



RESEARTCH OF A MODEL FOR APPLICATION OF ENGINEERING LOGISTICS IN THE MAINTENANCE SECTOR

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Abstract: *The present study aims to present not logistics as a service in itself, but the logistics approach in a company falling into the services sector, the end product of which is the performance of technical activities. The object of study is the sector of technical services in particular the construction and future maintenance of building installations for automatic control.*

Key words: *engineer logistics, technical services, automated systems*

The presented view of the activity from the inside gives a definition for the integration of engineering activities through specific management and logistics techniques, which are preventive tools for resource optimization and allow favorable development in a dynamic business environment with an initially low degree of predictability. Certain scientific papers [1 ÷ 8] are known, which pay very little attention to the logistics of services. For the creative thinking and interpretation are used examples from the practice of the company "Es En Electro" Ltd., specializing in the construction and maintenance of building installations powered by automated control systems.

In recent decades, the service sector has grown exponentially. The efforts of all participants in the vast market, driven by their needs, help this sector to take its dominant place in it. Enterprises are no longer alone in the search for sales of their products. Thanks to the unifying engineering logistics approach, industrial

interests become satisfactory. Gone are the days when factories produced goods that lay in warehouses and shops. Today, through the research mechanisms of marketing and management methods for resource planning, the needs of a product are discovered and the exact quantity is determined to satisfy its lack. Developed computer programs using effective mathematical forecasting methods allow to synthesize solutions, determine future tasks and optimize costs. Thus, the results obtain measurable parameters, which on the one hand protects producers from overproduction and saves additional effort, and on the other - prevents large-scale losses for humanity, because creates an obstacle to the unnecessary depletion of raw materials and pollution of natural resources. Logistics contributes to the positive outcome of human activities through universal approaches to solving many problems. With the advent of drawing and pulling systems, through the constant movement of tangible and intangible flows, the correspondence between supply and demand is ensured. This reduces the number of wrong management decisions resulting from excessive reinsurance, allowing for a minimum margin to guarantee contingencies. In the construction sector when performing technical services, the availability of stock is permissible only in case of emergency repairs and of systems of which the contractor is a representative. Even in these cases, a KIT installation kit is usually supported, with a minimum set of components corresponding to the latest models of the respective brand. For all other cases, it is inadmissible to maintain availability for completely understandable reasons.

With advancing globalization, companies are increasingly using two-way marketing tools to achieve results that determine their future existence. The market, as a general concept for production and consumption of goods and services, is saturated with products with equivalent parameters, such as quality and price, which need adequate distribution. In all this variety of offers, the customer feels confused to decide - which is the right choice for him. The dynamics of life further hinder this. To meet the needs of the market, it is no longer enough for the product and the customer to exist. There is a need for comprehensive distribution managed, through technical solutions or figuratively speaking, symmetrical logistics is implemented, with a mirror image of the participants in the logistics system, which knows the mechanisms to satisfy their interests and is able to make a sufficiently competent relationship with the product. and the product with the consumer. In the field of construction and repair services, in the middle between these two areas are engineering activities. For them, the expectation from logistics is to combine their knowledge on the

economic efficiency of a supply organization with the technical competencies of engineering, exceeding the technology of realization of the processes. In such a dynamic development environment, this mission is achievable only for the engineering logistics specialist, who with his broad-spectrum knowledge to offer adaptive solutions. The tasks facing him are often many times higher than those of the sales manager. In most cases, these two specialists find it difficult to work in sync due to the high degree of stressors arising from the difficult predictability of situations. It is often necessary for everyone to make quick decisions in the course of the developed emergency situation, which sometimes contradict each other. For this reason, the practice in the field of technical services is that these two positions - of logistics and manager, as well as that of technical manager to be filled by one person - project manager. The construction of a particular installation is associated with many organizational, research and technical competencies that the specialist must have. His duties are:

- to assess the required level of insurance stocks and that their total volume should not exceed the storage space (if there is one near the site at all);
- to calculate the exact quantity and the specific moment in order to shorten the storage time of materials with a short shelf life;
- to make quick assessments of whether it is profitable to use the stocks when the site is remote, and in order to implement the stocks, difficult to predict means of transport will be spent;
- to compare the price and quality offered to him by several suppliers, which he chooses according to the expected load of the product in operational conditions;
- be able to negotiate with customers and providers of services and materials;
- anticipate the need for large quantities and draw up preliminary framework contracts with the preferred contractor to ensure that the delivery will take place on time, in quantities, at the right price and in the right place;
- to organize the reception, unloading, storage, as well as the work of the team that will perform the installations;
- to make adequate decisions for timely actions in case of received calls for emergency situations, which is also related to the change of the response schedule;

- to know well the level of professionalism of the technical teams in order to know which of them will be more complete in the distribution of objects from the schedule;
- to look for ways to improve the quality of services, which is the biggest step towards reducing the funds for future advertising of the activity;
- if necessary, select subcontractors to perform specific tasks;
- to be informed in advance of the details in the event of an emergency, in order to know what tools and machines the repair team must be equipped with and what vehicle will be used;
- to choose which route the working group will follow and whether it can combine several sites in order to optimize transport costs;
- to rent construction equipment for longer-term sites;
- to prepare schedules, reports, financial documents, offers, protocols, acts, quantity and value accounts for project construction papers;
- to carry out trade operations with short-term and long-term perspectives;
- to keep business correspondence, combining all business areas in which the company has received development, etc.

When examining the details of the technical construction activity, it should be emphasized that in the initial stage, in order to connect the service with its target group, the greatest effort is inevitably imposed on the logistics engineers, who, as mentioned, are not good enough. Economists, suppliers and stockists. In order to achieve the expected satisfactory results, in addition to the mandatory knowledge of the technical knowledge, they should be able to market their service to the extent that the client remains satisfied with their work and, if necessary, turn only to them. An even more satisfying result is that they manage to provoke in him the desire to offer their services to potential future clients. The practice in the company "Es En Electro" Ltd., whose many years of experience we rely on, shows a desire for long-term cooperation. However, trust is important not only at the company level. Upon closer examination of the potential interaction with customers, it is found that when considering the purchase of new equipment, consumers are easier to trust the opinion of the dealer than the specialist from the company that will install it. The result of our research is that the lack of an accurate idea of the place of construction and installation of the specific technical

system, makes the assessment of the trader superficial. However, practice has shown that the client / investor is much more inclined to accept a commercial proposal describing the lack of an obstacle to things to happen according to his ideas and, accordingly, to reject the negative opinion of a person with practical technical competence. And so in the chaos of available information and ideas, consumers prefer to trust the one whose interest is to sell their product to them, instead of the professionals from the company, who will later have to meet their unprofessional expectations and configure and install selected by them product. For this reason, most of the companies in the field of technical construction decide to combine their activities with the supply of a certain model of equipment that they know very well and in whose quality they can be sure. They are bound by a contract with its manufacturer, which makes them less vulnerable to competition and protects their interests. It also protects them from the need to take other people's responsibility to customers, in case of production, transport defect, etc .. Accordingly, the customer turns to them with the prior intention to purchase the device or machine, the quality of which the company can guarantee and at the same time installs and maintains subsequently. To some extent, the guarantee of the installed systems is achieved by pre-laying protective automation, but the equipment is not eternal or protected from mechanical damage, so it is necessary to service in the direction of prevention. It is performed periodically - by subscription maintenance or as an emergency intervention - in case of forced repair.

The importance of the techniques used by the logistics in a company engaged in engineering activities is huge, in order to be able to connect the user of his service - the technical implementation, with the equipment produced for the given demand. No less important is the managerial strategic thinking. To cover a larger number of clients and, accordingly, a perimeter to serve, there are two main management approaches, the first of which is to build their offices in remote locations, and the second is to use the services of a trusted partner to take over the orders of their clients. . In the first case, the approach costs money to build, maintain the material base, hire employees, consumables, salaries, transport for supplies and others, and in the second case they save these current costs, as well as the time to perform the specific task and benefit from the saved tax. added value on the trade discount to the subcontractor. Thus, the company, on whose practical activity the findings of the research were made – “Es En Electro” Ltd., partners in the construction of automation systems for building facilities with several

leading companies on the market, covering the entire perimeter of northeastern Bulgaria. The systems in the construction of which she specializes are shown in the images from Fig.1:

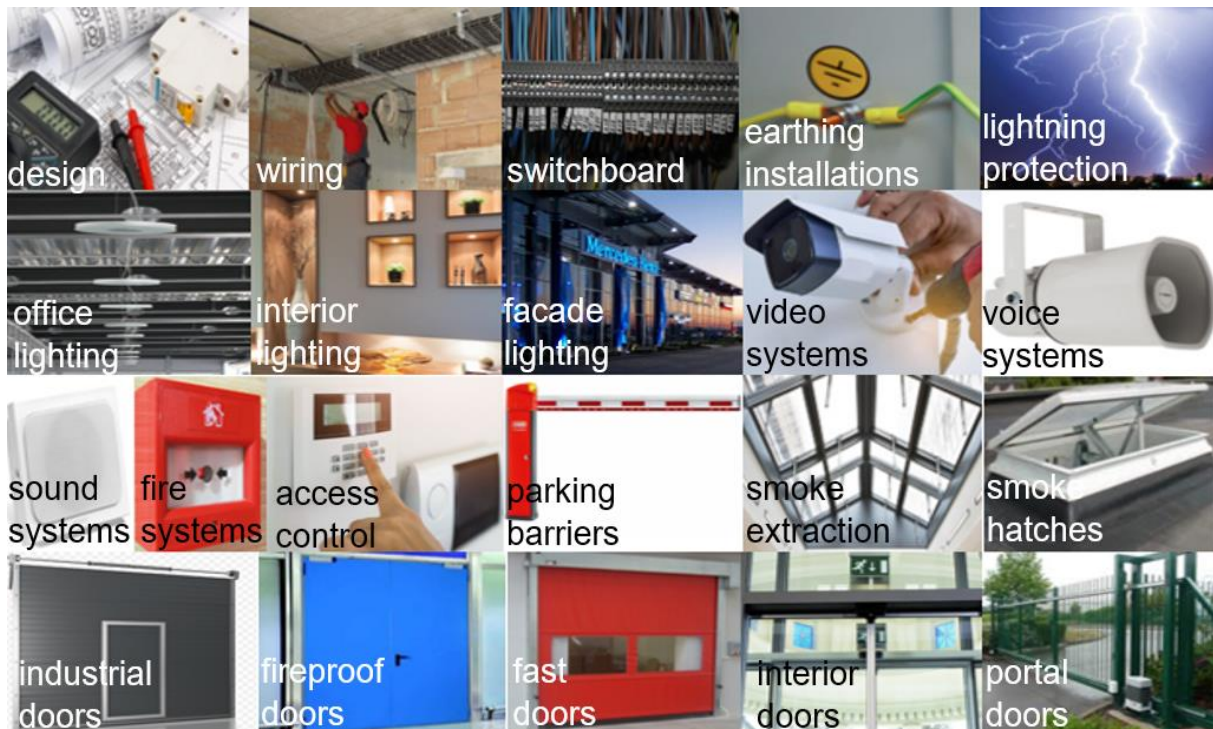


Fig.1 - Images illustrating different activities and installations related to drive systems and mechanisms

Because the production part in a company profiled in engineering activities, in particular technical services, consists of assembly and installation of equipment that arrives in parts / components and assembled on site, the logistics must be familiar in detail with their entirety. When it comes to building a complete system of different elements - mechanical parts, electronic components, software products, etc., the situation of trust is extremely important for the efficiency of the service. Here is another reason for the manager and logistics in a company performing technical activities to be technically literate and their competencies to meet the current level of development of equipment and the specific ways of working in it. In case the company offers complex services, the competence of the employees should be extended to the multitude of activities. As an example, we will again use the company “Es En Electro” Ltd., which specializes in the construction of many different systems in terms of functionality.

The stages of construction can be briefly described as follows:

1. Leading in the development of projects on behalf of the investor are the ordinances of the Spatial Development Act (Spatial Planning Act), in part electrical installations. In addition to numerous calculations, this area includes a study of the requirements for:

- type of building;
- construction category;
- the leading architectural project;
- the investment project;
- the legislation of the Republic of Bulgaria on health and safety (safety and health).

2. After completion of the design, the following shall follow:

- Bidding on quantity-value accounts, divided by types of electrical and low-current installations;
 - Preparation of contracts for ordering / production;
 - Determining the stages and terms of completion;
 - Signing a contract and settling advance payments.

3. Beginning of labor and supply organization:

- Planning - determining the need for auxiliary materials, stairs, scaffolding or lifting equipment, tools, personal protective equipment;
- Designation of a safety and health authority and project manager / technical manager
- Preparation of work schedules that are consistent with the stage of construction / repair and the supply cycle;
- The supply of materials and consumables for construction is consistent with their type, size and weight. It is carried out by official transport (or by a contractor of the company) to the site.

4. Construction of cable routes and cabling:

- Electrical installations for power supply with power cables:

- Low-current installations for control of equipment with information cables.

5. Saturation of switchboards - starts immediately after the actual wiring.

6. Assembly.

In particular, we will consider the assembly of an automatic door, whose components are: electric motor with gearbox, controller, DPS control switch, power supply, locking mechanism, radar, infrared barrier and sensors, battery, support beam, wing rollers, belt , springs, drum, ropes, guides, insisting mechanisms, floor guides, decorative housing.

All parts are installed in a logical sequence and then connected to the mains.

7. After performing the installation work, approach:

- Tests and commissioning of the installed system;
- Preparation of handover documentation;
- Training of staff who will work with the automated system;
- Final payment under the order contracts.

The organization of management and logistics in the company are skillfully combined with the technical competencies of the team. This provides stability and direction for better coordination and planning of activities. Specialists in the various fields are interchangeable and at times more functional thanks to their expanded practical training. The complex of activities that the company offers makes the investor's interests and intentions feasible.

The large differences in logistics activities between the goods sector and the services sector (in the private case the product of the activity is a technical service) come from the fact that the activity, in the second case, is not related to a specific building with concentrated fixed assets, facilitating the processes and greatly contributing to their predictability. For this reason, the logistical approach in the field of technical services is based on hypotheses and their constant testing. The hypothesis presupposes to assess to what extent a predetermined situation is actual or legally similar to the specific moment of development. On the basis of the information obtained from the inspection, a conclusion is made about the real possibilities, which can serve as a model for further planning of orders, deliveries, installations, etc. The dynamics of change require these assessments to be

performed repeatedly until the very end of each individual operation. This is the root of the big difference between logistics in the stationary production of products and services, and logistics in the mobile. The construction of completely different buildings implies completely new challenges. The different conditions and response capabilities that the location of an object provides distinguish it too much from the others. Each situation that arises on the new object differs from the one resembling it from the previous one and requires a new creative approach. In this situation, the amount of statistical analysis increases many times over. For each object of its production of services, the logistics operator uses the methods of statistical assumption. The comparison of hypotheses and the testing of possibilities is performed every minute. An in-depth analysis of the potential for response should be made before any follow-up can be taken. It is necessary for each subsequent decision to be as close as possible to the goals. The similarity in the resulting unforeseen situations in a stationary production and the difficult to predict mobile one is only in the professionalism based on experience, on which response models have been accumulated. Following the comparison made so far, we must emphasize that the consequences of any unforeseen situation due to unverified information, leads to misjudgment and puts any organization at a standstill, regardless of whether it is a product or service.

The work of specialists in the field of technical activities in the field of construction and maintenance of building automated propulsion systems is very similar to that of specialists in the IT sector, but these are radically different areas, although difficult to distinguish for non-professionals. The work of building automated systems is a hardware activity, while the creation of a software product is entirely software work. As important as the mechanical assembly of a system, together with its electronic components, is as important as the program embedded in its control device. Without any of the components that make up the integrity of a modern technical system, today's progressive development in technology cannot be expected. With the same importance in relation to the development of a business is the information service, which allows the exchange of information in the various processes not to concern the location of the participants in them and makes it possible to synchronize them. In the absence of information services, the possibility of remote process control would be minimized and the efficiency of production would decrease in direct proportion to it. Thanks to the information channels that can be used to improve coordination, the effectiveness of the activities in a company increases.

In conclusion, it should be noted that engineering logistics professionals in the services sector need to be seen as highly qualified staff whose knowledge surpasses their counterparts in standard economic logistics in technical terms. Even if the dynamics of the use of information systems are similar, the direct look at the innovations related to building automation and the innovations in the software products that manage the functions of the facilities supporting the processes is incomparable. In order to maintain the level of awareness, the knowledge about the technique, as a material reality, and about the technologies of construction of an installation should be updated according to the innovations in the sector. This is extremely important for the progressive development of any practice guided by the service logistics engineer.

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