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MEASUREMENT OF LOGISTICS-QUALITY

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Abstract

Because of the sophisticated characteristics of logistics it is difficult to survey the needs of customers and to create a comprehensive quality requirements system. On the joint points of logistics chain we always find a seller-buyer relation. The buyer has his quality requirements to be satisfied by the seller.

Quality measuring indicators will be suggested in the following three areas:

- logistics facilities,
- logistics process, subprocesses,
- human factors, management, organisation.

They will be analyzed by a logistics performance and logistics costs matrix.

Keywords: logistics, quality measurement.

Quality as a requirement has great importance also in the service industry. If a service activity is not very sophisticated, the quality terms and requirements applied in industry can be adopted here. We can see that more and more transport companies let them be qualified by respective Quality Standards.

Logistics is a complex process, it is divided into activities. The activities themselves carried out at high quality will not automatically turn a process into a high standard one but they offer chance.

The logistics system has the following areas with quality concerns:

- logistics facilities,
- logistics process and its subprocesses,
- human factors of service, organisation, management.

Quality will be assessed by the consumers. It is not possible to find just one consumer in the logistics process to satisfy his requirements (but the final consumer is the real target), on the joint points of logistics chain there is always a seller–buyer relation. A buyer always has his quality requirements, the seller has to satisfy them. The final consumer should define these requirements but it is not easy to focus on his demands at the beginning of the logistics chain (e.g. mining raw material etc.). This way we will get suboptimums at joint points, a comprehensive optimization of the whole logistics process can be attained by a learning process.

The interests of the whole economy and the interests of a company are not always the same (e.g. transport on week-end, transport by rail instead of busy road etc.). For the economy not just the level of performance is important but the selection of transport mode (environment protection).

A service activity is to be organized again and again every time. Its performance and its quality can be different any time, it shows a distribution. It is impossible to check its quality by instruments or automatically. Even the customers assessment can vary.

For this reason, the demand is stronger and stronger to guarantee the same quality level by standardized processes in compliance with the respective Quality Standards.

If we speak about the quality of logistics beyond the three areas (above), we have to involve the performance and productivity indicators and the expenses.

1. Quality of Logistics Facilities

The facilities include:

a) – delivery facilities
   – warehousing facilities
   – packaging facilities
   – material handling facilities

b) – transport ways

ad a) Quality indicators of logistics facilities:

- load capacity , performance
- modern design
- suitability to jobs
- maintenance background
- man–facilities relation (ergonomy, environment protection)
- good–facilities relation (specialities of goods, unit load, packaging, etc.)
- ways–vehicles relation
- performance–price relation
- relation of expected life and price of facilities
- specific energy and lubricant costs
- specific performance costs
- specific maintenance costs
- reliability
  - soundness (failure rate, MTBF, $F(t)$, $R(t)$)
  - longevity (general overhaul cycle, life span)
  - restorability (av. restoring time, total break-down time)
  - storability, transportability.

ad b) Quality indicators of transport ways (rail, road, water, air)

- length, capacity, network, wayleading (curves, slope etc.)
- easy to survey, illumination, surface, speed, sensibility to weather, comfort
- signs, information
- safety, help (telephone, helicopter etc.)

2. Quality Indicators of Logistics Process(es)

Requirements:

- optimum combination of jobs (tasks) and facilities
- optimum packaging and load unit
- optimum logistics chain
- optimum route and time
- minimum transfer of goods
- minimum warehousing event and time
- organizing and managing logistics activities in environment-friendly way (minimum noise, outside of housing estates, by-passes, etc.)

Indicators :

- capacity supply/capacity demand
- appear time/ordered time
- damage events/total activities (packaging also)
- missing volume/total volume (packaging also)
- error delivery/total delivery commitments
- physical performance/time, processing time
- performed commitments/demanded commitments
- number of customers/year

3. Quality of Service

The structure of organization and the human behaviour (way of thinking, decision etc.) are very important factors. A customer needs beyond physical performance also soft elements, such as how to reach the service company by telecommunication, how to get the phone number or address, after how many minutes will they pick up the receiver, is the proper person on the line to give information (price, time) and to make decision. How much time does a commitment need altogether. It is important to give advice the customer even if the company is not able to take the job.

Quality indicators :

- politeness
- quick information
- exactness

- reliability
- advising
- quick and optimum decision, flexibility
- quick response on complaints
- flexible tariffs
- price elasticity, rabatt
- computer, computer network
- telematics
- trucking & tracing

4. Logistics Performance at Companies

The productivity indexes of logistics are quantitative measures.

Their amounts just partly guarantee the high quality but e.g. the transport speed is an important factor of transport quality.

For this reason, its performance matrix is worth being looked at.

Table 1. Logistics performance matrix

Names	Managing (Dispatching)	Storing Packaging Material handling	Transport (in and out)
1. Personnel	Commitment / staff	Vol. loaded in / out / staff Packaged pcs / staff Handled volume / staff	Tr.ed volume / staff
2. Company facilities	Fac. work time / fac. time capacity Temporary utilization of facilities (%)	Vol. loaded in/out / fac. and year Packaged pcs. / facilities and year Handled vol. / fac. and year	Ton km / vehicle and year Transported vol. / vehicle and year Run km / vehicle and year Av.tr. distance (km) Utilization of vehicles (%) related to time, load capacity and tkm
3. Space and surface		Utilization of loading surface (%) Utilization of loading space (%)	

Table 1. (continued)

Names	Managing (Dispatching)	Storing Packaging Material handling	Transport (in and out)
4. Keeping inventory		Av. inventory (volume, value) Av. storage time (day, hour, minute) Av. inventory efficiency (day, minute) Rotation frequency/year Commitments/year Av. time of comm. (hour, minute)	
Average and total	Number of comm./year Numbers of suppliers/year No. of buyers/year Op.time/comm. Return/year	$\frac{\text{Handled vol.}}{\text{staff}}$ $\frac{\text{Handled vol.}}{\text{year}}$ $\frac{\text{Packaged pcs}}{\text{staff}}$ $\frac{\text{Packaged pcs}}{\text{year}}$	$\frac{\text{Transported vol.}}{\text{year}}$ $\frac{\text{No. of transports}}{\text{year}}$ $\frac{\text{Av. vol.}}{\text{transport}}$ $\frac{\text{Av. time}}{\text{transport}}$

5. Costs of Logistics

Along the logistics chain there are seller–buyer relations in every joint point. The seller adds some profit to his costs and offers his service at a price to the buyer. For the buyer the previous price means costs again, he adds more value and this way some profit to the previous service and sells it. This relation is repeated in the whole logistics process till the final buyer (customer).

It is not easy to separate logistics costs from he whole production costs for a product which has many phases.

For this reason we should take a simple industrial company which gets the raw material immediately from the extractive industry, manufactures just one kind of products. This product will be sold to the customers (not to another industry). Insurance is always included.

This scheme is repeated on the whole logistics chain.

We have to remember the quality costs of logistics.

There are here three groups of quality costs:

- failure costs (wastes),
- control and assessment costs,

Table 2. Logistics costs at companies according to logistics activities

Kind of costs	Managing (Dispatching)	Storage Packaging Material handling	Transport
1. Personnel costs	Pers. costs / commitment	Pers. costs / volume, unit, value	Pers. costs / comm., volume, tkm
2. Company facilities costs		Fac. costs / Op. time or op. No Fac. costs / hour	Vehicle costs / tkm, km Vehicle costs / hour
3. Space and surface costs	Constr. and op. costs / year	Constr. and op. costs / year	Contr. and op. costs / year
4. Inventory costs		Interest / volume, unit, value	
5. External service		Stor., pack., handl., tariff / volume, unit, value	Tr. tariff / tkm

Table 3. Contracted logistics costs matrix (according to the kinds of costs)

Names	Managing (Dispatching)	Storage Packaging Mat.handling (own &foreign)	Transport (own & external)
Costs according to cost places	Managing costs / commitment	Stor., pack, handl. costs / volume, unit, value	Tr. costs / commitment Tr. costs / volume, tkm, km Tr. costs / time & vehicle
Share of total logistics costs	Total man. costs / total log. costs	Total stor. & inv. costs / total log. costs	Total tr. costs / Total log. costs
Share of cost groups in total logistics costs	Personnel costs/total log. costs Company log. fac. costs/total log. costs Space and surface costs/total log. costs Inventory costs/total log. costs External log. costs/total log. costs		
Costs of total logistics performances	Total log. costs/year Total log. costs/product Total log. costs/total production costs		

- prevention costs.

High quality performance does not necessarily mean higher costs. The costs of wastes can be rearranged, reduced or eliminated by quality control and prevention.

How to save logistics expenditures at macroeconomic level:

- reducing the number of logistics activities
- optimum selection of logistics technologies, facilities (packaging, load unit, multimodal transport, preferring rail- and waterways etc.)
- restructuring industry allocation
- modern, comprehensive organisation (logistics centres, just in time etc.)

With the specialisation and globalization of production and with ensuring a wide range of choice of consumer's goods, the role of logistics is getting more and more emphasized. The rationalisation of logistics process is essential.

6. Conclusion

Logistics costs take 18–23% of total production costs (in a wider sense even 40%).

For this reason production companies are going to make these activities more effective. Big companies have third partners (forwarders) make it. A forwarder can comprehend and optimize a longer interval of logistics chain.

The share of distribution and production logistics is not right. The border is not sharp. In the case of quality the question is how and not where. The seller and buyer relation can be found in all joint points of the logistics chain.

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