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Work Standards in Selected Third Party Logistics Operations: MTM-LOGISTICS Case Study

Michal Koptak^a, Martina Džubáková^a, Virgilija Vasilienė-Vasiliauskienė^{b,*}, Aidas Vasilis Vasiliauskas^b

> ^aUniversity of Economics in Bratislava, Slovakia ^bVilnius Gediminas Technical University, Lithuania

Abstract

Good relations between company, suppliers and logistics provider must be based on a win-win strategy, so quality (and price) of services is essential factor in establishing long-term relationships. In this paper we offer the MTM (Methods Time Measurement) standard development as basis for determining quality and price parameters for fair 3PL contract. We use case study and "MTM draft development" to show opportunities to increase the productivity and reduce the costs related to outsourced processes in the selected enterprise. We provide a brief overview of the methodology MTM-logistics and show MTM as a tool for optimization of logistics operations in order to create the standards of individual activities that are outsourced to external companies in selected industrial enterprise. Standardization gives us a good basis for quality improvement and price negotiation.

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* Corresponding author. *E-mail address:* virgilija.zinkeviciute@vgtu.lt

Modern industry is aimed at producing well-designed products that are available to the large number of consumers as soon as possible. Furthermore the business environment is characterized by high competition, while the requirements of consumers increase. Many companies focus on their core competences and outsource other activities, to reduce cost or increase customer service level and revenues. The goal is to reduce lead-times and increase flexibility and responsiveness. Specialized company can provide required services faster and cheaper. Outsourcing can therefore be defined as strategic application of external resources in areas traditionally provided by internal employees. That means the process of shifting responsibility for specific business activities from one company employees to other subjects. In order to continuously reduce costs, companies outsource one or more logistical functions to Third Party Logistics companies (3PL) [6]. Although 3PL has many definitions, we take one from Sink and Langley [9]: 3PL provider is an external supplier performing some or all of a manufacturer's or customer's logistical functions". 3PL companies providing logistical outsourcing are oriented to provide comprehensive and high-quality logistics solutions that lead to the service quality improvement of the final product in order to make customers feel more comfortable [12]. Logistics services may represent the source of competitiveness to any company. Trying to meet more customers' needs of quality and price, companies are forced to find some real options how to increase their services inside a particular process and across the entire supply chain. Good relations between suppliers and logistics service provider must be based on a win-win strategy, so the quality and price of services is essential factor in long-term relationship.

2. Methodology and approach

To show the perspective of MTM (Methods Time Measurement) in logistics, we provide a case study. MTMlogistics specifies standard processes in logistics, which describes and at the same time assigns the rules and affecting quantities to determine the time standards based on tables. Setting up of standards for those processes using this method leads into the optimization of times. Along with logistics processes almost all companies run the similar actions with high repeatability that in general underlie the same rules. Just within the frame of the analysis is necessary to take into consideration individual variations in the processes as well.

2.1. MTM in Logistics

Historical evolution of work analysis contains a variety of processes and techniques more or less accurate. First research, started by Taylor and his Time Studies, ended up in observing a job and breaking it down into individual tasks [10]. Work standards enabled the workman to work faster and with better quality than before. Many scientific studies occurred with further development of work standards and Predetermined Motion Time Systems (PMTS). The foundation of PMTS was laid out by the research and development of Frank B. and Lillian M. Gilbreth [2]. PMTS work measurement systems based on the division of work into basic human movements, classified according to the nature of each movement and the conditions under which it is made. One of the significant advantages of PMTS was that they require a detailed description of the working method, and are thus useful for studying how work is done, how it can be improved as well as measuring the time it should take [5]. PMTS allowed the use of standard predetermined tables of the smallest body movements, and integrating them to predict the time needed to perform a simple task. Predetermined motion time systems has gained crucial importance, it can predict work time and quality without observing the actual work. In the 50s Maynard, Stegemerten and Schwab developed Methods Time Measurement (MTM) [7]. MTM was the first of a series of predetermined motion time systems, predetermined in individually, but are derived from an industry standard.

MTM method is the most widespread method used for measurement and work analysis. High productivity of this method relates to the speed, which enables to make a draft of time standards that means boost of productivity of supervisor by time standards, of course. Since founding the MTM Association (1951) and the national associations (Sweden in 1955, France 1957, Switzerland in 1956, etc.) there is a long tradition of using and distributing MTM in logistics. MTM – data catalogue for transport and storage was founded at request of members of the association

already in 1970. In 2003 those data were completely revised and edited in order to comply with strict requirements in terms of logistics [1].

According to innovation trends in logistics, the standards in MTM also must be regularly updated and completed according to new knowledge, and so support increasing tendency in applying this method. Application of this method covers understanding of logistics from classical view, which means specifying it not just as a storage unit, but as a complete JIT logistics chain. The areas where the method MTM in logistics is applied in practice [13]:

- Logistics areas storage units and distribution centre, automotive industry, suppliers for automotive industry, freight forwarder services, and aircraft engineering, other sectors.
- Processes Job creation, Commissioning, Transportation/Picking goods, Packaging/Examining, Material flow/Kanban, Calculation of personal needs, Storage facilities planning.

Within the frame of logistics similar processes (working methods) with high duplication in variety of business areas may occur. Those processes (working methods), which differ in their complexity, are known as standard working methods of logistics. Therefore, MTM, develops and offers existing compound process components for general use in running enterprise (Association MTM, 2011). MTM – methodology of logistics refers to standard processes (3–30 min.), describes them and at the same time assigns the rules and affecting quantities according to them determining the time standards based on tables.

Logistics processes with maximum frequency appearing in enterprises are:

- Transportation of finished products to storage unit,
- · Material handling,
- Commissioning and pick and pack services,
- Truck/lorry loading of materials,
- Removal of materials and put-away on the shelves,
- Removal and delivery of materials for generating production.

Manual logistics activity time duration (e.g. repackaging of any material, spilling components, opening and closing a cardboard cover, labelling, etc.) is determined by system MTM-UAS/MTM – Universal Analysis System (for processes 0.5-3 min.). Coding of all features is based on 12-digit code, while number 5 is placed at the end and marks the time standards MTM-UAS. Hierarchical level is always at the first place. Blank space in coding is marked with a dot. At the last place "P" as process time or "L" as line of process sequences may occur. Example of code with description of transport operation using the method MTM-Logistics is shown in the Fig. 1 [11].



Fig. 1. Example of coding in MTM-LOGISTICS (Association MM, 2011).

Coding of every single process runs through data card system, which contains predefined range of activities and operations with relevant allocation code and time value measured in timer units – TMU (1 TMU = 0.036 s. = 0.0006 min.). Example of data card is shown in the Fig. 2.

Then the code is booked in the form 4LTABH with time value 18TMU (0.648 s.).

Procedural steps for transport – general features		Code	TMU	
		4LT		
Control	Steering lever	ABH	18	
	Joystick	ABJ	10	

Fig. 2. Example of coding in MTM-LOGISTICS (Association MTM, 2011).

With MTM we create work standards for logistics operations. Standardization is a creation of norms and regulations aimed at maintenance of implemented changes to prevent negligence and return back to the situation when lean techniques not applied yet [3]. Through work standardization we can achieve an accurate quality result. Standard is a term, which should be seen as sequence of steps by which is possible to achieve identical results regarding to time, procedure/work technique, product and quality. For supervisors it is important to have at disposal visualizations of all methods, all components, production activities and measurement parameters of the production system in the way, which is understandable to anyone [4].

3. Draft of standards for logistics operations using the method MTM-logistics

The work analysis using MTM – logistics was done in VW Company under the auspices of Logistics Planning Department PLZ3. There was a need to analyze 28 repeating processes delivered by external company providing internal logistics through outsourced services. As VW pays this company for every manipulation minute per 1 vehicle, the main aim of the analysis was to reduce costs and find possible variants of time process optimization by itself. Along with that develop a standard and compare it with current state was another important issue. Such standards also make another considerable contribution, namely for supervisors of time standards, who can use these standards whenever they need to conduct any analysis for new suppliers, so reducing average time of making out new analysis by about 80%. Further on we describe only 3 selected processes (out of 28) with standards given for time reduction and optimization:

- A. Unloading a truck/tractor and allocation for goods received.
- B. Transport from receipt area to block storage.
- C. Transport from receipt area into shelves.
- A. Unloading a truck and allocation for goods received

Before making out an analysis there was a need to check time listed in the internal documents of outsourced company before carrying out accurate measurement, firstly lead simple time measurement and randomly choose 3 material suppliers for that:

- Time listed in internal documents for this process 1.1 min.
- Average time after 3 measurements divided by number over manipulated vehicles 1 min.

Using time measurement we uncovered data distortions. In order to reduce costs and set reliable time standard we decided apply MTM-logistics analysis (Table 1).

Carrying out analysis using the method MTM-LOGISTICS we discovered more time space and that means waste of time in individual process sequences:

- Time after standard setting of operation Nr. 1–0.69 min.
- Total savings of time compared to time presented by 3PL company represented 0.41 min.

B. Transport from receipt area to block storage

Before analysis there was a need to check time listed in internal documents of outsourced company before carrying out accurate measurement, firstly lead simple time measurement and randomly choose 3 material suppliers for that:

- Time listed in internal documents for this process 2.5 min.
- Time after 3 measurements divided by number of over manipulated vehicles 2.5 min.

Activity / Operation	Code	TMU	Sek.	Frequency	LT	SUM	
Mann/Walk towards the computer	KA	25	0.90	5	1	5.85 sec.	Other operations
Mann/Walk towards the tractor	KA	25	0.90	10	1	5.85 sec.	
VZV/Transport – direct – unloaded towards a truck/tractor	SFISF	7	0.25	120	32	0.95 sec.	Driving truck for unloading
VZV/Transport – curve – unloaded towards a truck/tractor	SFKSF	16	0.58	1	32	0.02 sec.	
VZV/First exit and forklift stop	SZEMF	693	24.95	2	32	1.56 sec.	
VZV/Transport – direct – unloaded towards authentic position	SFISF	7	0.25	130	32	1.02 sec	Driving to authentic position
VZV/Transport – curve – unloaded towards authentic position	SFKSF	16	0.58	2	32	0.04 sec.	
VZV/Visual control of damaged packages in the pallet truck	PT	833	29.99	1	32	0.94 sec.	Transport of pallet truck for goods received
VZV/Lower/Broaden sliding carriers	РТ	972	34.99	0.15	5.0	1.05 sec.	
VZV/Loading - truck/Storing - floor	SABAFM	934	33.62	1	5.0	6.72 sec.	
VZV/Lever truck control – allowance	РТ	88	3.17	1	5.0	0.63 sec.	
VZV/Gathering and storing lengthy sliding carriers	SZAGF	135	4.86	1	5.0	0.97 sec.	
VZV/Transport - direct - loaded	SFISF	13	0.47	40	5.0	3.74 sec.	
VZV/Transport - curve - loaded	SFKSF	16	0.58	1	5.0	0.12 sec.	
VZV/Lever forklift control – allowance	PT	88	3.17	1	5.0	0.63 sec.	
VZV/Gathering – Storing/2.5 m – floor	SACAFO	1080	38.88	0.92	5.0	7.15 sec.	Pallet allocation on receipt area
VZV/Gathering – Storing/1.2 m – floor (Gebindy)	SABAFM	934	33.62	0.08	5.0	0.54 sec.	
VZV Driving	SFISF	13	0.47	5	5.0	0.47 sec.	
VZV/Lever forklift control – allowance	PT	88	3.17	1	5.0	0.63 sec.	
VZV/90° turn in driving direction unloaded	SRFSF	56	2.02	1	5.0	0.40 sec.	Driving a truck back
VZV/Transport – direct – unloaded towards a truck	SFISF	7	0.25	40	5.0	2.02 sec.	
VZV/Transport - curve - unloaded	SFKSF	16	0.58	1	5.0	0.12 sec.	
						41.42 sec.	0.69 min.

Table 1. Analysis MTM for 1st process.

As there was setting of accurate measurement ratio in contrast to real time in the process, that means no changes in comparison to time under standard settings of time, nothing fundamental was innovated, that is why the time from the first execution of rationing remained changeless. This time can be changing, depending on the production hall of the company, because the distance and the number of curves is not equal. And this is the reason why the analysis was done with universal cells, and therefore one of them can be chosen, in the way that an encoder sets always the length of manipulating routing and the number of curves in the hall. Thus every production hall will operate with accurate time values for relevant process. Carrying out analysis using the method MTM-LOGISTICS we discovered more time space and that means waste of time in individual process sequences:

- Time after standard setting of operation Nr. 2 2.44 min.
- Total savings of time compared to time presented by outsourced company represented 0.06 min.

C. Transport from receipt area into shelves

Before the analysis there was a need to check time listed in internal documents of outsourced company before carrying out accurate measurement, firstly lead simple time measurement and randomly choose 3 material suppliers for that:

- Time listed in internal documents for this process 2.42 min.
- Time after 3 measurements divided by number of over manipulated vehicles 2.48 min.

Knowingly we've decided to choose the process with real time value, which is higher than the time listed in internal documents at primary measuring. This means, that current charges are less than the company might charge. Also this is the reason to make measurements in regular intervals, even if there wasn't any change in the running processes. In this particular case it is again about universal cell and its value, which can differ from type of a production hall. After analyzing the reasons which caused time increase the result was, that in fact what changed were containers for freight transport, and that lead in change in material handling that workers must treat goods in other way, and this fact must be additionally taken into account in the frame of setting up standards in this analysis as well. Carrying out analysis using the method MTM-LOGISTICS we discovered more time space and that means waste of time in individual process sequences:

- Time after standard setting of operation Nr. 3 2.36 min.
- Total savings of time compared to time presented by outsourced company represented 0.06 min.

4. Conclusions

Each process needs to be evaluated individually, although they might seem very similar. Each analysis must be done with personal approach, which means, everything must be done systematically and various number of factors continuously evaluated. Method MTM-LOGISTICS takes into account even ergonomic aspect, therefore is necessary to assess and respect, e.g. weight limits. If there is a material change in weight by use of other materials, we can expect, that operator exceeds the maximum safe limit and so analysis with standards using method MTM must be edited. Based on 3 examples, which were demonstrated, there was total time savings in amount 0.52 min. This time is very cardinal and already is beyond allowed 10% tolerance error approved by outsourced company. In case there is daily production in amount 220 cars in company, this represents time savings 114.4 min. per day, and 57 hours per month. De facto from 28 processes we analyzed within the company, the result showed time savings of 7 hours for 30 suppliers. Time decreased significantly due to a time optimization by more processes through using computer technology. This led to a significant decline in times of operations. And also led to a necessary need for doing repeated analysis caused by increasing doubts from outsourced company about whole process. Another important benefit of the logistics method MTM is time reduction in logistics planning for a cryptographer, who can make a draw from standard settings already done.

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