



Assessing the Product Quality of Meat Processing Companies and Costs on Quality Improvement

Yan Gennadievich Shtefan^{1*}, Liliya Aleksandrovna Zimakova¹, Stanislav Nikolaevich Aleynik², Aleksey Borisovich Tresnitskiy³, Natalia Leonidovna Kidanova⁴

¹Belgorod National Research University, Russia

²The Department of Agriculture and Reproduction of the Environment, Belgorod, Russia

³Belgorod University of Cooperation, Economics and Law, Russia

⁴Belgorod Law Institute of the Ministry of the Internal of the Russian Federation named after I.D. Putilin, Russia

*Corresponding author E-mail: shtefan.y.g@mail.ru

Abstract

Within the context of new economic conditions, the issues of quality become a priority that allows gaining competitive advantages, on the one hand, and satisfy the ever-growing needs of consumers, on the other hand. Meat processors carry out the multilevel quality control both of their products and of the processes: the quality issues are of particular importance for such companies; that is why they were chosen as the object of research. The article deals with the issues of evaluating the product quality and analyzing the effectiveness of quality costs. The authors propose to use the integral factor of product quality in practice as it includes the mathematical assessment of technical and consumer criteria and the product safety criterion. The recommendations allow reducing the complexity of the assessment process, improving the quality of information, and simplifying the procedure of control and analysis with regard to obtaining long-term competitive advantages that lead to an increase in a company's value.

Keywords: Cost Estimate, Product Quality, Raw Material Quality, Quality Costs, Cost-Effectiveness

1. Introduction

Quality control is a system of means for cost-effective production of goods and services that satisfy consumers' requirements. Earlier, the term "quality" was associated with products only, and now it is related to production processes and their management. The quality system affects all employees.

The problem is that quality is a subjective concept while the processes of improving and controlling the quality of products are associated with big enough costs [1]. The modern conditions dictate the necessity of focusing on the conditions that ensure a company's success in the market, and this means, first of all, satisfying consumers' needs, quality being the most important, and quality is regarded as a factor of increasing products' value that ensures success in the competitive struggle.

The concept of managing the costs of ensuring product quality includes their accounting, analysis, planning, and control (audit). In the 1950s, A. Feigenbaum, an American quality control expert [2] provided the characteristics of the Total Quality Control (TQC) model and was the first to indicate the importance of quality cost accounting. The issues of evaluation are also important, yet it should be understood that quantitative indicators do not always pass into qualitative ones. Thus, the research aims at developing methodological recommendations on product quality assessment. Meat processing companies located in the Belgorod Region are chosen as the object of the research.

2. Methods

The modern economic situation prompts the necessity for producers to control the quality costs in a constant manner. Yet approaches to this analysis may differ. Today, the issues of combining qualitative and quantitative methods of research are raised actively [3]. This is the basis of the authors' research.

During the first stage of the research, the structure of the quality costs was analyzed. Companies should conduct the analysis in order to define whether there are possibilities for improving in the following areas: correction for noncompliances, prevention of noncompliances, constant improvement and perfection of the activity [4].

The problem is that, first, the relative share of quality costs of Russian meat processors is quite small, while the category of quality is an important one; second, increasing or reducing quality costs will not necessarily lead to improvement of the financial results; and third, meat processors have mandatory multilevel quality control at all stages of production. Thus, in the second stage, due to the necessity to prioritize correctly, prioritizing in some cases cost reduction and in others – cost control and strict compliance with the standards, the qualitative analysis of the costs was carried out and two main qualification groups of costs were identified: raw materials and product quality control costs and process quality control costs.

Based on the industry specifics, the responsibility centers were defined for each identified group of costs in accordance with the performed functions, as well as the areas of responsibility, which allowed establishing the directions of the analysis and the ways of

assessing the quality costs.

The third stage provides for calculating the integral factor of product quality (K_{int}) using the following formulae (1, 2, 3):

$$K_{int} = \sum_{i=1}^n Q_i a_i b_i \quad (1)$$

where a_i is the weight of the i -th quality criterion; b_i is the weight of the i -th product property; n is the quantity of product properties; Q_i is the relative index of the product quality calculated according to the formulae:

- in case of maximized indicators (2)

$$Q_i = \frac{C_i}{C'_i} \quad (2)$$

- in case of minimized indicators (3)

$$Q_i = \frac{C'_i}{C_i} \quad (3)$$

where C'_i is the basic (reference) indicator of the i -th product property; C_i is the indicator of the i -th product property, $i = 1, n$ is the number of product properties considered in assessing the product quality.

The level of the assessed product quality is higher than or equals the level of the basic (reference) indicator if the value of K_{int} is higher than or equals 1.

The opinion poll and questionnaire survey of consumers and manufacturing process specialists were conducted within the research; the results allowed identifying the three most important product quality criteria and their significance for consumers: technical properties, consumer properties, and safety.

During the following stage, the detailed elaboration of indicators that characterize the selected criteria was carried out.

The quality cost effectiveness is quite difficult to assess. First,

there is a time lag between the costs borne and the result manifesting itself in profit increase; second, it is difficult to determine whether the quality costs created added value. Thus, such costs should be considered from the long-term perspective that ensures improving the public image of the products and, consequently, increasing the company's value.

3. Results

The methods described above include determination of the structure of quality costs at the first stage. The industry specifics should be taken into account when considering the issues of the quality costs.

Table 1 presents the structure of the quality costs. The data (regarding the cost structure in the US and Japan) are based on the studies carried out by Listkov [5]; the data on meat processors in the Belgorod Region are obtained by the authors.

Table 1: Comparing the structure of quality costs, %

Type of costs	The US	Japan	Meat processing companies of the Belgorod Region
Costs on preventive measures	0.5	2.5	0.59
Costs on checking	4.5	3	1.2
Costs on correction and remediation	20	7.5	0.11
Total	25	13	1.9

The data shown in Table 1 confirm quite a low level of quality costs in meat processing companies, as well as the fact that more attention is paid to quality checking than to preventive measures. As meat processing companies destroy raw materials or products of poor quality in case those are identified, the costs on remediation of poor quality products are quite small.

The next stage is the calculation of the integral factor of the meat product quality based on the formulae (1, 2, 3), and the results of such calculation are shown in Table 2.

Table 2: Calculation of the integral factor of the quality of meat products by Kapital Agro, CJSC

Criterion	Weight of the criterion	Weight of the property	Property	Standard value	Actual value	Relative index	Integral factor	
Technical properties	0.40	0.08	Illumination and colour (L a b)	not more than	52.00	50.00	1.0400	0.0333
		0.08	Deepness (C)	at least	11.00	10.80	0.9815	0.0301
		0.13	Colour value (a/b)	at least	2.00	1.47	0.7344	0.0386
		0.26	Marbling, tenderness	at least	4.00	3.00	0.7500	0.0789
		0.14	Loin-eye area (S), sq.cm.	at least	42.00	47.30	1.1262	0.0638
		0.09	Fat depth in a point (P2), cm	at least	4.00	4.00	1.0000	0.0368
		0.13	Length of the brisket (l), cm	at least	70.00	70.00	1.0000	0.0526
		0.08	pH24	at least	5.60	5.53	0.9870	0.0330
Consumer properties	0.40	0.47	Days of storage	at least	14.00	14.00	1.0000	0.1867
		0.53	Organoleptic parameters, packing	at least	4.80	4.50	0.9375	0.2000
Safety	0.20	0.50	Compliance with safety standards	at least	1.00	1.00	1.0000	0.1000
		0.50	Claims	at least	1.00	1.00	1.0000	0.1000
TOTAL:							0.9538	

When conducting the cost analysis, one should take into account that during the first stages the quality cost recovery will be higher than during later stages as the production process will improve.

4. Discussion

Studies by the majority of authors confirm that the business should constantly improve. Thus, if at a certain stage a company reaches a stable creation of value, the situation will change in a short period of time and what was stable passes into an unstable condition [6]. Thus, according to Volodina [7], Efremov [8] and several other authors, the process itself should be considered as the source of creating the product value. When describing the modern quality management system, Khachatryan believes that the quality control system of a company is not a static establishment, and its structural units are processes that ensure any changes. There are specific processes at each management stage,

and a clear interaction among them should be established [9].

Deming believes [10] that it is not necessary to define the exact amount of the quality costs as collecting these data leads to additional costs. The authors' opinion on this is the following: the incurred expenses should allow improving the quality, reducing the cost due to the reduced amount of reprocessing, errors, or delays, improving the productivity, increasing the sales volume due to better quality and lower prices, and creating new jobs. Based on the studied approaches, one of the most important things to do is separating the costs on preventing the manufacturing of poor quality products and controlling required costs that are defined in accordance with the requirements and standards.

A Japanese economist Nakanishi defined the main goal of the managerial cost accounting to be the assessment of the effectiveness of a business. His opinion combined the dynamic theory of balance and the managerial approach to assessment, therefore the scientist believed it necessary to record in accounting long-term prospects rather than to record retrospective indicators

(reflected in the financial accounting system). The author also focused on profit calculation for management purposes in order to reflect the production conditions and not to record profit as the relative success of the business in the previous period [11].

The idea of assessment and analysis, as well as managing the cost price of products in case of changes in quality, based on the target costing and Kaizen costing methods was developed in the works by [8] where the cost price management model was created including constant assessment of the product cost price in case any characteristics of products had been changed. The model is designed for assessing costs before starting the production of products with new qualitative characteristics. This is important as the desire to improve the product quality must be accompanied with the economic calculations and not only with marketing research data.

According to [10], analyzing quality costs is not as necessary as investing in the initial stages of the product life cycle in order to manufacture "right products".

Based on the studied approaches, it is most important to separate costs on preventing the manufacturing of poor quality products and to control the required costs defined in accordance with requirements and standards.

5. Conclusion

Thus, the proposed recommendations include the calculation of the integral factor of the product quality. The implementation of the proposed methods is possible on the basis of the information accumulated within the managerial accounting, that is why the classification features of meat processing companies' quality costs have been defined, the most important being the costs on process quality control and raw materials and product quality control, as well as the necessity to separate centres of responsibility based on performed functions and the areas of their personal responsibility. The approach is aimed at reducing the complexity of the assessment process, improving the quality of information, simplifying the procedure of control, and conducting analysis with regard to obtaining long-term competitive advantages that lead to an increase in a company's value.

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