

# RESEARCH OF THE TQM EVALUATION IN A SERVICE COMPANY

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## Abstract

TQM is a term associated mainly with ensuring the quality of production, where the emphasis is on quality in all stages of the production process. The introduction of TQM into the operation of a service company seems therefore to be more difficult. In the presented article we address the basic requirements for the introduction of TQM in a company providing road freight transport. The basic PDCA approach needs to be implemented in all processes of the actors involved in the supply chain. The article points out the fact that evaluating the quality of the provided service only on the basis of a single indicator, which is the monitoring of the number of complaints and claims, is not sufficient as evidence of the established TQM system. The customer requires evidence of long-term and serious monitoring. As part of this monitoring, it proposes the creation of an effective evaluation system for evaluating the quality of the external service provider. To determine the priority requirements of the customer, it is appropriate to apply several known simple evaluation methods. In the article, we applied the pairwise comparison method and the Saaty's method to determine the order of importance of the quality criteria that we previously found in the customer survey: integrity of the consignment, compliance with the agreed delivery time and completeness of the shipment, including documents. We therefore recommend focusing on these criteria when providing TQM in the company.

**Keywords:** total quality management; evaluation of quality; quality of service

## 1. Introduction

Quality management has been a very popular focus of attention for researchers across the globe. However, this interest in recent years have shifted in the direction of creating a culture of quality [9].

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The origin of the concept of total quality management (TQM) is not clearly defined. It is believed that this concept appeared sometime at the turn of the 70s and 80s of the last century. Quality Management (QM) has been based on this concept since the beginning of the 20th century. For several decades already, business organizations have been identifying, describing, and, in some cases, standardizing (for instance, ISO 9001) their business processes by introducing quality management systems and applying/constructing quality management models [1].

States that the cradle of TQM is Japan, a country that is at the forefront of management in many industries in today's world. Right from the start, TQM covers three basic pillars: customer, process and people, and owing to the ability to travel and populate all continents of the world with people of different cultures, TQM is also at the forefront in countries such as the USA and countries in Western Europe. Today, this principle is so widespread that in many countries, local quality awards are based on its basic pillars.

Total Quality Management (TQM) is an extended organizational philosophy focused on continuously improving the quality of production and processes to meet broad customer [1]. The idea of building a TQM in a company is to develop a system in which all employees will participate in top quality, not through the assignment of tasks and their fulfilment, but as a result of their own belief in the correctness of this procedure. The principle of TQM is therefore the involvement of all subjects in "quality creation", because they want it themselves.

From a management point of view, this is a very difficult task, convincing all stakeholders to participate voluntarily in improving quality, and it is a long-term matter [2]. It is made even more complicated by the fact that it is necessary to involve all stakeholders in quality production, including suppliers and customers, not excluding brokerage services. If management wants to achieve a high level of TQM, it must focus on the processes taking place between internal and external entities and increase the level of relationships with its suppliers and customers [15]. Quality management creates a part of innovation management [3]. Innovation management creates structures and framework conditions so that innovation potential can be systematically identified, and then ideas can be designed and successfully implemented [4]. Top management's consistency in involvement for all quality program's activities will facilitate changing of employee's attitude towards quality in the organization [13].

A functioning system of comprehensive QM is considered to be the highest level of quality in the company [14, 15]. However, if the company wants to constantly improve and perfect the quality of its production, it is also appropriate to correctly assess the level of TQM. However, the evaluation cannot be limited to determining the level in one's own company [7].

TQM approach isn't only restricted to manufacturing related quality improvements but also widely adopted by service sector firms to provide quality services [6, 15].

In the paper, the focus is on the analysis of TQM level evaluation in a service company and the key factors of quality assessment. While in the case of enterprises whose activity

is based on tangible production, the assessment of the level of TQM is a relatively unambiguous matter conditioned by the assessment of compliance with the physical parameters of the product; weighing, measuring, counting ... cannot be used or can be used only to a very limited extent. Therefore, it is necessary to develop a system of benchmarks for service companies, with which selected indicators can be compared.

## 2. Theoretical Framework

The system of quality needs to be developed by every company, in order to present itself as “a house of quality” [10].

Organizations in the developed countries have excelled in quality and competitiveness by realization of TQM approach [6]. However, organizations in the developing countries worldwide have little experience with the approach. These organizations even don't know which TQM practices are important to adopt in which area of that organization and they are even not able to identify the barriers associated with successful adoption of TQM practices.

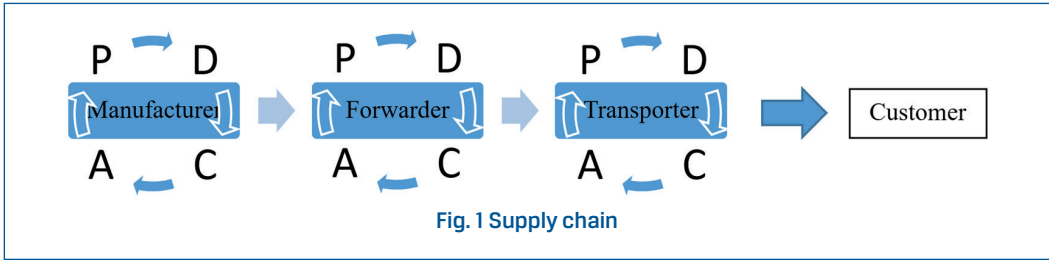
Good management of business processes provides the best image respecting the quality within company's operations, since the process of realization of business strategy is accelerated, and it enables completion of the business goals at the highest level, and satisfaction of all interested parties, as well [11].

A performance measurement system with continuous improvements has been created in the PDCA (Plan-Do-Check-Act) [12], a fourphase recurring cyclic system of continuous improvement. For PDCA is the ideal core structure if contextual factors make it highly possible to iteratively go back and forth between the tasks confined in early phases of production [20].

PDCA is a tool that can be used to manage processes and systems [16]. PDCA stands for:

- P Plan: set the objectives of the system and processes to deliver results (“What to do” and “how to do it”)
- D Do: implement and control what was planned
- C Check: monitor and measure processes and results against policies, objectives and requirements, and report results
- A Act: take actions to improve the performance of processes.

PDCA is a useful tool for bulding TQM also in transport service company as a part of supply chain. Every part of supply chain should accept PDCA system in its organization [16].



Imagine a simple supply chain (Figure 1), where the manufacturer addresses a forwarding company to arrange transport. The forwarding company selects the transporter who is to transport the goods from the manufacturer to the customer. The overall quality assessment of the customer is conditioned not only by the physical quality of the product, but also by the level of quality of supplier and brokerage services.

View of customer is critical to assessing the service quality because customer owns various perceptions for the service factors [19, 18]. If we want to assess suppliers, we should care about sustainability criteria as the criteria play a pivotal role in the suppliers' overall efficiency and effectiveness [17].

The determining indicator of the quality of delivery services is often considered to be performance, resp. reliability of suppliers, which can be assessed from different points of view:

1. *Quality of the subject of supplies,*
2. *Fulfilment of deliver deadlines,*
3. *Adherence to the ordered quantity ...*

Now let's focus our attention on the customer. Customer satisfaction must be understood in the overall context of TQM. The customer's dissatisfaction will then be reflected in the complaint of the shipment, the behaviour of the staff, complaints about delays in delivery, etc. Ultimately, the cooperation is evaluated as poor quality and there it comes to increased costs and customer loss.

Each part of the chain is connected with its suppliers and customers. Customer's satisfaction is also a problem that is hardly measured by physical measures. Therefore, the most common method is creation of a list of objections and complaints where manufacturer or supplier register reasons of his "failures". However, the manufacturer often has to endure customer's dissatisfaction not caused by his own staff, but by outsourced services. Choosing from a number of potential suppliers who are able to provide the expected service is one of the tasks of functional logistics. The selection will be subject to a number of requirements, such as delivery date, vehicle fleet, transporter's reliability, price, adaptability to changing requirements, etc. Therefore, it is appropriate for the manufacturer to keep a register of complaints, which will contain separate databases for problems caused by accompanying supply services.

The following complaint indicator can then be used to evaluate individual service providers:

$$RU_{ij} = \frac{\sum_{i=1}^n r_{ij}}{\sum_{i=1}^n s_{ij}} \quad (1)$$

where:

- j... transporter, forwarder, external service provider,
- RU... complaints indicator in time period "i",
- ri... the number of complaints in the given period "i",
- si... the number of realized services in the given period "i".

Based on the calculated indicator, it is then appropriate to determine what amount of the RU indicator is acceptable for the customer of the external service with regard to the possible return from the customer.

**Tab. 1. shows an example of such an evaluation. Such an evaluation of the external service provider is relatively long-term and requires serious monitoring.**

The value of RU indicator	Verbal evaluation	Number of points awarded
0 – 0.1	There are almost no complaints about the service provider. The transport, mediation, etc. is highly suitable.	4
0.11 – 0.2	There are rarely some complaints about the service provider. They are suitable for providing external service.	3
0.21 – 0.3	There are sometimes complaints about the service provider. They are less suitable for performing the delivery of the service.	2
0.31 – 0.4	There are more frequent complaints about the service provider. They are unsuitable for providing transport, mediation, etc.	1
0.41 – 0.5	There are very often complaints about the service provider. They are completely unsuitable for providing external services.	0

### 3. Research of methods

When striving for an overall functioning TQM system, the evaluation of external service suppliers on the basis of the above indicator alone is insufficient, it is appropriate to include this evaluation in a more comprehensive approach. The evaluation of the RU indicator will be extended by a point evaluation, while points are awarded according to a predetermined rule. An example of a point evaluation is given in the third column of Table 1.

The RU indicator only reflects the monitoring of actual complaints or complaints addressed to the manufacturer from the customer. This monitoring in terms of TQM will ensure the identification of persons and processes that are most important in terms of quality for monitoring customer relations.

In order to build a TQM, it is also necessary to focus on the evaluation of the area of relations with the supplier. The manufacturer cannot follow the number of complaints or objections here. As this is primarily a subjective evaluation of the supplier of the transport service, forwarding service or other external service from the point of view of the manufacturer, it is necessary to perform regular systematic evaluations on the basis of predetermined evaluation criteria, which form the evaluation basis.

An example of the point evaluation of the transport service is given in the Table 2. According to the degree of significance, the manufacturer assigns individual weights and point values to individual criteria.

**Tab. 2. Evaluation of the transport service supplier from the point of view of the manufacturer's satisfaction**

	Verbal evaluation	Very good	Good	Neutral	Acceptable	Unacceptable
	Score	4 points	3 points	2 points	1 point	0 points
<b>Evaluation criteria</b>	delivery for loading	Vehicle ready for loading at the exact time resp. with a tolerance of not more than 30 minutes.	Vehicle ready for loading with a deviation of up to 45 min. from the specified time.	Vehicle ready for loading with a deviation of up to 60 min. from the specified time.	Vehicle ready for loading with a deviation of up to 70 min. from the specified time.	Vehicle set up for loading with a deviation of more than 70 min. from the specified time.
	Flexibility of transporter	The transporter is always willing to adapt to changes in requirements.	The transporter will adapt to changes in requirements within 2 hours if they are given in advance.	The transporter shall adapt to changes in requirements within 4 hours if they are given in advance.	The transporter seldom adapts to changing requirements.	The transporter is not willing to adapt to the changes, or adapts very reluctantly.
	Adherence to delivery deadlines	Always or almost always.	Mostly yes.	Yes, with a deviation of up to 2 hours.	Yes, with a deviation of up to 3 hours.	He/it deviates from the set delivery date by more than 3 hours.

**Tab. 2. Evaluation of the transport service supplier from the point of view of the manufacturer's satisfaction; cont.**

	Verbal evaluation	Very good	Good	Neutral	Acceptable	Unacceptable
	Score	4 points	3 points	2 points	1 point	0 points
	<b>Evaluation criteria</b>	Reliability	The shipment is always delivered completely, according to the contractual conditions.	The transporter complies with the contractual conditions, the shipment is seldom damaged.	Damage sometimes occurs on the shipment, but it does not fundamentally affect the functionality or quality of the products.	Damage often occurs on the shipment, but it does not fundamentally affect the quality of the products.
Transporter's staff		Communication with the dispatcher is problem-free, drivers are willing to participate in the loading.	Communication with the dispatcher is problem-free, drivers participate in loading only when called.	Communication with the dispatcher is problem-free, drivers do not participate in loading.	Communication with the dispatcher is problem-free, but the driver refuses to communicate.	Communication with staff shows significant problems.
Price		The price is set in the price list, after agreement the transporter is willing to negotiate the price.	The price is set in the price list, the invoiced amount never differs from the price list.	The price is determined by agreement, the invoiced price usually does not differ from the agreed one.	The price is determined by agreement, the invoiced price usually differs only slightly from the agreed one.	The price is determined by agreement, the invoiced price usually differs from the agreed one.

Such evaluation should then be supplemented by the assignment of weights to individual categories.

If we are considering a functioning TQM system, it is also necessary to approach the selection of criteria and their importance very responsibly. Although the evaluation itself at the manufacturer is based on a subjective estimate, it should primarily respect the objective requirements of the customer. Measuring customer satisfaction is one of the requirements that are set and normative in terms of the approach to quality management.

The measurement of customer satisfaction is most often carried out in the form of surveys and questionnaires, which are carried out individually after the service. Due to extensive marketing surveys, global customer satisfaction surveys have recently been very unsuccessful, and an individual conversation with a customer has a much greater explanatory power. It must be the aim of communication to find out not only his subjective customer evaluation, but also to identify the most important parameters in a comprehensive quality management system - the criteria on the basis of which the customer evaluates the concept of "quality". These criteria are crucial for meeting TQM's requirement for continuous improvement in the future.

When comprehensively evaluating and selecting a supplier, it is useful to use all available tools for supply optimization, which includes in particular the following components:

- *Deciding on prices and supply conditions,*
- *Deciding on the amount of stock for the planning period,*
- *Product quality assurance measures,*
- *The nature of the suppliers in terms of their number and distribution,*
- *Advertising and promotion policy.*

The importance of the parameters can be determined based on communication with the customer by determining the relative weights of importance. Several methods can be used, while the determination of the assessed criteria is based on a survey conducted at the customer. Among the best known are pairwise comparisons or the Saaty's matrix method.

The use of pairwise comparisons to form judgments has a long history [8]. Using the pairwise comparison method, we determine the more important one in each combination of pairs. Then we determine the number of preferences. In theory, there often is a comparison based on assigning a value of 0 or 1, but this method suppresses the significance of the last criterion considered, which in this way always receives zero preferences.

A similar approach is to determine the relative weights of the importance of parameters using the Saaty's matrix. Saaty's method is also based on expressing the relationship between each of the two criteria, but unlike the usual pairwise comparison, the individual preferences can be scored. A point scale with the so-called descriptors to determine the preferences is given in the Table 3.

**Tab. 3. A point scale with the so-called descriptors to determine the preferences**

Score	Descriptor
1	The criteria are equally important.
3	The first criterion is slightly more important than the second.
5	The first criterion is much more important than the second.
7	The first criterion is demonstrably more important than the second.
9	The first criterion is absolutely more important than the second.



This point scale is generally used, but is not binding. The manufacturer may modify it or also expand to other levels. We compare criterions from row criterions point of view to column criterions. If criterion in a given row is more important than criterion in a given column the relevant cell will be filled by relevant descriptor. If criterion in a given row is less important than criterion in a given column the relevant cell will be filled reciprocal value of descriptor. Diagonal cells of matrix are filled by number 1. Row geometrical averages are calculated after cells filling [5]. After evaluating the individual cells by the above procedure, we determine the geometric row sum for the individual criteria. Using the criterion sums, we determine the relative weight of importance for individual parameters.

## 4. Conclusions

If the customer evaluates the delivered consignment in the context of all parties involved, it would be pointless to exclude other entities from the implementation of the TQM system. In terms of continuous improvement of the quality management system, it is therefore necessary for the manufacturer to monitor not only its internal processes, but also the quality of the processes of external service providers.

In the interest of the overall quality of its shipment, it is highly suitable for the manufacturer to evaluate the suppliers of external services, In order to ensure the maximum level of customer satisfaction.

One of the goals of supplier evaluation is to create more pressure on the quality of supplies. The effects of increasing supplier discipline are also reflected in a higher ability to respond flexibly to customer requirements, fewer complaints, a reduction in the number of employees at entry control, a reduction in total quality costs and savings in transport costs. Given that there is no universal way of evaluating suppliers, the choice of an appropriate combination of evaluation criteria is particularly important when designing your own method of evaluating suppliers.

PDCA is a recognized philosophy in the field of quality. It is a process of continuous quality improvement. This process describes increasing quality in one company. If companies create a retail chain, each of them needs to follow the PDCA philosophy in order to maintain quality. This can be considered as a condition for building a functional TQM. Each element of the chain is therefore part of the company's TQM and therefore the company needs to implement effective supplier quality assessment and customer rating monitoring. Demonstrating such an assessment is also a proof of functional TQM.

In cooperation with a company providing transport services and its customers we created a system of evaluation suppliers and customer's. It should be emphasized here that mutual communication with the customer will not only make it possible to define the criteria required by him and evaluate them appropriately, but by involving an external service provider in this communication, a final functioning TQM system is created. We have created a supplier evaluation system that companies have accepted. At the same time, by comparing the results of pairwise comparison and the Saaty's

method, we identified the most significant requirements of transport service customers. To provide this service, the most important thing for the customer is to meet the following criteria:

- *integrity of the consignment,*
- *compliance with the agreed delivery time,*
- *completeness of the consignment, including documents.*

These three criteria are recommended for more intensive monitoring within TQM in our chain.

## 5. Acknowledgement

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## 6. Nomenclature

ISO 9001 International Quality Management Standard

PDCA The Plan-Do-Check-Act Procedure

TQM Total Quality Management

QM Quality Management

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