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**OPERATING MODEL  
OF A 4PL PROVIDER**

## Introduction

Currently the number of 4PL providers is increasing on the market for logistics service operators. This seems to be a natural consequence of processes associated with the progressive trend to reduce costs. Consequently, large entities, managing their logistics chains, also decide to outsource operations related to the integration of these chains, passing their expertise in this field to outside 4PL logistics providers. In Europe, a turning point of this process was the last decade of the last century, and the automobile industry was the industry in which these phenomena were initiated. Stronger companies tend to switch sources of supply to Asia, Africa, and South America emerged in those years. The construction of logistics chains became extended and more complex as a result of supply sources relocation. In these transformed and extended chains there was a need for deeper integration of both the physical flow and the regulatory sphere.

The logistics costs reduction has become an overriding aim. It happened that the complex logistics chain management has not been in the company's core business, what should integrate such a chain. Therefore, the companies have increasingly begun to seek specialized entities dealing with supply chain management – 4PL providers.

Analysis of the literature sources made by the author allowed the assertions that does not exist any universal model of 4PL provider. Most of the authors is limited, because to define the scope of activities offered by such an operator. Therefore the aim of science – both cognitive and application of this publication is to develop and provide the operator model of 4PL. This model should also be practical, defining solution for direct application in practice.

### 1. The evolution of 4PL providers

The number of 4PL providers has been increasing in the market for logistics service providers recently. This seems a natural consequence of processes associated with the progressive tend to reduce costs. Consequently, large operators, managing their logistics chains, also decide to outsource the functions related to the integration of these chains, giving their powers in this regard to 4PL logistics providers.

Analyzing the literature, however, a kind of duality in identifying the operating model of a 4PL logistics provider can be observed. Some authors claim that the 4PL provider is a virtual operator, whose main task is to integrate the supply chain of the ordering party (See: Mukhopadhyay, Setaputra, 2006; Jeszka, 2007;

Logistik für die Bundeswehr, 2011). Therefore, these authors most often assume that the primary resource for the 4PL provider is an information system functioning at the scale of the supply chain often supported by IT applications. The 4PL provider can perform its statutory activities thanks to it.

There is also an alternative path of the 4PL provider development indicated by such authors as M. Maternowska (2002), A. Zukerman (2009, pp. 24-28), J. Sreeton (2009, pp. 30-34) or T. Komicz (2004, p. 10). According to them, the creation of a 4PL logistics provider is a natural consequence of the diversification and evolution process of the services provided by 3PL logistics providers. This can proceed in two ways: First as a natural evolution\* of 3PL logistics provider, second as a rapid change in the scope of services offered.

The first of the mentioned cases occurs when the 2PL provider changes into the 3PL provider and the later eventually evolves into the 4PL provider\*\*. The primary reason for this evolution is the need to adapt company's offers to the changing market expectations. These types of entities often start their business operations as transport companies. However, the shrinking gap between revenues and costs of their operations makes them to begin a gradual diversification of their activities. The natural development of the services portfolio is then:

1. The beginning of rendering forwarding services, namely the organization of the whole transport process, often using a means of transport belonging to third parties.
2. Extending the business offer by multi-modal transport services, it is often imposed by a client of such a company or by legislative conditions under which such a provider operates.

Another phase of the provider's evolution is to extend further its offered services package by the broadly understood storage. This extension is probably associated with the customers' expectations for their comprehensive support and a progressive outsourcing process in the market. Customers often expect higher efficiency from entities specializing in providing logistics services, in comparison to what they experience in the form of insourcing. The emergence of 3PL providers (called Three Party Logistics) resulted from these processes. The providers offering the services related to the handling of the logistics chain at some point will meet the demand for services related to the management of this chain. In this way they become leading entities in the use of such chains.

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\* Through evolution, in this case, the process should be understood as diversification of the service package offered by the logistics provider and not by the company as such. This means such situations in which 2PL and 4PL providers can work side by side and it does not mean that a 4PL provider is a "higher" (and hence more evolved) form of 2PL operation.

\*\* This process may also be limited to the change of 3PL operator into 4PL operator.

It seems that the crucial period in this process were the 1990s and the industry in which these processes were initiated was the automotive industry. During this time there occurred, on the one hand, the expansion of West German companies into, so called, the Eastern Lands and building of new factories in them. On the other hand, a stronger tendency to switch sources of supply to the Far East\* and Latin America\*\* appeared in these years.

All those led to elongation and complexity of logistics chains. In such chains there is also a need for their much deeper integration, both in terms of physical movement, and above all, the flow of information as well as proper synchronization of flows in these chains. All these changes were aimed at reducing logistics costs. At the same time the complex administration of a logistics chain was not in the core business of automotive industry companies. That is why more and more often they started to look for specialized entities. Naturally, they turned to 3PL providers who had been supporting them so far, with the need for expanding their portfolio of services into services connected with logistics chain integration and management.

The above-described processes run a parallel evolution path for 3PL providers. The existing providers of this type, having analyzed the emerging market trends, concluded that the possibility of offering services related to the logistics chain integration would make their offer much more attractive in comparison to other competitors from logistics provider. As a result, they often made decisions to buy applications supporting the logistics operations. Initially, these were ERP and CRM systems. Applications actually supporting the supply chain operations came onto the market not until the first decade of the twenty-first century, partially they were dedicated to specific providers and built on their experiences and for the market segment supported by them (e.g. Automotive, FMCG, Pharmaceutical Industry).

The above-presented methods of 4PL provider's evolution obviously show that the 4PL providers group is not homogeneous. There can be clearly distinguished operators who do not have their own logistics infrastructure, they focus on the information integration primarily and outsource other services. This group is called, in the later part, the 4PL virtual provider, unlike the other group representatives who have the logistics infrastructure. But the latter is also not homogeneous. On the one hand, we deal here with providers with limited resources consisting of a truck fleet and a number of warehouses, and, on the other hand, in the group there are also global logistics operators such as UPS, CARGOFORTE or DHL.

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\* E.g. VAG group.

\*\* E.g. FIAT.

In the subsequent part of the paper a model of 4PL provider is presented. Due to the characteristics of the market, the nature of the data and a limited number of 4PL logistics providers operating in Poland it has been decided to select a research method involving the case study analysis by the means of an in-depth interview and an acquisition of expert data.

## **2. Operating model of 4PL virtual provider. UltraLogistik case study\***

As it has previously been mentioned, 4PL providers can be divided into virtual operators and those who have their own logistics infrastructure. UltraLogistik Company is an example of a virtual provider operating as a part of the global Unilever Group and using the infrastructure of the concern. Unilever is one of the largest producers of food, household and cosmetic products in the world. It has 365 manufacturing facilities located on 6 continents and employs 167 000 people in 100 countries worldwide. Unilever's brands are present in 180 countries.

In 2006, a separate organization called the Unilever Supply Chain Company AG (USCC) was singled out of Unilever, seated in Switzerland. USCC is responsible for managing the entire logistics chain, so it is accountable for the flow of raw materials needed for production and finished products in the distribution network. It is also in charge of purchasing raw materials for production, transport, and storage contracts, purchase of pallet and forklift trucks. The scope of USCC operations is global, which allows the company to use the economies of scale in contracting raw materials and logistics services. One of the objectives is to optimize the USCC contracting power and organization of the transport process for finished products, packaging materials, semi-finished products and raw materials.

USCC, just in Europe alone, handles about 2000 transportation lines between locations in Europe, the number of transfers (volume) amounts to about 180 000 loads, while the value of the movement is about 200 million euros.

The analysis of logistics chains conducted by USCC, pointed out that despite global operations Unilever cannot take advantage of the aforementioned benefits of the economies of scale. The contracted logistics services in various markets in different countries are not centralized and synchronized. As a consequence, Unilever often contracts the logistics services from the same operator or carrier with separate contracts concluded for individual markets.

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\* Own study based on internal materials Unilever.

As a result of analyses, a decision has been made on establishing an entity called UltraLogistik, whose objective was to integrate Unilever's supply chain and to reduce transportation costs and related charges for the company. Currently, UltraLogistik is USCC operating office, in which all transportation and delivery operations to distribution centers are coordinated. The company expects that as an outcome of the operations of a newly established 4PL provider the following benefits will primarily occur:

1. Ensuring continuity of transport operations through the classification of transport and freight forwarding companies.
2. Implementation of the tender results in the Transport Management System (TMS).
3. The conclusion of new trade agreements with new transport companies, logistic centers, and logistics operators.
4. The amendment of existing trade agreements for more favorable for Unilever.
5. Gathering market information (Market Intelligence) by a means of special RFI questionnaires.

Unilever also expects that the establishment of the 4PL provider will bring the possibility of negotiating a lower transport charges per pallet compared to the previous year and to the market prices (the benchmark will be provided by Cap Gemini). At the same time, the maximum total rates increase year on year has been planned by 5%. The cost reduction does not exhaust the expected consequent benefits of UltraLogistik launch. The company also anticipates:

1. The improvement of the customer service level – the selection of the most reliable transport companies, with sufficient fleets to maintain a very high loading parameters and delivery on time performance (maintaining in 2011 KPI On-Time-Collection and On-Time-Delivery at 96%).
2. The reduction of greenhouse gas emissions – with relation to the sustainable development policy Unilever committed to reduce carbon dioxide in transport by 25% by 2015. This is possible mainly by moving a significant volume to a more environmentally friendly means of transport like trains, barges and ferries. There is also a possibility of using other types of trailers, such as two-floor semi-trailers. The target for 2011 is to reduce CO2 emissions in comparison to the previous year by 5%.
3. The reduction of the supplier number by 30%. The aim is to generate additional savings by:
  - a) the cutting bureaucracy – a smaller number of invoices, complaints, contact persons, etc.;
  - b) increased levels of customer service – by eliminating providers from the KPI level below the absolute minimum and transfer of transport lines to the suppliers with high levels of customers and on time deliveries;

- c) enabling the selected suppliers to develop together with Unilever – as Unilever has set itself the goal of doubling the value of the business until 2020, the same happens to the volume of the supported loads. Thanks to close and partnership cooperation with suppliers it will be possible to reduce transport costs in the long term (Porada, 2011).

As it has already been mentioned, UltraLogistik is a 4PL virtual provider. It does not have its own transport and storage base. Handling of physical flows is carried out by external parties, however, often owned by the parent company. Depending on the geographical positioning of suppliers and customers as well as the flow rate are selected suitable carriers and storage infrastructure. The subject of 4PL virtual provider operations is primarily the flow of information. So, the selection of appropriate applications to support this movement is very important. Therefore, UltraLogistik implemented a number of applications supporting the 4PL provider's operations. The most important of these include: Transportation Management System, Trade Extensions, MS Office and communication software.

Transportation Management System (TMS) – a transport management system introduced in order to coordinate transport as well as accelerate and automate the process of creating transport orders for Unilever. The system included both customers (factories, distribution centers, warehouses) and UltraLogistik itself and suppliers, namely the transport companies contracted for individual lines. Figure 1 shows the process of completing an order in UltraLogistik.

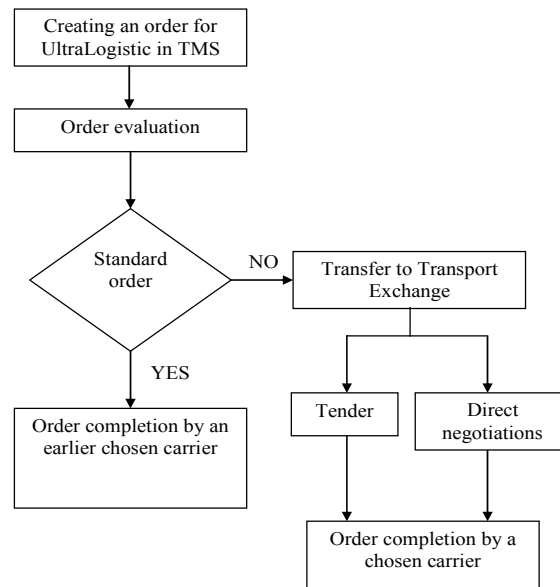


Figure 1. The process of completing an order in UltraLogistik

An order placed by a customer is sent in the TMS system to a transport specialist, who sees it, identifies the parameters for the so-called “Letter of Orders”. Subsequently, the operator evaluates whether the order is standard or customized. UltraLogistik Company estimates that 90% of orders received are standard, and thus are assigned automatically to the contracted transport companies in the tender. After assigning to the transport company, appropriate information is sent to it. TMS sends it directly to the interface located at a transport company and as a PDF attachment to email messages in the mailbox of the carrier. On this basis, the carrier delivers the order.

The remaining 10% of orders are called non-standard cases. An example of such an order may be, among others: unusually bulky cargo, non-full pallet packaging, shipping samples to a new customer.

In this case, the order goes to the internal transport exchange and is a subject to an additional tender. A different approach is also applied in the case when there are other requirements for transportation than those defined in the tender (e.g. shorter delivery time, another type of movement, and others). In this situation, a relevant employee contacts a transport company and renegotiates the rate for transport. If negotiations prove to be not rewarding the order goes onto the transport exchange.

TMS is based on a dedicated database. This database supports the implementation of each tender. The data supplying this database are exported as a file or MS Excel file and then checked for correctness by the Regional Operational Teams that own the data. Subsequently, once verified, the data are imported into another application – Trade Extensions, which handles tenders. After the tender process data are re-downloaded to the Trade Extensions in the form of MS Excel file and sent to the finance department. Then following the verification of compliance by the Finance Manager they are passed to the TMS team in order to update the database.

Another application of supporting 4PL operations in UltraLogistik is Trade Extensions. This application supports the implementation of e-procurement tenders for transport services. The procurement process support is carried out on several grounds, namely: project support, procurement support, analyses support, information flow support. The support of projects in the field of transport: through the ability to define a range of parameters such as a phase of a project (work flow) it is possible to define the negotiating rounds, the planning phases and evaluation of data as well as assigning the deadlines for these phases and tasks. The platform also allows the company to create tasks for both project managers and suppliers or to support (RFI, RFQ, RFP, Contract Management).

Tenders support – thanks to the Trade Extensions application it is possible to organize “reverse” (lowest rate), and “forward” auctions (best offer). It is



possible to define complex formulas calculating rates in accordance with buyer's needs (for example, the total annual rate, taking into account the rate of exchange differences arising from the calculation in different types of currencies, types of equipment supplied and capabilities of servicing the assumed volume) in the application. This enables a complete control over a tender with a minimum commitment of operational staff.

Analyses support – Trade Extensions thanks to advanced algorithms allow for data comparison, in a very short time, creating complex scenarios and business models. Thanks to the extraordinary friendliness of the application it is possible, after completing a short training, to create queries and rules as well as to filter data. Consequently, the user receives an extremely efficient analytical tool. In case of UltraLogistik it is used for many purposes such as, among others: calculating tender results, benchmarking results, the searching for optimal negotiating strategies.

An example of the analytical module use may be the creation of a “realistic” scenario, in which certain rules are defined, such as:

1. Time of a transit cannot be longer than the present time by 1 day.
2. Up to 60% of allocations on the lines can be changed (limited change management).
3. On ice lines, due to the seasonality, there must be 3 suppliers, etc.

After preparing the scenario, generating the results takes about 2 minutes. The system generates all possible solutions to the scenario and then presents the most cost-optimal solution. In addition, it compares the result to the historical data and shows the increase in costs or savings in the selected scenario. This allows the company to create quickly a number of scenarios and then compare the results and choose the most optimal approach for further negotiation or allocation of resources and transport. The system also allows for rapid generation of statements and reports with graphs.

Support the flow of information – the last but an extremely useful tool for Trade Extensions is an application with which it is possible to send messages with assigned tags. This permits the company to send direct messages from the platform to a very large group of recipients, with clearly defined terms of information. The use of the mail application is required to send them separately to each recipient individually.

Another of the applications which supports 4PL operations in UltraLogistik is Microsoft Office 2003. The basic tools used in this package are MS Excel and MS PowerPoint. MS Excel is an application used in UltraLogistik for converting, transferring and processing of data. Its main advantage is that it is compatible with other applications used in Unilever as well as the Transportation Management System (TMS) and Trade Extensions. All data from these two platforms can be

exported to Excel as a file type as well as imported back into this format. Thanks to which such data can be developed and presented in the form of charts and tables.

MS PowerPoint is used mainly for presentations, as well as to create training materials. In addition, to a small extent, MS Word is used to create technical documentation, contracts, orders and others. The documentation in MS Word is then converted to PDF format and sent to suppliers.

The last type of application used in Ultralogistik is communication software. The company uses two types of applications – Live Meeting and BT Teleconferences services. This software is used for communication between members of the team organizing the transport processes, located in different places in Europe. Through advanced teleconferencing services there are conducted both internal business meetings as well as severance and training for suppliers (such as training of the tender operating platform Trade Extensions).

Analyzing the operations of 4PL provider of UltraLogistik Company, it should be noted that this provider supports only one company. However, in contrast to the 1PL and 2PL providers, due to the scope and nature of performed operations, it should be classified as the 4PL provider.

UltraLogistik model of company's operations does not include the possibility of "deeper" service of its customers, including, for example, planning their production. It is evident in the lack of software such as ERP. In consequence it closes, at this point, the possibility of expansion in the market and offering services related to supply chain integration to other customers outside Unilever. On the other hand, the UltraLogistik operations model shows the basic mechanisms of 4PL provider operations and as such is an important basis for creating a general model of such a provider.

### **3. Practical model of 4PL provider\***

By creating a practical model of 4PL operator adopted four basic assumptions\*\*:

1. 4PL provider supports both physical and information flows.
2. 4PL provider should be open.
3. 4PL provider (or its division) should serve only a specific industry.
4. 4PL provider can have its own logistics infrastructure\*\*\*.

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\* The operation of a 4PL model was developed based on expert knowledge of the author and his consultancy studies in this field for business operators who are 4PL providers.

\*\* This model developed by the author's work is also consistent with the model presented by M. Christopher (2005, p. 296).

\*\*\* Many authors point to the virtual nature of the 4PL service provider however, according to the author's study should have a 4PL provider also own logistics infrastructure. This reduces costs, increases flexibility, reduces risk, and is also indicated in some industries due to the specific conditions of storage and transport materials (eg. branch petrochemical, pharmaceutical, and FMCG).

The 4PL provider should handle both the realm of physical as well as regulators flows. This assumption eliminates companies that offer services related to supply chain information integration, or even offer services related to the provision of on-line applications supporting the operations of such a chain. The 4PL provider should not be limited to handling only one company, but also offer its services outside of its logistics chains.

The third assumption is also important. It follows from the fact that each industry has specific conditions as well as technical and legislation requirements<sup>\*</sup>. Therefore, the provider should specialize in serving selected industry<sup>\*\*</sup>. Specialization is also due to the fact that the provider integrating the supply chain should also select suppliers of materials and services in accordance with the priorities relevant to given industry. Consequently, it should have an accurate diagnosis of the market (markets) and the exact knowledge of the suppliers.

The last of the assumptions is related to the previously mentioned three assumptions. It is not mandatory, because as the example of UltraLogistik shows, the 4PL provider can offer its services using external logistics infrastructure. However, some industries require adequate expertise and technical equipment<sup>\*\*\*</sup>. Thus, the acquisition of logistics service providers satisfying expectations in this respect is impossible in some markets. Therefore, the 4PL provider supporting such an industry should also have the necessary logistic infrastructure<sup>\*\*\*\*</sup>.

The 4PL provider integrating supply chain combines the information flow and physical flow. UltraLogistik example shows that the integration of the regulatory sphere should be carried out using a wide variety of applications. The basic components are:

1. SCM (Supply Chain Management) software.
2. Project management supportive software.
3. Software supporting the creation and flow of documents.
4. Communication software.

The aim of SCM software is to ensure the flow of information between supply chain links as well as processing and sharing of data in the form of repor-

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\* For example, food industry requires infrastructure to maintain the “cooling chain”, registration of storage and transport conditions, and the whole set of rules relating to traceability, which other industries do not have. These elements dictate the logistics provider specific technical solutions that cannot be transposable to other industries.

\*\* Certainly, situations when we are dealing with a global operator such as UPS or DHL are assumed for, whose divisions specialize in servicing particular industry.

\*\*\* For example, the pharmaceutical industry.

\*\*\*\* The industry companies when choosing a provider often place the requirements for it to have its own storage and transport facilities. This is to ensure adequate customer service in the case of JIT delivery.

ts on all events occurring in the supply chain. Figure 2 shows the basic functionality of such software.

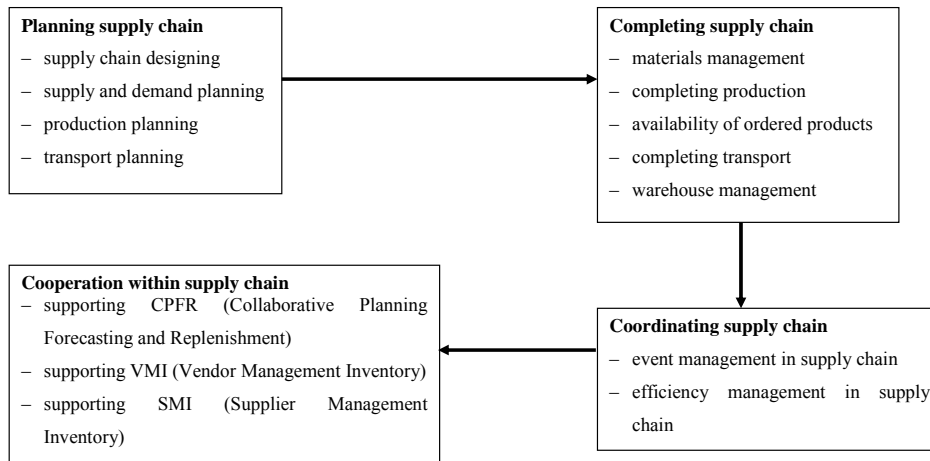


Figure 2. Basic functional performance of SCM

Source: (Żabicki, 2011).

Analyzing the content of Figure 2 and UltraLogistik case, the basic software modules supporting operations of the 4PL provider can be specified:

1. ERP Module with support for multiple locations for planning and coordinating production in logistics chain entities.
2. Transport Module, used to support and optimize the transport orders and freight rates.
3. Storage Module (WMS) can support multiple locations to manage the material in storage, acceptance and download the material.
4. QM Module for recording of deliveries quality.
5. Controlling Module.
6. Financial-Accounting Module (FA).
7. e-procurement Module, supporting e-procurement.
8. Module supporting the project management.
9. Communication Module allowing a company to conduct teleconferences and sending e-mails to the prepared list.
10. The data warehouse integrates information obtained from all participants in the supply chain.

The application packages listed above can operate as an integrated software as well as a separate application. However, the condition that should be always maintained is the ability of direct data migration between these applications.

This eliminates situations in which this transfer of data from one platform to the other requires middleware such as spreadsheet.

The number of modules and their kind are dependent on the type of relationship with the 4PL principal provider. As in the previously described Ultra-Logistik case, the operator integrates one company supply chain, so it uses the following applications: ERP, Controlling, FA, and other Unilever company. In the situation, however, when the 4PL provider supports external customers, and they are several, it should have all of the above applications. Since this allows it for the integration of logistics chain and coordination of all operations in real time as well as planning, implementation and monitoring at the operational level. Figure 3 shows the flow of information monitored by the 4PL provider.

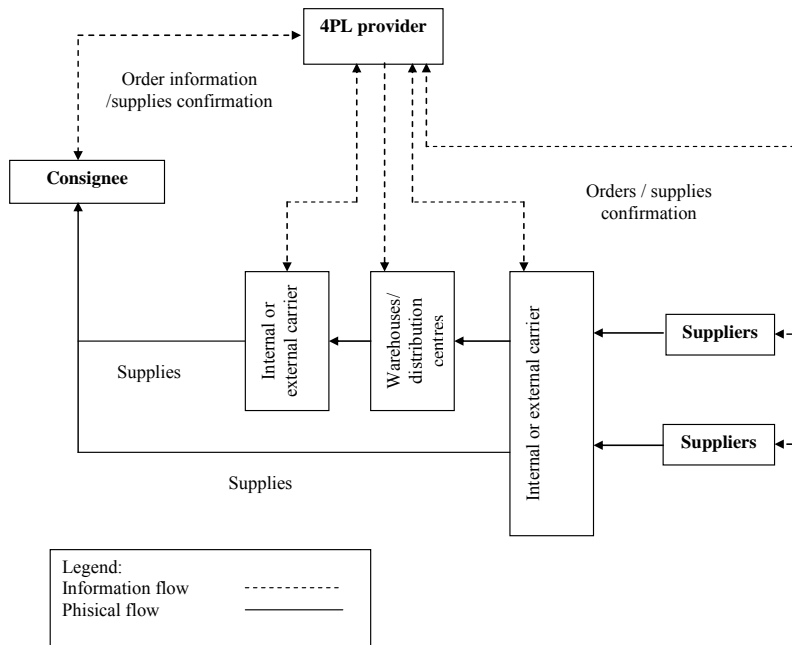


Figure 3. The information flow integrated by 4PL provider in the logistics chain

A contractor by issuing an order in the logistics chain communicates only with the 4PL provider (Figure 3). The latter is responsible for coordinating further operations by other participants of the supply chain (suppliers, carriers, etc.). In practice, such coordination may even include production scheduling and queuing of orders for the production of suppliers on behalf of the consignee\*. All these operations are carried out by the 4PL provider.

\* Such services are offered by DHL, using SAP R3 software.

Support of the logistics chain regulatory field does not exhaust the scope of operations pursued by the 4PL provider, as it operates in the sphere of physical flows. The integration of the logistics chain by the 4PL provider requires completing four basic processes: the qualifications of materials and services suppliers, supply, raw materials and finished products stock maintenance, organization and delivery to customers\*.

The first of these processes involves the search, selection and qualification of materials and services suppliers. This process continues throughout the period of collaboration with potential customers and leads to creating a database of qualified suppliers\*\*. The 4PL provider should first define the logistics chain\*\*\*. On this basis, in the agreement with the contractor, the 4PL provider looks for suppliers and subcontractors. They are selected for a defined order in the manner set out further. Subsequently, after the selection of suppliers, pursued by running the following processes. In the adopted model a complete flexibility of operation has been assumed, as a further order may lead to a reconfiguration of the suppliers' structure so as to ensure optimum delivery cost in units approved by the contractor, and under the assumed security of supply.

Another of the mentioned processes in the logistics chain integration is the supply process. Figure 4 shows the components of this process.

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\* This problem has been widely addressed in Shary, Skjott-Larsen (2002, pp. 147-150).

\*\* Qualification of suppliers affects not only the supply of raw materials or supplies but also services supplies such as storage and transport. As a result, a database is created that can be used to meet the needs of multiple contractors.

\*\*\* This means creating a model using the resources of the client and defining changes in the existing supply chain and identifying the resources needed to implement such a model. This is consistent with the concept presented by K. Rutkowski (2000, p. 32).

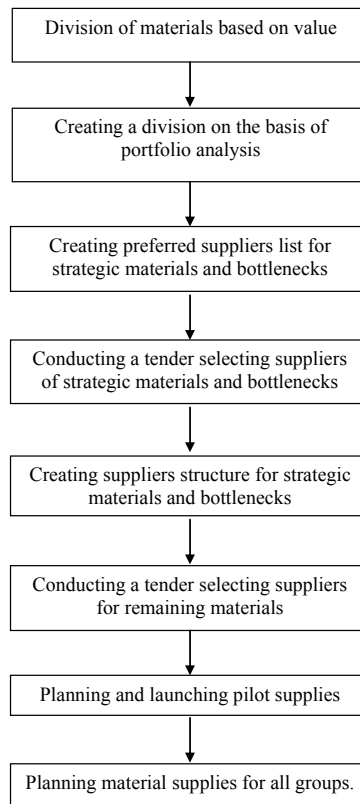


Figure 4. Algorithm of supply process

Source: Own study based on: (Kasperek, Świerczek, 2010, p. 32).

The first stage is an appropriate allocation of purchased materials. This division should be performed in two successive steps:

1. Separation by the ABC method, due to the value of the three basic groups. This is necessary for the next step of analysis.
2. Conducting a portfolio analysis in the field of purchases based on two basic parameters – the value of purchased materials and the risk of a supply (Based on: Kasperek, Świerczek, 2010, p. 32).

This division is necessary in order to diversify the selection and cooperation policy with suppliers in the supply chain. Strategic materials and bottlenecks, due to the value and risks of supply, are supported by preferred suppliers. Such a list is created on the basis of a qualified suppliers list. Preferred suppliers are qualified providers complying with additional parameters not related to the evaluation of the quality of their rendered services (such as a distance from the contractor, experience in co-operation). The list of preferred suppliers is maintained

by the 4PL provider, and it organizes, in order to select the best one, tenders for the internal most optimal supplier. A tool supporting the selection of suppliers is the tendering platform vendors – Figure 5.

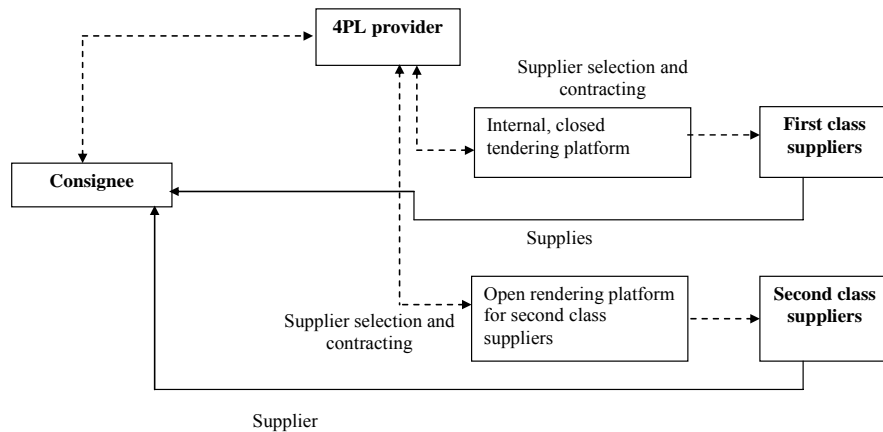


Figure 5. Schematic of supply contracts

Source: Own study.

This type of a solution providers, on the one hand, considerable flexibility in selecting suppliers and negotiating with them the optimal conditions of trade, on the other hand it has, a serious limitation. The 4PL provider, as it has already been mentioned, can operate in one industry only or in a limited number of industries. This requirement is related to the creation of an adequate structure of suppliers and then their continuous assessment.

Subsequently, via e-procurement platform, the most optimal choice of suppliers is made. A key element here is not only price, but also the flexibility of supply and a minimum lot size of a delivery.

Due to the fact that the 4PL provider coordinates physical movement, it controls both the quality of supplied materials and any damage in transport and other logistical parameters. Consequently, as mentioned earlier, it takes over from its suppliers formal tasks related to certification and subsequent evaluation of strategic suppliers and bottlenecks.

For materials from the leverage and routine groups the selection of suppliers is carried out based on an open tendering platform. Due to the fact that the materials bought in this way have a relatively low value, they are non-critical and highly substitutable, the choice of suppliers is not a subject to such rigors rules as in the case of the suppliers for strategic and bottlenecks materials. Using a tendering platform, usually one or two suppliers are selected. The deliveries



are monitored and evaluated on similar basis as described above. Using similar mechanisms, as in the case of supplies of strategic materials and bottlenecks type, the 4PL provider continuously assesses suppliers and quality of materials supplied by them. Within time, along with the collection of data on the suppliers participating in the supply of materials and services in a variety of logistics chains supported by the 4PL provider, a list of qualified suppliers is created who reliably perform their deliveries. This allows a company to increase security of supply and reduce costs associated with the qualification of suppliers, because the experience gained from work with one supplier can be used in many supported logistics chains.

Closing the stage of suppliers selection, opens the next stage of organizing the pilot supply. These supplies are the control amounts, subject to special supervision by the 4PL provider and the contractor. These types of operations increase the supply security and also eliminate the risk, occurring particularly at the start of deliveries from a new supplier and the associated decline in the quality during the first few deliveries.

At this stage, the 4PL provider plans the supplies volume and delivery time as well as controls more intensively, along with the client, technical quality and other parameters of logistic supply. In a situation where the contractor does not have the appropriate control instrumentation, the 4PL provider can arrange services of control studies, quality, outsourcing them from an external unit. When contracting many orders of this type the 4PL provider can effectively negotiate a low price, compared to the price the contractor would have to bear, while maintaining the necessary laboratory controlling the quality of supplies. The pilot phase closure of the supply is equivalent to starting an adequate supply of 4PL provider. At this stage, its role is to coordinate the physical movement of material from suppliers to customers and also to support the flow of information.

Another process to be executed by the 4PL provider is to maintain inventory. In the logistics chain inventory is a protective buffer against the individual links of different risk factors. The 4PL provider integrating the supply chain in order to optimize inventory can allocate inventory in the right places and amounts in the logistics chain, virtualize inventory or/and organize emergency supply\*.

The 4PL provider having forecasts and sales plans as well as current information on stock sales can allocate inventories to the most appropriate places in quantities corresponding to actual demand. Thanks to this it is able to reduce the global level of inventory in the logistics chain and to adjust its structure to the actual demand.

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\* This is in accordance with the concept presented by M. Christopher et al. (2009).

Accurate expertise in the characteristics of processes associated with the supply organization of raw materials as well as goods and products allows the 4PL provider to virtualize inventories (See: Caridi, Cigolini, 2002, pp. 556-576; more broadly on the topic: Chi Chu et al., 2004, p. 131; Tetteh, 2009; Clark, 1998, pp. 486-507; Crowley, 1998, pp. 547-574; Bal et al., 1999, pp. 71-82; Hakansson et al., 1999, pp. 443-452; Antia, Frazier, 2001, pp. 67-81). As a result, information about the stock replaces the actual inventory. The role of the logistics provider is reduced, therefore, to ensuring the availability of inventory, by optimizing decisions on the physical transfer of materials and products from the places of their allocations, and in places where there is demand for them. This eliminates the stock held in multiple locations, limiting it to the selected by the 4PL provider places and ensuring the availability of information on places of storage.

The control of physical flows in the logistics chain also allows the 4PL provider to mitigate or eliminate distortions in flows of materials and products. Due to the aforementioned limitation in the level of inventory in the chain the 4PL provider uses the so-called “emergency deliveries”\*. Coordinating the operations related to transportation, it should also contract out such carriers who would hold resources (transport fleet), necessary for the implementation of such supplies. In a situation where there is a delay of delivery, and which in consequence can lead to a delay or hold-up of earlier established plans for the production or supply, the 4PL provider starts the emergency delivery, offsetting this threat. In summary, the 4PL provider by means of a complex service of the entire supply chain can effectively reduce the level of inventory throughout the chain, while reducing the risks associated with the lack of supply or defective supply.

The last of these processes is the delivery to customers. This process is a natural consequence of the qualification process of suppliers and subcontractors and supply. The 4PL provider, building the transport companies structure relays on the list of qualified suppliers and the previously described principles. The structure of the distribution network is usually taken from the contractor. However, it is reconfigured by the 4PL provider. This reconfiguration usually refers to the location and number of warehouses and distribution centers and is a natural consequence of optimizing the allocation of inventory and warehouse base that is owned by 4PL provider. Figure 6 shows a model of 4PL provider in the field of distribution.

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\* Emergency deliveries are supplies completed with a fast means of transport such as aircraft, in order to compensate supply disruptions. However, the use of such means of transport rapidly increases transport costs.

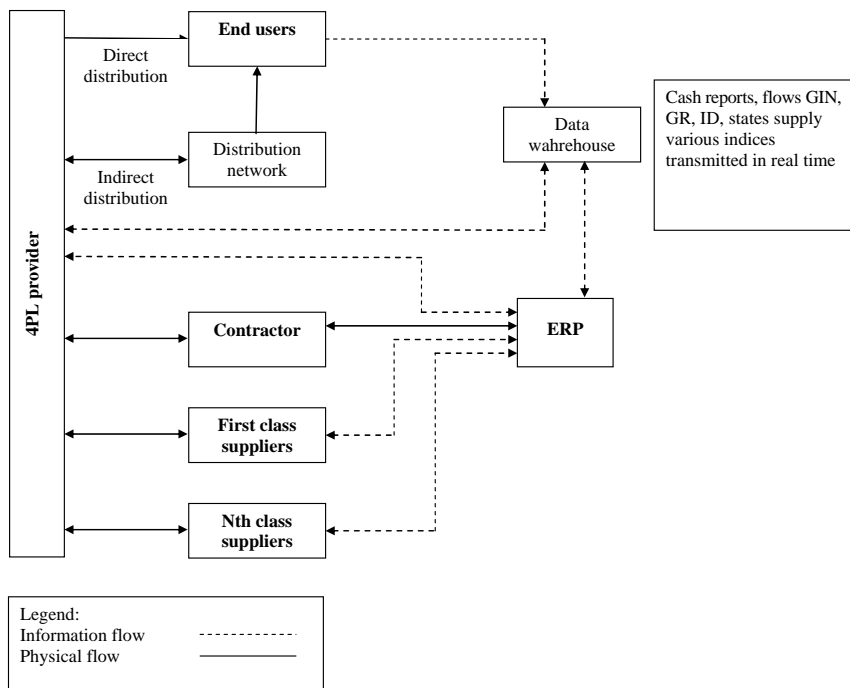


Figure 6. Distribution coordination by the 4PL provider

Source: Own study.

The primary tool for the logistics chain information integration on the distribution part is the data warehouse and ERP software. The task of data warehouse within the frame of the information support of distribution processes is:

1. Acquisition, aggregation, and further transfer of information from cash reports of the distribution network.
2. Identification of the inventory level at each level of the distribution network.
3. Identification of the events connected with the distribution, conducted in real time, and involving the aggregation and sharing of documents such as, among others: RW (Internal outgoings), PZ (Receipt of Goods at Warehouse), MM (Inter-Warehouse Transfer).
4. Communication with the ERP.

Acquisition, aggregation, and further transfer of data from cash reports, is essential for planning the supply of materials, maintaining inventories and deliveries of products from the contractor to the distribution network. Thanks to cash reports the 4PL provider is able to track independent demand and well in advance to plan delivery of materials to the contractor. In many cases this lead-time is longer than the contract duration. Consequently, the 4PL provider can

accurately predict the demand of the distribution network, prepare for it satisfying it directly from the production or completed inventory, and thus significantly reducing the level of inventory held.

If the 4PL provider has information on demand and, through a data warehouse, information about current inventory level and all related with it orders, it may actively use the distribution requirements planning – DRP. In practice this means:

1. Appropriate selection of transport means for cargo, transport time and the distance between the individual links of the logistics chain.
2. Proper allocation of adequate quantity, the right product at the right link of the distribution network, taking account of local demand, existing inventory supply and to provide the maximum level of customer service at minimal cost.
3. Handling of returns and complaints between the individual links of the logistics chain.
4. Servicing of the so-called “reverse logistics” and recycling associated with the transport and storage of waste resulting from manufacturing processes or transport and stored inventory damage.
5. Servicing the packages turnover between the individual links of the logistics chain, and their acquisition, storage, contingent maintenance, and replacement.

The above-presented model of the 4PL provider operations is based on the analysis of the described UltraLogistik case and DHL, Apreo Logistics companies. It assumes that the 4PL provider performs essentially its operations in the regulatory sphere of logistics chain. However, its operations should not be, as it has already been mentioned, limited to the scope of its activities to this particular sphere only. The examples of DHL or Cargoforte show that the 4PL provider may also have its own fleet and logistics infrastructure. In such a case, apart from an outside supervision of the information flow and supply chain integration, it performs a number of operations of a strategic, tactical and operational character connected with the development, maintenance and use of this infrastructure. The nature of these operations, however, does not differ from the scope of activities undertaken in this field by 1PL, 2PL, 3PL providers.

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