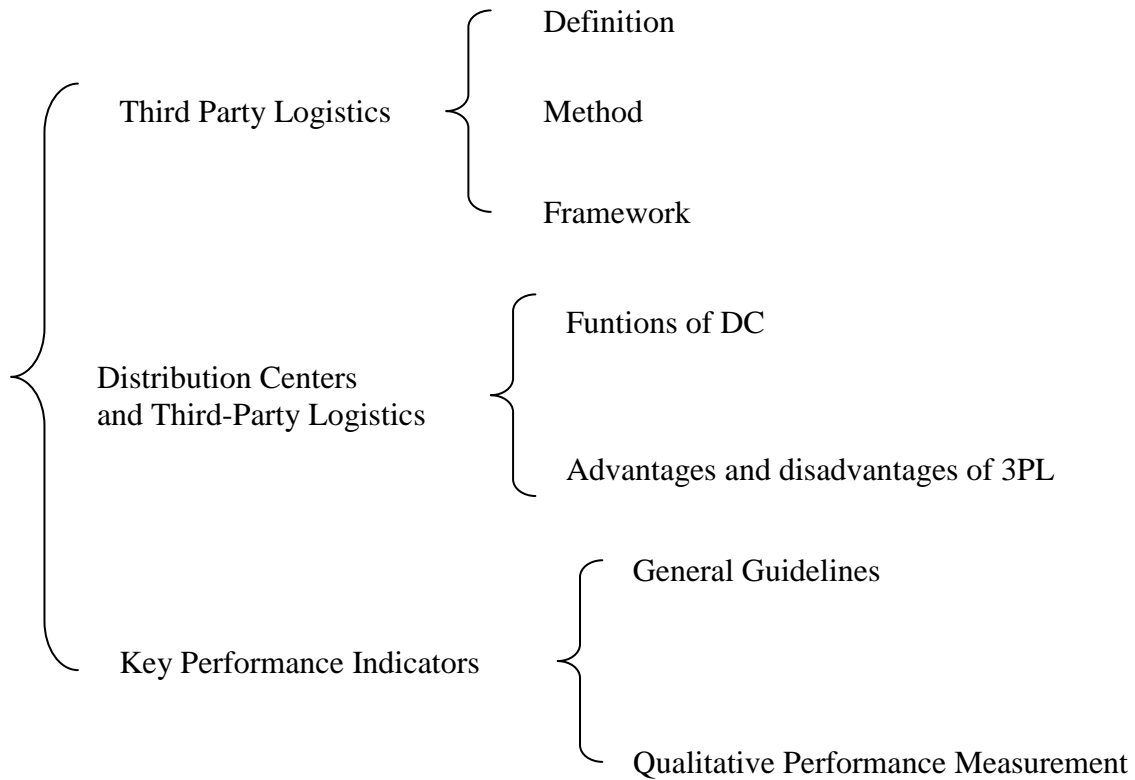
Before meeting in Shenzhen, the Chinese and American teams spent two months compiling the preparatory qualifying project (PQP), a necessary report that prepares the students for facing the main topics of their project. It consists of five parts:

- Introduction: including problem statement, project scope, problem goals, expectations and expected results.
- Research on the Retailer: including company structure, company history, and recent development in global growth.
- Literature review: including Third party logistics (3PL), research method, distribution center and key performance indicators (KPI).

Figure 6: Flowchart of Research Procedure

Flowchart of research procedure





- *Figure 7: Framework of literature review*
- Methodology: including chronology and division of labor, professional goals, and expectations from the project, relationship with the Retailer, future plans and overview of Project Plan.

Location: The Retailer’s Office, Shekou

June 28th to June 29th

During the team’s first two days in Shenzhen, China, the logistics manager introduced the company and detailed information about the project. After the first visit to the office, the team attended a seminar in the afternoon on the Retailer’s business, and how its supply chain is managed. The goal of the project is to evaluate the performance

of the 3PL and the EDC by developing Key Performance Indicator (KPI). A comprehensive understanding of the supply chain was needed, and the team learned about the interactions of the Retailer with the main parties involved in the supply chain, namely the 3PL, vendors, and the carriers. After learning about the Retailer's supply chain and the project's goal, the team received the detailed plan for the first week. Furthermore, the team was also directed to divide the supply chain into three subgroups, "Vendor management"(VM), "Inventory Management" (IM) and "Carrier and On Time Shipping Management" (CM). Next, the team divided itself in three groups of two and every duo was responsible of an area.

Prior to moving to the next location, the team visited both the Shekou and Yantian terminal ports. The tour and seminars the team had in the ports not only provided them with a solid understanding of how the port's operations work, but also acquainted the team with the geographical layout of the Shenzhen ports.

Location: Third Party Logistics Office, Yantian

June 29th to July 9th

The team spent the next two weeks in the 3PL's office, attended a set of seminars and presentations targeted at teaching the 3PL's operations procedures and information flows.

Specifically, in the first week, the team attended around 8 seminars on different aspects of the supply chain such as the general timeline, background information on

logistics, basic information for delivery and carrier, vendor management, inventory management and carrier management.

Furthermore, in numerous Question & Answer sessions during the seminars, the team had the opportunity to clarify the information and engage in more detailed topics related to the project. The team also analyzed several logistics case studies of companies that the 3PL contracts with. Moreover, the team visited the 3PL's warehouse and EDC to understand inventory management and the type of added value services that the 3PL offers its customers. The team also interviewed the employees individually to gain additional information and be able to relate the knowledge from the seminars to the worker's first-hand experience. For the remainder of the time in Yantian, the team created its first draft of KPIs.

Location: Huazhong University of Science and Technology, Wuhan

July 12th to August 3rd

After creating the rough KPI list in Shenzhen, the team spent 4 weeks at the Huazhong University of Science and Technology (HUST), mainly focusing on the following tasks:

1. In order to gain more information on KPIs and the distribution center from an academic standpoint, the team engaged in more literature review with the library resources on campus.
2. Based on thorough considerations and discussions of their rough KPIs, the

team generated refined versions of their KPIs. Afterwards, the team spent time formally defining the KPIs, developing formulas, and creating spreadsheets used to compute the KPIs.

3. During the process of creating the spreadsheets, the team spent time programming and developing the optimal output for the KPI results.
4. After finalizing the KPIs, the team worked to establish the availability of the data needed to calculate the KPIs by continuously communicating with the Retailer and the 3PL.

Location: Retailer's Office, Shekou

August 3rd to August 12th

In order to finalize the KPIs to meet the Retailer's requirements, the team thoroughly discussed the former KPIs with the Retailer's logistics manager and revised them accordingly. Since the list of KPIs changed, the spreadsheets for the KPIs were modified correspondingly. After that, the team went to 3PL's office several times to clarify certain questions, such as in which reports the data needed is contained, or the type of document exchange that occurs after the vessel's departure.

Then arose the time to work on the final presentation and report. During this time the team also developed the recommendations for both the 3PL and the retailer. In the process of preparing the final presentation, the team rehearsed with the professor and the logistics manager, and revised the presentation based on their advice.

The final presentation for the retailer was held on August 12th, 2010.

3.2 GOALS

1. Set up KPI's to evaluate EDC performance of a 3PL Provider.
2. Use KPIs to evaluate the performance of the EDC and provide concrete results and feasible solutions for undesirable outcomes.
3. Examine the possibility of improving the performance of the EDC. Recommend specific steps and methods for the 3PL to adopt and the improvement on efficiency.
4. Utilize the suggestions to achieve the final goals of the EDC, such as reducing cycling time and improving efficiency.

3.3 EXPECTATIONS OF PROJECT

To develop a list of Key Performance Indicators, which the Retailer can use in future endeavors to enhance communication between the Retailer and the 3PL, to establish a working relationship based on improvement with the 3PL, and analyze current operations. Track improvement in the EDC during seven weeks in China and support the KPI's with positive data reinforcements.

3.4 RELATIONSHIP WITH THE RETAILER IN THE U.S.A

There is no question that the success of this project relied heavily on a fruitful interaction between the Retailer and WPI/HUST. During the preparatory stages of the project, the team persistently communicated with the Retailer's executives, such as the Logistics Manager in China, the International Distribution and Logistics Director in the

U.S.A., and the Vice President of Global Product Development and Manufacturing in the U.S.A.

The team’s first encounter with the company was done via e-mail with the logistics manager, who supervised and guided the project once on-site. Through a series of questionnaires, the logistics managers clarified the task of the project, and briefly overviewed the process that the Retailer underwent for selecting the 3PL.

On April 23rd 2010, the WPI team met with Mr. Sullivan in Framingham, MA, at the corporate headquarters of the Retailer. A WPI graduate, Mr. Sullivan played a major role in making the project possible. During the meeting, the discussion revolved around the structure of the Retailer in China and briefly around the logistics of the international operations.

On May 12th 2010, part of the WPI team met with Mr. Zelenak, again at the headquarters in Framingham, MA. The discussion this time focused on the third-party logistics and the facilities in Shenzhen in particular. Some advantages of establishing an export distribution center (EDC) were discussed, such as the ability to order in bulk as opposed to in smaller quantities frequently.

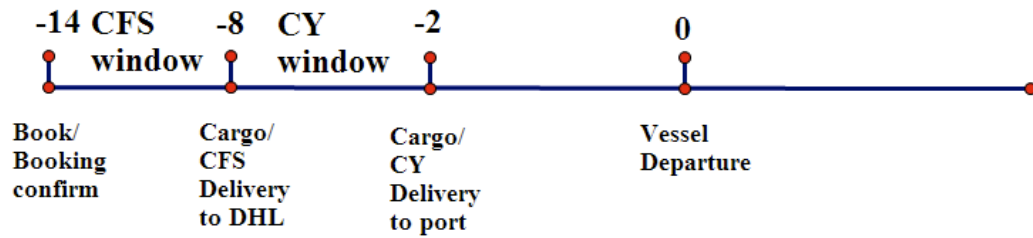
3.5 OVERVIEW OF PROJECT PLAN

Week	Brief Description of Tasks
1 (Shenzhen)	<ul style="list-style-type: none"> • Meet with executives and workers in the Export Distribution Center (EDC) and of the Retailer to establish what the goal of each party is, and examine their relationship with each other. • Clarify what project goal is. Modify certain aspects of it, or elaborate it. • Develop a preliminary set of questions. • Specify what the expectations of the project are. • Examine in thorough detail how the EDC operates. • Discuss a large number of possible KPI. This list will be made

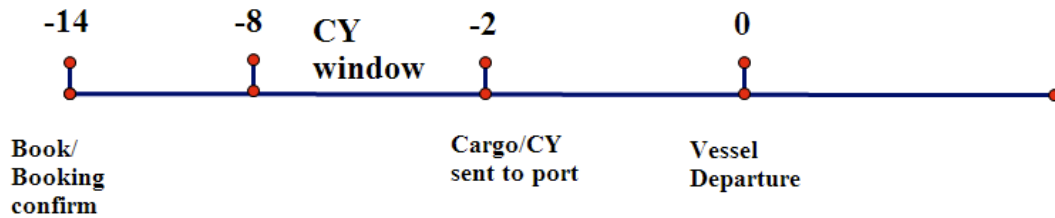
	smaller with time and insight.
2 (Shenzhen)	<ul style="list-style-type: none"> • Meet for a second time with the EDC and with the Retailer. These meetings will be crucial in helping determine the qualitative KPIs. • Use first set of questions to develop a second set of questions. • Eliminate some KPIs that are ineffective, and begin thinking about finalized list of KPI. • Begin discussing ways to track KPIs over time. • Begin examining what are the factors that affect KPIs (negative and positive impact)
3 (HUST)	<ul style="list-style-type: none"> • Stay in touch with the EDC in order to achieve subtasks. • Finalize first set of KPIs (this list should contain the majority of the final KPIs). • Use literature to examine how the team can track the KPIs over time. • Examine how it is possible to <i>validate</i> that KPIs are a good reflection of the performance of the EDC. • Do the necessary modeling and data compilation.
4 (HUST)	<ul style="list-style-type: none"> • Come up with a concrete plan to validate and track the KPIs. • Communicate with the EDC to propose to them how the team will validate and track the KPI. Get feedback on whether, based on the employees' experience, the team's plan is feasible.
5 (Shenzhen)	<ul style="list-style-type: none"> • Implement the validation and tracking. • Optimize the KPIs.
6 (Shenzhen)	<ul style="list-style-type: none"> • Continue plan from Week 5.
7 (HUST)	<ul style="list-style-type: none"> • Research optimization methodologies and begin formulating the suggestions. • Examine how the suggestions will help the EDC reach its overarching goals of reducing overall Supply Chain Costs, reducing inventory, and driving consistency within the Retailer's Supply Chain.

Timelines

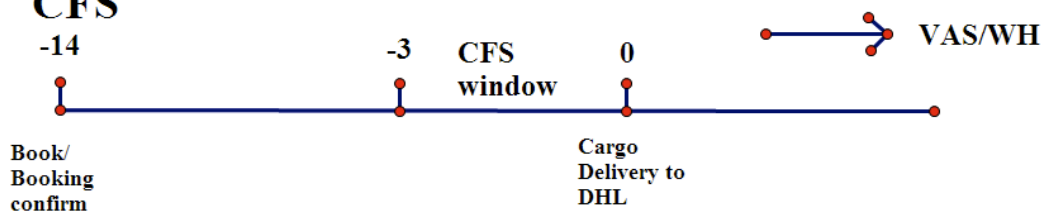
CFS/CY



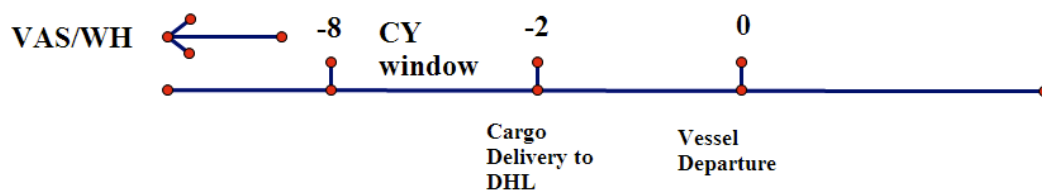
CY/CY



EDC CFS



EDC CY



4.1 EDC & CFS/CY SHIPMENT TIMELINES

VENDOR PRODUCTION

At the beginning of the Purchase Order Process the retailer asks vendors to produce a product, through a Purchase Order Contract.

VENDOR MATRICULATION

During production, vendors will be registered in GT Nexus by the 3PL. The 3PL trains the vendors to use GT Nexus and perform the purchase order procedure.

Vendor matriculation should be finished 21 days before the product is expected to ship from the port (Estimated Time of Departure for the vessel).

VENDOR BOOKING PROCESS

In the CFS/CY model, vendors need to submit a booking to the 3PL to notify them of the upcoming delivery of the product to the 3PL's warehouse, 14 days before vessel sailing. The 3PL will then verify the vendors booking form with the Purchase Order Contract. After verification the 3PL will send a confirmation of the booking to the vendor via GT Nexus.

In the EDC model, vendors need to submit a booking to the 3PL to notify them of the upcoming delivery of the product to the 3PL's warehouse, 14 days before the retailer's designated delivery date.

CARRIER FORECASTING

After vendors finish their production and booking, the 3PL can estimate the amount of container space the product will require. At this point the 3PL sends a forecast of

the estimated space the product will need to the carrier. If the expected volume of product changes the 3PL will contact the carrier again to update the forecast.

VENDOR DELIVERY

After the Vendor Booking is confirmed the vendor will load the tendering vehicle with the product. Then the tendering vehicle will depart for the 3PL's warehouse. Once the product arrives at the warehouse it must clear china customs and be offloaded into the warehouse.

WAREHOUSING

Once the product is delivered to the 3PL, it can be inventoried and redistributed according to when it will be shipped.

CARRIER BOOKING

After the product is delivered to the 3PL's warehouse the 3PL will be able to accurately estimate the exact volume which the product will need in a container. This allows the 3PL to book the exact container space with the carrier. Once the carrier booking form is submitted, the carrier will confirm the availability of space for the containers the 3PL requests.

DELIVERY TO PORT

The 3PL will pick up an empty container at the carrier's designated location after receiving the carrier booking confirmation. The empty container will be brought back to the 3PL's warehouse and loaded with the product. Since this is CFS/CY, the container will contain multiple Purchase Orders dependent upon the volume needs of each product. The loaded container will be dropped off at the port of departure two days before the vessel departs.

ISF SUBMISSION

If the product is destined for the U.S, U.S. customs requires that the retailer submit a document called the Internal Security Filing which describes the product, where it was produced as well as other information pertaining to the retailer. This document must be submitted by the 3PL 3 days before ETD to the retailer and the retailer will submit it to U.S. customs 1 day before ETD.

VESSEL DEPARTURE

In order for the vessel to depart, the correct documentation must be submitted to the carrier about the contents of the container, this is called the Shipping Instruction Form and is delivered with the container to the port. After the port receives the container it will be loaded onto the correct carriers vessel if all the documentation is complete. The vessel will then depart for the port of destination.

FCR PROCESS

Once the product has been shipped the 3PL must contact the vendor with a draft Forwarding Cargo Receipt 3 days later. This document allows the vendor to receive payment for cargo production. The vendor may confirm the draft Forwarding Cargo Receipt within 24 hours. Whether the vendor confirms the draft or not, the 3PL will print an original Forwarding Cargo Receipt after the 24 hour window and notify the vendor that it is ready for pick up.

BILL OF LADING

The carrier submits the Bill of Lading to the 3PL one day after the vessel sailing. The Bill of Lading is a document affirming that the cargo is onboard the vessel and will

be used once the container arrives at the port of destination. This document is one of many, which will finalize the 3PL's handling to the particular Purchase Order.

VENDOR DOCUMENT PROCESS

Once all the documents have been exchanged between the retailer, 3PL, vendor and carrier the Purchase Order documentation must be gathered for the retailer, for when the product arrives at its' destination. The vendor will compile many of these documents and submit them in a packet to the 3PL 3 days after the vessel departure. The 3PL is required to load the documents onto GT Nexus 5 days after vessel departure for the retailer's easy access.

4.2 CY/CY SHIPMENT TIMELINE DIFFERENCE FROM CFS/CY

In the CY/CY model, vendors need to submit a booking to the 3PL to notify them that production is almost finished and the volume of product to be shipped. The volume must be enough to fill either a FEU or TEU. The 3PL must then contact the carrier with this information to book an entire container for the product. After the carrier confirms the booking the vendor will pick up an empty container at a designated location and bring it back to the vendor's factory. The vendor will then load the product into the carrier and return the full container to the port of departure.

5.0 VENDOR MANAGEMENT

5.1 INTRODUCTION TO VENDOR MANAGEMENT

5.1.1 Vendor Management Definition

Official Definition:

Vendor management is the discipline of establishing service, quality, cost, and satisfaction goals and selecting and managing third party companies to consistently meet these goals.

Definition for the purpose of this report:

Vendor Management is a subsection of the overall purchase order process relating to all interactions that occur between a vendor and 3PL, and between the 3PL and the Retailer regarding vendor documents and shipments. These interactions may be divided categorically, consisting of Vendor Matriculation, Vendor Booking, Vendor Cargo Delivery & China Customs Clearance and Final Vendor Documents.

5.1.2 3PL's Responsibilities for Managing Vendors

The 3PL's performance managing the Retailer's vendors is a key factor in assuring that the shipment is on time. The 3PL is responsible for establishing standard processes, educating the vendor on those standards, monitoring daily vendor performance and handling exceptions. The 3PL company must also inform the Retailer of daily vendor interactions, exceptions and report monthly vendor performance. The 3PL also modifies and supplements existing process standards and develops new standards. In

addition to initializing new vendors, the 3PL must apprise vendors of modified standards as changes occur and assist vendors who are failing to abide by the standard processes.

The 3PL is responsible for monitoring and facilitating the step-by-step process of a purchase order. The life of a purchase order begins with the vendor beginning production of the goods; therefore vendor management is the commencement of the 3PL's responsibilities as a service provider. Vendor management ends, in the life of purchase order, after the Retailer honors the forwarding cargo receipt.

5.1.3 Timeline of 3PL Vendor Interactions

Vendor Management, as defined above, is a series of interactions between the vendor, 3PL and the Retailer. The interactions specific to vendor management have been highlighted in the timeline below to ensure the clear understanding of the portion of the purchase order process flow which vendor management concentrates on. This timeline contains a segment of the same information from figure 8, but is more detailed and is within a different framework.

3PL Vendor Management Timeline

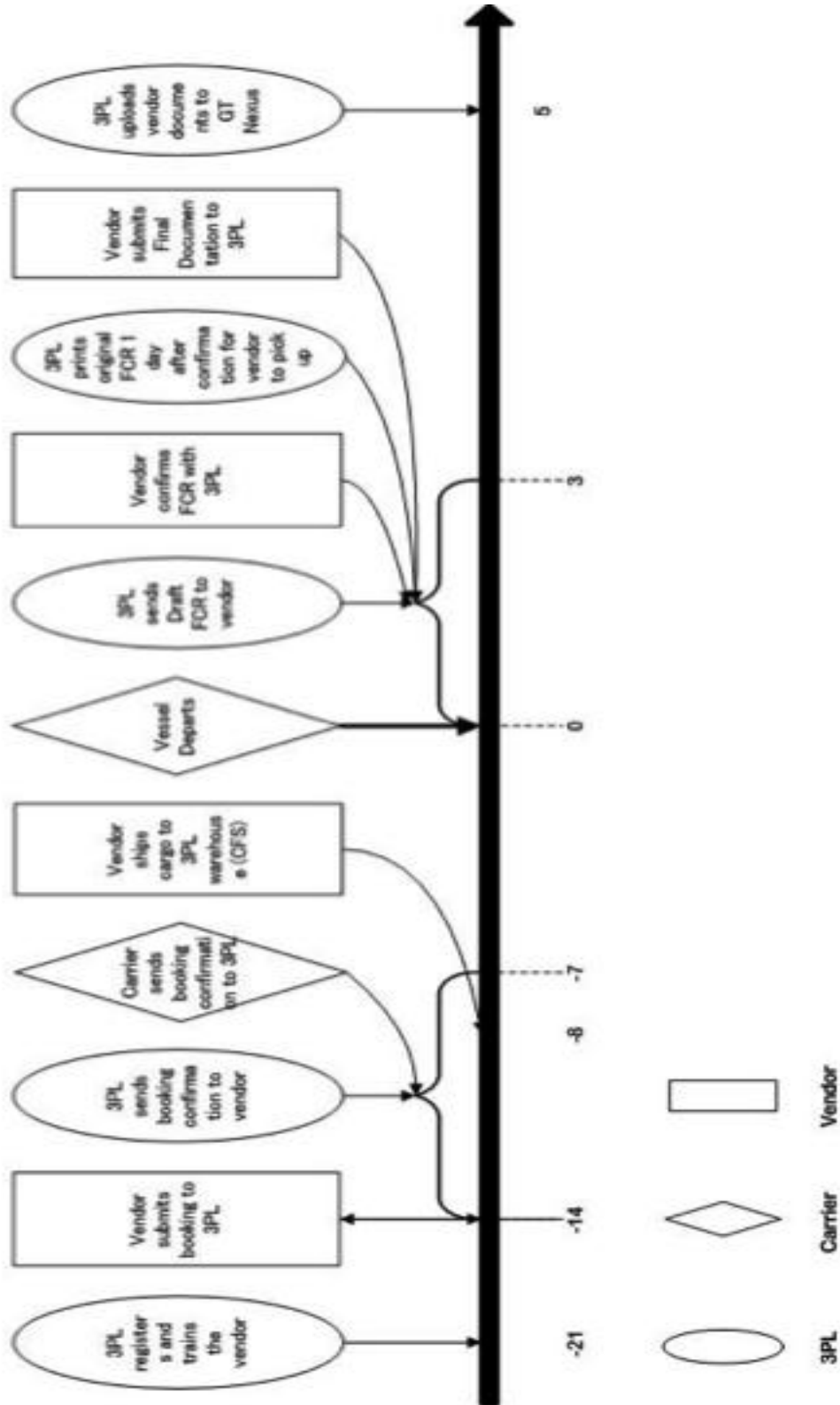


Figure 11: Vendor-3PL interaction Timeline

5.2 KEY PERFORMANCE AREAS

5.2.1 Vendor Matriculation

Vendor Matriculation, a sub area of 3PL Vendor Management, consists of two parts: vendor registration and education. These areas are an essential preparation for the vendor to be able to do business with the Retailer and the 3PL.

Vendor Matriculation refers to the time period, which the 3PL has, to instruct a new Retailer's vendor in the many protocols that the vendor is expected to uphold. The Retailer first selects a new vendor during the Retailer's search for a purchase order's producer. The Retailer will then form a contract with the vendor for a purchase order and then the vendor will begin production. Once the deadline specified in the contract for the complete purchase order's delivery approaches, the 3PL will contact the vendor. To facilitate the smooth hand-off from the vendor to the 3PL to the carrier, the vendor will be taught the process timeline and the 3PL's expectations for the vendor's role in that timeline. Not only will the vendors know their role but they will also be given the log on information for the GT Nexus system so that they have the means to fulfill the role expected of them. This log on information is necessary for the vendor to submit a booking to the 3PL in the correct format. It also signifies that the 3PL has registered the vendor in the GT Nexus and, both the vendor's and PO's particular information, are in the system.

The Retailer will often contract with the same vendor for many purchase orders, especially if the vendor upholds their side of the contract reliably. Therefore there are much fewer new vendors to register than purchase orders to process. It also means that the vendor matriculation volume is quite manageable. The 3PL may find exponential

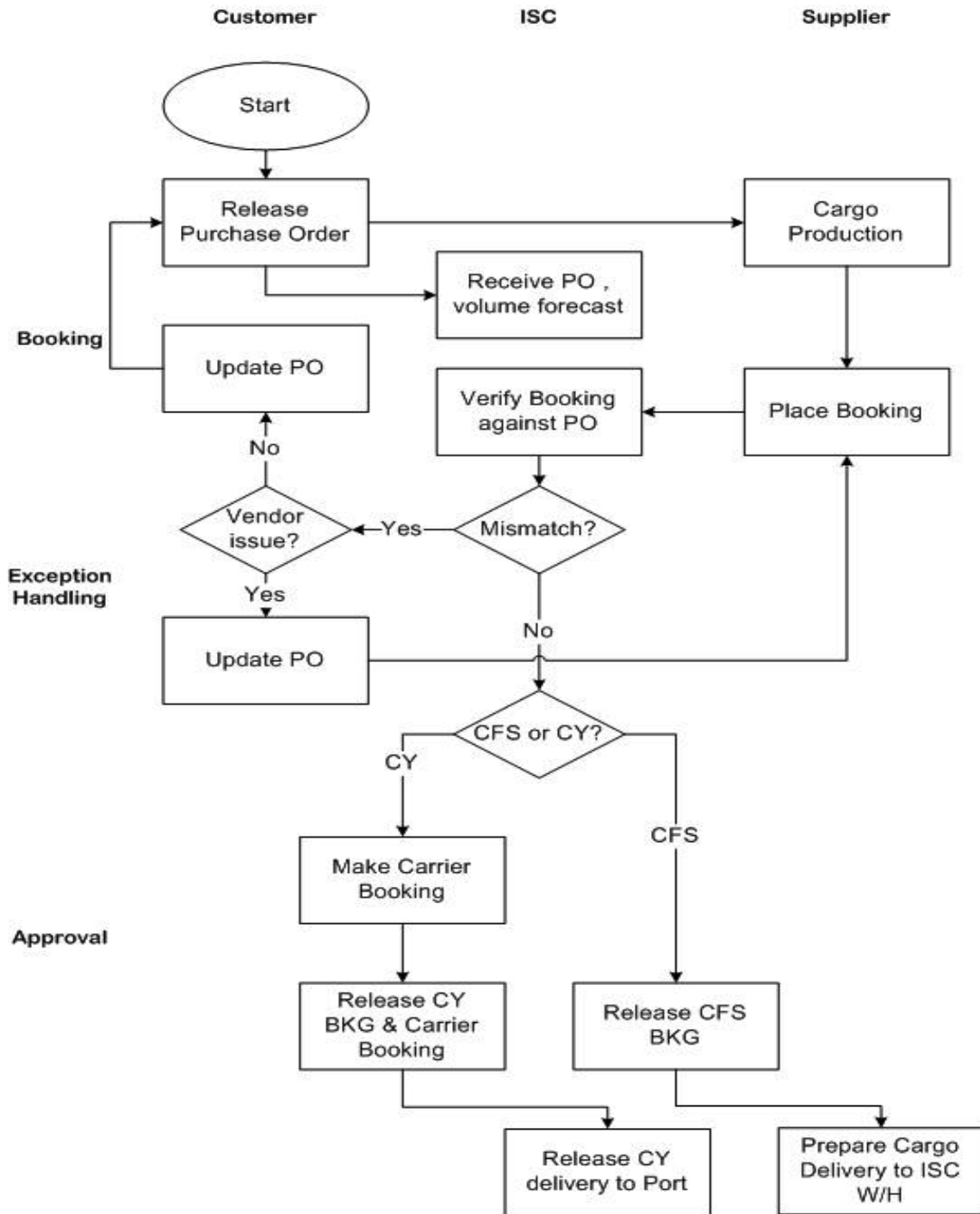
benefits in on time shipping for the purchase orders produced by those vendors, which have a solid background in the purchase order process. Therefore the Retailer stresses that vendor matriculation is a key area to concentrate on because it will greatly affect the performance of other key operations.

5.2.2 Vendor Booking

The Key Performance Area Vendor Booking refers to vendor booking related activities and the 3PL's booking confirmation as shown in the flow in Figure 11. Vendor Booking should occur fourteen days prior to the Vessel Departure Date. Approval of the Shipment should also arrive within this time period. If the shipment is CFS/CY, then the 3PL will confirm the booking after it reviews the booking for errors and receives the Approval of Shipment. If the shipment is CY/CY then the 3PL must also wait for the Carrier Booking Confirmation of the requested container space in order to confirm the Vendor Booking. The reason CFS/CY and CY/CY differ in standard process is due to the location of cargo delivery. In the CFS/CY situation the cargo is first delivered to the 3PL, and if the Carrier space is unconfirmed then the 3PL has the ability to warehouse the cargo until the Carrier releases the booking confirmation. Whereas with CY/CY shipments, the container for shipping is the same container that is stuffed at the vendor's factory; the vendor must have the ability to pick up the empty container, to stuff it, and then to drop off the full container at the terminal port. The vendor is unable to pick up empty containers at the port until the Carrier has confirmed that they will be able to ship the full container upon re-delivery.

Booking not only encompasses the process of confirmations but also of information verification. When a vendor submits a booking to the 3PL company, the 3PL takes the booking and cross checks it against the original Purchase Order for the shipment. If there are any inconsistencies between the two documents, the 3PL must contact the Retailer. The Retailer then decides whether the vendor is allowed to deliver the cargo as written in the booking. If the Retailer decides that the vendor may not deliver the cargo, the booking will be rejected. In this case, either the 3PL or the Retailer will contact the vendor for further instruction; perhaps the cargo will be corrected, or the Retailer will renegotiate the terms of the Purchase Order. If the Purchase Order is renegotiated then the vendor must go through the process of booking, approval of shipment, and confirmation of booking again. If the shipment is urgent and the crosscheck uncovers discrepancies, then the Retailer may choose to ship the cargo nevertheless and renegotiate with the vendor after shipment. Also, if the shipment is not urgent, the cargo may be reworked to the Retailer's satisfaction and delivered on time, eliminating an issue when the cargo arrives at the 3PL warehouse. It is important that this crosscheck occurs because it may detect problem areas before the shipment is delivered, allowing the Retailer more time to respond and resolve potential delays. The process of exception reporting and resolution is illustrated in figure 12.

Vendor Booking Exception Process Flow



Currently the 3PL Company and the Retailer manually track exceptions, such as those mentioned above, in the Excel documents. The exceptions list is added to, for each exception that occurs in a Purchase Order. This is one way in which the Retailer is

already monitoring the 3PL and the vendors' performance. Due to this system's current utility, the Retailer is more focused on introducing a new system for monitoring Vendor Booking Confirmations, which is an area that has never been tracked. Considering the Retailer's goal, a Key Performance Indicator has been developed to examine Vendor Booking Confirmations.

5.2.3 Final Vendor Documents

Even after the 3PL receives the physical delivery of the cargo, the documentation of the shipping order still continues. Inventory Management covers the physical cargo delivery process in the next chapter, but the responsibility of documenting the shipment is shared between the vendor and the 3PL. "Final Vendor Documents" refers to the documents, which are trafficked between the vendor and the 3PL after vessel's departure. The first document is the draft Forwarding Cargo Receipt (FCR), which the 3PL sends to the vendor one to three days after vessel departure. The vendor must confirm the draft FCR's accuracy within 24 hours, or the vendor's non-reply will be an assumed confirmation, after which the 3PL will print out the original FCR and notify the vendor that it is available at the 3PL's facility.

Other than the FCR, the other documents which the vendor is responsible for providing to the 3PL are the Commercial Invoice, SBI addendum, Statement of Origin, Beneficiary Certificate, Packing List, Bill of Lading, Manifest, Inspection Certificate, Lacey Act Declaration, GSP declaration and Material Safety Data sheet. The latter four documents may or may not be applicable to every purchase order. Although none of the cargo handling occurs at this time, this portion of the purchase order process is important

to measure and track because it may affect the shipment when it arrives at its final destination. It also allows the Retailer to measure all the previous processes because the documents also contain information on the exceptions and delays.

5.3 PRELIMINARY PERFORMANCE INDICATORS

ELECTRONIC DATABASE INTERCHANGE (EDI) VERSUS HARDCOPY BOOKING TRANSACTIONS

Definition:

“Electronic Database Interchange versus Hardcopy Booking Transactions” calculates the percentage of bookings received via EDI and compares it to the percentage of hardcopy bookings received.

Purpose:

In order to track the key performance area “Vendor Booking”, the data must be traceable. An Electronic Database Interchange system, such as GT Nexus, assists the customer of the 3PL in monitoring key performance areas by capturing the dates of creation, submission or upload. The greater the traceability and accuracy of data, the more minutely the Retailer can monitor a 3PL. Due to this reality, key performance indicators will be more accurate if all bookings are exchanged on GT Nexus, since all the data will then be available for calculations. This performance indicator allows the Retailer to monitor the percentage of data availability for booking KPIs, which also indicates the validity of the booking indicator’s result.

Removal Rationale:

Vendor Bookings are rarely submitted via any exchange systems other than GT Nexus. Therefore, if the indicator were to be monitored, its' result would indicate that all bookings are received via GT Nexus, and the 3PL should concentrate on strengthening its weaker areas. As a result, it does not seem worthwhile to monitor an area which the 3PL excels in, when the Retailer is so confident in the 3PL's sustained performance.

EMPTY CONTAINER PICK UP (CY/CY)

Definition:

“Empty Container Pick up” refers to monitoring the time window in CY/CY orders after the booking confirmation but before Container Yard Closing, in which the vendor must pick up an empty container from the port and stuff it.

Purpose:

During the month of July 2010, the Retailer's vendors complained about the shortened time window referred to in “Empty Container Pick up”. Since the Retailer was unaware of the 3PL's performance and the issues, which the vendors raised, this performance indicator seemed to be a possibility for attesting to the vendor's rectitude.

Removal Rationale:

The monitoring of this time window, which may or may not be foreshortened because of the vendors' late booking or the 3PL's late booking confirmation, would produce indeterminate results for whose performance narrowed the window. Upon reevaluation this performance indicator was discarded for a more versatile and better-structured indicator, which is now termed “On time Vendor Booking Confirmations” and monitors solely the 3PL.

BOOKING EXCEPTIONS RESOLVED AND SHIPPED ON TIME

Definition:

“Booking Exceptions Resolved and Shipped On time” calculates the number of Purchase Orders with exceptions that were resolved and shipped on time.

Purpose:

The number of purchase orders that are late due to booking exceptions indicates if the resolution of booking exceptions is fast and efficient. By evaluating how efficacious the 3PL’s booking exception resolution process is, it is possible to identify if the 3PL’s performance may be improved in this area.

Removal Rationale:

The Retailer has already developed a system, which tracks the exceptions per Purchase Order. Moreover, it is more appropriate to track the time an exception takes to resolve rather than determine if that exception caused the delayed shipment because there may be many variables that cause a delay rather than one. This performance indicator is too narrow for the purposes of the Retailer. Any calculation that does not take into account all the exceptions, but only booking exceptions, that may occur will produce deceptive results.

BOOKING EXCEPTION REPORTING TIME

Definition:

“Booking Exception Reporting Time” refers to the time it takes the 3PL to inform the Retailer of an exception in the booking.

Purpose:

In order for an exception to be resolved, the Retailer must be informed of the exception and then direct the 3PL on what action to take in order to resolve the exception. The first step towards resolving a booking exception is to inform the Retailer, since the faster the 3PL is able to report an exception, the closer the exception will be to a resolution.

Removal Rationale:

Every exception that occurs within a day is reported at the end of the day to the Retailer in the form of a “Booking Report”. If the exception is in a particularly urgent shipment, then the 3PL will report it immediately upon notice. Since the 3PL either reports an exception immediately or at the end of the day, this performance indicator would be in hours, too short of a time period to affect the overall on time shipping.

BOOKING EXCEPTION RESOLUTION TIME

Definition:

“Booking Exception Resolution Time” calculates the time it takes the 3PL to carry out the appropriate action to resolve an exception.

Purpose:

As part of its responsibilities, the 3PL is expected to resolve a booking exception as per the Retailers directions for that exception. If the Retailer gives the 3PL directions but the 3PL does not respond to those directions until a few hours, or perhaps days, later, the shipment may be late.

Removal Rationale:

The 3PL needs exceptions to be resolved as quickly as the Retailer requires so that the 3PL can correctly book container space from the carrier. Therefore the 3PL always responds immediately to the Retailer's directions on how to solve the exception. Due to the rarity of prolonged exception resolution, this performance indicator is not critical to the problems related to on time shipping. Also, because many exceptions can be solved in a matter of hours, this performance indicator would be difficult to track and does not affect the overall purchase order timeliness.

RECEIVING AND OFFLOADING TIME

Definition:

"Receiving and Offloading Time" calculates the amount of time it takes the 3PL to offload the cargo when it arrives at the warehouse and clears China's customs.

Purpose:

The 3PL is responsible for assuring the cargo is inventoried and clears customs in a timely manner. The vendor cannot leave the 3PL's facility until the cargo is offloaded and clears customs, since the faster the cargo clears customs and is offloaded the more satisfied the vendor is. The more satisfied the vendor is, the better the relationship among vendor, 3PL and Retailer. This performance indicator is important for vendor relations.

Removal Rationale:

Even though the 3PL is responsible for the majority of the process of delivery, the 3PL has no effect on the amount of time it takes the cargo to clear china customs. Since this timeframe is not part the 3PL's responsibility and cannot be separated from the

delivery process, this performance indicator will not be totally indicative of the 3PL's performance. Also, because the delivery process only takes a few hours, the performance will not affect the overall on time shipping and is therefore not relevant to measure.

ON TIME ORIGINAL FCR DELIVERY

Definition:

“On Time Original FCR delivery” calculates the time between the vendor's confirmation of the draft FCR and the notification of the original FCR's availability for pick up from the 3PL's facility. It also determines if it is on time and divides by the total original FCRs.

Purpose:

The vendor must confirm the draft FCR with the 3PL within 24 hours of receiving the draft; if they do not do so within this timeframe, then it is assumed that no response indicates approval. After the confirmation, or the 24-hour time window, the 3PL is required to make an original FCR available for the vendor to pick up, as well as notify the vendor that this print out is ready. The 3PL's performance in this area may affect the vendor's satisfaction with both the 3PL and the Retailer.

Removal Rationale:

Upon consideration, this performance indicator was discarded because a more important indicator of the FCR process is “On Time Draft FCR Delivery”. The Retailer's vendors rarely complain about the 3PL's performance in this area. The 3PL's performance in the draft FCR delivery has been more erratic; therefore monitoring draft FCRs is more critical to the vendor's satisfaction. Also, monitoring the beginning of the

FCR process has revealed that the original is often on time when the draft FCR is on time, according to the Retailer’s record.

5.4 KEY PERFORMANCE INDICATORS

ON TIME VENDOR REGISTRATION PERCENTAGE

KPI Description:

“On Time Vendor Registration Percentage” monitors the amount of the vendors who are registered in GT Nexus on time.

KPI Information Table:

Category	Vendor Matriculation
Metric Type	Time
Formula	On time New Vendor Registrations per year/ Total New Vendor Registrations per year
Unit	Ratio
Required Data	(1) Vendor Registration Date per Vendor (2) Estimated Vessel Departure Date for the Vendors’ First Booking in GT Nexus (LSD/ETD)
Data Source	(1) GT Nexus capture (2) Transferred to Excel document
Target	100%

KPI Significance:

Assuring that vendors have access to GT Nexus is critical to the vendor’s ability to meet the standardized performance measures, which the Retailer holds them to. The vendors with a registration record have the ability to access GT Nexus and submit shipping orders. The 3PL will search the GT Nexus database for recently registered

vendors in order to locate the new vendors in need of training. Since GT Nexus is the main tool that the 3PL, vendor and Retailer use to exchange documents, it is the Retailer's expectation that every vendor will be registered by the 3PL in GT Nexus on time and without failures. Failure to do so may result in the vendor's inability to submit a shipping order. If the 3PL does not efficiently train the new vendor, the Retailer will risk receiving the cargo late. Therefore "Vendor Registration Percentage" is one of the more significant KPIs to track and enforce from the Retailer's perspective.

KPI Methodology:

"Vendor Registration Percentage" is calculated by taking the amount of times a vendor is registered on time and dividing it by the total number of registrations. The requirement of on time registration is 21 days from the Latest Shipping Date (LSD) of the first shipping order the vendor submits. This means that the 3PL should collect and input the vendor's registration information for GT Nexus at least 21 days before latest shipping date of the first shipping order.

KPI Implementation/Issues:

All the dates, which are necessary to calculate this KPI, can be captured from the GT Nexus system. Once the registration form is filled out in GT Nexus and submitted, the database, GT Nexus, records the date that it is saved. Within the purchase order form submitted to GT Nexus is the Latest Ship Date (LSD/ETD) established by the retailer. Unfortunately GT Nexus cannot sift through the purchase orders and select the first purchase order of each new vendor. Therefore the extraction of the first purchase order LSD of the newly registered vendors will have to be performed manually. Since there are so few new vendors registered in a year this should be a manageable responsibility for the

3PL, and must only be done once a year. Due to the low number of new vendors contracting with the Retailer per year, it is unnecessary to measure this KPI monthly and would be more effective if measured yearly.

ON TIME VENDOR TRAINING PERCENTAGE

KPI Description:

“Vendor Training Percentage” monitors how many new vendors are trained 21 days prior to the vendors first Shipping Order Latest Shipping Date.

KPI Information Table:

Category	Vendor Matriculation
Metric Type	Time
Formula	Vendors Trained On time per year/ Total Vendors Trained per year
Unit	Ratio
Required Data	(1) New Vendor Training Date per Vendor (2) Estimated Vessel Departure Date of the First Booking
Data Source	(1) GT Nexus capture (2) Manual Excel spreadsheet input
Target	100%

KPI Significance:

Similar to “Vendor Registration Percentage”, “Vendor Training Percentage” relates directly to the vendors performance. The goal behind training the vendors is to clarify the expectations that the Retailer and the 3PL have for the vendor’s performance in the purchase order process. During training the vendor will learn how to access GT Nexus, create bookings, deliver the cargo and communicate with the 3PL. If this training is not accomplished before the vendors go through the purchase order process, then the vendors will perform poorly because they may not have had prior

experience with the Retailer's contracted 3PL. Therefore, in order to expect the vendor to uphold the expectations of the retailer, the vendor must be aware of the expectations as well as know how to perform the necessary tasks. This KPI monitors whether the 3PL has responsibly educated the vendor in the purchase order process before the vendor undergoes the process, to promote a smooth first purchase order for the new vendor.

KPI Methodology:

“Vendor Training Percentage” is calculated by taking the amount of times a vendor is trained on time and dividing it by the total amount of trained vendors. The requirement for on time Vendor training is defined as training (materials or seminar attendance) at least 21 days prior to the first Shipping Order Latest Shipping Date.

KPI Implementation:

The data required to measure this KPI is available but must be assembled manually. The seminar attendees and date are recorded in a log, as well as the sent date of training materials. The latter are not recorded in tandem with the Shipping Order Latest Shipping Date, but should be easy to assemble manually. As mentioned previously, the Shipping Order submission Date and Latest Shipping Date can be captured in GT Nexus. In order to acquire the first Shipping Order Submission and Latest Shipping Date, the dates will have to be manually located and keyed into an excel spreadsheet. Due to the low amount of vendors trained in a year this KPI should still be tracked and logged, even if it is only manually feasible.

ON TIME VENDOR BOOKING CONFIRMATION PERCENTAGE

KPI Description:

The “Vendor Booking Confirmation Percentage” calculates how many bookings are confirmed within 24 hours of the Booking received at the 3PL company.

KPI Information Table:

Category	Vendor Booking
Metric Type	Time
Formula	On time Booking Confirmations per month/ Total Booking Confirmations per month
Unit	Ratio
Required Data	(1) Shipping Order confirmation Date (2) Carrier Booking confirmation date (3) Vessel Departure Date
Data Source	(1) GT Nexus (2) Transferred to Excel document
Target	≥ 98%

Significance of KPI:

The booking confirmation allows the vendor to deliver the cargo to the 3PL anytime thereafter. If this is not done in a timely manner then the vendor’s cargo delivery window is foreshortened and may create issues. In the process flow shown in Figure 9 the cargo delivery window for CFS/CY is from day negative fourteen (-14) to day negative eight (-8). Assuming the vendor submits a booking on time, the confirmation is the only document that can stymie the cargo from being delivered early or on time. The vendor may not load the cargo to be transported to the 3PL until the booking is confirmed because if the booking is rejected the cargo would have to be unloaded. This is a potential waste of labor on the part of the vendor. Therefore the vendor must accomplish two tasks within CFS/CY cargo delivery window. One, the cargo must be loaded onto a vehicle for transportation and two, the cargo must be conveyed to the 3PL warehouse.

For CY/CY shipments the vendor must submit a booking 14 days in advance of the Vessel Departure Date but cannot deliver the cargo to the port until eight days before Vessel Departure. From day negative fourteen to day negative eight the 3PL must obtain Carrier booking confirmation from the Carrier for container space. If the 3PL company does not receive confirmation from the Carrier and, in turn, confirms the vendor booking then the vendor will have a reduced time window. For CY/CY shipments the vendor has even more tasks to accomplish within the CY window (six days). One, pick up the empty cargo container from the Port of Origin, two, stuff the container and three, deliver the stuffed container to the port. In order for the 3PL to best encourage on time delivery, the 3PL should provide as lengthy of a window as possible for either CFS/CY or CY/CY shipments. Therefore the 3PL's performance in this area can affect the on time shipment of the cargo and the vendor's satisfaction with the Retailer.

KPI Methodology:

“Vendor Booking Confirmation Percentage” is calculated by computing the total confirmed bookings on time and dividing it by the total confirmed bookings. The requirement for on time booking confirmation is 1 day after booking submission from the vendor in CFS/CY, or 1 day after Carrier booking confirmation in CY/CY.

KPI Implementation/Issues:

Some of the data needed to calculate this KPI is available directly from GT Nexus. The vendor submits a booking (CFS and CY) into the GT Nexus database, through the account that the 3PL has registered the vendor for. According to the 3PL, the date of submission is logged in the database. The 3PL approves CFS/CY bookings through GT Nexus, which automatically captures the date.

Though the 3PL confirms CY/CY bookings via email, which is traceable, the volume of CY/CY bookings confirmed in a month is too much to ask the 3PL to log. Therefore, the confirmation date used to track CY/CY shipments will be established from the Carrier booking confirmation date. One day from the Carrier booking confirmation will be the assumed day that the 3PL confirms the vendor booking. Although this system is not optimal, until such a time as the 3PL uses a process for confirming CY/CY bookings, which is easily traceable, this KPI will be an intermediary tactic for the Retailer’s review of the 3PL’s performance.

ON TIME DRAFT FCR DELIVERY PERCENTAGE

KPI Description:

“Draft FCR Delivery Percentage” calculates how many Draft FCRs are delivered on time to the vendor.

KPI Information Table:

Category	Final Vendor Documents
Metric Type	Time
Formula	Draft FCRs delivered on time per month/ Total Draft FCRs delivered per month
Unit	Ratio
Required Data	(1) Draft FCR Creation Date (2) Vessel Departure Date
Data Source	(1) GT Nexus (2) Transferred to Excel Document
Target	≥ 98%

KPI Significance:

The 3PL’s performance on this KPI will affect the vendor’s attitude and relative satisfaction with the 3PL. The forwarder’s cargo receipt allows the vendor to receive

payment for the cargo production, therefore making the FCR available to the vendor assures the vendor that the vendor's effort to produce and deliver the cargo has been appreciated and will be honored. If the FCR is not drafted and delivered to the vendor on time, the vendor will often log complaints with the Retailer on the 3PL's dilatoriness. This causes undue apprehension for the vendor because if the draft FCR is late, it may mean that there is an issue with the order and the Retailer may be preparing to approach the vendor to renegotiate the terms of their contract. Therefore the FCR should never be drafted late if the order is satisfactory because not only is the 3PL not following through with their responsibility but it may also alarm the vendor.

KPI Methodology:

“Draft FCR Delivery Percentage” is calculated by taking the total draft FCRs delivered on time divided by the total draft FCRs delivered. The requirement for on time draft FCR delivery is delivery 1 to 3 days after the actual vessel departure date to the vendor.

KPI Implementation/Issues:

The difficulty with measuring “Draft FCR Delivery Percentage” is that the data for when the draft is actually sent to the vendor is not tracked. Currently the draft FCR is sent via an email attachment for every purchase order. The method for tracking this KPI is indirect since the direct data, email, is too cumbersome to track. Every draft FCR is first created in the GT Nexus system and the date of creation can be captured. Since the date of creation should be the same as the date of delivery, the date of creation will be used as a traceable measure. Other than the date of draft creation, which can be easily amassed by GT Nexus, the actual vessel departure date is also necessary. GT Nexus is

also capable of capturing the actual vessel departure date and amalgamating the data in an excel spreadsheet.

ON TIME VENDOR DOCUMENT UPLOAD PERCENTAGE

KPI Description:

“Vendor Document Upload Percentage” calculates the amount of packaged vendor documents that are uploaded to GT Nexus on time.

KPI Information Table:

Category	Final Vendor Documents
Metric Type	Time
Formula	Vendor documents uploaded on time per month/ Total Vendor documents uploaded per month
Unit	Percentage
Required Data	(1) Vendor Document Upload Date (2) Vessel Departure Date
Data Source	(1) GT Nexus (2) Transferred to Excel Document
Target	≥ 98%

KPI Significance:

The 3PL must perform this action within the given time frame for the Retailer to be able to retrieve the uploaded documents. The documents contain customs information as well as inform the Retailer of the shipping order information. This is the last upload to GT Nexus about the purchase order and summarizes the entire life of the purchase order until the vessel departure.

There are multiple documents uploaded at the same time to GT Nexus; this package of documents will not be uploaded till all the documents relative to that purchase order have been received from the vendor. Any documentation that is not completed by

this deadline signifies that the purchase order process is not complete, which may lead to a problem that the Retailer needs to address. This KPI not only serves to indicate whether the 3PL has performed their duty on time, but also that there may be an underlying issue which requires the Retailers direct engagement in the purchase order documentation.

KPI Methodology:

“Vendor Document Upload Percentage” is calculated by taking the total vendor documents uploaded on time divided by the total vendor documents uploaded. Vendor documents uploaded on time is defined as 5 days after the actual vessel departure date.

KPI Implementation/Issues:

The data necessary to calculate this KPI is directly from the GT Nexus database. GT Nexus is capable of capturing the date of the purchase order document upload and the actual vessel departure date for comparison. The data can be transferred to an excel spreadsheet and the dates can be calculated and analyzed.

5.5 RECOMMENDATIONS

1. *Allow the vendors to register themselves in GT Nexus.*

Currently, the vendor registration is performed by the 3PL. As the vendors are not authorized to register directly into the system, they are required to send the 3PL relevant registration information in order for the 3PL to input registration information into GT Nexus. Instead of the 3PL collecting and inputting the registration information, it is recommended that the 3PL grants vendors permission to register themselves in GT

Nexus. This recommendation will promote on time registration. First, since the vendor will input the information directly into GT Nexus, the discrepancies, which may occur from passing information from one party to another, could be reduced. Secondly, if this responsibility is given to the vendors, the Retailer may impose financial sanctions against the vendor for late registrations, which can more effectively encourage on time registration.

2. *Set up a vendor-training log.*

The 3PL does not maintain a specific record for new vendor training, which prevents the Retailer from knowing the 3PL's previous performance in vendor training. To gather more information about the 3PL's on time performance, it is recommended that the 3PL sets up a training log of all new vendors indicating when, where and how they were trained. The training log will track the information necessary to measure "On Time Vendor Training".

3. *Create a vendor questionnaire for after vendor training.*

In order for the 3PL to improve vendor training and the method of education, it is recommended that a questionnaire is developed for the 3PL to receive directed feedback on improving the teaching techniques used. After receiving feedback through a questionnaire from the vendor, the 3PL can review the results and try different techniques for explaining the portion of the training that left the vendor confused or unclear.

Through this vehicle, the 3PL can hone the training to perfectly suit the vendor's needs. The questionnaire will simply identify which sections to retain or modify.

4. *Create a 3PL protocol manual that the vendors can access at any time.*

Another recommendation for the 3PL is to create a training protocol manual for vendors as a quick reference and guide so the vendor can have access to the correct protocol for any purchase order procedure at any time. Currently, the vendor must inquire with the 3PL to obtain training materials, which will be sent via email in the form of a PowerPoint document. The advantage of this recommendation is that it enables the 3PL to reduce redundant email communications and empowers the vendors to quickly reference any protocol with which they are unfamiliar.

5. *Avon Case Study Recommendation for CY/CY utilization*

Avon is one of the main suppliers of beauty products to women, and markets in more than 100 countries. Avon operates with a sales revenue of 10 billion per annum, employing approximately 16,000 suppliers from 50 different countries. 89% are Avon-owned, 11% are 3rd party manufacturers. Avon expects each vendor to abide by the Avon Supplier Code of Conduct, but also monitors each vendor's adherence through certain KPI's.

Vendor Management Techniques Avon Implements:

Avon contracts the Third Party Logistics Provider to monitor its' vendors regarding their compliance of the Avon code of conduct. Seminars are held with vendors to proactively address operational issues and promote clear understanding of Avon's expectations. In 2004, Avon and the 3PL collaborated to create a Vendor Management System, which addressed issues that arose when vendors were not meeting Avon requirements.

Specifically, the 3PL sets up a plan to assist vendors who were not utilizing container space efficiently in CY/CY orders. The 3PL would initially approach the vendor regarding the vendors' current container load procedure. If the vendor did not have an efficient container loading strategy, then the 3PL used a load plan software to calculate an optimal solution for the vendor. If the vendor rejected the loading plan, the 3PL would engage the vendor in a telephone conference for guidance. If the vendor needed additional support, the 3PL would visit the factory to demonstrate and/or supervise container loading. This system helped the vendor meet the requirements without necessitating Avon to continually fine the vendor for infractions or take more drastic measures such as finding another supplier.

The situation described above is elaborated upon in Figure 13.

Avon Container Utilization Flow

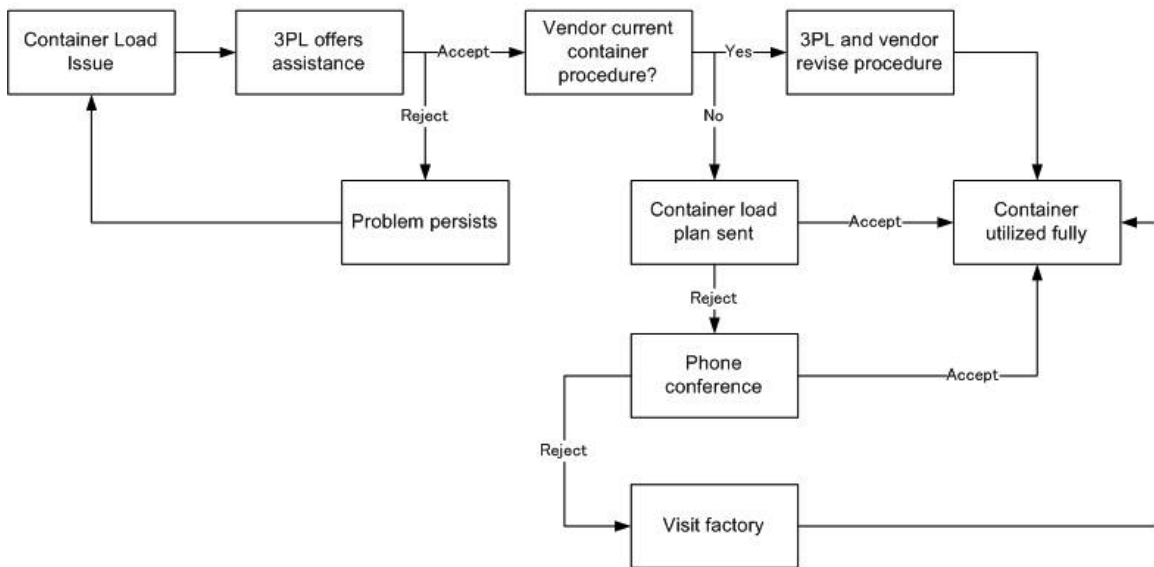


Figure 13: Avon Container Utilization Flow

This same system could be implemented with the retailer’s vendors if container utilization was an issue that the vendors were encountering often. Since Avon has already run the program with good effect, it is an optimal solution to a potential issue that the retailer may find with CY/CY orders. Also, the 3PL knows the implementation process, which would make a smoother entrance for the program with many long-term benefits for the retailer.

6. *Set up a tracking system for CY/CY purchase order bookings.*

In CY/CY orders, on time targets are hard to measure for the following reasons. First of all, vendors will participate/be involved in more processes than in CFS/CY orders

or EDC orders. As activities related to vendors happen without the 3PL's direct supervision, the lack of a tracking system for one party makes it difficult to measure the performance of either party. An example is the 3PL's booking confirmation for the vendor, which has consistently been a problematic area. In this process, after vendors submit a shipping order to GT Nexus 14 days before the estimated vessel departure date, the 3PL needs a booking confirmation from the Carrier in order to confirm the vendor's booking. Carrier's booking confirmation states there is enough space for the container on the vessel and grants permission to the shipping party to pick up an empty container. If the Carrier or the 3PL does not release the booking confirmation on time, there may not be enough time for vendors to pick up an empty container, stuff and return it to the port before the CY/CY cut-off, potentially causing the shipment to be delayed.

In order to define each party's responsibility clearly, there must be a better measurement strategy. Currently there is no data measuring the 3PL's performance for confirming the vendor booking after receiving the Carrier's booking confirmation. It is recommended that the 3PL be required to track the vendor booking confirmations sent to the vendor in CY/CY, similarly to the tracking system for CFS/CY orders. Similarly to how CFS/CY vendor booking confirmations are sent via GT Nexus, the CY/CY order process should also be transferred to GT Nexus instead of email document transactions, because of GT Nexus's document traceability.

7. *Allow vendors to upload final documents to GT Nexus instead of the 3PL.*

The final vendor documents should be uploaded to GT Nexus, by the 3PL, five days after vessel departure. This upload is a package of documents collected from the vendor documenting the entire purchase order process. Since the 3PL must sometimes wait for all the documents to be received from the vendor in order to upload them as a package it is recommended that the vendors be given the capability to upload the documents themselves. This will reduce the amount of paperwork through the 3PL's facility as well as reduce the number of input errors that may occur because of the involvement of multiple parties. The 3PL can then log onto to GT Nexus, confirm the accuracy of the documents and release them to the Retailer for further use. The new process first eliminates the vendor submitting hardcopies or emailed documents and then the 3PL removes the need for re-formatting the data for GT Nexus. It also streamlines the system and may reduce the amount of time currently necessary for the vendor document's process.

8. *Add new functions to GT Nexus, like automatic memo list which allows GTN to remind the 3PL to confirm booking on time, release draft FCR on time, and upload vendor docs on time.*

As all the key performance indicators in Vendor Management are characterized by the on time criteria, an unmanageable number of purchase orders seem to cause most of the 3PL's negative performance. It is recommended that the 3PL consider adding a new function to GT Nexus, which reminds the 3PL to act or respond on time. One recommendation is to set up an automatic memo list for each shipping order, so that GT

Nexus can remind the 3PL to register the vendor on time, confirm the vendor booking on time, release the draft FCR on time, upload the vendor documents on time, etc. If the 3PL is sent reminders, it is more likely that processes will be carried out on time and there will be less room for human error or inattention.

6.0 INVENTORY MANAGEMENT

6.1 INTRODUCTION TO INVENTORY MANAGEMENT

6.1.1 Introduction

Inventory Management is the listing of goods or materials that are available in stock for a company. It is important for a company to know the exact amount of product they hold within their inventory so they can understand how much they need to produce and order. The company that warehouses the inventory must be provided with the accurate size and placing of the product within the holding warehouse so they can easily prepare the product for shipping. Without the proper information on the products, the warehousing company will not progress. There are many places within the facility that different types of inventory management are required to ensure specific planning within the production processes.

Some major aspects encompassed in inventory management include, but are not limited to replenishment lead time, carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space, quality management, replenishment, returns and defective goods, and demand forecasting. Inventory Management delves into the overall management and tracking of the products being handled. [1]

6.1.2 Inventory Management Pertaining to The Retailer

Inventory Management is a fundamental process in the Retailer's Supply Chain. The Retailer subcontracts the 3PL to provide the basic warehousing services:

storing and managing the products coming in and out of the warehouse. Furthermore, the 3PL performs activities that enhance the flexibility and efficiency of the Retailer's Supply Chain, such as consolidation, which promotes on time shipping to the final destination. The Retailer's Inventory Management is an important set of process where the 3PL handles all of the cargo coming in and out of the warehouse. Without inventory management, it would be impossible for the Retailer to understand the amount of product they have at any given time. The main subareas of Inventory Management, under which the Key Performance Indicators will fall, are unloading, warehousing, and loading.

In the old model, namely in a supply chain without an EDC, the Retailer handled the warehousing process, for example sorting, checking, and consolidation. Inventory Management is a critical portion of the Retailer's supply chain.

To highlight the importance of inventory, it may be of use to use a metaphor. If the whole supply chain of the Retailer is a computer, the vendor is the hard disk and the origin source of all of the data. Data is just like the cargo in that the hard disk sends out the data according to the conduction of the operators. Before the data is exported to numerous operators, it must be stored temporarily in caches to compensate for the difference in speed between data transmissions and data processing. The warehouse in the retailer's supply chain plays a similar role to the caches in a computer processor. Some of the cargo cannot be sent to customers directly. It needs to be stored in the warehouse temporarily to be divided, sorted, and consolidated.

Unloading is when the cargo comes into the docking bay in containers and is taken off of the truck and put into the warehouse. It is important to check for exceptions

as the cargo is offloaded so the third party logistics company (3PL) notices that it was not their fault that the cargo has been damaged or is unsuitable. If there are any exceptions it is the logistics company responsibility to come up with timely solutions for these issues so the cargo can be unloaded as promptly as possible. These exceptions are shown in figure 14:

A: SW Mismatch

B: Origin Mismatch

C: Destination Mismatch

D: Quantity Mismatch

E: PO/Item Mismatch

F: Overweight

G: Incomplete Docs

H: Movement Type Mismatch

Figure 14: Exceptions

The 3PL has a warehouse for the Retailer and within it there are numerous amounts of products with different SKUs, SO numbers, etc. These numbers guide the employees to fill the purchase orders correctly and on time.

The 3PL has a system for distributing the cargo within the warehouse so it will not be a complicated process for the employees to find a particular product. This is important for the Retailer because it assures there is a simple process for the Retailer to retrieve their goods from international distribution centers. Without warehousing it would not be possible to identify the amount of product that is being shipped to a certain area.

The loading process is another significant activity within the warehousing procedure. The Retailer needs to make sure the logistics team utilizes FEU and TEU space to minimize the amount of containers needed for the cargo. Optimal container utilization leads to fewer containers sent and profit gains for the Retailer. Fortunately, the 3PL uses a load plan that is computer generated, which calculates the optimal cargo orientation for each FCL. Figure 15 shows an empty container that is ready to be loaded:



Figure 15: Empty Container

THE 3PL'S INVENTORY MANAGEMENT FOR THE RETAILER

Internet System Consortium (ISC) manages firms order receipts by paperwork and physical count. The 3PL uses a specific Warehouse Management System for the Retailer's products in which employees implant and control the movement of products. They do this from the time the product comes into the warehouse to the point that it leaves. The Warehouse Management System tracks shipping, receiving, product placement within the warehouse, and picking specific products from within the warehouse. This system is used to ensure the specifics of the products are properly

tracked from point A to point B. Figure 16 shows the separation of cargo into different pallets:



Figure 16: Separation of Cargo

The 3PL uses a first in first out strategy to ensure that first of a product to come into the warehouse is also the first to leave. This makes sure that a product is not sitting in the warehouse for too long depreciating in value. The 3PL uses a pallet paper to keep track of the date the cargo comes in so they can ensure the first-in first-out process is operational. By comparing the pallet paper to the date the cargo was entered into the

warehouse management system, they can judge which cargo to pull, without inspecting every pallet paper in the warehouse. This is because the earliest date will be in the WMS, which can then be compared to a single pallet paper to quickly identify the appropriate products.

There are four other major aspects that go into the 3PL's inventory management. These include physical cargo receiving, inventory processing, physical cargo loading, and physical check.

Physical cargo receiving is defined by three different subgroups. The first is the cargo counting by carton, verification of the purchase order numbers, shipping marks against approved S/O (vendor booking). The second subgroup is the scanning of the goods that will be received by the 3PL, against the electronic data interchange (EDI) order in the system (UPC, NGC bar code, and quantity verification). The third subgroup is that the 3PL pre-assigns cargo warehousing positions.

Inventory processing is also divided into three subgroups. The first of the subgroup includes UCC128 label producing, and ASN txm to end customer. They also pick and pack by working instruction or from the EDI system. Lastly, they distribute goods by comparing distribution purchase order against the initial purchase order.

Physical cargo loading can be divided into three subgroups as well. First, they load the cargo by a container-loading plan. Next, they load the cargo based on a Pick List produced from the Systems Application and Products in Data Processing. Last, they load the cargo by the product's scanned verification code.

The physical check aspect of the 3PL's inventory management can be divided into two subgroups. They can both be illustrated through weekly floor checks that the 3PL compares to both the customs records and the inventory report to ensure the numbers in the system are equivalent to the amount actually have stored in the warehouse. [2]

WAREHOUSE MANAGEMENT SYSTEM AND GT NEXUS

Although WMS and GT Nexus are two different systems, there is a distinct connection between the two. This connection only involves EDC orders.

With physical receiving, the WMS will send information of received cargo (EDC Order) by way of EDI to GT Nexus. Then, GT Nexus will compare the information sent by the WMS to the information in the GT Nexus to make sure the information in the WMS is correct. If there is no difference or the difference is tolerable, GT Nexus will send a container manifest to the Retailer. If there is something wrong with the information in the WMS, GT Nexus will also send a report to the Retailer to ask for a resolution.

Most of the work related to business information is done via GT Nexus. The information stored for every order in GT Nexus is more exhaustive than the information in the WMS.

1.) Inventory Management Information, 2003, 6/30/2010,

www.inventorymanagement.com

2.) Presentation from Henry Qu done on June 29th

6.2 PUBLISHER CASE STUDY

Introduction

The Publisher began in 1478 and was part of the technology revolution after the first printing press was invented two years prior. [1] They partnered with the 3PL in 2007 using the 3PL as a Third Party Logistics provider (the 3PL).

6.2.1 Type of System

The 3PL uses a Systems Application and Products in Data Processing (SAP) system for The Publisher. When the cargo arrives at the docking area, the 3PL inputs the cargo size into the SAP, and the system then informs the user of where warehousing space is available. Then, when the 3PL needs to offload the product, the system tells them exactly where the cargo is located in the warehouse. The system also instructs the 3PL to move products that have been in storage for a significant amount of time to the front of the warehouse so the older product can be offloaded before the new ones. By informing the warehouse employee where to store the cargo, the only type of possible mistakes are human errors.

6.2.2 Racking and Physical Layout

The Publisher's racking system is located in a Yutai warehouse. There is enough space on each rack to provide room for two full size pallets. Each bay is 2.7 meters long, 1 meter wide, and 1.5 meters high. The maximum height of the entire rack can be 5.5 meters high. The highest point, including the pallet, will be 6.5 meters high. Each rack can hold a maximum weight of 1,000 KG or 2,204.62 lbs.

The racking system the 3PL has set for the Publisher consists of four levels in each bay and seventeen full length racks. The racking system's first level is separated into three different types of pallets: F1, F2, and F3. F1 is a full size pallet in which two of them can fit into the bay. The publisher's warehouse consists of ninety six F1 bays. F2 is a 1/8 pallet that is for medium size products that the publisher produces and there are five-hundred and seventy-one in the warehouse. F3 is for the smaller products and is a 1/12 size pallet. There are one thousand, six-hundred and ninety-four of these bays. There are seventeen full size racks within the warehouse consisting of eight back to back racks and one rack by itself. Their system is set up as shown in figure 17 and Figures 18 & 19:



Figure 17: Example of Racking System



Figure 18: Example of Racking System 1



Figure 19: Example of Racking System 2

The Publisher's Warehouse has three levels for bulk pack cargo, which are on levels two through four, and they are labeled as either B1 or B2. B1 is a full pallet location and B2 is a half pallet location. B1 space per level is one hundred and nineteen pallets and the total B1 space provided is one thousand, two hundred and ninety two pallets (1292 pallets). B2 space per level is three hundred and seventy four pallets and the total B2 space provided is one thousand, five hundred and twenty four half-pallets.

The 3PL has six different storage types within the Publisher's warehouse. Type 001 is a Bulk type and its function is pallet shipment only (full pallet and half pallet). Type 003 is a Forward type and is for loose goods only (box, package, copy). Type 902 is a HR Area External Receipts type and is for receiving area (check and countdown).

Type 923 is Packaging Area and is for pick/pack area (hundreds of ISBN packed onto boxes or pallets). HLD is holding area and is for urgent bulk cargo. OVF is for Bulk overflow and is for the bulk cargo but not urgent like HLD. [2]

6.2.3 KPI Information for The Publisher

The following list of “Key Performance Indicators” (KPIs) are some of the Publisher' warehouse metrics. The values of the KPIs are divided into three sections: green, amber, and red. Green means they are performing at excellent standard, amber is an average performance level, and red means that they are performing below par.

The KPI that the Publisher has set up for the 3PL are labeled as CH3, CH4, CH4A, CH5, CH6, CH7A, CH7B, CH8, CH9, and CH10.

CH3 is Order Packing and is measured by the quality of the packing. Orders (monthly) must be packed so that they arrive at the Publisher ELT customer without any damage to the cargo done from the packing. This is measured through customer complaints and corrections processed on SAP. It would be considered in the green zone if more than 99.5% of the cargo is properly packaged. It would be considered amber if 99.5% - 98.5% is up to par for the customer. Anything under 98.5% is in the red zone and would be considered unacceptable by the customer.

CH4 is Order Dispatch and is measured by timeliness. Orders must be dispatched on the specific date given by the customer each month. Failures are reported by the 3PL and are input into the SAP. The green zone would be labeled by over 98% going smoothly. The amber zone would be between 98% - 95% success rate. Anything under 95% would be unacceptable for the order dispatch.

CH4A is Order Ready at the Warehouse and is also measured by timeliness. Orders are packed and readied on the date that is specified by the customer each month. Failures are reported by the 3PL on the shipping plan. A success rate of 98% and above is considered to be in the green zone. Between 98% and 95% would be in the amber zone, and under 95% is considered in the red zone.

CH5 is Goods Receiving and is measured by timeliness. The 3PL needs to make sure the products delivered each month are available for picking on the delivery date specified on the SAP purchase order. The methodology is elapsed time between the delivery date on the SAP purchase order and the date the product is ready for picking. Above 98% is considered to be in the green zone. The amber zone is labeled as 98% - 90%. Any less than 90% is unsuccessful and is in the red zone.

CH6 is Goods Receiving and is also measured by the timeliness of the operation. Products must be delivered each month to be available for picking within one day of the delivery date specified on the SAP purchase order. This is barring custom clearance exceptions. The methodology for measuring this KPI is looking at the elapsed time between the delivery date on the SAP purchase order and the date that the product is ready for picking. The only way this can be in the green zone is if there is a 100% success rate. Between 100% and 98% is in the amber zone, and anything under 98% is in the red zone.

CH7A is Continuous Counting and is measured by its timeliness. All bulk locations are to be counted once annually. They must count 8.33% of their annual total each month on a rolling cycle. This is measured by the number of continuous counts

completed each month by location, and a percentage of total locations. This can only be measured by a rolling target of 8.33% per month.

CH7B is another form of Continuous Counting and is also measured by timeliness. All forward locations must be counted twice annually and 8.33% of annual required counts are to be completed each month on a rolling cycle. It is measured the same way as CH7A, by the number of continuous counts completed each month by location as a percentage of total locations. It can also only be measured by a rolling target of 8.33% per month.

CH8 is Stock Accuracy and is measured by continuous counting. Locations must be counted monthly to contain the correct product and quantity. All stock discrepancies are to be investigated and resolved on the same day. This is measured by the number of corrections made as a percentage of locations counted. A measurement of 98% and above is considered in the green zone. Between 98% - 88% is considered par and is in the amber zone. Anything under 88% is in the red zone.

CH9 is another form of Stock Accuracy and is measured by the total unit accuracy by month. The methodology for measuring this is if it is measured as a gross stock adjustment on SAP as a percentage of total stock holding on SAP. This is a measurement of the total accuracy. 98% and above is above par and is in the green zone. 98%-90% would be considered in the amber zone, and anything under that would be in the red zone and unacceptable.

CH10 is the perspective of Stock Loss and is measured by tolerance. The target is the percentage of the loss of the unit. It is measured as a gross stock loss as a percentage

of total stock holding on the SAP. Under 0.25% loss is in the green zone. Between 0.25% and 1% is considered to be in the amber zone. Anything over 1% loss is in the red zone and is unacceptable.

All of these Key Performance Indicators have specific measurements and methodologies for finding out how the 3PL performs according to the Publisher' standards. [2]

1.) www.OUP.com

2.) Power-Point from Josie Meng done on June 30th 2010, pg 11.

6.3 INVENTORY KPI DEVELOPMENT

6.3.1 Inventory Process Description and Subareas

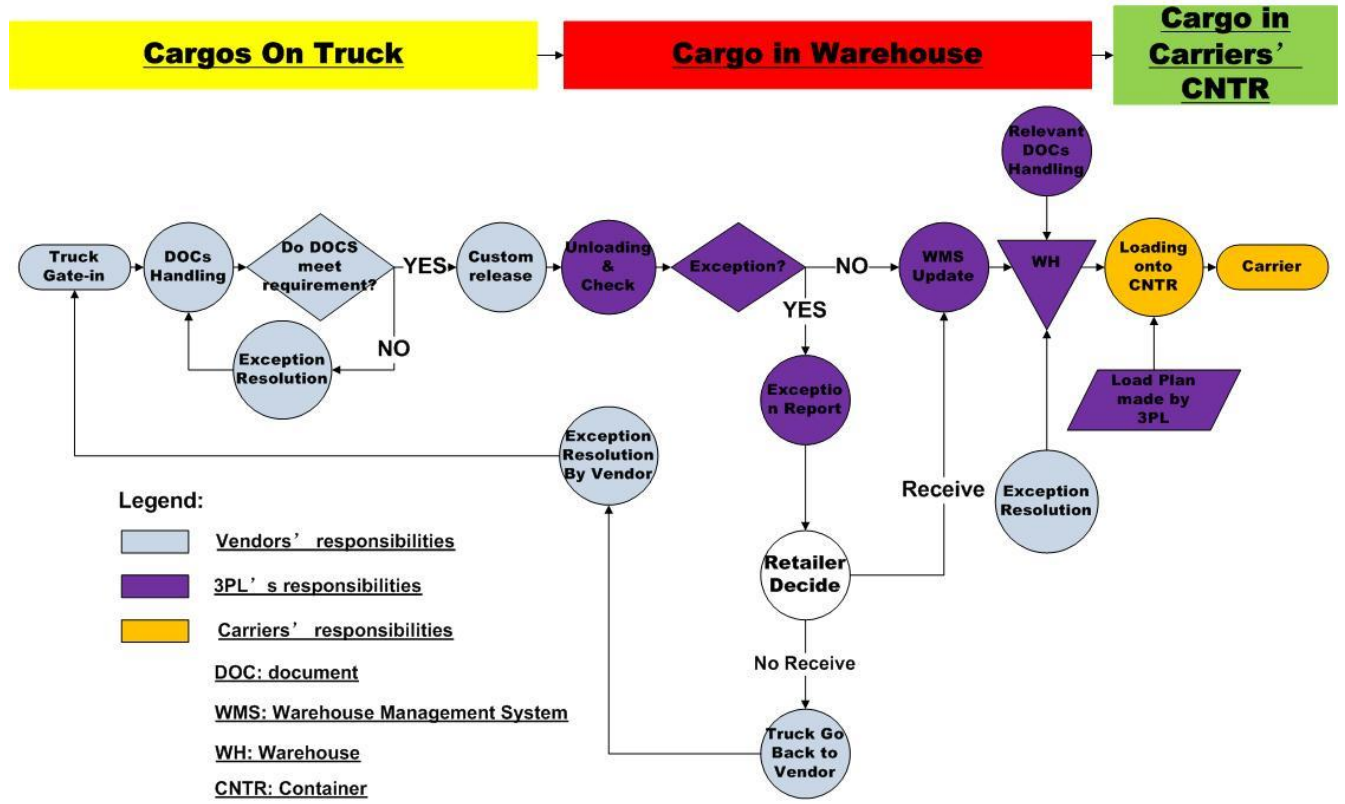


Figure 20: Inventory Process Flow

The inventory management process begins with the unloading of the cargo into the warehouse. As this occurs, the 3PL will notice any exceptions, or damages, to the cargo that can possibly cause an issue. These exceptions will be filled out in an exception report that can be sent back to the vendor.

If there is no issue, the cargo will be brought into the warehouse. Within the warehouse, the product is put into the Warehouse Management System, which will tell the employees the proper placement of the cargo. There is a password so that only authorized personnel can access the Warehouse Management System. The cargo that is

used more often will be put into an aisle or a low rack where it will be more easily accessible in the future. This can help the process of inventory management flow more smoothly. The 3PL has begun to construct a racking system for the Retailer similar to that of the Publisher. Currently, the retailer has one horizontal rack in the warehouse as shown in figure 21:



Figure 21: Beginning of Racking System

When it is time to load the product into the containers, the 3PL uses the load plan to find the optimal way to place the cargo within the containers. This plan will optimize the capacity of the forty equivalent units and the twenty equivalent units, which will inevitably save the Retailer transportation costs.

OUTLINE OF WAREHOUSE MANAGEMENT PROCESS

Within the warehouse, the inventory begins at the Truck Gate-In process. This simply means the truck enters the gate of the warehouse yard.

Then, the DOCs Handling begins, which is dealing with the documents of the cargo. The driver submits the documents to the counter for verification. If the documents are correct, they will pay the unloading fee. If the documents are imperfect, the truck may have to go back to the vendor and correct the documents, namely as part of exception resolution.

Customs Release is when the truck is sent to an assigned zone for a customs inspection and/or document verification. The following picture illustrates the China Customs Clearance:

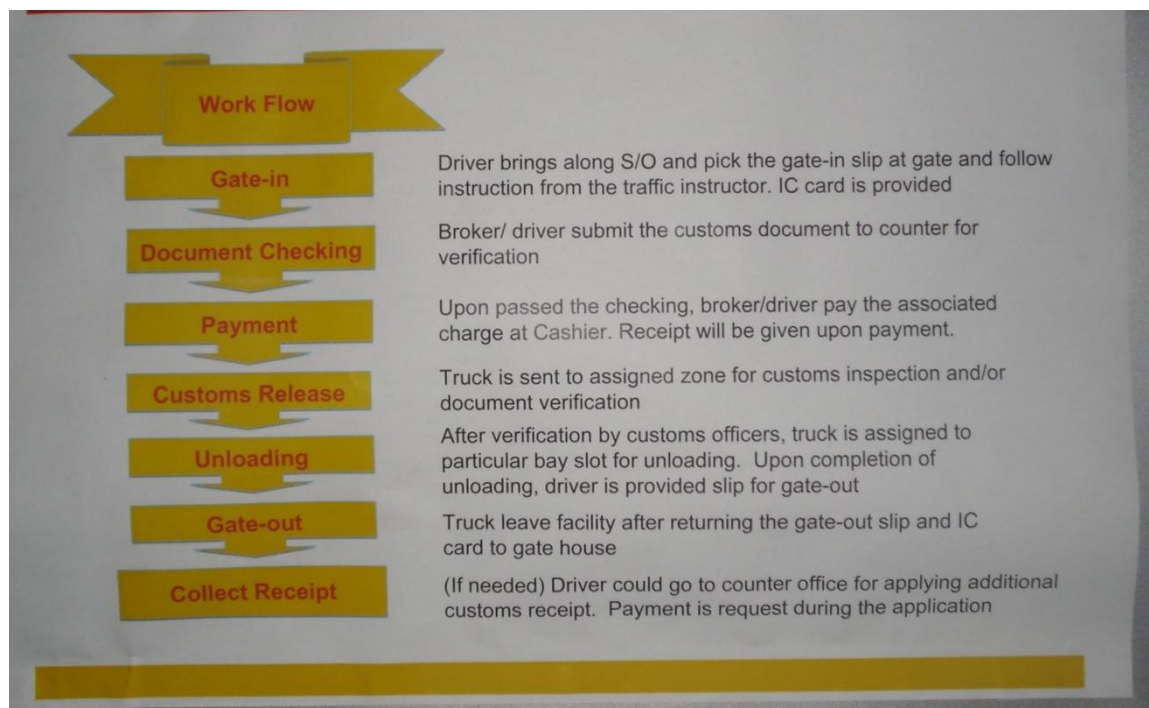


Figure 22: Customs Information

During the Unloading and Check phase, the truck unloads the cargo at a specific dock and the workers will check the numbers, situation of the cargo, etc. If an exception is found after the check the workers will send an “Exception Report” to the team involved in the vendor management. Then, the Retailer will decide whether to receive the cargo or not.

If the Retailer decides to receive the cargo, it will be temporarily stored in the warehouse. The team will communicate with the vendor and figure out an exception resolution. The exception resolution will be carried out in the warehouse by the vendor. If the Retailer decides not to receive the cargo, the truck will take the cargo back to the vendor until the vendor resolves the issue.

If there is no exception to the cargo, or it has already been reported, the cargo is put into the warehouse and the Warehouse Management System.

The Warehouse Management System Update will find an area in the warehouse to place the cargo. Employees in the warehouse will place the cargo according to this plan, and then update the information of the cargo in the Warehouse Management System. They also use a first in first out system where the first product of one type will be the first to be put into the purchase order and taken out of the warehouse. The following picture is of the computer in the warehouse that holds the Warehouse Management System:



Figure 23: Warehouse Management System

The warehouse position is merely the cargo being stored in the Warehouse.

Loading onto CNTR is when the 3PL consolidates the cargo from separate vendors and load the cargo onto the containers according to the Load Plan that is made by the 3PL.

Lastly, the Carrier aspect is when the containers are received by the carrier and then shipped to the destination.

TRUCK OFFLOADING AND CHECKING CARGO

When the truck arrives at the offloading bay, there are numerous KPIs that can be measured to detect the 3PL's performance.

First, we must understand whether the shipment arrived intact, that way we can understand whether the damage (if any) was sustained before the cargo gets into the 3PL's hands, or if the 3PL has been the cause of the impairment. The 3PL has to be able to notice cargo that has been damaged before it makes its way into the warehouse. It is important for the 3PL to do so because otherwise it will be very difficult for them to differentiate the origin of the damage in the future.

If there is any exception to the cargo, the 3PL must notify and report it as soon as possible for the exception to be fixed on time and properly. Otherwise the Retailer will receive the products late and the customers will not be satisfied.

WAREHOUSE

As the cargo is put into the warehouse there are other KPIs to measure the 3PL's performance.

First, when the cargo is entering the warehouse, the 3PL must enter the product information in the Warehouse Management System. This system tracks the product from the time it is offloaded to the time it is loaded into the containers. The information that is input into the WMS must be equivalent to the product information. We can measure that by comparing the correct product information while loading to the information that is in the system (1). Separate ratios can determine KPIs within the warehouse as well. Some of these ratios include: product order mismatches, item number mismatches, and misplacement within the warehouse.

TRUCK LOADING

While loading the cargo into the container, the 3PL has to make a load plan to optimize the Cubic Meter Ratio (1). This is the total CBMs in the container divided by the amount of CBMs the cargo fills. This is for both the Forty Equivalent Units and the Twenty Equivalent Units. The 3PL must to fill these containers to ensure that the Retailer is getting the maximum amount of space used. The loading process is shown in figure 24:



Figure 24: Docking Bay

Looking at the load plan, it is possible to measure the capacity being used by the 3PL while loading the product onto the FEUs and TEUs. The cost of the FEUs and the TEUs are different, so it is important to differentiate the two.

DOCUMENT HANDLING

One of the 3PL's duties for the Retailer is to handle documents. They need to deal with the documents correctly and on time. In the process of inventory management, employees in the warehouse will be involved in handling relevant documents.

When considering set KPIs to measure how good this responsibility is done, two kinds of KPIs for this duty.

One is used to define whether they handle the documents correctly. Defining what is “correctly” is of great importance. This part may need to be broken down into several KPIs.

The other is used to define whether they handle the documents in a timely manner, how much delay the process of handling documents produces in the overall process of the 3PL. This delay should be measured periodically. It is necessary to find out how often it is needed to measure it: daily or weekly.

6.3.2 Preliminary Performance Indicators

Having sets of information for each of the seven KPIs under the inventory category is ideal. This information outlines the perspective, measurement, target, methodology, tracking time period, source, and required data. The KPI are exception report time, information mismatch ratio, misplacement ratio, CBM used ratio for FEU,

CBM used ratio for TEU, service failure ratio, and delay caused by the 3PL's exception resolution.

CHECK ERROR RATIO

Definition:

“Check Error Ratio” is set to evaluate the process of checking. The goal of check is to find out the ratio of cargo that does not satisfy the requirement of retailer.

Removal Rationale:

There are two workers that supervise the checking process. Thus, check error rarely happens. It was removed because it also because the concept of check error is very hard to understand.

EXCEPTION REPORT TIME

Definition:

Exceptions need to be reported within one day of being detected to minimize the time of the exception resolution. Thus, the “Exception Report Time” KPI has been developed to measure the timeliness of completion.

The methodology computes the elapsed time between the time that the cargo begins unloading and the time that the Retailer receives the exception report, which will be tracked weekly. The source of the data is the warehouse's report and the 3PL's

document team's report. Required data are the report time and the time that the cargo arrives.

The formula is the report time minus the time that the cargo arrives, minus one, then all multiplied by the sum. The key areas for this KPI are unloading and checking. The reason for this KPI is to make sure that exceptions are resolved on time because it is very important to find out whether there are exceptions and resolve them as soon as possible.

Removal Rationale:

This KPI was removed because of the difficulty to keep track of the data. In addition, the KPI does not add significant informational value since a delay in the exception report rarely happens.

INFORMATION MISMATCH RATIO

Definition:

“Information Mismatch Ratio” means that the information in the warehouse management system has to be matched to the original data on the shipping order. For information mismatch ratio, the measurement is in the percentage of mismatches. The methodology is the number of mismatches between the original shipping order and the data in the warehouse management system, being measured weekly.

The source of the data will be in the original shipping order and the warehouse management system. The required data is the number of mismatched cargo and the total

number of cargo. The formula for finding out the KPI is the number of mismatched cargo divided by the total amount of cargo. The key area is the warehouse for this performance indicator. It is important because the employees in the warehouse may miscopy the information into the warehouse management system or onto the pallet paper. That wrong information may cause issues in the warehouse and more customer complaints.

Removal Rationale:

This KPI was removed because it is too specific, and can be combined with other KPI. Specifically, “Information Mismatch Ratio” and “Misplacement Ratio” are amalgamated to create Inventory Accuracy, one of the final KPIs.

MISPLACEMENT RATIO

Definition:

Misplacement ratio will measure the percentage of cargo misplaced in the warehouse. The cargo is located in the area that the employees assign when they record it in the warehouse management system (WMS). On a monthly basis, the KPI will be calculated by the finding the percentage of times the employees cannot find cargo in the warehouse. The source of the data will be the Warehouse’s report. Required data are the number of misplaced cargo and the total number of cargo in the warehouse. The formula is the number of misplaced cargo divided by the total number of cargo in the warehouse. The key area supply chain that this KPI measures is warehousing. This is important because the employees in the warehouse may misunderstand the instructions on the WMS

and therefore misplace cargo. If workers do not find the misplaced cargo, the 3PL's reliability may be undermined and on time shipping of certain cargo may be jeopardized.

Removal Rationale:

This KPI was removed because it is too specific, and can be combined with other KPIs such as "Information Mismatch Ratio" to create "Inventory Accuracy", one of the team's final KPIs.

DELAY CAUSED BY EXCEPTION RESOLUTION

Definition:

The task that "Delay Caused by Exception Resolution" captures is the 3PL's resolution of some of the exceptions in the warehouse to ensure that the cargo can be dispatched on time. For the delay caused by the 3PL's exception resolution, this will be measured by timeliness. The methodology of this KPI is the ratio of times that the cargo cannot be dispatched on time because of the 3PL's exception resolution. The source of the data is the warehouse's report. Required data are the number of delays caused by exception resolution and the total number of cargo. The formula is the number of delays caused by the exception resolution divided by the total amount of cargo. This KPI captures the 3PL's performance during warehousing.

Removal Rationale:

This KPI was removed because there are too many vendors and the 3PL can send the cargo without exceptions from other vendors first.

CBM USED RATIO

Definition:

In order to reduce cost, it is necessary to optimize the used capacity for the container. The “CBM Used Ratio” KPI measures how efficiently the 3PL fills and optimizes the container capacity.

The methodology is how much container space is used according to the load plan in comparison to the maximum capacity of the container. It will be measured weekly. The necessary source of the data for this KPI is the load plan. Required data is the total used volume in the container, maximum capacity of the TEU, and the number of container. The formula is the total used volume in the container, divided by maximum capacity of the container multiplied by the number of container. The key area for this KPI is the Loading Period. A good performance for this KPI can reduce the cost of deliveries by maximizing the used capacity of the containers.

Removal Rationale:

The 3PL uses a load plan to ensure that the maximum amount of CBMs is used. Also, if there is an overweight issue, the 3PL cannot put more cargo onto the container. Finally, the retailer already has ways of measuring this KPI. That said, the 3PL only needs to follow the guideline from the Retailer and does not need to consider the CBM used Ratio.

SERVICE FAILURE RATIO

Definition:

The purpose of “Service Failure Ratio” is to capture the loading performance of the 3PL. Specifically, it must load the correct dimensions of the cargo, such as quantity, to customers. For the service failure ratio, the measurement will be both quantity and quality. The methodology for this KPI is to compare the cargo in the container to the shipping instructions list in the load plan and find a mismatch. The KPI will be tracked weekly. The source of this KPI will be the load plan and the report of DC in destination. Required data are the number of faulty loads and the total loads. The formula is the number of faulty loads divided by the total loads. This KPI will capture the 3PL’s performance during the loading period. This is important because if there are errors in the process of loading, they may cause serious complaints from the carriers due to shipping delays.

Removal Rationale:

This KPI was removed because it is unpractical to quantify.

6.4 KEY PERFORMANCE INDICATORS

The most important factor, when narrowing down the KPIs, is to focus on the Retailer's overarching goal of shipping on time. With this perspective in mind, the team decided which of the previously introduced "key performance indicators" are actually critical to on time shipment and not simply irrelevant metrics. The team's KPI system must be as simple as possible for the Retailer to utilize, while still capturing all of the 3PL's key responsibilities that affect on time shipment of the cargo.

Also, some of the previously discussed KPI have a prior policy that the Retailer has already set to ensure that there is no delay caused. For example, the load plan is already set up for every shipment and sent to the Retailer, so it can measure the CBM ratio of the containers. Therefore, it is unnecessary to measure such a KPI. This helps narrowing down the KPIs to ultimately develop the fewest number of KPI that capture the entirety of the 3PL's performance that affects the cargo's on time shipping.

Given the operations that occur inside the EDC, it is possible to develop key performance areas (KPA) in IM under which the KPI fall. The KPA for IM are "Unloading", "Warehousing", and "Loading". Exception report time is mainly during the unloading process, inventory accuracy is most commonly exemplified during the warehousing, and service failure is usually illustrated in the warehousing and loading procedures.

Exception report time is an interesting KPI because while it captures a key 3PL responsibility, it can be difficult to measure. This is due to several factors that go into the exception report process.

The main problem the Retailer has for measuring exception report time is that the 3PL would have to check the exception report e-mails per purchase order one by one. Considering there are approximately three to four thousand purchase orders per month, depending on the season, it would be highly demanding to keep track of this information, especially since it requires significant manual labor.

It may be easier to measure this KPI if the Retailer did not consider how long the exception report time took, but simply if it took too long. If it caused a delay than that is an issue worth noting. If the exception is fixed on time, then the 3PL accomplished its responsibility according the Retailer' standard. That said it would unnecessary to measure how long each exception took to resolve, and would take a great amount of time and energy.

Another idea for measuring this KPI would be to estimate how long each KPI takes which could bring the Retailer to one of two directions. The Retailer could split the KPIs into an approximation of resolution time; for example, if exceptions A and F each took one day, they would be in the same subgroups. This would make it easier for the Retailer to measure whether the 3PL has fixed the exception during this allotted period. Otherwise, the Retailer could take an average of all of the exception resolution times for exceptions A through H, and calculate the average amount of times each exception happens over some time period.

The next KPI is during warehousing and is named inventory accuracy. This KPI involves both the information mismatch ratio and misplacement ratio. These KPIs are subgroups of inventory accuracy and will inform the Retailer how the 3PL has performed

in delivering the cargo from point A to point Z. Figure 25 is of the shipping order and holds all the information the 3PL needs to track the cargo including shipping order number, marks and numbers, packages, a description of packages and goods furnished by shippers, gross weight, measurement, warehouse address, etc:

DHL ISC (HONG KONG) LIMITED
TEL: (+852) 2218 6888

DHL

ATTN: _____

Account Code: Staples, The Office Superstore, LLC
 Shipper (Name and Address): DRAGON STAR CD CASE MFG LTD
 ROOM 406 CHEUNG TAT CENTRE 18 CHEUNG LEE STREET CHAI WAN
 Hong Kong
 Hong Kong

Shipping Order Number: 2010433109
 Manufacturer (Name and Address): DRAGON STAR MAGNETICS INDUSTRIAL
 HUI ZHOU LTD
 DISTRICT 75 ZHONG KAI HI-TECH INDUSTRIAL DEVELOPMENT ZONE
 Guangsheng 516006
 China

Consignee (Name and Address): Staples, The Office Superstore, LLC
 500 Staples Drive
 Framingham, MA 01702
 US

Country of Origin: China
 P.O.No.: 5001203

Vessel/Voyage: _____
 Port of Loading: Yantian
 Port of Discharge: _____
 Place of Delivery: SHENZHEN YUTAI EXPORT SUPERVISOR WH

Shipping Term: FCA
 Service Type: CFS

Marks & Numbers	Packages	Description of Pkg. & Goods particulars Furnished by Shipper	Gross Wt. (KGS)	Measurement (CBMS)
STAPLES SBO PO NO. AFFILIATE PO NO. SBO ITEM NO. AFFILIATE SKU NO. DESCRIPTION: UNITS BOX 1 - OF MADE IN CHINA	400 EA	STAPLES SBO PO NO. AFFILIATE PO NO. SBO ITEM NO. AFFILIATE SKU NO. DESCRIPTION: UNITS BOX 1 - OF MADE IN CHINA Description in Chinese: PAPEROLFS VINYL NO. 1 WOOD (包封纸)	270	0.900
PO Number: 5001203 Product Code: 32010-NAUS	25 CTNS	PO Number: 5001203 Product Code: 32010-NAUS		
	Sub total: 400 EA 25 CTNS		Sub total: 270	Sub total: 0.900

Warehouse Address: _____
 DHL: _____
 香港国际机场空运货物出口货物处理中心
 东海道22号运通集团香港物流中心
 香港 (TEL: (86-755) 2217 6088
 传真 (FAX): (86-755) 2217 6088

Est. Cargo Ready date: 02 July, 2010

Shipper Declaration:
 1. We hereby expressly declare that the above particulars furnished by us are correct and complete and that we will be fully responsible for the contents of such a declaration
 2. We further agree to settle all prepaid charges in accordance with the above mentioned shipping terms.
 3. We further agree ISC to issue an original cargo receipt for the above shipment unless a special instruction are given.
 4. The shipping order is governed by the terms and conditions set out on the ISC cargo receipt.

Shipper's Chop and Signature: _____ Date: _____

Closing date/Time: 3-July 15:00
 Total # of packages received (IN WORDS): 贰拾玖个
 Remarks: 1) Payment in USD 2) FOB Pick up by buyer 3) Qty: Pcs

Shipped by: _____ Date: _____
 Booking approved by: _____ Date: 24 June, 2010
 Cargo at warehouse: _____
 Received by: _____ Date: _____

NO: _____
 1. DHL/ISC shall not be responsible for shut-out shipments after official CFS closing and unloading of goods at DHL/ISC's warehouse
 2. DHL/ISC shall charge the shipper for storage cost if goods are delivered before the approved ship date or prior to ship window.

03 JUL 2010
RECEIVED

Figure 25: Shipping Order

To calculate the information mismatch ratio, it is necessary to find out what goes into the warehouse management system and compare it to the original shipping orders.

This will illustrate whether the data the 3PL is given is equal to the information it input into the WMS system. A poor performance in this area can cause warehouse mismanagement, and consequently potential delays, hence also jeopardizing the 3PL's performance in other areas.

The misplacement ratio is another subarea of inventory accuracy. This KPI is for checking whether the prearranged space in the warehouse, according to the warehouse management system, is actually where the employees put the cargo. Otherwise it will be difficult to find the product, potentially causing issues with the loading process.

The purpose of Service Failure is to ensure that the 3PL is satisfying the Retailer's requirements. The KPI measures the delay caused by the 3PL's exception resolution and appropriate loading features. Resolving the exceptions on time can prevent issues with delay and also any problems they may have occurred when the goods reached the distribution centers. If the appropriate cargo is not readily prepared, the 3PL will send another cargo in its place that is going to a distribution center in the area. When referring to loading, the team examined certain aspects of the operation such as load time, weight of containers, correct quantity of products, and correct cargo. This is important because the Retailer needs to guarantee that the 3PL is getting the accurate cargo at destination.

These KPIs were further refined into our final KPIs , which are presented in the next section.

6.4.1 Final KPIs

INVENTORY ACCURACY

KPI Description:

“Inventory Accuracy” is created for warehousing to evaluate the accuracy of information in the warehouse management system (WMS) and find whether it matches the location of the actual inventory. It is also used to tell whether the cargo is loaded correctly according to first-in first-out strategy. There are three sub KPIs under Inventory Accuracy, namely information mismatch ratio, misplacement ratio and first-in first-out.

Category	Warehousing
Metric Type	Quantity
Formula	$\frac{\text{Number of Failures}}{\text{Total Number of Samples}}$
Unit	Ratio
Required Data	1) Total Number of Samples 2) Number of Failures
Data Source	1) Random Sampling Trial
Target	100%

KPI Significance:

“Inventory Accuracy” is set to measure the accuracy of information, location and the implementation of the first-in first-out strategy

Inventory Accuracy is one of the basic functions of EDC warehouse management. Good results in every one of the sub KPIs are essential for successful inventory management. First, if the information of cargo in the WMS is wrong, the cargo may be loaded incorrectly and employees may have difficulties managing the warehouse. Second, if the location of cargo in the WMS is wrong, employees in the warehouse may

take a longer time to find the cargo than is necessary. This may cause serious delay.

Finally, the first-in first-out strategy can help the Retailer prepare a better cost forecast.

KPI Methodology:

In order to measure the accuracy of information, location, and the implementation of strategy of cargo in the WMS, workers in the warehouse should compare the information in the WMS to the information on the original SO and then compare the information in the WMS to the information on the carton.

But it can be overwhelming to perform the comparison for all POs since there are approximately three to four thousand POs in the warehouse and the WMS cannot do the comparison automatically. Thus, workers should use random sampling trials. For example, one approach is to randomly pick 100 POs in the WMS and check if the information matches. If the information, location or implementation of strategy is wrong, the trial is a failure. For each sub KPI, the workers should count the total number of failures and the total number of samples. Then, the KPI is calculated by applying the formula.

KPI Implementation:

The 3PL performs weekly physical inventory check for all the shipment quantity and outer carton condition. 3PL can do the random sampling trial at the same time and get data more conveniently than just do the trial individually.

Since inventory accuracy is one of the fundamental functions of EDC inventory management, the target is 100% for the 3PL.

CARTON DAMAGE RATIO

KPI Description:

“Carton Damage Ratio” is set to measure how well the cargo is stored in the warehouse.

Category	Warehousing
Metric Type	Quantity
Formula	$\frac{\text{Number of New Cartons}}{\text{Toatl Number of Cartons}}$
Unit	Ratio
Required Data	1) Total Number of New Cartons 2) Total Number of Cartons
Data Source	Weekly physical inventory check Special Operation List
Target	0.1%

KPI Significance:

“Carton Damage Ratio” is used to measure how many cartons in the warehouse have been seriously damaged. The carton may be damaged in the warehouse. Serious damage not only damages the carton, but also damages the cargo inside. It is the 3PL’s responsibility to guarantee the safety of cargo.

KPI Methodology:

The 3PL performs weekly physical inventory checks for all the shipment quantity and its outer carton condition. It is possible to find out the number of damaged cartons

from the weekly check. And if there is serious carton damage, the 3PL will report the exception to the Retailer and to the vendor to ask for new cartons. The operation of carton change is called special operation. After the seriously damaged carton is changed, employees in the warehouse will create a special operations list to ask for a fee to implement the special operation. Data about how many cartons are changed can be found in the special operations list.

KPI Implementation:

The Retailer does not allow cargo damage in the warehouse. But some of the damage is inevitable. Thus, the KPI’s target is set at 0.1% for the 3PL.

STOCK LOSS

KPI Description:

“Stock Loss” evaluates whether the cargo is theft-proof and loaded correctly.

Category	Warehousing
Metric Type	Quantity
Formula	$\frac{\text{Number of POs with Stock Loss}}{\text{Total Number of POs in the warehouse}}$
Unit	Ratio
Required Data	1) Total Number of POs with Stock Loss 2) Total Number of POs in the warehouse
Data Source	1) Weekly physical inventory check
Target	0%

KPI Significance:

The cargo in the warehouse may get lost mainly due to theft or load error. If the cargo is lost in the warehouse, the Retailer loses property and it will take time and money to compensate for the problem. Theft-proofing and correctly loading are other basic functions of the EDC's inventory management.

KPI Methodology:

There is a weekly physical inventory check for all shipment to verify the correct quantity. It is easy to get data for this KPI from the regular check. After stock loss is found, the 3PL will communicate with employees in the warehouse and review the loading record to find out the cause of the stock loss. Then, the 3PL will report the cause of the stock loss. There are 24-hour security guards and it is hard to steal when the warehouse is under the supervision of China Customs. There has been no theft in the last two years.

KPI Implementation:

For the Retailer, stock loss is not allowed. The 3PL performs weekly physical inventory checks for all the shipment quantity. It is easy to get data from the results of this regular check. Thus, it is required for the 3PL to achieve 0% stock loss.

6.4.2 Final KPI Tests

On August 3rd, 2010 the team asked a warehouse supervisor about warehouse management system process. This illustrated the system and enabled the team to understand the inventory database system.

Figure 26 illustrates the organization of the program's user-interface:

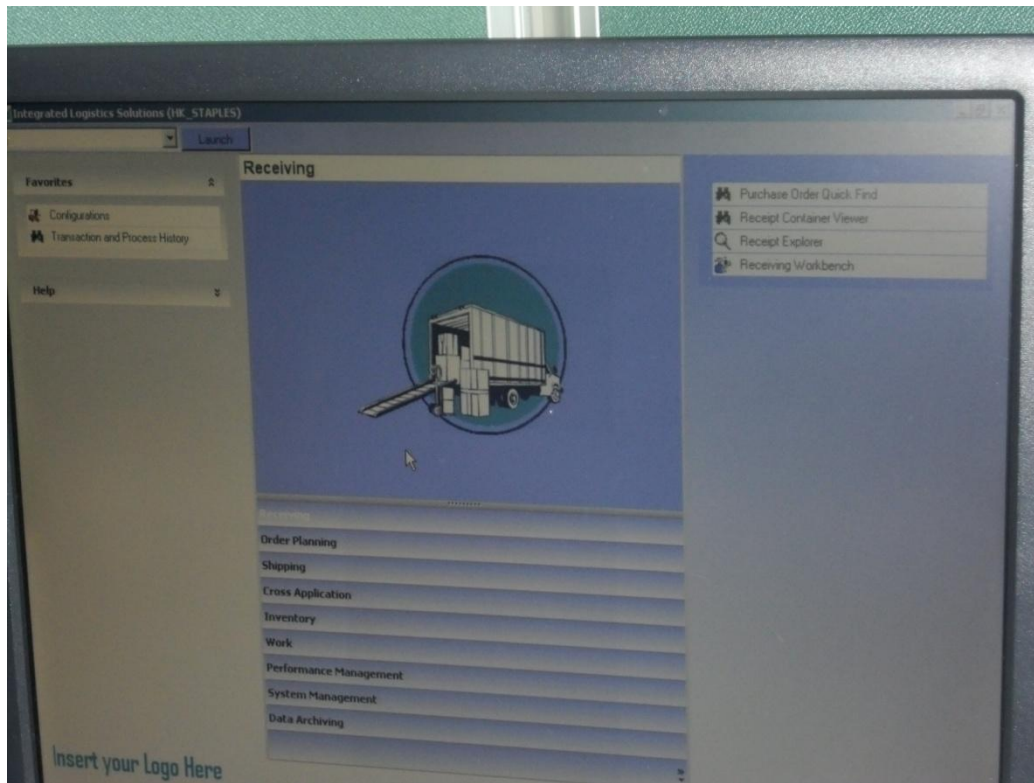


Figure 26: WMS Information

This window includes functions such as receiving, order planning, shipping, cross applications, inventory, work, performance management, system management, and data archiving. The 3PL does not manage future cargo coming in, just the cargo already in the warehouse. If there is an over-order, the 3PL explains the Retailer/Suppliers that they cannot receive the product at this time.

Figures 27 & 28 show one of the functions of the WMS, specifically the container receipts:

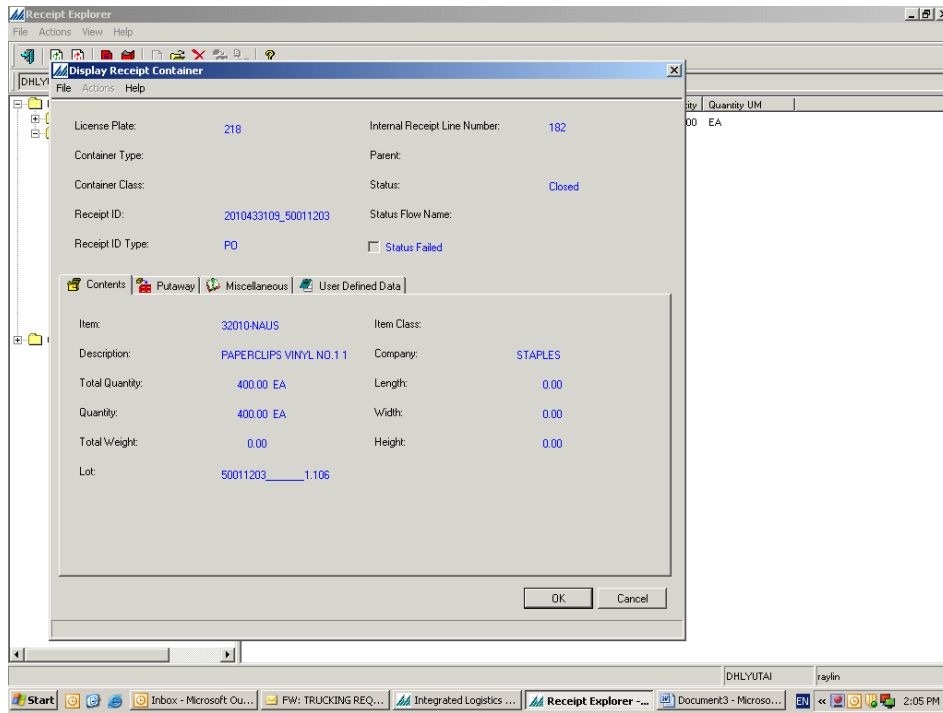


Figure 27: Container Receipt 1

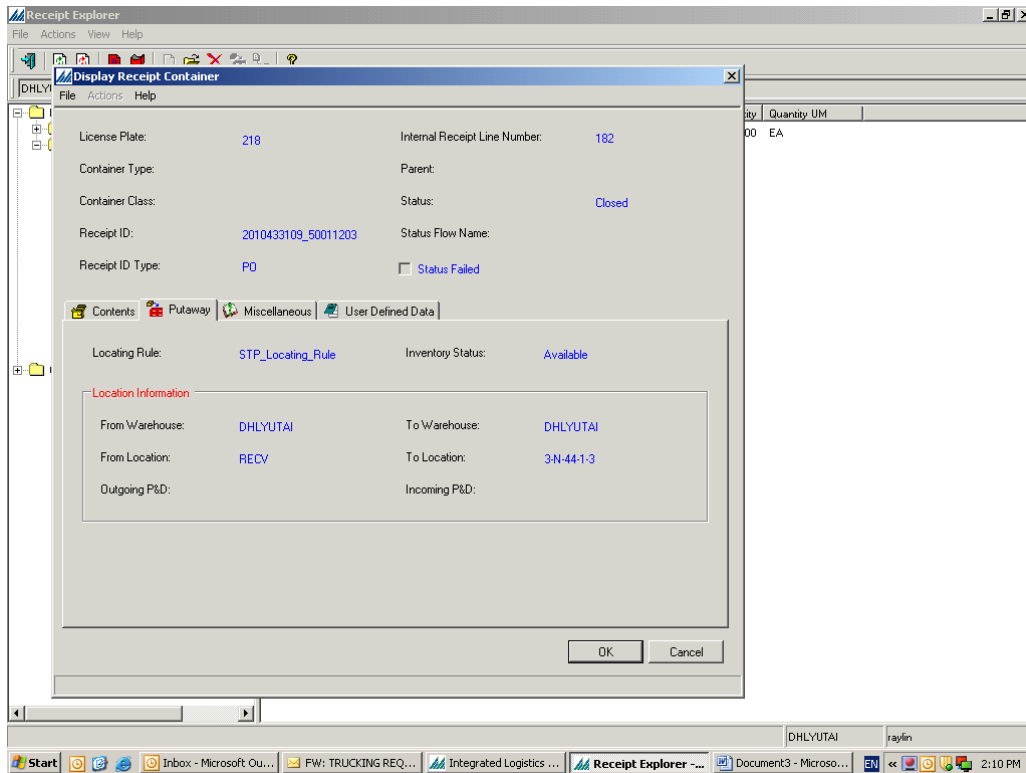


Figure 28: Container Receipt 2

These container receipts outline the information about the containers including their license plate, receipt ID, receipt ID type, internal receipt line number, status, location information, etc. The first container receipt shows specific information about the product in the containers, and the second shows specific information on the path of the container holding the product itself. This aids the process flow because the 3PL can easily look at these receipts and understand all of the information on a single container.

Further, the program contains an On-Hand Inventory Report located in the management reporting section of the Warehouse Management System as shown in figure 29 & 30 (please note this is one on hand inventory report that did not fit on one print screen):

Report: On-Hand Inventory Report
Print Date: 8/3/2010 2:25:58PM

Seq. No.	LOCATION	ITEM	ON HAND QTY	GROSS WEIGHT/ITEM(KGS)	TOTAL GROSS WEIGHT (KGS)	GROSS VOLUME/ITEM(CBM)	TOTAL GROSS VOLUME (CBM)	#OF CARTON	SO#	EDC ORDER NO.	Item Description
1	3-M-20-1-1	13400-NAUS	40	0.59	23.44	0.00000	0.15000	0.89	CAF	50011062	1.5 IN BLUE BETTER BINDER W VIEW WINDOW
2	3-M-20-1-1	13400-NAUS	40	0.59	23.44	0.00000	0.15000	0.89	CAF	50011062	1.5 IN BLUE BETTER BINDER W VIEW WINDOW
3	3-M-20-1-2	13395-NAUS	12	0.52	6.18	0.00000	0.03000	0.71	CAF	50011062	1 IN BLACK BETTER BINDER W VIEW WINDOW
4	3-M-20-1-2	13395-NAUS	12	0.52	6.18	0.00000	0.03000	0.71	CAF	50011062	1 IN BLACK BETTER BINDER W VIEW WINDOW
5	3-N-44-1-2	10445-NAUS	264	0.11	28.60	0.00000	0.15000	17.60	CAF	50011202	4 PACK GLUE STICK CLEAR

Current Page No.: 1 | Total Page No.: 1 | Zoom Factor: 100%

Figure 29: Inventory Report 1

ITEM	ON HAND QTY	GROSS WEIGHT/ITEM(KGS)	TOTAL GROSS WEIGHT (KGS)	GROSS VOLUME/ITEM(CBM)	TOTAL GROSS VOLUME (CBM)	#OF CARTON	SO#	EDC ORDER NO.	Item Description	arrived_date,time
3400-NAUS	40	0.59	23.44	0.00000	0.15000	0.89	CAF	50011062	1.5 IN BLUE BETTER BINDER W VIEW WINDOW	5/18/2010 2:00
3400-NAUS	40	0.59	23.44	0.00000	0.15000	0.89	CAF	50011062	1.5 IN BLUE BETTER BINDER W VIEW WINDOW	5/18/2010 2:00
3395-NAUS	12	0.52	6.18	0.00000	0.03000	0.71	CAF	50011062	1 IN BLACK BETTER BINDER W VIEW WINDOW	5/18/2010 2:00
3395-NAUS	12	0.52	6.18	0.00000	0.03000	0.71	CAF	50011062	1 IN BLACK BETTER BINDER W VIEW WINDOW	5/18/2010 2:00
0445-NAUS	264	0.11	28.60	0.00000	0.15000	17.60	CAF	50011202	4 PACK GLUE STICK CLEAR	7/2/2010 1:00

Figure 30: Inventory Report 2

This report shows all of the necessary information about a single product that is contained within the warehouse. It contains the sequence number, location number, item information, gross weight, total gross weight, gross volume, etc. each of which is distinct to each product. The most important piece of information about the product, when it comes to finding it in the warehouse, is the location number. This location number will guide the 3PL in finding the product when it needs to be shipped or moved. At the end of the report there is an item description that allows the 3PL to make sure that it is moving the appropriate product.

This report seems to be very detailed and very well organized causing little room for human errors.

The employee can locate the cargo in the warehouse by using the location number found in the purchase order. The location number is comprised of certain identities that each piece of cargo has within the warehouse. For example, each rack has their own set of digits as shown in figure 31:



Figure 31: Location Number

For example, the number of the cargo in the picture indicates that the product is in the first row of the 44th set of racks.

Also, they look at what number garage column it is in the warehouse. For example, the following picture shows the letter M, which is in the location number signifying that the cargo would be in the “M” bay in the warehouse:



Figure 32: Bay Letter

Every digit in the location number helps the 3PL speed the process of finding the cargo they are looking for within the warehouse. This inevitably saves time and money for the Retailer.

Finally, the appropriate cargo was found following the easy procedure due to the straightforward directions following the WMS as shown in figure 33:



Figure 33: Cargo on Rack

Finally, the cargo can be easily found by the employees without unnecessary additional efforts. The Warehouse Management System efficiently guides the employees and, as mentioned earlier, there is little room for human error. Thus, the 3PL is performing well in the area that the inventory accuracy KPI captures. As it is difficult to measure set KPIs without the warehouse completely set up, it is recommended to further monitor this area, especially as the warehouse facility that the 3PL offers to the Retailer expands.

How to Measure Inventory Accuracy in the Future

Clearly, in the future it will become more difficult to measure inventory accuracy because there will be far more inventory stored in the warehouse. Therefore, the team

proposes the following recommendations to prepare for the increase in inventory handling.

It is useful to measure inventory accuracy bi-weekly. To do so, the Retailer should randomly pick several location numbers of cargo and measure how efficiently the 3PL finds the chosen cargo. Also, it is important for the 3PL to compare the purchase orders to the information in the WMS. This should be done monthly or bi-monthly depending on the frequency that the Retailer needs. This will prevent the products within the warehouse from getting lost or misplaced.

6.5 RECOMMENDATIONS

Recommendations are as follows:

1. Add a random sampling for inventory accuracy in a weekly check. There is already a check on quantity and damage, so it is recommended that the 3PL checks carton damage and stock loss. There are a great amount of purchase orders to check, so the Retailer could find it beneficial to come to the warehouse and select a set amount of purchase orders, (e.g. one hundred), and ask the 3PL to search for it and ensure it is in proper condition. This could help the 3PL from find the reasons for carton damage and stock loss.
2. It is recommended that the Retailer records the service failure and exception reports immediately after the e-mail is received. That way, they can keep a full database of all of the exceptions and issues revolving around service failure, which will not be lost. Thus, the retailer will gain an understanding of how the 3PL is performing when it comes to report time, and help the 3PL manage the

increasing amounts of PO.

3. Identify the type of service failure; doing so will help the retailer identify the problem areas. Once the problem areas are identified, it will be easy to understand which areas need to be ameliorated within the inventory process. Service failure is too broad and must be narrowed down to be fixed.
4. Set a standard level for service failure magnitude that is universally understood by all the involved parties. This way people that work on different processes will understand the expectations and standard levels, which will promote efficient communication and goal setting (and achievement) strategies.

7.0 CARRIER AND ON TIME SHIPPING MANAGEMENT

7.1 INTRODUCTION TO CARRIER AND ON TIME SHIPPING MANAGEMENT

7.1.1 Definition

Carrier management refers to the interactions that the 3PL has with the various carriers to fulfill the demands and needs of the customer. The 3PL and the carriers hold numerous responsibilities towards each other that are the driving force behind the completion of the physical and documentation flow. The 3PL must manage the carrier's resources and duties to serve the Retailer.

The 3PL's goal in managing the carrier is to help the customer reduce cost (when applicable; in this project, the Retailer places the most emphasis on the shipment being On Time), meet the volume commitment for different carriers and routes (as determined the Retailer), and work with the carriers to improve the services they provide to the customer. More specifically, the 3PL must:

- Prepare and submit forecast report to the carriers
- Book without delay with the carriers according to the volume and allocation requested by the Retailer
- Pick up the empty container that the carrier has offered to the 3PL in a timely manner
- Efficiently fill the container (optimize container capacity) and ship it to the port On Time without delivery mistakes (including the right volume and the right destination)
- Correctly write the required information from the 3PL on the Shipping Instructions (S/I)
- Send the container by truck to the port terminal in a timely manner

- Submit the container and S/I to the carrier
- Take charge of the appropriate paperwork after the vessel sails
- Receive the Bill of Lading (B/L) from the carriers
- Complete the paperwork to pay vendors (General Case):
 - Draft Forwarder's Cargo Receipt (FCR)
 - Original (i.e. printed after confirmation) FCR
- Complete the paperwork to pay vendors (The Retailer's case in this project)
 - Letter of indemnity
 - Confirmation of booking forms
- Compile the documents on the Electronic Data Interchange (EDI)
- Send Delayed Document Notice (DDN) and Document Dispatching Summary (DDS) to the Retailer

7.1.2 Importance

The importance of carrier management is twofold. First, it promotes the On Time shipment of the cargo from the 3PL's EDC to the terminal port. Second, successfully complying with the carrier's requirements will help the Retailer cultivate a fruitful relationship with the carriers for future partnership. One of the main benefits that arises from a strong relationship, is the carriers are inclined to dedicate greater container volume to the Retailer.

Therefore crucial for the customer to establish key performance indicators to track the performance of the 3PL and locate the areas that need improvement. To achieve a

strong long-term relationship with the carriers, it is of the utmost importance for the 3PL and the Retailer to focus on optimizing the short-term shipping logistics.

7.2 CASE STUDY OF COLES

To better understand “Carrier and On Time Shipping Management”, the 3PL presented a case study of Coles, an Australian based company that owns Supermarkets. Coles is an organization that oversees several other major companies, including Target and Kmart. The presentation included discussions of carrier allocation, carrier codes, carrier sailing information, Container Yard (CY) operations, Container Freight Station (CFS) operations, carrier event log, and carrier booking KPI.

Coles collaborates with various carriers, including MAERSK and MSC. The customer informs the 3PL of how it wishes to split on an annual basis its goods among the carriers that it works with. Even though the 3PL may not be able to satisfy the percentages required during a certain shipment, it will balance the carrier allocations in future shipments to ultimately have the actual allocation be as close as possible to the desired allocation that Coles determined. Every carrier is assigned a unique code, as well as an ID to log into LogNet, an international logistics and supply chain management software that allows the user to manage logistics and collaborate with the various parties involved in the operations.

Based on the data in the LogNet system, the customer acquires a volume forecast for operations for the coming two weeks and informs the 3PL who will monitor daily receipt of goods to compare it against the forecast. If necessary, the forecast of the Hong Kong control tower will be adjusted (Coles has a corporate branch in Hong Kong that is responsible of overseeing the supply chain operations). In case the carrier could not

provide enough container space for a certain PO, the 3PL will contact Coles (specifically the Hong Kong branch) for further instructions on which orders to hold.

The sailing schedule information presents information regarding the departure (ETD, Time, and Origin), the mode of transportation (the carrier's name, the mother vessel, the feeder vessel, the voyage number) and the arrival (ETA, Destination). Coles requires a sailing schedule for all origins that should be made known between the 24th and 27th of every month. The carrier charges are collected at the destination.

In the CFS/CY operations of Coles, the 3PL follows a structured procedure to acquire container space from the carrier. First, various parties compile a forecast report that is sent to the Hong Kong Control Tower. These are then sent to the carrier, who responds by confirming the space. The 3PL then books the space with the nominated carrier, who in turn releases the booking (i.e. confirm). The 3PL then informs the carriers of the KPI used to evaluate their performance. If changes in the booking are needed, such as a different container size, port, or empty container pick up place, the 3PL and the carrier collaborate and update the actual space use report. Furthermore, there is a deadline to cancel the carrier booking. The 3PL then fills in the weekly loading summary and sends it to the customer's Hong Kong team. Finally, the Carrier Event Log is used to take note of the performance of the carrier, accidents, issues or of any exceptions that may have occurred.

Finally, the discussion moved to the relationship between actually used and booked carrier space, a factor that can be used to evaluate the performance of the carrier. Finally, the presentation introduced the carrier event log, used to capture possible issues,

such as no space, no empty container to pick up, late booking release, and container rolling. More specifically, the event log contains:

- The day of the event
- Origin and destination locations
- The bill of lading for the shipment
- The brand and sub-brand of the shipment (In our case both are Target)
- The container number
- The carrier's name
- The vessel's name
- The voyage's number
- The Estimated Time of Departure (ETD) and Estimated Time of Arrival (ETA)
- The category under which the reason of the problem falls
 - Examples
 - Vessel change
 - Vessel delay
- A short description of the event

7.3 TIMELINE OF 3PL-CARRIER INTERACTIONS

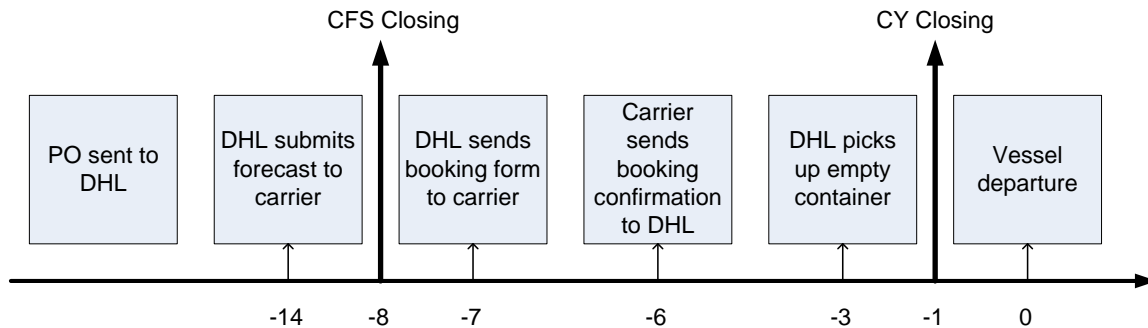


Figure 4: Timeline of 3PL-Carrier Interactions

The supply chain process begins when the customer sends the Purchase Order (PO) to the various vendors as well as to the 3PL. Using the PO, the 3PL develops a forecast and submits it to the carrier, via email, 14 days before CY closing (the date that the carrier will stop receiving cargo). Then the carrier will release the available space to the 3PL based on the forecast. Between 14 and 8 days prior to vessel sailing, vendors will continuously send cargo to the 3PL's warehouse. The deadline for receiving the vendor's produced items is called CFS Closing Day and is 8 days before CY closing. Seven days before the estimated vessel sailing date, the 3PL sends a formal booking form to the carrier (also known as carrier Shipping Order or carrier SO). The data contained in the SO is based on the cargo in the warehouse and includes the consignee name, the vessel voyage, the number and size of containers required, and the destination. One to two days later, the carrier sends a booking confirmation with the required information, including the vessel details, CY closing date, the empty container pick up point, and the booking number. After loading the container, the 3PL needs to send the cargo to the port

before CY closing. Finally, the 3PL develops a Carrier Performance Report for the carrier.

In case the carrier does not accept the booking, it will notify the 3PL, whose responsibility is to inform the customer of all exceptions and input the issue in the event log. After the exception is resolved, as soon as the 3PL confirms and finalizes the loading plan, it picks up the empty containers. Loading frequency depends on the size of the shipment. For example, large customers can potentially load on a daily basis; average sized customers load a few days before the CY closing. Note that the container pickup location is not necessarily the port, since it may be cheaper for the carrier to store empty containers in other areas. Furthermore, if the carrier tells the 3PL where to pick up an empty container, it does not necessarily mean that the 3PL's truck will find it at the designated area. The reason is that the carrier tells many freight forwarders about the same pick up area and some other party may obtain the container before the 3PL. In case this happens, the 3PL will communicate with the carrier and inform the retailer about the exception, which is usually quickly resolved.

7.4 KEY PERFORMANCE AREAS

Based on the analysis above, in carrier and on time shipping management, the 3PL's responsibility is divided into three subareas: Forecast, Booking and Delivery.

Forecast KPA

The 3PL begins sending forecasts of space requirements 14 days before the estimated vessel sailing departure. The forecast information is likely to be updated to improve its accuracy. The 3PL should make the forecast space be as accurate as

possible, because inaccuracy leads to complaints from the carriers. The 3PL also needs to inform the Retailer of any exceptions that happen during this process and communicate with the carriers to remedy any issues.

Booking KPA

The 3PL needs to send the carrier booking form to demand container space 7 days before the estimated time of the vessel's departure. If the difference between the time that the carrier SO is submitted and the vessel date is less than 7 days, then the booking form is considered delayed. Not only does the carrier need to book on time, but it should also book enough space for the every shipment, because a lack of space will lead to the delay of the cargo. The 3PL also needs to inform the Retailer of any exceptions that happen during this process and cooperate with carriers to resolve them. Finally, since the Retailer set a yearly volume allocation for the Retailer's carriers (established by the Minimum Quantity Commitment, MQC), the 3PL also needs to manage the volume booked to try to fulfill the Retailer's requirements.

Delivery KPA

The 3PL needs to deliver the required cargo to the port before CY closing. In addition, the 3PL should deliver the right amount of cargo to the right port, or it will lead to the delay of the cargo.

7.5 PRELIMINARY PERFORMANCE INDICATORS

Under "Forecast"

FORECAST SUBMISSION DELAY

Description:

“Forecast Submission Delay” measures when the 3PL submitted the forecast to the carrier.

Purpose:

By submitting a forecast late, there may be a possibility that the carrier grants container space to another customer as opposed to the Retailer, thus jeopardizing on time shipment of the goods. Submitting a forecast 14 days prior to vessel sailing is a performance indicator of the service that the 3PL is providing to the Retailer.

Removal Rationale:

The time of submission will not affect the on time shipping of the cargo. In fact, the forecast is likely to change as the booking submission date (seven days from vessel sailing date) approaches because the 3PL gains more information about the shipment. For example, vendor production quantity may change, therefore affecting the shipment volume. Finally, as the booking submission date approaches, if the forecast needs to be modified, it should be more accurate because the 3PL has more information.

FORECAST VOLUME ACCURACY

Description:

“Forecast Volume Accuracy” is a measure of how accurate the forecast the 3PL submitted to the carrier for container space is in comparison to the booked volume sent via the carrier booking form.

Purpose:

In the supply chain timeline of a PO, the first interaction that the 3PL has with the carrier occurs when the 3PL receives the vendor booking form (at day -14 from vessel

sailing date) and submits a container space forecast to the carrier. From day -14 to day -7 (the expected booking form submission date), the carrier can revise the forecast, depending on whether changes originating from the vendors or the Retailer happened. The carrier then confirms the forecast (depending on the carrier company, it is usually on a fixed day of the week; for example, every Thursday).

It is critical for the 3PL to consistently submit an accurate volume container space forecast; a poor performance in this task may lead to complaints from the carriers. The carrier utilizes the forecast from the various 3PLs and its' customers to optimize the container space it offers. The forecast should provide a reasonable heuristic for the carrier on how much container space will be used, and if the 3PL consistently books more or less than the confirmed forecast, it will reflect poorly on the Retailer. While this task may not necessarily affect the on time shipment of the goods, it strongly contributes to a good relationship between the Retailer and the carriers.

Removal Rationale:

A meeting with one of the Retailer's carriers confirmed that not only can an inaccurate forecast generate complaints, but more importantly, a wide difference between the confirmed forecasted volume (that the carrier sends to the 3PL) and booked volume (that the 3PL sends to the carrier) is detrimental to the relationship between the customer and the carrier. This is particularly true during years when the demand for container space is high. If the 3PL does not book a volume that has a value near that of the confirmed forecast, then the carrier will lose business (the space could have been given to other customers) and the carrier will communicate with the Retailer to report the 3PL's poor performance. In turn, the Retailer must, on a case per case basis, talk to the 3PL to

find out what generated the discrepancy between the forecast and the booking, and trace back through the process to find the source of the problem.

Thus, forecast volume accuracy is clearly a relevant measure since it affects the long-term relationship between the Retailer and the customers. While most carriers rely on the rate (the price that the customer is willing to pay for the space) as the primary indicator to allocate the container space between the users, the customer's past compliance is also reviewed. For example, if the customer consistently books less than the quantity that the carrier confirms in the forecast, then the carrier will begin confirming a smaller volume, hence influencing the on time shipment of the goods. That said, if forecast volume accuracy is an important measure of the 3PL's performance, why is it that it is not in the final list of KPIs?

The 3PL does not consider the "forecasted volume" to be a crucial type of data for its operations, and hence does not formally keep track of it. Instead, the 3PL solely relies on e-mail exchanges to communicate forecast information with the carriers. Since the task is done manually, tracking the data requires attention from an employee, as opposed to being automatically captured by some automated system. Therefore, it is difficult to keep a database of this data, and measuring this KPI may be practically impossible given the current forecasting information exchange system. Furthermore, the 3PL does not have any incentive to create a tracking system for forecasting information because, as mentioned previously, it impacts neither the supply chain operations, nor the Retailer's on time shipping goal.

Under "Booking"

VOLUME BOOKED

Description:

“Volume Booked” is a measure of how much container space the 3PL booked per shipment order for the Retailer in comparison to how much container space the Retailer needed.

Purpose:

Since it is the 3PL’s responsibility to book the appropriate amount of container space from the carrier for the Retailer, this measure is a valid indicator of the performance of the 3PL. A bad performance in this area will affect whether certain goods do not arrive on time to the destination’s distribution center.

Removal Rationale:

The 3PL is responsible for booking container space to accommodate the cargo that the Retailer is exporting. That said, this KPI initially calculated the ratio of actual booked volume to vendor booking volume (i. e. the volume found in the SO that the vendor sends to the 3PL). But, the KPI does not capture the 3PL’s performance. The 3PL is in charge of the “carrier booking logistics”, such as sending the booking form on time or communicating with the carrier to report the forecast. The volume booked KPI implies that if the actual booked volume is different than the volume the Retailer demands, then it is because of the 3PL’s poor performance. However, this is not the case because many factors can affect the volume that the Retailer demands and the one that the vendor produces, and they mainly originate from the carrier (e.g. unable to provide carrier space), customer (e.g. change in PO) and the supplier (e.g. unable to produce the goods). Moreover, if the 3PL did not book the right quantity, then the 3PL

communicates with the Retailer about the exception and awaits for further instructions from the Retailer. The remedial action is done on a case-per-case basis and the exception is report in a dashboard document.

PEAK SEASON PERFORMANCE

Description:

“Peak Season Performance” calculates the volume booking ability of the 3PL in the peak season, when customers have the most container needs. The KPI compares the 3PL’s booking ability during peak times to the annual average booking ability.

Purpose:

The booking ability of the 3PL during peak seasons captures how well the 3PL plans ahead to prepare for the time of year with high demand for container space. Whether or not the 3PL can perform well during peak season will directly influence the cargo.

Removal Rationale:

The logistics manager insisted that the type of season (i.e. peak or regular season) is not relevant, because the 3PL’s performance should be maintained according to the Retailer’s standards. Thus, the activity that “Peak Season Performance” is intended to measure is already captured in the performance indicator measuring the 3PL’s overall booking ability.

BOOKING SUBMISSION DELAY IN DAYS

Description:

“Booking Submission Delay in Days” is designed to calculate the average number of days that the booking submission is delayed.

Purpose:

This performance indicator complements “Booking Submission Delay” by introducing the number of delayed days. Computing solely whether delay occurred is not sufficient. If the 3PL only delayed one booking, but did so by a great number of days, then the performance of the 3PL is not same as if the 3PL had delayed only one booking by a small number of days (or even potentially two bookings by a small number of days). For example, “Booking Submission Delay” will not differentiate between a booking being delayed three days or one day. However, the performance level is not the same, and “Booking Submission Delay in Days” provides the tools to discern the difference in performance. If the Retailer was only informed that the 3PL delayed one booking, it may choose not to investigate or seek a reason from the freight forwarder. However, if the Retailer knew the number of delayed days, its reaction might be entirely different and it may choose to investigate.

Removal Rationale:

Booking on time is a relevant metric, and the number of delayed days is an insightful measure of the 3PL’s performance that the Retailer examines on a case-per-case basis. However, according to the logistics manager, the average number of delayed days in a month is not significant information. The booking form delay ratio is sufficient. When a booking form is delayed, the Retailer will record the difference of days between the idea submission day (seven days from vessel sailing date) and the

actual submission date. To remedy the problem, the Retailer must find the exception that may have caused the carrier booking submission delay, and ultimately assess which party was responsible for the delay.

BOOKING FORM MISTAKE

Description:

“Booking Form Mistake” computes the 3PL’s performance in submitting the booking forms to the carrier without a mistake from the first submission.

Purpose:

Shipment Orders (i.e. Booking Forms) needing revisions may delay the overall shipment and thus may affect the Retailer’s overarching goal of delivering on time. Consequently, it is crucial for the 3PL to submit the booking form correctly the first time as much as possible; otherwise, the services of the 3PL would be undermining the Retailer. It is therefore essential for the Retailer to track how consistently the 3PL submits SO correctly. However, the ratio does not convey the entire story, and it is also important to examine the time it takes the 3PL to resolve a booking form mistake.

Removal Rationale:

Sending the carrier’s booking form without mistakes unquestionably affects the smooth operations of the supply chain, and can potentially affect the on time shipment of goods. However, this metric is captured in one of the final KPI, namely the one measuring on time booking. In other words, capturing the performance of on time booking implicitly takes into account the 3PL’s performance sending the correct booking form without mistakes. If there is a mistake in the Shipment Order (i.e. booking form),

then the value of “On Time Booking” will change. One may think of the “Booking Form Mistake” KPI as a metric measuring the occurrence level of the incorrect SO submission exceptions. As mentioned earlier, it is critical that the KPI captures the 3PL’s performance in the entire process, but it must be done so without overlapping measures. The Retailer, on a case-per-case basis, will analyze the reason for late booking forms, and what kind of exceptions may have caused them. Keeping the “Booking Form Mistake” will create redundant information, and does not add informational value for the 3PL.

BOOKING REVISION TIME

Description:

“Booking Revision Time” computes the time it takes for the 3PL to resolve a mistake in the SO when it is filed.

Purpose:

“The Booking Revision Time” is complementary to “Booking Form Mistakes”. It is only natural to expect human errors to occur, and mistakes in the booking forms should be considered. Examining how quickly the 3PL is able to remedy exceptions is critical to capturing the entire picture. For example, it is possible that the value of “Booking Form Mistakes” indicates a low performance but the value of “Booking Revision Time” indicates a high performance.

Removal Rationale:

Similarly to the “Booking Form Mistake” KPI, previously discussed, there is no need to calculate this metric since the performance is already measured in the on time

booking KPI. Moreover, initially, this KPI was meant to be calculated by using the number of returned SO forms needed to be fixed. This data type is not formally kept track of since such problems are dealt with on a case-per-case basis. If the carrier booking form is not submitted on time, the Retailer can trace back through the process to find the source of the problem.

Under “Delivery”

INCORRECT DELIVERED VOLUME

Description:

“Incorrect Delivered Volume” measures the 3PL’s performance in delivering the right cargo (volume and type of goods) to the terminal port.

Purpose:

After acquiring the empty container, the 3PL must stuff it with the goods and send it to the terminal port. Sending the wrong cargo to the destination will cause logistical issues and affect the on time shipment of the correct cargo. Thus, measuring the 3PL’s performance in this area is a relevant key metric.

Removal Rationale:

This indicator is not under the carrier management division, but rather under inventory management. A poor performance in “Incorrect Delivered Volume” illustrates mismanagements in the warehouse, inventory storage, information exchange, and of the loading process. Thus, the source of the error is traced back to activities relating to inventory management. In what form this indicator will be included in the inventory

management part depends on the analysis of the IM team, but for the purpose of this section, “Incorrect Delivered Volume” should not be included in the final KPI list.

Figure 35: From Preliminary to Final KPIs

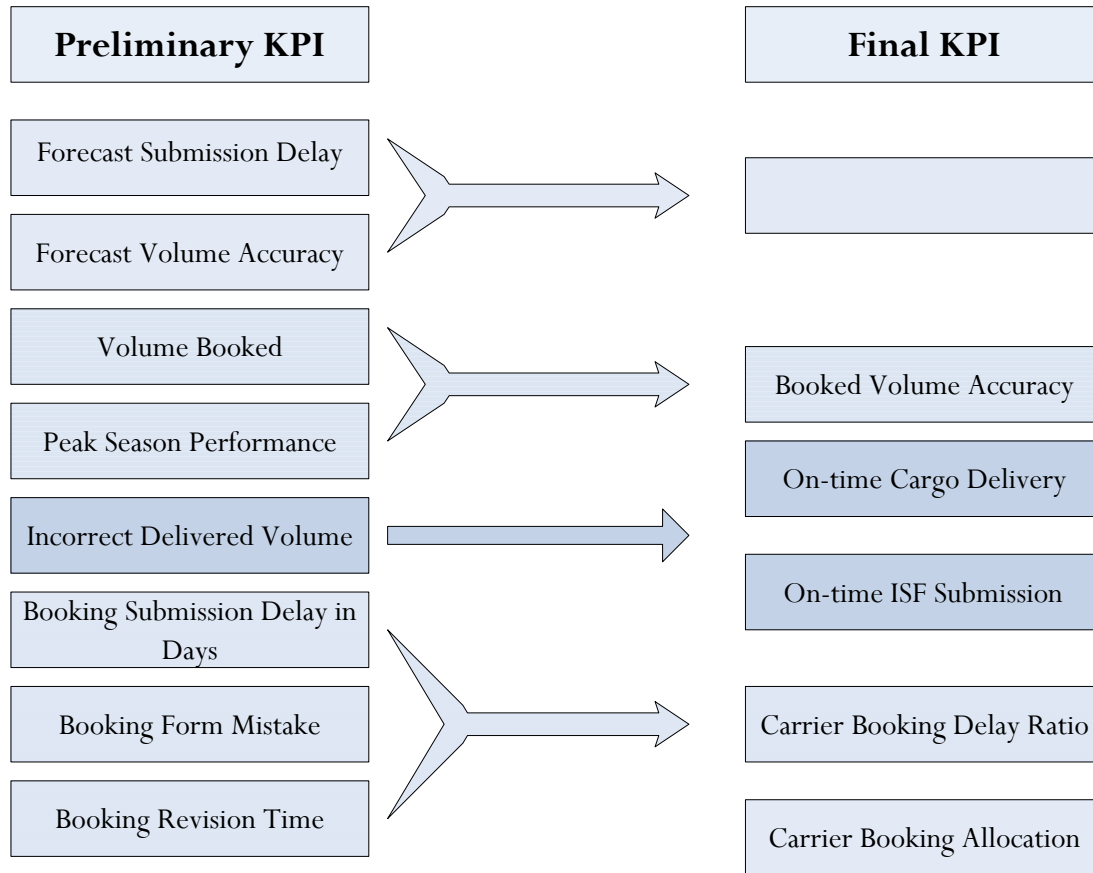


Figure 35 illustrates the development of the preliminary KPI into the final KPI.

7.6 KEY PERFORMANCE INDICATORS

Final Carrier Management KPI Under “Booking”

Booking

The booking process refers to when the 3PL sends the booking form to the carrier 7 days before vessel departure, informing the carrier how much container space the 3PL will need on the vessel. Seven days before vessel departure is the required date from the carrier, and any booking submitted later will be considered delayed. The 3PL's responsibilities in this process are to correctly send the booking form to the carrier on time and accurately demand container volume.

BOOKED VOLUME ACCURACY

Description:

“Booked Volume Accuracy” is a measure of how accurate the volume in the booking form that the 3PL submitted to the carrier is in comparison to the actual volume of the shipped cargo.

KPI Table Information

Category	Booking
Metric Type	Volume
Formula	$\frac{\text{Actual Shipped Volume Per Month}}{\text{Confirmed Booked Volume Per Month}}$
Unit	Percentage
Required Data	(1) Booked Volume per shipment (2) Actual Shipped Volume per shipment
Data Source	(1) Dashboard from Retailer and 3PL (2) Recorded in an Excel Spreadsheet
Target	≥98%

KPI Significance:

When developing the KPI, the team first examined the various forms that were exchanged between the 3PL and the carriers. The 3PL first sends a forecast, the carrier confirms the forecast, then the 3PL sends a formal booking form, and the carrier confirms it. Finally, the 3PL delivers the cargo to the terminal port. Comparing the confirmed

forecast with the actual booked volume in the carrier SO is significant because a wide discrepancy between the values may generate complaints from the carrier. As mentioned earlier, because the forecast is exchanged manually, the metric is unpractical to track. But, comparing the volume that is shipped to the terminal port with the volume that the carrier confirms in the booking form is also a significant measure and is easy to measure.

The importance of “Booked Volume Accuracy” is twofold. First, it captures the on time shipment performance of the 3PL. If the actual shipped volume is less than the confirmed volume then part of the cargo will be delayed. Second, the performance of the 3PL in “Booked Volume Accuracy” affects the relationship of the Retailer with the carriers. If the 3PL does not ship the volume that the carrier is expecting to have, then the carrier will communicate with the Retailer to complain and find the reason for the underperformance. This measure is important for the carrier because if the 3PL does not send the right amount to the terminal port, the carrier would have lost potential business from other customers. If the 3PL consistently underestimates, the carrier will begin confirming less container space, thus hurting the Retailer’s goal of shipping on time.

KPI Methodology:

The KPI is calculated by summing up first the volume submitted in the booking form per month and second the actual shipped volume per month. Next, the KPI’s value is obtained by finding the ratio of the latter value to the former.

KPI Implementation:

Both the 3PL and the Retailer maintain records of the carrier confirmed booked volume in a dashboard report. Moreover, not only is the data for the actual shipped volume found in the GT Nexus system, but Excel spreadsheet documents are also

developed to save records of the data. That said, the data needed to calculate the KPI's formula is accessible.

The discrepancy between the carriers' confirmed booked volume and the actual shipped volume can be caused by several factors. The team agreed that the 3PL has control over the shipped volume. That said, if the value of the KPI indicates a low performance, the Retailer must trace back the process on a case-by-case basis to assess who is responsible for the exception that caused the lower shipped volume.

CARRIER BOOKING DELAY RATIO

KPI Description:

“Carrier Booking Delay Ratio” calculates how many carrier bookings have been submitted with a delay in relationship to the total number of bookings.

KPI Information Table:

Category	Booking
Metric Type	Time
Formula	$\frac{\text{Number of Carrier Bookings Delayed per Month}}{\text{Total Number of Carrier Bookings per Month}}$
Unit	Ratio
Required Data	(1)Actual Booking Submission Date (2)Vessel Sailing Date (3)Total Number of Bookings
Data Source	(1) E-mail (2) GT Nexus (3) Retailer
Target	≥98%

KPI Significance:

To determine whether this metric is a Key Performance Indicator, the main question to ask is whether delayed carrier bookings can lead to cargo delay. If the carrier booking is submitted late, then the carrier releases the booking at a time that is closer to

the CY closing date, therefore putting 3PL at risk of not being able to fill and deliver the containers in time to the port. Another possible scenario, given the booking is submitted late, is that the carrier may have already allocated the container space to another customer and the 3PL risks acquiring the space it needs for its shipment. Therefore, submitting the carrier booking late will increase the likelihood of exceptions occurring, which significantly affects on time delivery of the cargo to the port.

KPI Methodology:

The formula for “Booking Submission Delay” is the ratio of the “Number of Bookings Delayed” to the “Total Number of Bookings”. This metric does not take into account the number of days that the bookings were delayed. Rather, this KPI is solely concerned with how many bookings were delayed in a month.

The data that this KPI requires is the “booking submission date” and the “vessel sailing date” and the total number of bookings over the time period. If the difference between the booking submission date and the vessel sailing date is less than 7 days, the booking is delayed.

KPI Implementation:

Of the three data types required for this KPI, “Actual Booking Submission Date”, “Vessel Sailing Date”, and “Total Number of Bookings”, the 3PL only has control over the first one. The Retailer controls the total number of bookings and the carrier determines the vessel sailing date. It is crucial for the KPI ratio to be consistently low, even during peak seasons. If the value of the “Carrier Booking Delay Ratio” is low, the Retailer can trace back the process to find the exceptions that caused the low performance in the “Actual Booking Submission Date” to determine what parties are responsible.

CARRIER BOOKING ALLOCATION

KPI Description:

The “Volume Allocation” metric is an indicator of how close the percentage of container space that 3PL booked from every carrier is to the percentage that the Retailer demanded.

KPI Information Table:

Category	Booking
Metric Type	Quantity
Formula	$\sum_{all\ carriers} Actual\ Booking\ Allocation - Minimum\ Quantity\ Commitment$
Unit	Ratio
Required Data	(1) Booked Volume For every carrier (2) Retailer’ Demanded Carrier Percentage for every carrier
Data Source	(1) The SOP (Standard Operations Procedure) (2) Retailer
Target	Deviation between Actual Allocation and MQC: $\pm 10\%$

KPI Significance:

On a yearly basis, the Retailer instructs the 3PL to follow certain carrier allocation guidelines to fulfill its’ container space needs. For example, the Retailer may require the 3PL to book 40% of its annual booking volume with carrier 1, 30% of its volume with carrier 2, and 15% with each carrier 3 and carrier 4. Note that these percentages refer to the annual percentage. In other words, for a certain shipment order, the 3PL can book a greater or smaller percentage with a carrier than what the Retailer demanded, as long as it compensates for the difference in future shipments. Ultimately, at the end of the year, the total actual percentage must be as close as possible to the requested allocation percentage.

The Retailer works with a certain fixed number of carriers (6 at the time of the project) to fulfill its' short-term (short-term refers to the length of the time it takes from producing the good to shipping it to its final destination) goal of shipping on time.

Achieving a healthy relationship heavily depends on whether the 3PL provides the carrier with at least a volume equivalent to the MQC. A bad performance, for example by overbooking with one carrier at the expense of another or by not providing enough volume to the most prominent carriers, will hurt the strategic goals of the Retailer.

KPI Methodology:

The first data needed is the booked volume for every carrier, which is found in the Standard Operations Procedure (SOP) document. The second data is the yearly allocation that the Retailer thrives for. The KPI compares the first data against the second and computes if the yearly actual allocation is close to the MQC for all carriers.

KPI Implementation:

Thus, the value of "Carrier Booking Allocation" is clearly an important indicator of the quality of the service that 3PL provides to the Retailer. However, it is only applicable during certain years, when there is not much pressure on the carrier for the container space. If, due to certain conditions (for example the state of the economy), carriers are experiencing high demand for their services, then 3PL may be unable to fulfill the allocation that the Retailer requests. This will not be a poor reflection on the 3PL's performance; rather, the exception recorded will indicate that the origin of the poor performance is the carrier's inability to respond to the Retailer's needs. Examples of exceptions that are caused by the carrier include "No Space", "No Empty Container Pick-

up”, and “Late Booking Release”. Moreover, given the Retailer’s goal of shipping its goods on time, the 3PL will focus on acquiring as much container space as possible during peak demand years, even if doing so does not coincide with the customer’s requested carrier allocation.

Final Carrier Management KPIs under “Delivery”

The 3PL is responsible for the logistics of delivering the cargo to the terminal port. The main task is to ensure the on time shipment of the goods. However, this task is dependent not only on the previous operations in the supply chain, but also on the on time submission of the ISF form to the Retailer.

ON TIME CARGO DELIVERY PERFORMANCE

KPI Description:

“On time Cargo Delivery Performance” measures 3PL’s performance in delivering the cargo late from the EDC to the terminal port.

KPI Information Table:

Category	Delivery
Metric Type	Time
Formula	$1 - \frac{\text{Number of Shipments Late Per Month}}{\text{Total Number of Shipments Per Month}}$
Unit	Ratio
Required Data	(1)ETD (2) LSD (3)Total Number of Shipments
Data Source	(1)GT Nexus or Advanced Shipping Notice (ASN) (2) Shipping Schedule or Website or Booking Confirmation (3) Retailer
Target	≥93%

KPI Significance:

“On time Cargo Delivery Performance” measures how efficiently the 3PL achieves the Retailer’s overarching goal of delivering the cargo on time. All the tasks within the Retailer’s supply chain in China lead to this final milestone: delivery on time. Having said so, there are numerous actions prior to delivery that will have an effect on whether the cargo arrives on time to the terminal port.

Delivering the cargo late to the port can cause the cargo to miss the vessel, and thus significantly affect the on time delivery of the goods to the final destination. Furthermore, if the goods need to urgently be delivered to the final destination, the Retailer may incur additional costs by needing to send the cargo to another port (e.g. Hong Kong). The other alternative would be for the cargo to remain idle in the port of origin for an additional week, as it awaits the next departing vessel.

KPI Methodology:

The data required for “On time Cargo Delivery Performance” is automatically recorded by the IT system, and is thus easy to track. The “Cargo Delivery Date” is found in either the GT Nexus or the Advanced Shipping Notice (ASN) sent by 3PL to Retailer. The CY Closing Date is either found in the Shipping Schedule sent from the carrier to 3PL, the carrier’s website, or the released carrier booking. Finally, the Retailer has the information on the total number of shipments that the 3PL facilitated.

The formula is the ratio of the number of late deliveries to the total number of deliveries.

To define a late shipment, we use two dates: “ETD” and the “LSD”. If the “ETD” is greater than (comes after) the “LSD” then the cargo is late.

KPI Implementation:

The KPI purposefully does not take into account the number of days that the shipment is late. The Retailer has access to this information through GT Nexus, and having the KPI convey the number of days late is redundant. More importantly, the Retailer is eventually concerned with whether the shipment is able to leave on the expected vessel sailing date. If on time shipment is ultimately successful, the Retailer may opt not to investigate even if exceptions occurred. But if the cargo misses the vessel, then the Retailer will examine the exceptions that have occurred, assess who are the responsible parties, and take action from there (e.g. remedy the issue and/or impose sanctions).

Out of the three data types required to calculate the KPI (“ETD”, “LSD”, and “Total Number of Shipments”), the only one that is actually controlled by the 3PL is “ETD”, that is when the cargo departs the terminal port. Evidently, the exceptions related to the transit process will affect the “ETD”, such as “Traffic Congestion”. But, the total list of exceptions that occur and affect the “Cargo Delivery Date”, are very numerous and not solely related to the physical cargo delivery.

When the cargo arrives at the port is dependent upon every process in the supply chain that precedes it, including the tasks measured in the list of KPIs. The later the task comes in the supply chain, the more the number of tasks it is dependent on to be successfully implemented. Some of them are caused by the 3PL, while others are caused by other involved parties, for example vendors or carriers. Examples of exceptions that are not directly related to the delivery process, but affect the arrival time to the port include “Late S/I Submission”, “Defect in Cartons” (caused in the warehouse), and “Carrier Space or Equipment Issues”.

To find possible exceptions that pertain to the delivery process of the cargo to the port, it is useful to examine the subtasks that constitute the process, namely loading, transit, and arrival. For example, exceptions related to loading include “Lack of Trucks”, “Overweight Container”, “Overload Container”, “Insufficient Time to Fill Container”, “Detected Defects in Cartons”. Examples of exceptions related to the transit process include “Traffic Congestion” and “Truck issue”. Examples of exceptions related to arriving to the port include “Random Customs Inspections” (about 5% of total cargo).

In conclusion, exceptions are of the utmost importance in complementing the KPI. They determine the corrective action that Retailer must take to optimize its process.

ISF ON TIME SUBMISSION

KPI Description:

“ISF On Time submission” measures the 3PL’s performance in submitting part of data in the ISF (Importer Security Filing) on time to the Retailer to ensure the cargo can clear U.S. customs on time.

KPI Information Table:

Category	Delivery
Metric Type	Time
Formula	$\frac{\text{Number of On Time ISF submissions Per Month}}{\text{Total Number of ISF submissions Per Month}}$
Unit	Ratio
Required Data	(1) Actual ISF submission Date (2) Total Number of ISF submissions every month
Data Source	(1) Retailer monitors (2) Excel Spreadsheet
Target	≥98%

KPI Significance:

The 3PL has the important task of compiling the data from the carriers and the vendors required for the ISF form and submitting it to the Retailer on time. Since the vast majority of the Retailer's cargo is currently sent to the U.S., a poor performance in this area can significantly affect whether the cargo arrives to destination on time.

Moreover, there is little leverage to compensate for a poor performance, not only because the required date of the ISF submission is near vessel sailing date, but also because the rules of customs are unyielding and the Retailer cannot negotiate with the U.S. authorities. Finally, this task comes far down the supply chain, meaning that even if the processes have gone perfectly smoothly, and the ISF is not submitted on time, then the overall outcome may be significantly jeopardized.

KPI Methodology:

If the "Actual ISF submission Date" is later than when the ISF form is required, that is 3 days before vessel sailing date, a delay happens. This KPI value is the ratio of the number of ISF submitted on time and the total number of ISF submissions in a month.

KPI Implementation:

The Retailer monitors whether the ISF is submitted on time and records the total number of ISF forms in an excel spreadsheet. The KPI takes into account the number of ISF that are submitted on time without computing the number of delayed days. At this point in the supply chain, a delay of more than one day can be the difference between the cargo shipping on time and missing the vessel. That said, calculating the number of delayed days does not add informational value and the logistics manager of the Retailer must work on a case-by-case basis to ensure that the cargo does not miss the vessel.

An acceptable ratio is at least 98%. This is not surprising given the significance of the KPI. A near perfect performance is expected, for, with time and experience, submitting the ISF form should become “routine work”, that is a set of tasks that is repeated and perfected over time.

7.7 RECOMMENDATIONS

- 1. Standardize forecast information exchange, for example by employing the LogNet System (as used by Coles).*

Currently, forecast information is exchanged between the Retailer and the carriers via e-mail, which leads to difficulties in tracking the data. This is the main reason why there is no KPI under the forecast area in the team’s final results. Standardizing means developing a medium for exchanging the forecast information that is not only convenient to use, but also allows for easy data tracking. Examples include the LogNet System that was described in the case study of Coles. Before implementing the concept however, the 3PL needs to perform a Cost-Benefit Analysis (CBA) to compare the benefits of the novel system against the cost. Implementing this recommendation will help the development of KPI under forecast, which continues to be a key area.

- 2. Categorize carriers into “main” and “backup”*

This is a strategy for the retailer. Establishing a long-term relationship between the retailer and the carrier will help the former obtain preferential treatment from the latter. To achieve a healthy partnership, the Retailer must not only comply with the carrier’s

requirements, but it must also be willing to commit great amounts of volume. But, the more carriers the Retailer cooperates with, the more it must share its cargo volume amongst the carriers. Thus, it is impractical and unnecessary to build a long-term relationship with all the carriers. Instead, the team suggests the retailer divide the carrier into “main” carrier and “backup” carriers.

The Retailer should commit most of its’ cargo to the main carriers, consequently promoting a long-term relationship with them. In contrast, the Retailer should commit less cargo with the back-up carriers; their main purpose is to ensure that even if the main carriers are unable to provide container space, the shipment is still delivered on time.

3. Record and categorize exceptions

During the entire supply chain timeline, there are numerous potential exceptions that could put the on time shipping of the cargo at risk. In order to reduce the amount of exceptions, the first necessary step is to record the exceptions. According to the “80/20” rule, 80% of exceptions are caused by 20% of the reasons. Thus, it is beneficial for the 3PL to, after recording the exceptions, categorize exceptions and focus on the reason of and the remedial procedures for the top three reasons. Implementing this recommendation will help reduce the occurrence of exceptions.

4. Create manual for exception solutions

Even if the 3PL is trying to find the reasons for the exceptions and focus on solving them, exceptions are inevitable. The question becomes how to secure the cargo’s on time shipment even when an exception occurs. The team suggests the 3PL to create a manual

for exception solutions. The manual will contain a set of procedures for each specific common exception. The information for a procedure is based on prior exception analysis and experiences. For example, when exception “A” happens, the 3PL can immediately know what to do and when to do it according to the procedures in the manual. Thus, a manager is no longer needed to guide remedial actions; instead, inexperienced workers can follow the standardized procedures to resolve an issue. Finally, the manual needs to be continuously revised to update old procedures and add new exception resolution strategies.

8.0 EXCEL SPREADSHEETS DEVELOPMENT

After designing the KPIs, finalizing their formulas and verifying that the data required for calculations is available and easily accessible, the next logical step was to create an interface for computing the values of the KPIs. Each team developed spreadsheets, using Microsoft Excel, which consume the data (input) and produces the value of the KPIs (output). At the time of the project's completion, the sponsor planned to collaborate with the 3PL to develop a set of spreadsheets to calculate the KPIs that were ultimately chosen. The team nevertheless designed spreadsheets that present one possible alternative of compiling the data and showing the KPI's results.

One of the main challenges in designing the spreadsheets was to ensure their user-friendliness. Every month, the retailer releases approximately 3000 to 4000 PO to the vendors. As every PO progresses through the supply chain, additional data must be tracked. Thus, the total amount of data grows rapidly and may become overwhelming. That said, it is essential to organize the spreadsheets and the data in an efficient and user-friendly way. To account for the different KPI calculations methodologies, every team (VM, IM, and CM) has developed a different Excel document.

8.1 VENDOR MANAGEMENT

8.1.1 User-Interface Organization

In the Excel document that vendor management created, every KPI has a separate spreadsheet. Since all of the KPIs calculate the 3PL's on time performance in a certain operation, the team decided to utilize one methodology to calculate the final KPI that is

described in the next paragraph. Moreover, two spreadsheets were created to collect the data, namely “Vendor Mat Input” and “SO Input”. Then, the KPI spreadsheets automatically link to the data, determine whether a delay has occurred, and compute the overall cumulative KPI.

For example, to calculate “On Time Vendor Registration”, the user first finds the spreadsheet in question and refers to the “Collected Data” set of columns. The user will find that the inputs for vendor’s name, the Vendor SO Number, the date of the registration’s creation, and the first PO’s latest shipping time are already available (by being linked to the “Vendor Mat Input” and “SO Input” spreadsheets). Based on the last two data types the spreadsheet determines whether there was a delay. A delay is indicated by “0”, and on time performance by “1”. Then, the KPI is calculated by taking the cumulative average of the number of times the performance was timely. The following table shows an example of the spreadsheet.

Figure 36: Vendor Management Data per New Vendor

Vendor Management Data per New Vendor				
Vendor Name	SO#	Creation of Registration date	Training Date	1st PO's Latest Shipping Time
A	1	2010/7/31	2010/7/31	2010/8/21
B	2	2010/7/28	2010/7/28	2010/8/21
C	3	2010/8/2	2010/8/3	2010/8/21
D	4	2010/8/3	2010/8/5	2010/8/21
E	5	2010/8/4	2010/8/4	2010/8/25

On Time Vendor Registration Percentage					
VM Data per New Vendor				Calculations	
Vendor Name	SO#	Creation of Registration date	1st PO's Latest Shipping Time	Registration and Training on time	Percentage of Registration
A	1	2010/7/31	2010/8/21	1	100.00%
B	2	2010/7/28	2010/8/21	1	100.00%
C	3	2010/8/2	2010/8/21	0	66.67%
D	4	2010/8/3	2010/8/21	0	50.00%
E	5	2010/8/4	2010/8/25	1	60.00%

Figure 37: On Time Vendor Registration Percentage

8.1.2 Calculation Methodology

To calculate whether a delay occurred, the team used a combination of predefined Excel functions to develop the formula. Referring to the previous example, the formula to calculate “Registration and Training On Time”, the following code is used:

$$=IF(OR(C4="",D4=""),"",IF(D4-C4>=21,1,0))$$

The code checks whether the difference between the date of the registration’s creation (*C4*) and the first PO’s latest shipping date (*D4*), is greater than 21 days (3 weeks). If so, then the spreadsheet outputs a “1”; otherwise, it outputs “0”. The rest of the code is meant to trap cases where one of the dates is not inputted (in which case, there should be no result, or, in coding terms, an empty string “”).

Furthermore, to calculate the KPI, for example the “Percentage of On Time Registrations”, the spreadsheet sums the average of all the individual performances. For example, in the previous example, the average is 60% because of $(1+1+0+0+1)/5=3/5=0.6$.

Note that the value of Percentage of Registration is cumulative, meaning that a certain value implicitly takes into account the value of all the previous entries.

8.1.3 Limitations of Spreadsheet Style

Vendor Management emphasized the simplicity and ease-of-use of the spreadsheet to promote their user-friendliness. However, there are some shortcomings that could improve the efficiency of the spreadsheet:

1. The user must manually input the data in “Vendor Mat Input” and “SO Input”.

Currently, the 3PL can generate an excel spreadsheet from the GT Nexus, and thus bridging the two interfaces can strongly reinforce the spreadsheet.

2. It does not separate data based on a time interval (e.g. on a monthly basis).

However, it may be advantageous for the Retailer to have the option to choose the data it wants. It depends on what kind of data and result organization the Retailer prefers.

8.2 INVENTORY MANAGEMENT

8.2.1 User-Interface Organization

The data needed to calculate the Inventory Management KPI is collected when workers perform the weekly scheduled runs or the random trials. The Excel document is divided in three spreadsheets. The first is for the “Inventory Accuracy” KPI, the second for “Carton Damage”, and the third for “Stock Loss”. To calculate “Inventory Accuracy”, random trial runs need to be performed, and three types of data must be recorded, namely Information Mismatch (whether the information in the WMS matches the information in

the vendor SO), Misplacement (whether the inventory is located where the WMS indicates it is), and First-in, First-out Strategy (whether inventory of the same kind is leaving in the order it entered the warehouse). The workers must indicate by “YES” or “NO” whether these conditions have been satisfied. For easier reading, every “NO” will be in red font and be underlined. Finally, based on the three conditions, inventory accuracy will be computed for every trial run. If there is at least one condition that is not satisfied, the inventory accuracy value per trial run will automatically be “NO”; otherwise, its value will be “YES”. To calculate the Inventory KPI over all the trial runs, the spreadsheet computes the ratio of trials whose inventory accuracy value is “NO” to the total number of trials.

The other two IM KPI, “Carton Damage” and “Stock Loss”, are tracked on a weekly basis, as the employees perform the inventory check. The employees must record the number of cartons that have been damaged and need to be replaced for the former KPI, and the number of inventory items that have been lost for the latter. That said, the two KPI compute the yearly percentage of carton damaged or stock loss, respectively.

8.2.2 Calculation Methodology

The IM spreadsheets rely on predefined Excel functions to compute the KPI’s formulas. Similarly to the VM spreadsheets, “IF” statements are used to determine whether failures have been detected during the weekly and random checks.

Moreover, to calculate the ratio of failures for the sub KPI under the “Inventory Accuracy” KPI (e.g. Information Mismatch), two Excel predefined counting functions were used. The first, used to count the number of “NO” in the column, is “COUNTIF”. The second, used to count the total number of samples, is “COUNTA”. That said the ratio is:

$$=COUNTIF(B2:B1927, "NO")/COUNTA(B2:B1927)$$

Finally, to calculate the yearly KPI for “Carton Damage” and “Stock Loss”, the average of the weekly KPI is computed. To do so, the Excel predefined function “AVERAGE” is utilized.

8.2.3 Limitations of Spreadsheet Style

A main strength of this spreadsheet style is its simplicity and ease-of-use. However, a great amount of manual work on the part of the workers is needed to successfully calculate the KPI. A main reason for this shortcoming is that the limited technology in the warehouse requires the workers to manually check the inventory on a weekly basis. As novel inventory checking methodologies develop, the process may become more efficient and require less manual labor.

8.3 CARRIER MANAGEMENT

8.3.1 User-Interface Organization

The Excel document consists of two types of spreadsheets. The first is designed to collect data and the second to calculate the KPI based on the information and the data found in the former. Moreover, within the data collection spreadsheets, there are two types of data to be collected. The first is targeted at making the Excel formulas and codes work. For example, the user must input the *location* of the column that will contain information about “carrier booked volume”. This information is necessary not to disrupt the computations if changes in the spreadsheet’s template are made. Data falling under this type will be found in the first spreadsheet, named “Spreadsheet Info”. The second type is that related to the supply chain process. Examples include the “ETD”, “LSD”, “Booking

Submission Date”, and “Actual Shipped Volume”. Such data will be found in the second spreadsheet of the document, named “Data Collection”.

Upon opening the Excel document, the user refers to the first spreadsheet, entitled “Spreadsheet Info”, where he or she must fill out the information under the “Spreadsheet Data Locations Section” (i.e. data of type 1). For example, the user examines the value of “First Row of Data”, moves to the second spreadsheet, “Data Collection”, and ensures that the data entries begin in the row given by “First Row of Data”. Similarly, for “Carrier Name Column”, the user must ensure that the value under “Spreadsheet Locations Section” matches the actual column number under which the carrier entries are inputted in the “Data Collection” spreadsheet. Note that while columns appear to be referred to alphabetically (i.e. Column A is the first column), Microsoft Excel requires a number to designate every column. To draw a parallel, the first column, named column A, will actually be referred to as column 1 (column B is 2 ; column C is 3 ;).

Furthermore, in the first spreadsheet, the user must first input the year that of the data, and second a list of the carriers that the retailer cooperated with during the specified year. Moreover, next to every carrier’s name in the list, the user must input the Minimum Quantity Commitment (MQC), that is, how much volume the retailer promised to ship with every carrier. After doing so, the user can move to the second spreadsheet, “Data Collection”, where supply-chain-related data can be found. The data falls under three main categories, “Vessel Information” (data is: “Carrier Name”, “Vessel Voyage”, “ETD”), “Booking Information” (data is : “Actual Booked Volume”, “Booking Submission Date”), and “Delivery Information” (data is: “Cargo Delivery Date”, “LSD”). After inputting all the data, the

document automatically computes whether the booking has been delayed and whether the cargo has been delivered late. To calculate the booking delay, the formula checks whether the difference between “Booking Submission Date” and “ETD” is less than 7 days, and if so, indicate that a booking submission delay has occurred. Similarly, to calculate whether the cargo was delivered late, the formula checks the difference between “ETD” and “LSD”. The Excel document is designed to allow the user input all the data for every PO in the specified year in solely one spreadsheet, namely “Data Collection”.

Next, a third spreadsheet that is linked to the first two compiles all the data and arranges it on a monthly basis, and per carrier if applicable. For example, in “Monthly Info”, the total volume per month for every carrier is computed. Every spreadsheet thereafter is designed for a final KPI. They are linked to the first three spreadsheets and extract the data required to compute the KPI in question. For example, “Booked Volume Accuracy” utilizes “Actual Booked Volume” and “Actual Shipped Volume” for every month from the “Monthly Info” spreadsheet to calculate the KPI and generate the graph.

8.3.2 Calculations Methodology

Excel Visual Basic Applications (Excel VBA) is the tool used to compute the KPI and compile the data on a monthly basis (as found in the “Monthly Info” spreadsheet).

Whenever possible, the team decided to utilize the formulas and functions innately found in Excel; however, when no combination of internally defined functions yielded the desired result, the team relied on user-defined functions. To create user-defined functions, that is functions that are created from scratch and designed to specifically output what the user

needs, Excel VBA is used. For example, to acquire monthly data for total carrier booked volume from the “Data Collection” spreadsheet, a user-defined function was created, named “FinalSum”. The following screen shots illustrate some of the code utilized in the user-defined functions.

```

Dim LastRowCell As Date

Function FinalSum(Therow, ACarrierRow, ACarrierCol, SumCol, DateCol, M, Y)
FinalSum = 0
If IsEmpty(Cells(Therow, SumCol)) Then
FinalSum = FinalSum + Cells(Therow, SumCol)
Else
Do Until Month(Cells(Therow, DateCol)) = M And Year(Cells(Therow, DateCol)) = Y Or Not Year(Cells(Therow, DateCol)) = Y
Therow = Therow + 1
Loop
Do While Month(Cells(Therow, DateCol)) = M And Year(Cells(Therow, DateCol)) = Y
If Worksheets("Spreadsheet Info").Cells(ACarrierRow, 1).Value = Cells(Therow, ACarrierCol) Then
FinalSum = FinalSum + Cells(Therow, SumCol)
Else
FinalSum = FinalSum
End If
Therow = Therow + 1
Loop
End If
End Function

```

Figure 38: VBA Code 1

```

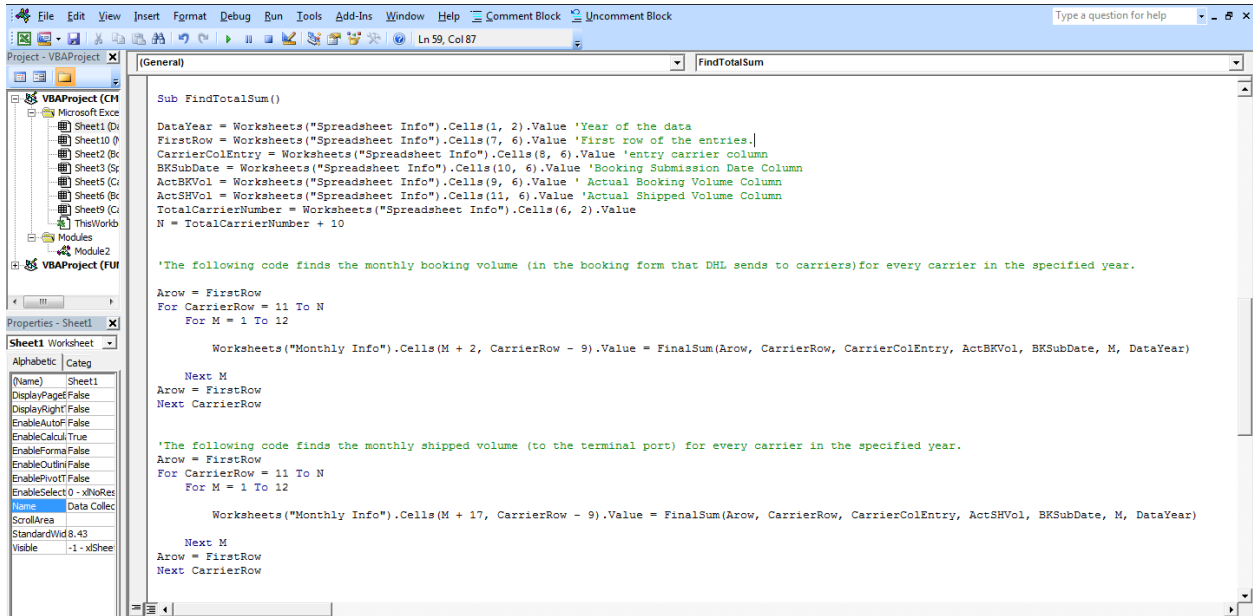
Function DelayFunction(Therow, DelayCol, DateCol, M, Y)
DelayFunction = 0
If IsEmpty(Cells(Therow, DateCol)) Then
DelayFunction = DelayFunction
Else
Do Until Month(Cells(Therow, DateCol)) = M And Year(Cells(Therow, DateCol)) = Y
Therow = Therow + 1
Loop
Do While Month(Cells(Therow, DateCol)) = M
If Cells(Therow, DelayCol) = "YES" Then
DelayFunction = DelayFunction + 1
Else
DelayFunction = DelayFunction
End If
Therow = Therow + 1
Loop
End If
End Function

```

Figure 39: VBA Code 2

Furthermore, the following screenshots illustrate how some of the user-defined functions are used to output the result in the desired cells of the spreadsheet.

Figure 40: VBA Code 3



To further examine the Excel VBA code, please refer to the Microsoft Excel document, and, upon opening, enable Macros and press “Alt + F11” to move to the “Microsoft Visual Basic” applications.

As mentioned earlier, the team refrained from using Excel VBA when the functions already existed in Microsoft Excel. Doing so promoted the simplicity of the program. An example of the team’s use of predefined functions is the following code, which is used to calculate whether a booking delay occurred:

=IF(OR(F3="",D3=""),"",IF(F3-D3+7<=0,"NO","YES"))

The most important section of this code is “ $F3-D3+7 \leq 0$ ”, which produces a Boolean of whether the difference of $F3$ (Booking Submission Date) and $D3$ (ETD) is greater than 7. If so, then the answer is the string “NO”, indicating that there is no delay. The rest of the code is targeted at ensuring that if either one of the two data types (Booking Submission Date, ETD) is not inputted for the PO in question, then the formula does not output any value.

8.3.3 Limitations of Spreadsheet Style

The two main priorities in developing the spreadsheets were to make the code for the calculations operational and make the program user-friendly. While the team believes that these goals have been achieved to a certain extent, there still are certain concerns that, if resolved, will promote the document’s efficiency:

1. All the PO are in one spreadsheet. With data for 3000 to 4000 PO in a month, the amount of data for a year can be overwhelming if inputted in one spreadsheet.
2. The code does not take into account when years in data entries are changed. Thus, the user must be meticulous when inputting the data entries.
3. The user needs to spend time inputting data location information. Ideally, the code would be linked to the data type in a more efficient way than via the column number that the data is found in. Doing so would remove the need for the “Spreadsheet Data Location Section” in the “Spreadsheet Info” spreadsheet, hence promoting the user-friendliness of the program.
4. The spreadsheet can further be refined to trap for potential human errors. For example, misspellings can occur when the user inputs the carrier name in the

- “Data Collection” spreadsheet. A way to trap the error is to limit the number of choices that the user can choose when inputting the carrier’s name. For example, the carrier’s name in the “Data Collection” can be directly linked to the Carrier list in “Spreadsheet Info”, only allowing the user to choose a carrier from the list.
5. The dates must be entered chronologically; otherwise the code will not operate well and will overlook data. Moreover, the “Data Collection” spreadsheet does not automatically rearrange the data entries per PO based on the carrier booking submission date. Instead, it must be done manually, hence increasing the risk of human errors.

9.0 DISCUSSIONS AND RECOMMENDATIONS

While the team ultimately developed a valid set of key performance indicators, there were several technical limitations that posed challenges to the project's progress. The team had to work within certain constraints, some of which were accepted, others overcome.

9.1 INFORMATION CONSTRAINTS

During the preparatory phase of the project, the team discovered that much of the available literature was general, meant for public consumption. In order to secure confidential information, companies tend not to publish the specifics of their particular supply chain. Knowledge of the specific supply chain proved a necessity for further progress in customizing concrete KPIs for the retailer. Therefore the development of the preparatory KPIs was constrained until on-site interview sessions would commence.

While attending seminars and conducting interviews was a key factor towards progressing, the time and energy these activities required reduced the amount of time spent on the actual project. If the retailer had been more specific during preparation this time may have been salvaged for more focused research on the 3PL or retailer or the team may have had more time to further the project.

The presentations the 3PL held during the first two weeks on-site were essential for the team to build a foundation of knowledge for the project. However, the seminars would have been complemented by the opportunity to follow the progress of an actual Purchase Order, in order for the team to understand the retailer's estimation of valuable 3PL performance through first hand experience. This would have added a more practical and

hands-on experience rather than the sense of distance that the team felt in working with the 3PL and retailer. Access to real time information adds a sense of certainty that the work will be useful in the future because it is currently applicable. The team attempted to overcome this constraint by having numerous interview sessions with the 3PL's managers as well as touring the 3PL's facilities, both of which related more to physical cargo movement instead of information flow.

9.2 KPI DEVELOPMENT CONSTRAINTS

The fundamental validation of every metric is to demonstrate that it successfully captures the performance of the measured task and is a key indicator of the 3PL's performance.

The original team plan included a validation process in which actual data was analyzed and examined with the tools the team developed. During the validation process, the tools in question could be refined based on analysis of user-friendly data output. Unfortunately, this strategy was unfeasible because a limited number of Purchase Orders had been processed via the EDC at the time of the project. Also the information exchange system employed at the time of the project inhibited the team from accessing the required data for testing. In part this was due to the Logistics Managers reservations about providing non-employees with confidential information as well as the man-power that would be exerted to trace the multiple email correspondences that would be needed for certain KPI testing.

Consequently, the team relied on the logistics' manager subjective approval of the KPIs for validation. Ultimately, the logistics manager's standpoint on the usefulness of the metrics was the strongest validation because he is the user. Also given the logistics

manger's vast experience in assessing the validity of KPIs, the team is confident that the final list is quite similar to the KPIs eventually used by the retailer to measure the 3PL's performance. This compromise is not ideal and testing the KPIs would have added credibility to the list but under the circumstances it was the best resolution.

During the course of the project, the sponsor had certain expectations in mind, which gave the team direction towards the end goal. The team believes that the opinion of the logistics manager and his continuous supervision of the project's progress was critical to the success of the project, and propelled the learning environment. However, his constant supervision proved to be a limiting factor in the opportunities the team observed which the logistics manager disregarded. Ultimately, the team may have been able to produce evidence that some of these opportunities were worth pursuing if the logistics manger had not been so intimately involved with every step of the project. His involvement formed an environment in which some KPIs were jettisoned because they were not immediately applicable to the current situation of the supply chain. The team may have had broader perspective on the project than the logistics manager because he was involved with daily operations, whereas they were outside the process instead of focused on one specific area. Perhaps, if the logistics manager and team had been able to express their perspectives and combine the two to create a list that was able to capture focused as well as broad-spectrum operations, the outcome may have been improved.

9.3 RECOMMENDATIONS FOR FUTURE PROJECT WORK

Studying and developing measurement systems is a promising endeavor that potentially has many debouches. This project mainly looked at designing the KPIs, but has allowed for many expansion opportunities.

1. Rely on collected data to validate the present proposed KPIs. The sponsor validated the team's KPIs subjectively, basing the judgment on experience; however, future students should research the possibility of scientifically demonstrating their validity.
2. Develop a questionnaire or teaching manual for the new vendors to access.
3. Examine how to refine the Excel spreadsheets to improve their user-friendliness and efficiency.
4. Presently, the user must manually input the data into the spreadsheet, which not only leaves room for human errors, but also creates the need for constant revision. Future students can research how to standardize the process between the information exchange system and the spreadsheets.
5. Furthermore, future projects can focus on how to standardize the exception resolution procedures. Presently, the remedial of issues that affect the on time shipment of the goods is often done on a case-by-case basis. Once the top occurring exceptions are found, creating a standardized remedial system can be cost-saving and faster than the present procedure.
6. Future projects should be created within every main area of the supply chain, namely vendor management, inventory management, and carrier management. Either every team's recommendations can be used as the stepping stone, or projects can be based on specific issues that the sponsor has been experiencing.

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APPENDICES

GLOSSARY OF TERMS

Actual Booking Volume: The booking volume asked for in the carrier booking form, which is recorded the 3PL's spreadsheet.

Actual Carrier Volume Allocation: The total yearly volume that the 3PL delivers to every carrier.

Beneficiary Certificate: The beneficiary certificate is provided in response to details required and requested by the buyer/importer. The beneficiary's certificate is a document issued by the beneficiary of the international trade transaction, often in conjunction with a documentary collection or documentary credit/ letter of credit (L/C).

Bill of Lading: A bill of lading (sometimes referred to as a BOL or B/L) is a document issued by a carrier to a shipper, acknowledging that specified goods have been received on board as cargo for conveyance to a named place for delivery to the consignee who is usually identified. A thorough bill of lading involves the use of at least two different modes of transport from road, rail, air, and sea. The term derives from the verb "to lade" which means to load a cargo onto a ship or other form of transportation.

Booking Exceptions:

Item Quantity Discrepancy

Late Delivery: Cargo ready date later than ship date

Origin: If cargo ships from a different origin

Destination: If cargo ships to a different destination

Split PO or Partial Shipment

Incorrect PO/Item/ SKU

20 ft Container (FOB CY)

Container Utilization: If vendor books CY loads below the minimum utilization or over the payload limit

Booked Volume for every carrier: The total booked volume by the 3PL in a month from a certain carrier for the Retailer, which is attained from a spreadsheet compiled by the 3PL.

Cargo Delivery time: The exact time that the truck arrives at the port with certain cargo, which is got via Port's System.

Carrier Booking Form Confirmation: After the 3PL sends the carrier booking form, the carrier must inform the 3PL of how much space it is able to offer and confirm.

Carrier Booking Form: Also referred to as Carrier Shipment Order (SO), this is the formal booking form that the 3PL sends to the carriers. The submission of the carrier SO initiates the carrier booking process.

Carrier Forecast: Approximately 14 days prior to vessel sailing date, the 3PL sends to the carrier a forecast of the volume that it will book from the carrier in the carrier booking form.

CFS (Container Freight Station) Closing Time: The time that cargo can no longer be received at the container freight station, specifically in this project, at the 3PL's warehouse.

Commercial Invoice: A commercial invoice is a document used in foreign trade. It is used as a customs declaration provided by the person or corporation that is exporting an item across international borders. Although there is no standard format, the document must include a few specific pieces of information such as the parties involved in the shipping transaction, the goods being transported, the country of manufacture, and the Harmonized System codes for those goods. A commercial invoice must also include a statement certifying that the invoice is true, and a signature. A commercial invoice is primarily used to calculate tariffs.

Confirmed Forecast Volume: After the 3PL sends the forecast to the carrier 14 days before vessel sailing, carrier will confirm the forecast space; this is the confirmed volume, which is got via email between the 3PL and the Carrier.

Cubic Meter Ratio: Cubic Meter Ratio (CBM Ratio) is the actual amount of space that the cargo uses in the container, compared to the maximum CBM that can fit in the container.

CY (Container Yard) Closing time: The time that CY closes at the port, after which no more cargoes for a certain vessel departure can enter the port. The information is attained from GT Nexus.

Delivered Cargo Volume: The volume that 3PL delivered from its warehouse to the port.

Draft FCR Creation Date: A Draft FCR form is filled out in GT Nexus. When it is saved in GT Nexus the date is recorded.

Electronic Data Interchange: Electronic Data Interchange (EDI) is the verification of the quantity of orders in the database system.

Estimated Time of Arrival: Estimated Time of Arrival (ETA) is the approximate time the cargo will reach its destination after leaving the warehouse.

ETD: "Estimated Time of Departure" The approximate date that the vessel departs from the terminal port

First-In First-Out Strategy: First-In First-Out Strategy (FIFO) ensures that the first product that enters the warehouse is also the first that leaves, so the product does not depreciate within the warehouse.

Forty Equivalent Units/Twenty Equivalent Units: Forty Equivalent Units and Twenty Equivalent Units (FEUs/TEUs) are the different types of containers the 3PL uses to transport the cargo. FEUs are forty feet long and TEUs are twenty feet long.

Inspection Cert (if applicable): Required usually for import of industrial equipment, meat products, and perishable merchandise, it certifies that the item meets the required specifications

and was in good condition and correct quantity when it left the port of departure. Also called inspection certificate or inspection report.

Internet System Consortium: Internet System Consortium (ISC) manages firms order receipts by paperwork and physical count.

ISF : “Importer Security Filing” A document that U.S. customs specifically requires for the cargo to be delivered. Twelve data type are required, ten of which are from the vendors, and the remainder from the carriers. The form must be received by U.S. customs prior to the cargo departing the country of origin. The Retailer formally submits the form one day prior to vessel sailing date, but the 3PL must collect the data from the vendors and carriers and deliver it to the Retailer 3 days before vessel sailing date.

ISF submission Date: The Retailer records the date that the ISF form is received by the Retailer from the 3PL.

Load Plan: The Load Plan is an electronic system used to ensure that the maximum amount of CBMs is used in the containers by planning out the optimal placing of the cargo.

LSD: “Latest Ship Date” The deadline for the purchase order to depart the country of origin

Manifest: See packing list

FCR: The Forwarder's Cargo Receipt provides validation that a vendor has delivered the specified cargo and all related documents to the designated receiver. It also enables the vendor to collect payment for the cargo from the clients’ bank as defined in the Letter of Credit (L/C).

Material Safety Data Sheet (if applicable): A material safety data sheet (MSDS) is a form with data regarding the properties of a particular substance. An important component of product stewardship and workplace safety, it is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures. MSDS formats can vary from source to source within a country depending on national requirements.

Minimum Quantity Commitment (MQC): The minimum volume that the Retailer promises to every carrier on a yearly basis.

Packing List: A shipping list, packing list, packing slip (also known as a bill of parcel, unpacking note, packaging slip, (delivery) docket, delivery list, or customer receipt), is a shipping document that accompanies delivery packages, usually inside an attached shipping pouch or inside the package itself. It commonly includes an itemized detail of the package contents and does not include customer pricing. It serves to inform all parties, including transport agencies, government authorities, and customers, about the contents of the package. It helps them deal with the package accordingly.

Packing List Data:

Buyer

Notify Party

Origin Port

Ultimate Consignee
Letter of Credit
Payment terms
Freight Terms
Destination Warehouse
Freight Collect

Affiliate Po's
SKU's
Brand
Items
Description
Quantity (Units)
Cartons
Net Weight (KG)
Total Net Weight (KG)
Gross Weight (KG)
Total Gross Weight (Kg)
CBM
Total CBM

LCL Shipment
Vessel/Voyage
On Board Date
Origin Port
Destination Port
Container/ Seat no.
Freight Collect
Country of Origin

Pallet Paper: Keeps track of the date the cargo comes in and when compared to the WMS makes it easy to figure out which cargo to pull.

Peak season: The time of the year where the demand for container space is high.

Registrant's first Shipping Order submission Date: Every Shipping Order of the Retailer Vendors is logged on GT Nexus. A Vendor submits a Shipping Order Form on GT Nexus. Once this form is submitted GT Nexus records the date. Simply by selecting the first recorded Shipping Order ever submitted by a vendor, the date of the registrants first Shipping Order is captured.

Registrants first Shipping Order Last Shipment Date: On the Shipping Order Form is the LSD date. By selecting the first Shipping Order Form of a vendor, the date of the first Shipping Order LSD is captured.

Registration Date: Every Retailer's Vendor must be registered on GT Nexus in order to use the system. The Vendor sends the 3PL the information necessary for registration and the 3PL inputs

the registration information into the correct form on the GT Nexus system. When the 3PL saves that form on GT Nexus, the date is recorded. From the recorded date the creation of registration date is captured.

Shipping Order confirmation Date: After a Shipping Order Form is submitted to GT Nexus, the 3PL releases the Shipping Order. GT Nexus captures the date that the Shipping Order is released.

Shipping Order submission Date: Every Shipping Order of the Retailer's vendors is logged on GT Nexus. A Vendor submits a Shipping Order Form on GT Nexus. Once this form is submitted GT Nexus records the date.

Statement of Origin: A Manufacturer's Certificate of Origin (MCO), also known as a Manufacturer's Statement of Origin (MSO), is a specified document certifying the country of origin of the merchandise required by certain foreign countries for tariff purposes, it sometimes requires the signature of the consulate of the country to which it is destined. A Certificate of Origin is employed to certify that a good being exported either from the United States into Canada or Mexico or from Canada or Mexico into the United States qualifies as an originating good for purposes of preferential tariff treatment under the North American Free Trade Agreement (NAFTA).

Systems Application and Products in Data Processing: Systems Application and Products in Data Processing (SAP) is an electronic system that informs the employees of any open warehousing space. When it is time to offload the product, it tells the employees exactly where the product is within in the warehouse. The system also instructs the 3PL to move products that have been in storage for a significant amount of time to the front of the warehouse so the older product can be offloaded before the new ones.

Vendor Booking Exception Report Data:

Vendor
PO No.
Item NO.
Booking Date
Ready Date
Origin
CTNS
PCS
CBM
KGS
Exception Code
Exception Description

Vendor Booking Report Data: Received daily by the retailer

Bkg. No.
Vendor
PO No.

Item No. Ship Date
Ready Date
Origin
CTNS (Container)
PCS
CBM (Cubic Meters)
KGS
Vessel/ Voyage

Vendor Document Upload Date: The Vendors documents are uploaded onto GT Nexus. GT Nexus records the date of the upload.

Vendor Training Date: The Vendor Training Date is the date that the 3PL either holds a seminar or sends the vendor educational material regarding GT Nexus and the 3PL standard processes. The attendees of each seminar are recorded on GT Nexus as well as the date of the seminar. For Non-seminar vendor training the 3PL must record the date that the educational materials are sent to the vendor.

Vessel Departure Date: Each Shipping Order is eventually shipped. The Shipping date is recorded on GT Nexus.

Warehouse Management System: Warehouse Management System (WMS) is an electronic database that controls the cargo placement within the warehouse. The WMS tracks shipping, receiving, product placement within the warehouse, and picking specific products from within the warehouse.

QUESTION & ANSWER

Q & A with the 3PL

How Often Will the 3PL Report to the Retailer, and what does the 3PL Report?

We have to report about the situation of the cargo every day and we send them a weekly report every weekend.

What costs are fixed and which are variable?

Fixed Costs: Warehouse Rent and Cost per Container are fixed so they will not vary according to cargo. Therefore, in order to reduce the cost of delivery, the 3PL must optimize the capacity of each container. We can test this by measuring the CBM ratio of the containers through the load plan.

Variable Costs: Container Freight Station (CFS) per cubic meter, labeling per cubic meter

How does the Warehouse Management System work?

The Warehouse Management System is made of dialogue boxes that differentiate the different types of cargo into the scheme. The cargo enters the WMS when the cargo is offloaded into the warehouse and leaves the system when the cargo leaves the warehouse. After that it is entered into the GT Nexus system.

What is the 3PL's Load Plan?

The load plan is a list of cargo and the information of that cargo, which will be loaded into the container. Workers will know what will be loaded into the container. The 3PL load plan document has the following information:

- The carrier
- Vessel and Voyage
- Estimated Time of Departure
- Estimated Time of Arrival
- Shipping Instruction Cutoff
- CY Closing
- Voucher Cutoff
- Carrier Booking
- Container Size

Will the Loading Process Cause Delay?

No, the warehouse will be informed when the cargo leaves and the employees in the warehouse forecast the date of their loading. The 3PL makes the load plan according to the CFS closing date and then begin to load one to two days ahead of schedule.

If there is too much cargo that needs to be loaded at once, may it cause delay?

If there is too much cargo that needs to be loaded, the 3PL will load some of them earlier to make sure that there is no delay for the shipment.

Can the Loading Process Cause Damage to the Cargo?

Cargo damage has little probability of happening during the loading process. They 3PL office will notify the employees of the requirements of the cargo. There are also supervisors to assure that nothing goes wrong during the operation.

What May Cause Cargo Damage of Inventory in the Warehouse and how does the 3PL Solve This?

Usually the cargo damage is caused by natural factors, which cannot be precluded. The damage will be found when they are loaded onto the containers. If they can solve them while loading, for example, repack the cargo with tape, they will solve them. Otherwise, they will report to ask for special operations that can solve the problem.

How does the 3PL Find and Solve Cargo Divided Error?

We divide cargo according to the purchase order number. If there is a cargo dividing error, the number of goods not matching the number in the shipping order. There are supervisors in the warehouse to check whether the two numbers match or not. Once workers find that the numbers do not match, the employees will solve it.

What Documents Will the Employees Have to Handle in the Warehouse?

The document is called the pallet paper, which they put on the carton and is made according to the Shipping Order from the vendor. The SO, PO, Custom No., Date, Destination, and a number from the Warehouse Management System for the Retailer are put onto this paper. The following picture shows the document that the 3PL puts onto the separate pallets for the Retailer specifically:



What happens if the Information in the Document is wrong?

Workers cannot locate cargo in the warehouse if the document is wrong. It is a serious mistake and is not allowed to happen. People involved in this sequence will be very careful and there are supervisors there to check all of the information.

How difficult can it be to keep track of specifics?

Every individual product has its own item number to represent that product. The product order and item number will be unique every time. It is like an SAP system in that it will tell the employee where they may find the product at any time. Different customers have different requirements and that is how the 3PL decides to use which system; SAP, WMS, etc.

Does the Retailer have KPIs separated into Green/Amber/Red like the Publisher?

Most of the KPIs are separated the same way, however some of the KPIs must be at 100% success rate to be considered positive.

Are There Strategies to Place the Cargo?

Yes, there are strategies when it comes to placing the cargo in the warehouse. For example, the cargo, which will be loaded onto the trucks first is put near an aisle or on a low rack.

How does The Retailer separate KPIs?

Right now the Retailer has around fifteen total KPIs, but they have started with five. Those major KPIs are PO/EDI Exceptional Management, Shipping on time Management, Vendor Management, Documents Management, and EDC Management.

Q & A Inventory Management with Mr. Sun

How long will the cargo information be stored in the Warehouse Management System after cargo delivery?

The WMS will preserve the information of the cargo. The purchase order will be updated according to the status of the cargo to reflect the situation of the cargo at different times.

We know that the Retailer shares a warehouse with other companies. In the peak season, how does the 3PL prevent a situation where the 3PL does not have enough space in the warehouse for the Retailer?

Inventory plans are made by the Retailer and the 3PL is not involved. The Retailer will have a safe stock and replenish according to the historical record of sales, present sales, and inventory and forecast.

How does the 3PL report exceptions? Is it done by purchase order or per exception? Before the 3PL knows how to handle cargo with an exception, do they store it or send it back to the vendor?

The 3PL reports exceptions by the purchase order. Before the 3PL knows how to handle the cargo, the cargo will be stored in the warehouse temporarily until the exception is resolved.

Can the Warehouse Management System compare the information in the system with the information in the shipping orders automatically to make sure that the information is correct?

The shipping order is created by the purchase order from GT Nexus. The information in the WMS is created according to the actual information in the purchase order of the cargo that the 3PL receives and dispatches. The information in the WMS may differentiate from the information in the purchase order. The GT Nexus and the WMS are two different types of systems.

Do any of the exceptions take longer to deal with? What kind of exceptions can be dealt with in the warehouse?

Handling the physical cargo, such as damaged cartons and filling in missing quantity, is what will be done in the warehouse mostly. It will take a very long time to deal with exceptions related to customs, such as the returning of goods.

When the cargo arrives in the US distribution center and they find that the cargo has something wrong with it, such as wrong quantity, wrong destination, or wrong loading results, does the 3PL have any codes for these exceptions?

There is no exception code for this. They regard this situation as a kind of service failure and e-mail that to the Retailer to figure out a solution.

The shipping order will be sent to the 3PL before the cargo arrives in the 3PL, but they also receive a paperwork shipping order with the cargo. Which one will be copied into the WMS?

The 3PL will update the information according to the actual cargo they receive after comparing it with the shipping order. Some of the information may differentiate from the information on the shipping order, such as volume.

How does the Retailer deal with service failures? Do they assort them? Can we have a sample service failure?

Usually The Retailer handles the service failures in the model of a case-by-case study. There is no assortment of the service failures. The key to handling them is to figure out the root of the cause to improve the process and avoid similar failures.

How does the 3PL make the load plan? How do they make sure the cargo is ready to be dispatched?

The load plan is created according to the cargo received or going to be received. Cargo that has the same destination and close shipping windows will be put in the same container.

The cargo will be dispatched when there is space.

How does the 3PL tell whether it is the 3PL's responsibility or the vendor's responsibility when there is a delay caused by untimely resolutions to the exceptions? Does the 3PL have a report for this area?

The daily communication between the Retailer and the 3PL is based on EXCEPTIONAL REPORT/CASES. It is easy to tell whose responsibility it is from a view of the whole process and the information flow.

Is the information in the WMS the same as the information on the pallet paper? What kind of differences between the information in the WMS and the original shipping order can be tolerated?

If there is a difference between the WMS and original shipping order, communication and resolutions will be needed. All of the information in the WMS is created according to the actual situation of the cargo.

The weight is another factor that affects the cost of delivery. Should the 3PL take the weight of the container into consideration at the same time that the 3PL considers volume used ratio?

The cost of each container is fixed unless the container is overweight. The 3PL will take weight and volume into consideration while they are creating the load plan. The container cannot be overweight and also a partial shipment.