

Development of a supplier and purchase order management product/service under the 4PL logistics concept: a case study

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Abstract: Supply chain starts with a demand arisen and ends with material transport and delivery at its final destination. With this in mind, most of manufacturing, processors or distribution companies of consumer goods, spare parts and components for production, processing and finished goods, within national or international markets, may not have information and control over its supply chain performance. This article presents concept and logistics models evolution, purchase order and international supplier management, control tower and its logistics information systems. This also presents a real process implementation for a global high tech manufacturer company.

Keywords: logistics, purchase order, supplier, control tower, information systems, transport.

1. Introduction

According to *Global Investment & Business Center United States* (2008), logistics management is the part of supply chain, which plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer and legal requirements.

Logistics control composes the central part of supply chain management. During an acquisition process, the logistics control shall be applied from a demand arisen, supplier management, production planning and control, transport, information flow, arrival at production plant or selling point, delivery to final customer and reverse if necessary (Reverse Logistics).

Due to operation complexity, many of above-mentioned processes tends to be handed over by product, components and raw material manufacturing, processing or distribution companies to third parties. According to Moura (2006), up to the 70s all logistics activities were executed by manufacturer's internal resources, designated First Party Logistics (1PL). Within this scenario, the organizations had all the know-how, infrastructure, vehicle fleet and warehouses, exception being made for long international transportation traditionally executed by sea freight carriers from long ago.

The outsourcing process started being largely utilized in the beginning of the 80s, especially with specialized logistics providers for very peculiar and specific activities out of manufacturer's core business, unlike the insourcing process, where the hiring company owns these resources.

Still according to Moura (2006), the application of this concept is known as Second Party Logistics (2PL)

or Logistics Service Provider (LSP). This concept was created to empower cost reduction programs within the organization. Although logistics performance, management and control was still an internal matter.

From the 90s a new integrated logistics concept was created and called Third Party Logistics (3PL). On this model, some benefits and personalized services were applied. Such as, integrated logistics services solutions, increase in information management level, reporting and logistics solutions specialists in transportation and warehousing.

With the natural logistics evolution, as per Figure 1, meaning higher number of tasks and increase of supply chain complexity, better ways to manage supply chain were needed. According to Jensen (2010), initially Forth Party Logistics (4PL) was a brand, becoming an ordinary term in every business related literature; the 4PL concept consists of a company or organization, which develops specific activities within the supply chain. According to Win (2010) apud Jensen (2010), the updated concept of a 4PL provider is an independent, singularly accountable, non-asset based integrator of clients supply and demand chains. The 4PL's role is to implement and manage a value creating business solution through control of time and place utilities and influence on form and possession utilities within the client organization. Performance and success of the 4PL's intervention is measured as a function of value creation within the client organization. As a conclusion, this service would best suit a neutral logistics partner in the supply chain.

A purchase order and transport management system, capable of EDI (Electronic Data Interchange) integration, as

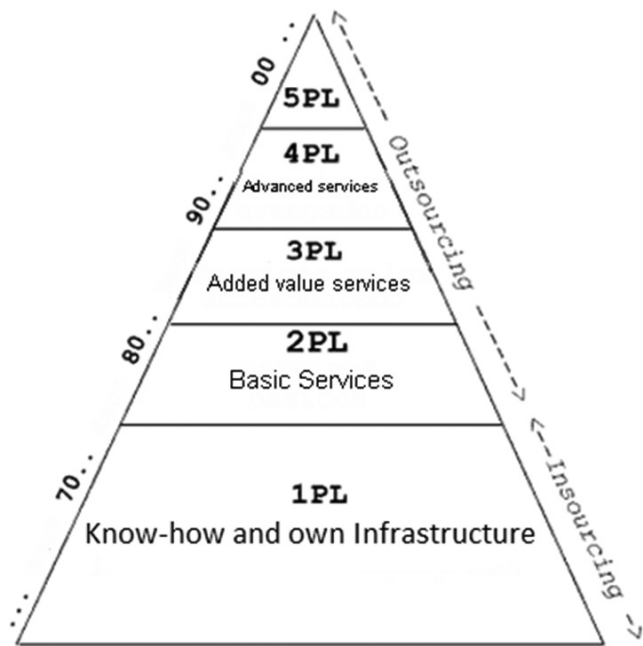


Figure 1. Logistics Outsourcing Evolution (Moura). Translation: Diogo Merguizo de Vasconcelos.

well as the application of key performance indicators (KPI) to measure supplier's and carrier's performance, enhance information flow control and agility within the supply chain is part of this context.

Data gathering and management in a daily operational report for operational order/shipment follow up as well as management reports, aiming at strategic decision-making.

This partner reward can be done in several ways and agreed previously, such as, administration fee by allocated order, percentage upon saved amount by the client on the logistics spend, monthly administration fee and others agreed between both parties. In this case study, a percentage upon amount saved by the client on the logistics spend was the methodology used.

1.1. Scop

This service is applied to all manufacturing, processors or distribution companies of consumer goods, spare parts and components for production, processing and finished goods, within national or international markets; preferably with moderate to high added value or critical products. Can be applied to internal market, however, is designed to support and manage complex supply chain, involving a high number of suppliers and purchase orders.

This service is not applicable to commodities companies. It is not recommended for low transactions volume or low added value products. It is also not recommended for over sized shipments, where special handling and requirements are needed.

2. Value proposition

Due to supplier and purchase order management under 4PL model service complexity, a clear understanding of the proposed service, benefits and challenges on both sides during implementation period and execution, as well as expectations alignment and business needs, are very important. The alignment and involvement of both companies senior management is also essential to the program success, as well as value propositions workshops involving medium management and operational staff from both companies.

The 4PL provider shall have access to strategic information from its client such as: global logistics spend, actual logistics scope, suppliers, logistics service providers (LSP) 3PL/2PL, cost split per part/unit, PO load and other specific information.

Therefore, the party contracting the service shall understand all risks involved and advantages of having a 4PL provider and the need of an effective partnership between them.

2.1. "As Is" situation analysis and solutions proposal

As service value proposition first step, the necessary study to define the best solution to satisfy contractor's needs, the "As Is" situation analysis methodology is recommended to be applied.

The "As Is" situation analysis aims to map customer logistics activities in a macro, but precise way, therefore mapping today's logistics chain "photograph" being as it is.

Points to be considered during the analysis:

- Number of plants or operative warehouses (importers or domestic activity related);
- Country of origin and percentage of shipments/orders from these countries;
- Quantity of active and inactive suppliers;
- Percentage of shipments/orders from these suppliers;
- Annual shipped volume;
- Percentage of shipped volume per country and/or supplier;
- Total logistics spend;
- Fragmented logistics spend;
- Operational logistics flow;
- Logistics partners involved in the process (3PL);
- Transit times and agreed services with 3PL provider.

Additional points:

- Average stock material cost;
- Stock material cycle.

Feasibility and scope proposition calculations of service to be provided, or solutions proposed, (based on customer's needs on supplier and order management) are done based upon these analysis.

2.2. Purchase order management

The purchase order is normally issued by importer/buyer for material/parts acquisition for manufacturing, processing or distribution of consumer goods, spare parts and components for the production of consumer goods or processing and other products. This process can also be called the replenishment process.

According to Sabri, Gupta and Beitler (2007) the replenishment philosophy is based on two distinct systems: replenishment system pull-driven and replenishment system push-driven.

The former is based on demand itself, while the latter, push-driven, is a forecast demand driven.

For instance - suppliers used to work on a just-in-time method or who have a low manufacturing lead-time, could fit in a pull-driven system, while suppliers with a larger manufacturing lead-time and more stables could be inserted on a push-driven system.

Considering that purchase order shall be issued by the contractor company, via an ERP (Enterprise Resource Planning) system, to the 4PL provider system; on implementation phase, some parameters can be set in the purchase order transactional system, so this contains all information regarding lead times for each part number of required parts, transit times from origin ports and destinations, suppliers and logistics providers contact lists and agreed rates.

Based upon these configurations the system shall execute pre-defined calculations for collection and dispatches according to the order due date on the customer's site and/or warehouse, defining this way expected collection and departure dates.

The complete purchase order, including expected collection date as per agreed lead-times, could be ready to be sent to supplier, who should be able to receive it via EDI (Electronic Data Interchange).

An internet web portal can be made available for the orders follow up by supplier, or the customer, who can follow it in real time.

2.3. Supplier management

This topic has no intention to explore supplier's procurement. On the 4PL service and implementation model concept presented in this article, it is understood that the customer's purchase department or procurement will execute this task, which could be considered one of the business strategies.

Product quality inspections and technical specifications is also out of scope. The 4PL provider can be responsible for the LSP management, in regards to origin collections, before departure for physical boxes inspections to avoid shipments of damaged material.

Therefore, the management and follow-up of delivery dates by suppliers, deadlines and quantity as per the purchase order will be presented in this article.

The active follow up and relationship between suppliers and buyers on logistics related matters can be executed by 4PL logistics planners. This follow up can canalize information regarding collection dates, material collection details and PO quantities.

Once chronogram is established with appropriate deadlines, order steps and suppliers; KPI (Key Performance Indicators) can also be developed for process measure. This step can also be called supplier's performance measure.

3. Logistics control tower

According to the consulting company Capgemini Consulting (2011), supply chain control towers, are cross-divisional organizations with system integrated "information hubs" that provide Supply Chain Visibility. These hubs are used for gathering and distributing information, and allow people trained to use these visibility capabilities to detect and act on risks or opportunities more quickly. Control Towers are typically set-up to monitor, measure, manage transport and manage inventory movements across the supply chain. Supporting systematic information to help in the decision-making activities.

Figure 2 shows the three pillars of a logistics control tower. Which are people, process and technology.

When fully operating, a logistics control tower is responsible for all purchase orders and supplier management in the 4PL logistics concept.

3.1. Process

Well-defined processes are the base for a consistent and robust operation, not only on logistics related activities. According to Chase, Jacobs and Aquiliano (2004), a process is any organizational part which transforms entries into outcomes with added value for the organization.

The processes are to be well defined, documented and distributed to all involved parties through a SOP (Standard Operational Procedures). The SOP defines exactly what needs to be done, by who and when for each execution step of the process.

3.2. Technology

Technology is the main enabler for the correct function of a logistics control tower, while several information systems must be connected in order to centralize all logistics related activities information in one central location.

Information can be used to monitor, audit and for decision-making. Through technology, order and transport management systems receive purchase orders and process

shipments. This system can be used to follow up with suppliers, event follow up and costs too.

Proactive purchase order and shipment monitoring can also be developed and implemented systematically.

Regarding costs, it is possible to generate reports for cost follow up on each acquired product; fluctuation and category break down, generating comparison graphics to help on strategic decision making.

Figure 3 shows the systemic integration of a logistics control tower.

3.3. Human resources

Well trained and motivated personnel complete the third pillar of a logistics control tower.

4. Information systems

Logistics is in constant mutation. Many changes have happened in the last decades in this field and the information systems play a key role in these changes. The precise, real time and low cost availability of information flow has taken supply chain management to a higher quality level.

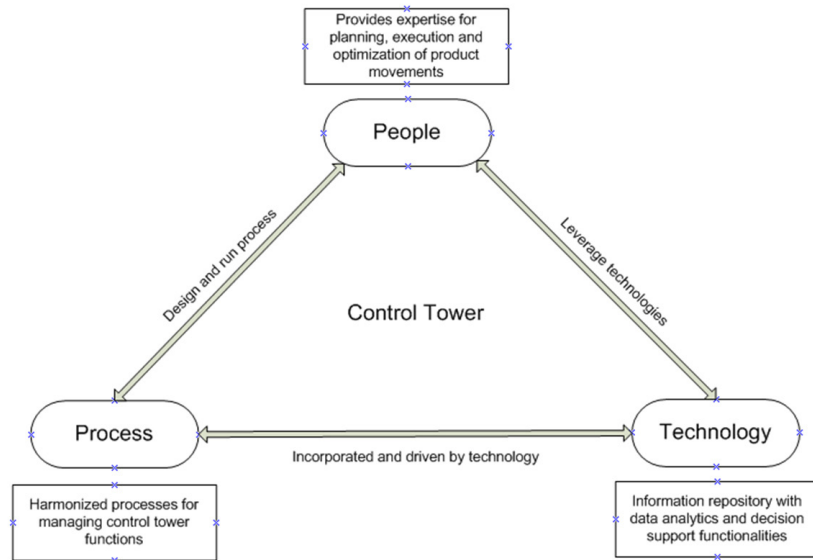


Figure 2. Three Pillars of Control Towers (adapted from Capgemini Consulting, 2011).

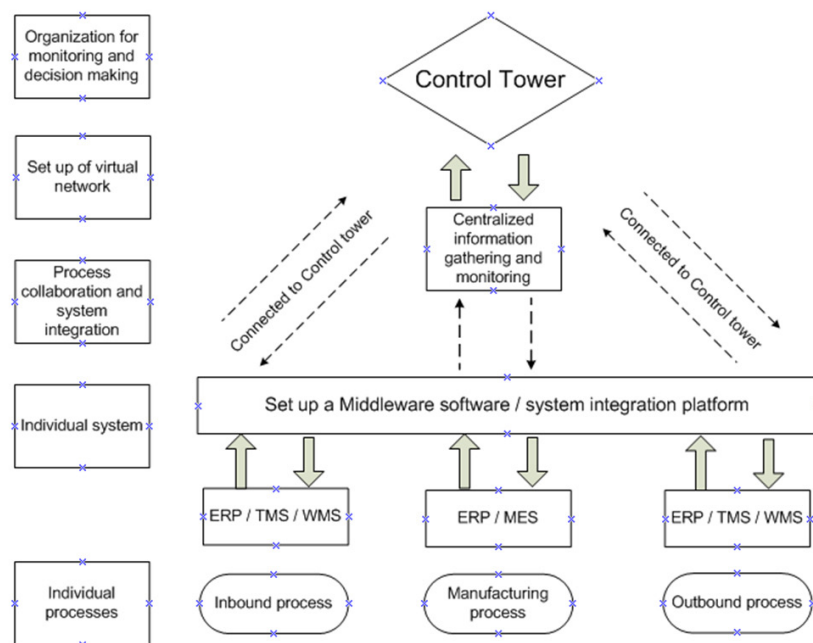


Figure 3. Control Tower Technology Approach (adapted from Capgemini Consulting, 2011).

According to Voortman (2004), a logistics information system is the link between computerized logistics activities, responsible for the connection point, including purchase order, purchasing, demand planning, transportation, warehousing, distribution, payment and final delivery information.

With the advent of improved technologies on logistics information systems, old fashion practices are being reviewed, processes redesigned, allowing the re-engineering of the logistics process to focus on providing a better quality service to customers and optimize operational process.

Supplier and purchase order management under 4PL logistics concept service is only feasible due to this technological development. Technology being one of the main pillars for this service being executed in an efficient manner.

4.1. ERP (*Enterprise Resource Planning*)

According to Severo Filho (2006), ERP system is a software architecture which streamlines the department information flow within the organization, such as: manufacturing, logistics, finance, human resources; operating under a single consolidated data base for the business operational information flow.

By consolidating all business information in a single database, the great benefit is the need to input a data only once, making this data available whenever needed.

On the proposed model, the purchase order load is issued by the customer's ERP and sent to the 4PL provider, so this party is able to have the same level of detailed information as its customer. This communication is streamlined through an EDI connection.

4.2. Order Management System

The order management system shall be able to receive and transmit information through EDI, store PO information, be capable of calculating dates and quantities, and has a work interface for operators.

With the proposed model, the system operations start with the configuration of the main collection zones and departures. Followed by a supplier master file and allocation of these suppliers on each specific collection and departure zones. The Figure 4 shows the process flow.

The flowchart on Figure 5 shows the receiving process, the PO loading processing, pre-defined calculations on system configuration and PO forwarding to each supplier via EDI or automated e-mail, as well as the PO acceptance process or not by the supplier.

For example, when a certain number of days (considering X as number of days) from readiness date confirmation availability is due, and that X should be agreed by all stakeholders during the implementation process, the system shall trigger an alert to all suppliers informing estimated collection date, asking supplier to reconfirm quantities and actual material readiness date.

In case supplier does not confirm readiness date information, confirm a readiness date information which does not attend initial material delivery requirements or does not attend requested initial quantities, the buyer can be pro-actively advised before ultimate readiness date deadline expires, thus causing more problems due to lack of material availability as per initial request.

Figure 6 shows an example of the order management system flow, notification process, readiness date and quantities confirmation process.

4.3. Transport Management System (TMS)

According to Palevich (2012), supply chain management systems are divided into Supply Chain Planning (SCP) and Supply Chain Execution (SCE) system. The Transport Management System (TMS) belongs to SCE category. Its duty is to move freight throughout supply chain.

The main functions of a transport management system are:

- Order Consolidation – The order management system identifies which POs can be shipped and the transport management system group these orders to generate a consolidated transport order;

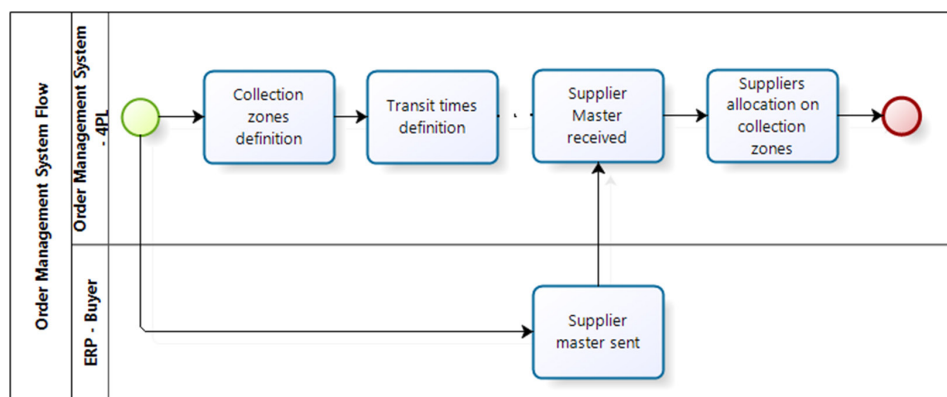


Figure 4. Order Management System Flow – System configuration.

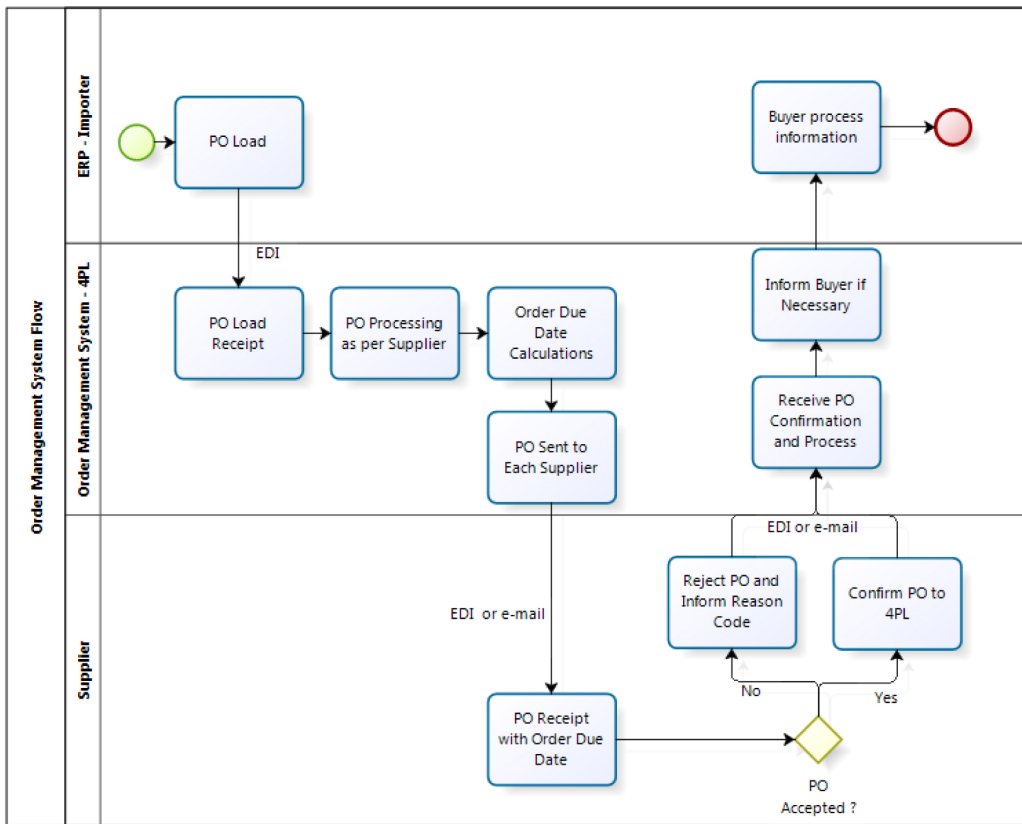


Figure 5. Order Management System Flow – Order Receipt and Acknowledgement process flow.

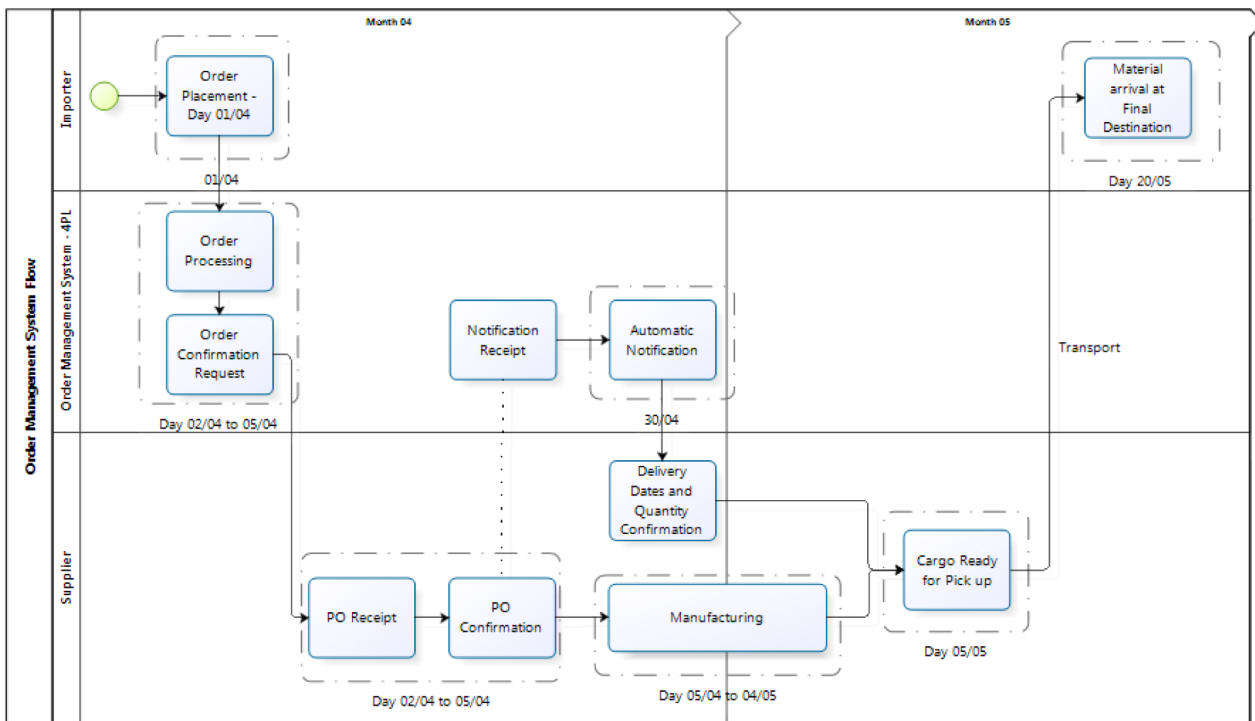


Figure 6. Order Management System Flow – Notification process, readiness date and quantity confirmation process.

- Transport Order – The TMS is capable of creating and managing transport orders;
- 3PL Rates Storage – This function allows service level versus cost comparison between different providers for one transport route, allowing the selection of the most cost effective service provider;
- Event and Exception Management – To manage events and exceptions on transport status execution;
- Key Performance Indicators – Management reports issuance measuring 3PL providers performance;
- Advanced Shipping Notice (ASN) – Advanced shipping notice containing real quantity information and actual collection date.

Figure 7 shows the transport management system flow.

4.4. Reports

On this business case study, reports are divided in two main categories, they are: management reports and daily logistic follow up reports.

The daily logistics follow up reports are used to keep the tracking and follow up of the order acquisition process - showing if the supplier confirmed a certain order, if this order will be delivered as planned, if the quantities were correctly confirmed and the shipment and arrival date.

The management reports provide consolidated information to support strategic decision-making. Examples of management reports:

- Supplier’s Performance Report;
- LSP Performance Report;
- Invoicing Acklodgement Report;
- Volume Report.

5. Implementation/Service application

An implementation for an Electronic Manufacturing Services company (EMS) - based in St. Petersburg, Florida – United States of America, with approximately 60 locations (offices and factories), presented in 25 countries with approximately 100 thousand employees worldwide - will be demonstrated in this article.

The service was implemented in the North West Europe region involving the United Kingdom and Northern Ireland, Denmark, Finland and Sweden, where a logistics control tower was set up in England to support a customer inbound operations and purchase order management.

Before the initial scope analysis and “as is” process mapping, value assessment meetings took place aiming at the appropriate understanding of project scope and customer expectations alignment.

The real identity of involved parties will be preserved due to confidentiality agreements.

Therefore, it is defined that:

J – Customer – EMS Company

LL – 4PL provider

E – Logistics service provider 3PL 1

D – Logistics service provider 3PL 2

K – Logistics service provider 3PL 3

5.1. Implementation Project

An implementation team was appointed to work on the tasks execution as per the project plan on all sides, customer J, 4PL LL and 3PLs. The project was built based on the

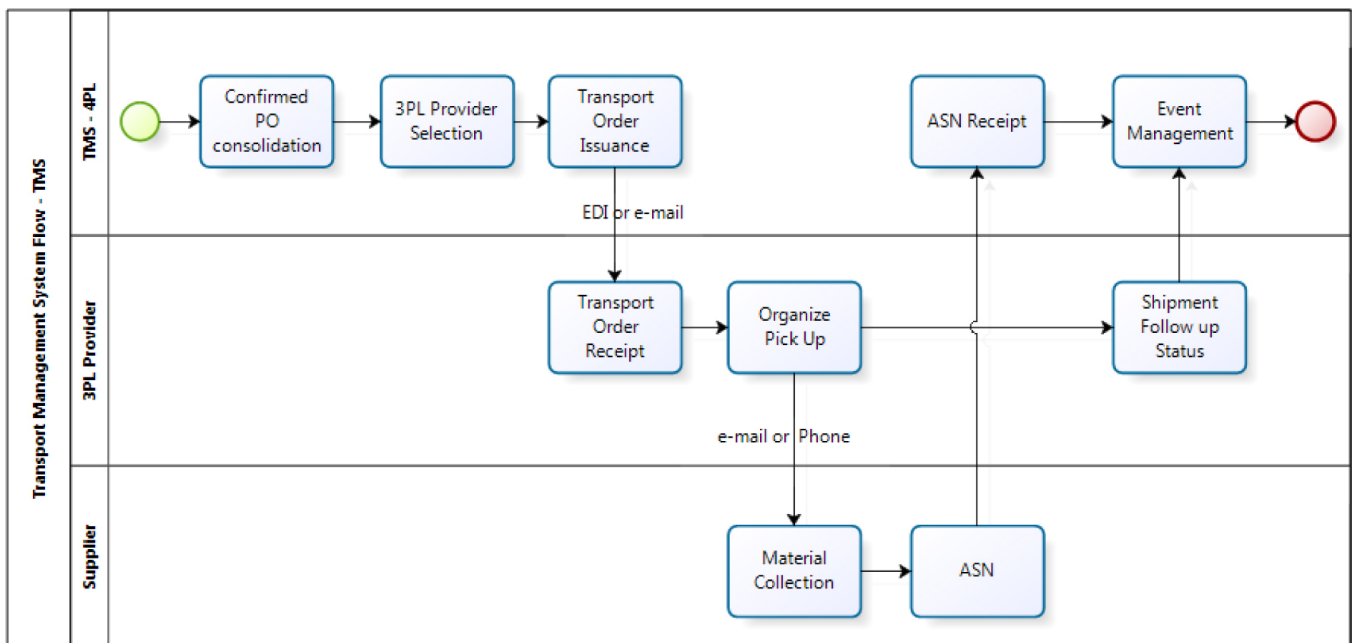


Figure 7. Transport management system flow chart (TMS) – Transport Order Issuance.

most common project management methodology, such as PMI™ and *Prince2*™.

Main deliverables for the project were:

- Process Mapping;
- Logistics Control Tower set up;
- System Implementation;
- SOP with Logistics Parties;
- Trainings;
- Pilot test;
- Go Live.

5.2. Logistics control tower

Studies to define the most appropriate location were made considering structure costs versus its location, human resources availability versus costs, living costs and geographical location.

The appointed location was a mid size city on South West England. The city holds one of the best universities of the United Kingdom, which helped on the Human Resources structure.

A low cost of living compared with bigger centers and privileged geographical position, surrounded by motorways with easy access to bigger centers such as London city, was also a plus.

The space renting process took approximately 15 days and ten more days to set up the office desks and working stations.

5.3. Systems

The 4PL provider LL developed its own system to manage orders and transportation, systems screens and modus operandi shall not be revealed due to confidentiality matters, however the logic demonstrated on topics 4.2 and 4.3 are applied to this system.

The system configuration took approximately 20 days, the testing phase ten days in a total of 30 days to its complete set up.

Once vendors were defined by locations (majority Asia and United States of America) a table with names, codes and locations of each vendor were inserted into the system, referring to the base for transit time parameters going to United Kingdom. A table with item codes by supplier and necessary production lead times was inserted too.

Once purchase orders were sent to suppliers/vendors an internet web page was also made available to them, so they could see and confirm their orders with no need for additional system implementation in every supplier around the world. Only internet access was required.

The following parameters were also established in the system:

- Up to five percent over original PO as over shipment, meaning extra quantities accepted of original shipped PO by supplier;

- Up to five percent of under shipment, meaning less parts quantities accepted of original shipped PO by supplier;
- Automated alert trigger by e-mail to 4PL in case confirmed quantities by suppliers were over five percent from the original purchase order;
- Automated alert trigger by e-mail to 4PL in case confirmed quantities by suppliers were under five percent from the original purchase order;
- Automated alert trigger by e-mail to supplier five days before the required collection date;
- Automated alert trigger by e-mail to supplier two days before required collection date, in case order not confirmed by supplier on web page;
- Automated alert trigger by e-mail to 4PL confirming order confirmation by supplier;
- Automated alert trigger by e-mail to 4PL in case of confirmed date of order availability differs from collection confirmed date from system's calculation.

5.4. Logistics partners

Customer J previously nominated the 3PL providers. Three 3PL providers were appointed to execute collection and transportation, the 4PL provider LL was appointed to manage these 3PL, issuing transport orders to the most cost effective provider for each route in every shipment.

SOP (*Standard Operational Procedures*) were issued to guide and standardize operations procedures between the 4PL provider and 3PL providers. EDI connections were also set up to streamline communication between 4PL LL and 3PLs who support it. In the meantime, customer J informed suppliers about the new work methodology.

5.5. Employees, customer and Supplier's training

The 4PL provider employees were the first to receive training on the new process, as they also helped training the other parties - such as providing training and being the point of contact for over two hundred suppliers.

The employee's training started right after the hiring process, together with system implementation, as office space and physical structure were set up already. Implementation team and local human resources department provided training to employees.

Right after customer J's purchase department was trained by 4PL provider in just one session. 3PL training was also very simple as there was no need to access any kind of system and they would receive the transport orders from 4PL systematically or via e-mail in a most common electronic spreadsheet.

Hence, executing collection, transporting and providing 4PL with accurate shipment status.

Last, but not least, the training for the over 200 suppliers took place in approximately 40 days. Obviously, the pilot

suppliers were trained with priority before the rest. These training sessions were done via conference call and online access via web. Suppliers were split in daily sessions with five suppliers in each session.

The main challenges during the supplier's training were difficulties to conciliate agendas, time differences, abstentions and language barriers.

5.6. Pilot and tests

The pilot phase lasted three months until completion. Five suppliers were chosen for this phase, customer J defined the criteria, being:

- An intercompany supplier;
- A high order volume supplier, meaning above average;
- A low order volume supplier, meaning below average;

- A problematic and hard to manage supplier;
- A cooperative and easy to manage supplier.

On the day one of the testing phase, the PO load was sent via EDI to 4PL provider's system. The system then processed the purchase order items according to pre-defined parameters.

The purchase orders were then sent to all suppliers via automated e-mail, as per a contact list, by supplier, made available by customer J.

The suppliers had five days to acknowledge the orders via web portal on the internet for each received purchase order, as per the training received.

During this pilot phase, the manufacturing lead times for the items involved ranged from zero to 30.

For purchase orders with immediate availability (or less than 25 days) suppliers were told to go to the web portal and confirm material delivery, before purchase order system

Table 1. Implementation costs for customer J.

Description	Int./ Ext.	Recurrence (x)	Cost (EUR)	Comments
Control Tower Infrastructure	Int	1	8000,00	Desks, chairs, computers, office supplies, etc
Order and transport management systems	Int	1	5000,00	Existing system. Customization only
EDI Interfaces	Int	3	2000,00	
Travels	int/ext	5	15000,00	For 2 headcounts
Supplier training	int	40	200,00	Via conference call
Customer J training	Int	1	3000,00	On customer premises
Total in EUR			33200,00	

Table 2. Fixed operating costs customer J.

Description	Int./ Ext.	Cost (EUR)	Comments
Control tower	Int	1000,00	Shared costs / for 8 headcounts
Water	Int	NA	Included in shared costs
Electric Energy	Int	NA	Included in shared costs
Telephone	Int	800,00	
Monthly wages	Int	15000,00	Do not include taxes
Cleaning and maintenance	Int	1000,00	
System maintenance	Int	5000,00	Accrued costs for system support
Total EUR month		22800,00	

Table 3. Final results x yearly savings.

Year	Cost (EUR)	Savings (EUR)	4PL turnover (EUR)	Fixed cost - yearly (EUR)	Implementation cost (EUR)	Customer J final economy (EUR)
0	35,00	0	0	0,273	0,033	-0,31
1	27,00	8,00	2,64	0,273	0	5,36
2	23,00	4,00	1,32	0,273	0	2,68
3	21,00	2,00	0,66	0,273	0	1,34
4	19,00	2,00	0,66	0,273	0	1,34
Estimation			Total savings after 2 years of operations: 7,73 Million EUR			
			Total 4PL provider turnover after 2 years: 3,96 Million EUR			
			Total 4PL provider net profit after 2 years: 3,41 Million EUR			
Values in Million EUR						

execute any automated follow up, making these orders ready to be picked up.

For the remaining orders, the system sent an automated alert via e-mail for each open PO to each supplier, requesting order confirmation.

The appointed suppliers accessed the available web portal and confirmed quantities and collection dates. According to the system parameterization, the following was verified:

- For those purchase orders from suppliers who confirmed readiness dates and quantities according to the original PO request, the 4PL operations team was able to issue a transport order to 3PL provider to proceed with collection and shipment execution;
- For those purchase orders from suppliers who confirmed readiness dates and quantities of five percent above or below original requested by customer J and was parameterized in the system, an automated alert was triggered to 4PL provider LL; the 4PL provider operations team contacted the responsible buyer from customer J;
- For those purchase orders from suppliers who confirmed original quantities, confirming however, a readiness date different from the expected calculated by the system, an automated alert was triggered to 4PL operations team, who contacted the responsible buyer from customer J to decide if express shipment is required, raising transportation costs or not.

From transportation order issuance by 4PL provider, the 3PL was in charge of goods collection at supplier and international transportation.

The material being collected and shipped, it was the 3PL provider's responsibility to keep 4PL provider informed about the transport execution up to its final destination delivery, meaning customer J premises.

A 30 days steady state was defined for eventual adjustments within this project.

5.7. Production

With test phase completed and respective adjustments made, the rest of suppliers were trained along the execution of pilot phase. As this phase was successfully implemented, the steering committee decided to launch the full project production including all suppliers and purchase orders.

5.8. Costs

The involved costs for this kind of implementation can be presented in two ways - operational costs and direct implementation costs.

The operational costs can be defined as fixed. On the other hand, implementation costs are normally variable - including the service implementation costs for a specific project, i.e. travel costs.

Table 1 shows the implementation costs for customer J and Table 2 shows operational fixed costs.

During the first year of operation under this methodology, the costs were fully transferred to Customer J by 4PL LL. From year two onwards, fixed operating costs were not transferred.

Customer J's estimated logistics spend was approximately 35 million euros. The overall reduction during the first year was approximately 8 million euros. On the second year of operation, the overall saving was 4 million euros and for the next two years, estimation of savings is 2 million per year.

As per Table 3, by the end of the second year the total saving acquired by Customer J was 7.7 million euros. By the end of the same period, 4PL LL turnover was 3.9 million euros and 3.4 million euros net profit in the same period.

6. Conclusion

Supplier and purchase order management under 4PL logistics concept is basically the outsourcing of the supply chain control process from the purchase order release to supplier, up to material arrival at its final destination by a third part nominated 4PL provider.

Even with no control of all supply chain activities, the execution of this kind of service requires a deep integration between both parties - driving changes on the *modus operandi* and changes of paradigms.

On the case study, during the service implementation, there have been several operational problems mainly due to lack of or poor communication, generating conflicts and disagreements on the operational level of customer J, 4PL provider, suppliers and 3PL providers.

Supplier's commitment on accessing the web portal to confirm purchase orders, quantities and readiness date was also an issue.

4PL provider transactional system was not flexible enough to support last minute demand changes from customer J, generating a lot of manual work for planners, delaying also the information flow.

Besides implementation issues and first year of operations, the high standard of supplier and transportation management significantly increased cargo consolidation level, optimizing cost effectiveness, manufacturing lead times and transportation standards. It also made possible a considerable reduction in stock levels due to correct in transit and confirmed purchase order visibility.

The auditing and management on 3PL providers generated reductions on transit times, development of key performance indicators, measuring, controlling costs and service level of transportation. The result was cost cuts and increase of delivery on time rate.

The increase in transportation efficiency generated greater reliability on customer J's sales department, who

started feeling more confident on promising deliveries of imported products or products with imported components.

By the end of the second year of operations, customer J observed a reduction of approximately 23 per cent of its total logistics costs.

Therefore, the conclusion of this case study is that the obtained result with the implementation of supplier and purchase order management under 4PL logistics concept, proved to be a competitive advantage in logistics costs reduction, consequent leverage on profitability for customer J and also generation of profit for the 4PL provider.

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