

PROJECT ORIENTED MANAGEMENT (POM) AND LOGISTICAL CHALLENGES IN MAINTENANCE AND NETWORK DEVELOPMENT SYSTEMS

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Abstract: *Maintenance, Refurbishment and Network Upgrading Systems occupy a prominent place among service systems, especially due to their dispersed location and large territorial extent. For the efficient operation of these systems, it is essential to apply Project Oriented Management (POM), which aims at optimizing logistic processes and meeting project specific requirements.*

Keywords: *Project Oriented Management (POM), Procurement and Logistics Centre (PLC), performance assistance, subcontractors, project manager, supplier, Service Provider Company.*

1. INTRODUCTION

Maintenance, refurbishment and network systems occupy an important place in the range of network service systems, whose structure and operation can be divided into the following areas:

- Maintenance, refurbishment and network, objects and the lines and paths connecting them (e.g. electricity or gas pipelines, etc.).
- Objects occur over a large area, are scattered, and are mostly nationally or regionally deployed.
- The distance between objects can vary considerably (from a few 100 m to several 10 km).
- The network includes warehouses, permanent and mobile work sites.
- Some or all of the maintenance, renovation and network construction work may be subcontracted.

Efficient management of logistical challenges is key to the optimal operation of maintenance and network upgrading systems [1]. Using a combination of centralised and decentralised elements, it is necessary to enable the efficient management of tasks that require planning and rapid response. Improving information flow and communication can further improve the system performance.

A good logistics system will bring benefits in terms of material procurement, stock reduction, minimisation of storage and transport costs [2]. Centralised purchasing offers the opportunity to obtain better purchase prices for larger orders and optimises order lead times and inventory management.

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2. PROJECT ORIENTED MANAGEMENT (POM)

POM is a system that links procurement logistics tasks to projects [3]. It is based on the collaboration between the Procurement and Logistics Centre (PLC), project managers, subcontractors and suppliers. The POM uses a hierarchical arrangement between the Central Procurement and Logistics Centre (PLC) and the project managers, ensuring a continuous flow of information in both directions.

Project Oriented Management (POM) can lead to more efficient operation of network maintenance and network systems, which can achieve priority logistics objectives. Priority objectives include ensuring a reliable supply of materials, labour and equipment for the operation of the project, on time, and to achieve minimum stock levels and minimise logistics costs associated with procurement.

The elements of Project Oriented Management are the Procurement and Logistics Centre, the project managers, the subcontractors and the suppliers. POM links all procurement tasks to the dedicated project. Projects cover maintenance, refurbishment and new installation/construction tasks.

The basic principle of the POM system is that procurement logistics functions are managed as a distributed, coordinated and cooperative system, with a two-tier hierarchy of management consisting of the Central Procurement and Logistics Centre and the project managers. It is important for the operation that information is constantly flowing vertically and horizontally in both directions. The POM can take advantage of centralised purchasing to procure materials and equipment, reduce inventories, make efficient use of leftover stock, and minimise storage and transport costs. POM benefits by displaying data on stocks, materials and requirements, by continuously collecting changes, and operating as a virtual logistics company. It achieves this through coordination activities, autonomy in the activities of projects, subcontractors, decentralisation and division of labour to compensate for the disadvantages of centralisation in certain tasks [4]. They can also make a significant contribution to the achievement of the objectives set by taking responsibility for determining material requirements, scheduling purchases and helping to anticipate changes in stocks by forecasting them at the right time (Fig. 1).

Some projects are managed by the Service Provider Company. The Commissioning Company - which may also have ownership rights in the Service Provider Company - assumes an important role by placing direct orders with the Service Provider Company, or the Commissioning Company may put the Service Provider Company in competition with external firms to carry out certain tasks. The Service Provider Company may, of course, also be commissioned by external companies. In many cases, the operation can be supplemented by the use of simulation test solutions [5].

The Service Provider Company's management appoints the project managers for each project, who plan the overall workflow and determine the material, component and equipment requirements for the project, as well as the subcontractor and performance assistance requirements, including quantity, quality and time requirements.

The PLC also maintains direct contact with all suppliers, subcontractors and other facilitators of the deliverables. Accordingly, it selects the supplier for a given material, part or tool, determines the order quantity, the delivery date and designates the storage location where the goods will be delivered. At the same time, it selects the subcontractors for the subcontracting activities requested, specifying the performance requirements for the

activities, and designates the performance assistance, their professional composition and the companies providing the services.

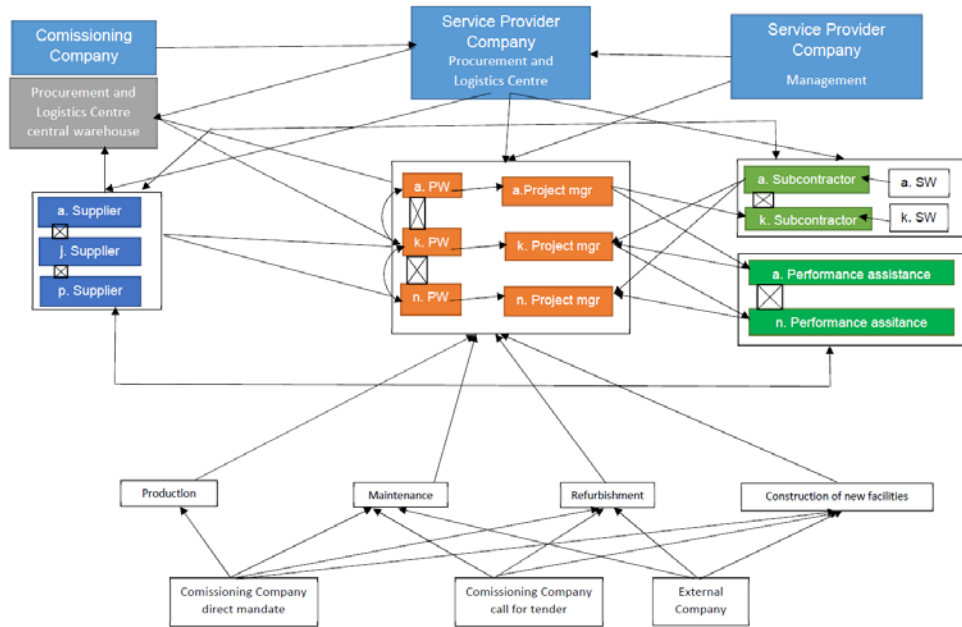


Figure 1. The Project Oriented Management (POM) structure diagram

Suppliers of materials and components are grouped into four categories by the Service Provider Company (Fig. 2):

- Key Strategic Suppliers are the Service Provider Company's Qualified Supplier Network, with whom cooperation agreements are concluded for the types of goods, their quantity and price defined each year.
- Strategic Suppliers I., with whom global framework agreements are concluded for the supply of materials and components.
- Exclusive and Conventional Suppliers, who regularly supply recurring materials necessary for operations (e.g. stationery, printing, computer equipment, etc.) are permanent suppliers
- Strategic Suppliers II, which supply specific materials. Their scope varies frequently.

The PLC's activities cover not only the procurement of materials, but also the provision of subcontractors and performance assistants. The scope of their activities can be divided according to whether the subcontractor carries out a given technological task independently in accordance with the desired conditions and deadlines, or whether the work of the performance assistants is carried out under the direction of the project management. The PLC continuously evaluates the suppliers, which forms the basis for the classification or reclassification of suppliers into different groups, the content of the necessary cooperation agreements and the implementation of different systems. The PLC analyses the logistical

factors relating to subcontractors and performance assistants, such as the price and source of materials purchased for subcontracted activities, as well as the timeliness of the activities carried out and the quality required. The results of the audits are used to select or replace subcontractors and performance assistants.

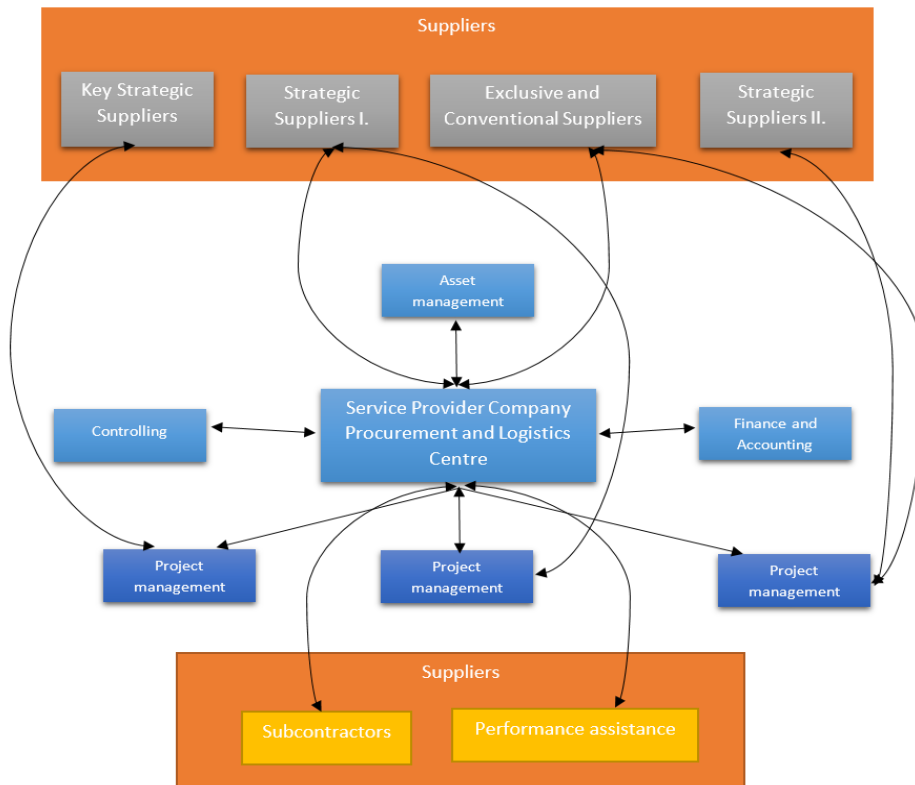


Figure 2. The Contact system of the Procurement and Logistics Centre

Materials ordered by PLC are clearly the responsibility of the project managers from the date of receipt. As such, project managers are responsible for providing accurate and correct information on the types, quantities and receipt dates of materials available for procurement, and for notifying PLC of any changes in the progress of the project that are reflected in the quantity and timing of material, subcontractor and performance assistance requirements. Project managers have an interest in minimising the cost of materials, subcontractors and performance assistance procured in order to minimise the cost of the project.

3. THE DIVISION OF LABOUR BETWEEN PLC MANAGEMENT AND PROJECT MANAGEMENT AND THE INFORMATION SYSTEM NEEDED TO OPERATE IT

The Procurement and Logistics Centre can only fulfil its role if it works as a distributed intelligence, cooperative system [6]. This general principle means the following: at the

same time, the management and coordination of purchasing and stocking is carried out by the PLC in such a way that it can take advantage of the benefits of central purchasing:

- it can achieve a favourable purchase cost by taking advantage of the possibility of aggregating needs in the same period, based on a dynamically maintained database and cooperation agreements in force, by using the bulk ordering option,
- make optimal decisions on order lead times and the quantity to be ordered, taking into account the order lead times, material consumption and demand dates of projects and their uncertainties,
- monitor stock levels, regardless of the location of the materials and parts in stock, and order transfers between projects if the ability to complete the project tasks set results in a reduction in stock levels, taking into account the additional costs of possible transfers,
- scheduling the dates for the delivery of materials to the warehouses and the location of the storage of each material,
- coordinating and harmonising the selection of subcontractors and performance assistants and coordinating their logistical aspects in relation to the PLC.

According to the principles of the division of labour between the PLC and the project managers, the project managers are responsible for the overall project schedule. This includes determining material requirements, including the quantity, type and expected time of use of materials. They are also responsible for defining the subcontracting requirements and for defining the terms of reference for the performance assistants in terms of technical area, number of staff and time period, for which they make proposals for centralised procurement. They define the lower limits for each type of material, quantity and subcontracting activity for centralised procurement. The project manager will independently manage the materials, subcontractors and performance assistants ordered by the PLC, regularly monitoring the progress of the project and providing feedback to the PLC on material usage, stocks, subcontractors and performance assistants' activities. It sends a specific signal to PLC during the project period if new material becomes necessary, or if material already in stock becomes necessary, or if the date of use of certain material is expected later than planned or is needed earlier. In the event of an overrun, the project manager will take action within the limits of his/her authority, coordinated by the PLC. Logistics tasks such as transport and storage are carried out with your own resources or with external help. The PLC essentially operates as a virtual logistics centre, which only performs real logistics tasks in the operation of warehouses.

PLC also maintains relations with subcontractors, not only by playing a coordinating role in the selection and cooperation agreements, but also by analysing and evaluating how its independent activities (e.g. the procurement and use of materials, etc.) fit in with the services provided by PLC and taking them into account in the pricing of services.

Shared intelligence management also involves the creation of a horizontal link between project managers at the same level in the hierarchy in terms of logistics. Some of these are those that the PLC has to follow (such as: movement of stocks), while others relate to reallocations of various logistical resources (storage capacity, transport and loading, etc.) that are not within the PLC's remit.

As a virtual logistics centre, the PLC operates an information network. The computer connection does not need to be online, it could be sufficient enough also in offline mode (Fig. 3).

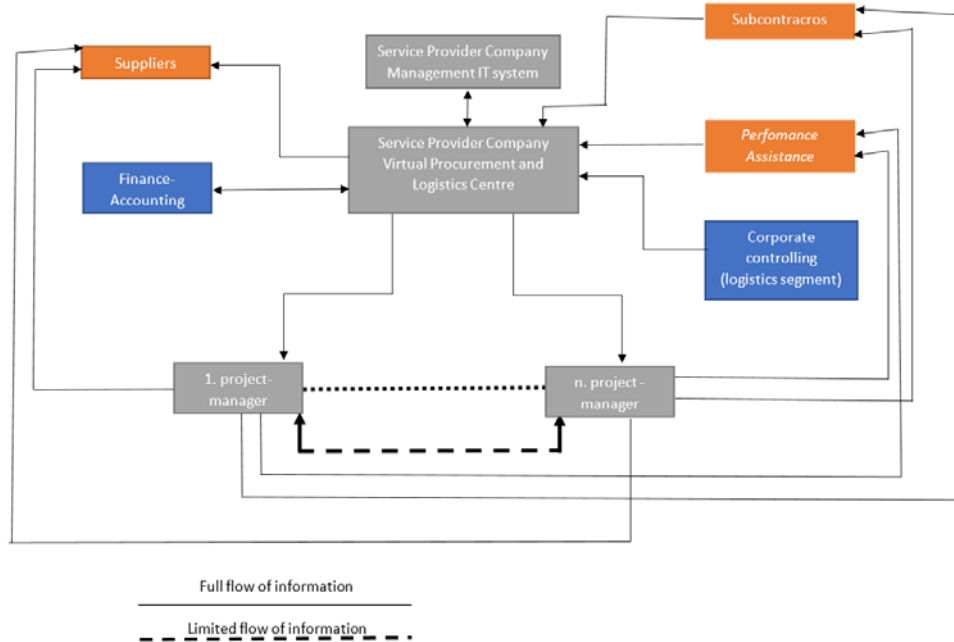


Figure 3. Virtual Procurement and Logistics Centre Information Network

The PLC is in contact with subcontractors, not only when selecting them, but also when monitoring them when they are working independently. The flow of information through the information network can take three forms:

- Event-driven, where the flow of information between project managers and PLC is usually continuous.
- Periodical, where the information flows are related to transactions (e.g. information flows related to orders).
- In the case of information flows at specific, predefined times in the system, the flow is of instantaneous values of selected system attributes or of detailed or summarised information of events for predefined periods.

The information must be processed at the specified level of detail and at the prescribed intervals for the PLC or project managers, using mathematical statistical methods as necessary, generating various indicators and taking decisions at the appropriate managerial level on the basis of the results obtained in accordance with the scenario developed.

The regular processing and evaluation of the information flowing into the PLC must cover the evolution of stock levels by group of materials, by project, the evolution and utilisation of stocks, the extent of deterioration by supplier, the quantity, quality and price of the types of materials supplied, and the consistency of the framework contracts. A particular important task is to analyse the logistics and related activities of subcontractors and performance assistance (e.g. quantity, quality, accuracy, etc. of materials purchased by subcontractors, quantity, quality and punctuality of services provided).

The strategy for the choice of the place of supply and storage of the purchased goods is usually managed by the Service Provider Company's Contracted Procurement and Logistics Centre, where there is a choice of different warehouses (such as central warehouses, regional warehouses and subcontractor warehouses). For project-oriented activities, the warehouse chosen for storage is basically the warehouse of the Procurement and Logistics Centre, in some cases there may be separate project warehouses. In the case of project warehouses, there are several possibilities (e.g. one project has only one project warehouse, several projects have one project warehouse, or one project has several project warehouses).

When using project warehouses, an important issue is who provides the project warehouse to perform the storage activity. The solution may be that the customer provides the project warehouse with a suitable building of its own for the duration of the project activity, or the project may also be able to provide storage on a rental basis. Accordingly, it should be determined at the time the project is set up how any new warehouse created for the project can be used after the project has been completed, or what the possibilities are for storage on a rental basis within a suitable distance.

In addition to distance, the choice of storage location must take several factors into account, including the types and quantities of goods ordered, the frequency of arrivals, the location of the supplier of the goods and the project, and the storage requirements for each type of goods. Also important are the number of projects for which the ordered commodity is received, the planned delivery from one or more suppliers, and whether there are specific storage requirements for each commodity type.

4. MANAGEMENT STRATEGY FOR DECENTRALISED STOCKS OF MATERIALS FOR THE PROJECT

Four cases of decentralised management of material stocks for projects should be examined. In the first case the stocks that become necessary later than the planned date should be examined. In this case, the procurement process of project materials is analysed. Any changes should be decided by comparing the cost of transfer and the cost savings from stock reduction. In particular, the type of material, its value, the quantity required, the storage area and volume required and, if not yet ordered, the ordering and delivery times should be considered [7].

The analyses can be used to determine the time, quantity, value, etc. limits for which no further analyses or tests are necessary.

If any lower limit is exceeded, the stage of the procurement process for the material in question must be examined. If it is already in the process of being supplied, or has already been supplied, the material can then be used:

- if the material is needed for a project and
- if the delivery date can be rescheduled, and
- if the cost of transfer is less than the cost savings from inventory reduction.

In this case, the material should be transferred to another project that needs it.

If the material has already been ordered, but it is necessary to change the order and it is possible or economical to change the order, this should be done, or if the material has not been ordered, the revised date should be taken into account in the order.

Other than in the cases listed above, no intervention is possible.

When dealing with stocks that become necessary earlier than planned, it is necessary to check whether other projects have available material and, if so, how to transfer it to the project in question efficiently and economically. If not, a supplier should be sought who can supply it at the lowest additional cost and in the shortest time.

If, during the development of the project, there is a need for surplus materials or if materials become surplus, the procedure described above should be followed, taking into account the costs of transfer and possible sales opportunities.

In the case of materials remaining after the completion of the project, it will be necessary to assess whether there is a future need for them or whether they may be needed for another project, and to manage stocks that become necessary at a later date than the planned date.

If there is no demand for the remaining material at the time the project is completed, then it is necessary to assess the likelihood that there will be a demand for the material in question within a certain period of time, as long as the storage costs are lower than the costs of reacquiring the material:

- if the probability is greater than 50%, then there is no need to wait for the material in question for a fixed period of time before completing the project,
- if, with a probability greater than 50%, there is no demand for the material in question after the specified date and it can be sold for more than 90% of the price purchased, it should be sold,
- if there is less than a 50% probability of a demand occurring within the specified time, sell the material if it can be sold for at least 90% of the purchase price,
- if, at the specified time, or if there is less than a 50% probability that the material will be surplus at the time of completion of the project, the material can only be sold for less than 90% of the purchase price, then the material must be sold within a shorter period of time not exceeding half the specified time.

At the end of the project, it is also necessary to assess the percentage of the remaining material that will be needed, with a probability of 50% by the end of the project. That part of the residual material for which there is 50% probability that there is no demand by the specified date should be dealt with at the time of completion of the project as described above.

Mathematical models can be developed to address these strategies, but their detailed development is beyond the scope of this article.

5. SUMMARY

In conclusion, maintenance, renewal and network upgrading systems are high on the list of service systems, especially because of the dispersed location and large territorial coverage of the sites. To ensure the efficient operation of these systems, it is essential to apply Project Oriented Management (POM) to optimise logistics processes and meet project-specific requirements, in which the role of the Procurement and Logistics Centre, managed as a virtual network and operated in the Service Provider Company and based on distributed intelligence, is a key element, offering a significantly more efficient solution than traditional methods.

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