

Tendencies of the Product Quality Assessment in Romania

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Abstract

This article tries to bring out the “quality assessment” concept, to further more focus on a detailed characterization of the main tendencies regarding product quality assessment in Romania: using the assessment questionnaires, objectivity of product quality assessment by using mathematical equations, product quality assessment by economic efficiency and differentiate assessment of product quality elements.

Key words: *product quality, product quality assessment, quality characteristics of product*

Quality assessment represents the process of establishing the degree in which a product satisfies certain specific requirements [5]. These requirements are the customers’ needs.

The quality product assessment denotes a relation (comparison) between the quality characteristics of the analyzed product and a *reference*, which can be:

- A product made by the same company, at a previous date;
- A product made by the best company in the market;
- A product made by the best company in the world;
- The clients’ needs.

Among the tendencies of the product quality assessment in Romania are: using the assessment questionnaires, objectivity of product quality assessment by using mathematical equations, product quality assessment by economic efficiency and differentiate assessment of product quality elements.

Using the Assessment Questionnaires

The assessment questionnaires evaluate the customers’ answers using a 5-point scale. These questionnaires are of two types: questionnaires in which the quality steps are express through attributes and questionnaires in which the quality steps are express through numbers.

Questionnaires in which the Quality Steps Are Expressed through Attributes

These questionnaires contain at the beginning the purpose for which the interviewers must answer the questions, being followed by questions referring to product quality and tree demographics questions, at the end.

Figure 1 shows an example of a compression-type refrigerator quality assessment questionnaire.

COMPRESSION-TYPE REFRIGERATOR QUALITY ASSESSMENT QUESTIONNAIRE				
Our company wants to satisfy your need at the highest level, and for that we wish to detect in time your needs and dissatisfies, for a on-going quality improvement.				
Product quality questions				
1. What compression-type refrigerator model do you use				
2. How much does the product satisfy your needs, based on your experience?				
Very Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Very Dissatisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. How do you assess the product reliability?				
Very Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Very Dissatisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Does the product measure up to your needs?				
Very Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Very Dissatisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. How do you assess the product performance until present?				
Very Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Very Dissatisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. How do you assess the product design?				
Very Satisfied	Satisfied	Neither Satisfied nor Dissatisfied	Dissatisfied	Very Dissatisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remarks and recommendations:				
Demographics questions				
1. What is your age?				
18 - 25	26 - 35	36 - 45	46 - 55	Over 56
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. What is your monthly income?				
Less than RON 500	RON 500 - 700	RON 701 - 900	RON 901 - 1100	More than RON 1101
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. What is your sex?				
	Male		Female	
	<input type="checkbox"/>		<input type="checkbox"/>	

Fig. 1. Compression-type refrigerator quality assessment questionnaire

Source: Adapted from Cristea, M. Evaluarea satisfacției clienților – procedură operațională aplicată la S.C. TRACTORUL – UTB S.A. Brașov, în *Tribuna Calității*, nr.2, februarie, 2002, pag. 43-44

The questions are formulated in a way to identify the quality product assessment by customers, using a 5-point scale (“Very Satisfied”, “Satisfied”, “Neither Satisfied nor Dissatisfied”, “Dissatisfied” and “Very Dissatisfied”). The interviewers must choose one single point, the one which measures up to the satisfaction degree of needs.

After the interviewers have answered the questions regarding the product quality, they could make some remarks and recommendations about the product quality (in some cases may include unconformities).

To analyze the data from the questionnaires, it is important to follow 5 steps [3]:

- Transformation of attributive assessment in numbers, using a 5-point scale:
 - “Very Satisfied” – 10 points;
 - “Satisfied” – 8 points;
 - “Neither Satisfied nor Dissatisfied” – 6 points;
 - “Dissatisfied” – 3 points;
 - “Very Dissatisfied” – 0 points;
- Add up the points for each questions, assessed by the interviewers;
- Add up the maximum points for all questions;
- Calculate the ratio between the points assessed by the interviewers and the maximum points for all questions;
- Quarterly chart the client satisfaction.

The advantages of this type of questionnaire reside in the fact that the number of question can vary according to the goals of the survey, the 5-point scale is much known and it is easier to apply.

Questionnaires in which the Quality Steps Are Express through Numbers

These questionnaires contain questions referring to the customers’ satisfaction degree by a product, demographic question, and the clients’ quality remarks, at end.

To assess the quality product, the interviewers use a 5-point scale, between 2 and 10 points.

Figure 2 shows a TV quality assessment questionnaire.

The 5 points have in attributive description the following meaning [1]:

- 2 points – Very Insufficient;
- 4 points – Insufficient;
- 6 points – Sufficient;
- 8 points – Good;
- 10 points – Optimum.

To analyze the results, it is calculated the satisfaction degree indicator (*SDI*) which has the formula (1):

$$SDI = \frac{\sum_{i=1}^n X_i}{n} \tag{1}$$

TV QUALITY ASSESSMENT QUESTIONNAIRE					
Product quality					
1. How do you assess the product quality?	2	4	6	8	10
2. How do you assess the product reliability?	2	4	6	8	10
3. How do you assess the product performance?	2	4	6	8	10
4. How do you assess the product design?	2	4	6	8	10
5. How do you assess the product packing and identification?	2	4	6	8	10
SDI=					
Demographics questions					
1. What is your age?					
18 - 25	26 - 35	36 - 45	46 - 55	Over 56	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. What is your monthly income?					
Less than RON 500	RON 500 - 700	RON 701 - 900	RON 901 - 1100	More than RON 1101	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. What is your sex?					
Male			Female		
<input type="checkbox"/>			<input type="checkbox"/>		
Remarks					
.....					

Fig.2. TV quality assessment questionnaire

Source: adapted from Agapescu, F. - Evaluarea satisfacției clientului – procedură, în *Tribuna Calității*, nr.10, octombrie 2002, pag. 15

where:

SDI = satisfaction degree indicator;

X_i = number assess by interviewers of *i* question;

n = number of total questions.

The *SDI* values are between 2 and 10, and represent the satisfaction degree of customers’ needs based on the following correlation:

- 2 points – “Very Dissatisfied”;
- 4 points – “Dissatisfied”;
- 6 points – “Neither Satisfied nor Dissatisfied”;
- 8 points – “Satisfied”;
- 10 points – “Very Satisfied”.

The disadvantage of the scale used in this questionnaire (from “Optimum” to “Very Insufficient”) is that in case the value of *SDI* is for example 5.5, this assessment doesn’t belong to the attributive evaluations (from “Very Dissatisfied” to “Very Satisfied”), being somewhere between “Dissatisfied” and “Neither Satisfied nor Dissatisfied”. Thus, it is difficult to make attributive conclusions about the satisfaction degree of the clients’ needs.

Objectivity of Product Quality Assessment by Using Mathematical Equations

Using the mathematical equation in product quality assessment has the advantage that, on the first hand, it integrates the correlation between different variables through algebra sings and the results are numerically expressed and charted, on the other hand. Finally, numerical results can be computer processed with some advantages: quickness, safety and minimum errors.

An example of a mathematical equation used in product quality assessment is *product medium utility degree index*, with the formula:

$$IU_m = \frac{\overline{U_{ma}}}{\overline{U_{mr}}} \quad (2)$$

where:

$\overline{IU_u}$ = product medium utility degree index;

$\overline{U_{ma}}$ = medium utility degree of the *a* analyzed product;

$\overline{U_{mr}}$ = medium utility degree of the *r* reference product.

The *product medium utility degree* is calculated with formula (3):

$$\overline{U_m} = \frac{\sum_{i=1}^n U_{ij} \cdot p_{ij}}{\sum_{i=1}^n p_{ij}} \quad (3)$$

where:

$\overline{U_m}$ = product medium utility degree;

U_{ij} = utility of *i* characteristic of *j* product;

p_{ij} = points of *i* characteristic utility of *j* product.

Von Neuman-Morgenstern method is used to calculate the utility of each characteristic with formula (4) [7]:

$$U_{ij} = a \cdot x_{ij} + b \quad (4)$$

where:

a and b = transformation parameters calculated by linear interpolation, assuming that maximum utility is 1 and minimum utility is 0;

x_{ij} = value of i characteristic of j product.

The estimation of a and b parameters depend of the type of the characteristics [7]:

- For characteristics which are directly proportional to the product quality, the equations system and the parameters are calculated with formula (5):

$$\begin{cases} a \cdot x_{\max} + b = 1 \\ a \cdot x_{\min} + b = 0 \end{cases} \Rightarrow \begin{cases} a = \frac{1}{x_{\max} - x_{\min}} \\ b = \frac{-x_{\min}}{x_{\max} - x_{\min}} \end{cases} \quad (5)$$

where:

x_{\max} = the biggest value of the characteristic;

x_{\min} = the smallest value of the characteristic.

- For characteristics which are indirectly proportional to product quality, the equations system and the parameters are calculated with formula (6):

$$\begin{cases} a \cdot x_{\max} + b = 0 \\ a \cdot x_{\min} + b = 1 \end{cases} \Rightarrow \begin{cases} a = \frac{1}{x_{\min} - x_{\max}} \\ b = \frac{-x_{\max}}{x_{\min} - x_{\max}} \end{cases} \quad (6)$$

This method has the disadvantage of including only numerical variables, thus eliminating the attributive characteristics. Thus, the product quality assessment is not complete.

Product Quality Assessment by Economic Efficiency

Product quality assessment by economic efficiency uses *two variants of the quality complex indicator*, according to product lifetime [4, 6]:

- For products that have a lifetime smaller than a year, the quality complex indicator is obtained with formulas (7) and (8):

$$QCI = \frac{E}{Er + Ep} \quad (7)$$

and

$$QCI = \frac{Er + Ep}{E} \quad (8)$$

where:

QCI = quality complex indicator;

E = effect obtained;

Ep = production expense;

Ee = exploration expense.

The (7) and (8) formulas are as a matter of fact calculation formulae of economic efficiency. The first one expresses the relation between “effect” and “effort”, and the second the relation among “effort” and “effect”.

- For products that have a lifetime bigger than a year, the quality complex indicator is obtained with formula (9):

$$QCI = \frac{E}{Ep \cdot kn + Ee} \quad (9)$$

where:

kn = economic efficiency normative multiplier (with value: 0.15).

In comparison with formula (7), formula (9) is obtained by multiplying the production expense with kn , representing at the same time an economic efficiency relation, “effect” on “effort” type.

This quality assessment method has the disadvantage that it can be applied only for comparing products which belong to different companies and not for customers’ satisfaction evaluation (consisting in relating the product quality characteristics to clients’ needs).

Differentiate Assessment of Product Quality Elements

The product quality perceived by the consumer is made of two components: *design quality* and *production quality*. [9]

Design quality is created, as its name suggest, in the marketing and design activities, and it is assignable by the accuracy of identification the customers’ needs and precision of transpositions these needs in quality characteristics indexes.

Production quality is formed along product manufacturing deployment, being leavened by design quality, on the first hand, and raw materials quality, equipments quality, human resources’ experience and competence, planning and scheduling etc., on the other hand.

Because the two elements of quality are different, its assessment should be further on subcategorized [9]:

- *Design quality assessment* is hardly attainable, because the competition information is not accessible, due to its privateness. The information from advertisements, prospectuses, press notice etc. are generally being unhelpful;
- *Production quality assessment* is much easier to be acquired beside design quality assessment; it consists of the comparing characteristic indexes of the analyzed product with characteristic indexes of reference product (which is mostly the product of the best company in the market). In this case, the information use in the assessment is reachable, lighting the analysis.

The distinct approach regarding the two components of quality is very important because it permits companies to identify the level of its product quality, in distinctive phases (design and production), comparatively with others firms from the same market.

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Tendințe privind evaluarea calității produselor în România

Rezumat

Acest articol încearcă să clarifice conceptul de „evaluare a calității”, concentrându-se apoi asupra prezentării detaliate a principalelor tendințe în evaluarea calității produselor în România, și anume: folosirea chestionarelor de evaluare, obiectivizarea evaluării calității produselor prin folosirea relațiilor matematice, evaluarea calității produselor prin intermediul eficienței economice și evaluarea diferențiată a componentelor calității produselor.