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APPLICATION OF TECHNICAL LEVEL ON TWO FRUIT AND VEGETABLE JUICERS

Case
studies

Keywords

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JEL Classification

C50, C60, D40, G10, M30, O10

Abstract

This paper aims to examine two products used in kitchen, a centrifugal juicer for fruits and vegetables and another masticating juicer. In order to choose the optimal variant of juicer (fruit and vegetable), it will analyze the characteristics of each juicer, so finally using the STEM method to choose the juicer with best features for the user, both technically and from the point of view of health.

It will present the main advantages and disadvantages of use these two types of juicers, both in terms of energy, the final product resulted and of component.

It will make a brief description of the STEM method, to finally, it presents the obtained result after the application of this method.

1. Introduction – Quality of the products

A characteristic is an attribute, a feature, a parameter of the product that distinguishes it from others. Feature shows the usefulness of the product. In general, it identifies the following types of characteristics:

- technical – determined by the constructive concept and functional parameters;
- economic – determined by the effort with which it is used;
- use – determined by the behavior over time and effort into operation;
- psycho-sensorial – determined by the emotion it stirs, the aspects of aesthetic. [2]

All these characteristics are reflected in the form of parameters that can be measured.

The set of the characteristics of the product describes its quality. Quality is the image of an entity: product, service, software, organization, process. “Quality” is not used in the sense of “very good”. There is no quality in itself, but things that have quality. [1]

The products are divided into classes to analyze the quality, so all products in a class with common typological features. Quality is what makes the difference in class and give qualitative differences between products. Typological characteristics derived especially from use value and quality characteristics expresses how the utility is achieved.

In order to establish the characteristics of the product, in the first place are determined the subjects for which the product presents significance: the beneficiary, the manufacturer, even the society as a whole.

Currently production is geared to meet customer requirements, thus the way the customers define these characteristics is determinant. However, there is also the need to satisfy the manufacturer and society, thus, having an expansion of the concept of quality, this taking into account both efficiency and overall satisfaction and the existing value (price / quality ratio).

Qualitative characteristics are: process characteristics, basic characteristics, ability characteristics.

Process characteristics. The quality of equipment used and the degree of organization of production is directly reflected in the quality of the product. Some behaviors of the product in use is explained by its specific mode of production.

Basic characteristics. Have a direct role in the functioning of the product and can be estimated by analyzing each product.

Ability characteristics. Are those who

describe the behavior of the product in time, namely: availability, reliability, safety, maintainability, durability, etc.. [2]

2. Method of technical level

Measuring quality is achieved by comparing a number of products with identical typological characteristics that are on the same market. Comparison with an existing product is achieved by the method of technical level (H), while comparison with desired product characteristics is based on the qualitative level method (Q), both indicators having the same principles of determining.

The difficulty of expressing quantitative technical level of the products is determined by the variety of technical characteristics which define the technical level. Each feature has its unit of measure and degree of their influence on the overall technical level indicator. Some features are desired to be as large e.g., efficiency, sustainability, reliability, precision, and other features as small as possible, e.g. specific weight, complexity, specific consumption of energy and fuel, so the technical level to be high. The technical level can be expressed by two indicators: absolute and relative.

The absolute technical level

$$H_{ai} = k \cdot \prod (X_{ij} / X_{lj})^{\pm x_j}$$

where: i – the product for which the technical level is calculated;

k - dimensionless constant representing the technical level of the reference product 1 (k = 1000 to delimit enough the products, any product from the compared ones can be chosen as a reference);

S1 - subset of product characteristics that should be bigger for the product to be as good;

S2 - subset of product characteristics which should be as small as the product is good;

j - product feature;

X - Value;

- share feature.

The relative technical level

$$H_{ri} = H_{ai} / \max\{H_{ai}\} \cdot 100\%$$

To determine the share of characteristics, the STEM method can be used.

Characteristics are compared two by two, defining the matrix A with elements a_{j1j2} defined as follows:

$$a_{j_1 j_2} = \begin{cases} 4 \dots \text{if} \dots k_{j_1} \gg k_{j_2} \\ 2 \dots \text{if} \dots k_{j_1} > k_{j_2} \\ 1 \dots \text{if} \dots k_{j_1} \approx k_{j_2} \\ 0 \dots \text{if} \dots k_{j_1} < k_{j_2} \end{cases}$$

$$x_j = \frac{\sum_{j_2} a_{j_1 j_2}}{\sum_{j_1} \sum_{j_2} a_{j_1 j_2}}$$

where
(the symbol >> indicates that it is more important, and ~ means such) [3]

3. Marketing Research - fruit and vegetable juicer

Since 1992 people began to consume natural juices to improve their quality of life and health. They are consumed as prevention of disease occurrence or simply just for vitalizing and energizing. [4]

Nowadays has appeared on the market all sorts of juicers that produce quickly the juice from any fruit or vegetable and even green leaves.

This paper uses two types of juicers characteristics (centrifugal or masticating) taking into account two distinct aspects, first - objective evaluation of the quality and competitiveness of the products using the technical level.

Through the technical level study understand a process of some research directions for improving product quality, which seeks the effect it has the change one or more of features. The study can be made:

- on the dynamics: imposed by the evolution of the characteristics of products and the requirements of the market;
- on the composition of the product: the effect of the use of certain sub-assemblies, components, parts, raw materials with particular characteristics.

Using the STEM method we want to find the indicators: absolute and relative technical level for the masticating juicer. So we can see if we need improvements on this product and what we can change to improve the product.

Why masticating juicer? Because this is considered to be much healthier than the centrifugal. Below shows some possible explanations.

Masticating juicer has an innovative slow spinning by cold pressing, without friction and heat the juice at high speeds without aeration of juice as centrifugal juicers. When using the masticating, results a natural juice, maximizing the amount of

juice and retain full vitamins, minerals, enzymes, phytonutrients and antioxidants.

The juice obtained from the masticating juicer does not contain sediments, has a uniform texture, taste and retains its natural color.

The material used for the masticating juicers, e.g. Hurom, it is Ultempolyetherimide (an 8 times more resistant than regular plastic) that cut beforehand, and wringing the worm shaft between the sieve and the juice thus the juice is not heated or aerated, effectively delayed the oxidation of nutrients and active substances in fruit, vegetables and leaves.

The slow squeezing of 42 rotations/minutes yields to up to 2 times more juice and up to 6 times more nutrients than the centrifugal method.

Because masticating juicers uses a healthy squeezing method by cold pressing, the result is a consistent and natural juice, while the centrifugal uses a compression method, cleaning and spinning at high speeds, causing the juice without consistency, aerated and oxidized, with plenty of foam.

So compared to conventional centrifugal spinning method, the masticating method appears to be the healthiest method to produce and consume a juice beneficial to our body. [5]

In table 1 [6, 7] (see you Annex) are presented the characteristics of the two types of juicers.

4. Case study-STEM Method

Helping us by the particulars of Chapter 3, we take the first step in determining indicators of the STEM method (absolute technical level or relative), i.e. their conversion into subsets S1 and S2.

S1 - Lc, warst, .s.o., w, umc, cpf, cj, nsp, P;
S2 - p, l, I, H, w, rot, ls

Step two is to determine the coefficients of importance of technical characteristics on the absolute level. Calculations shall be made by using the percentage-comparison of two by two features: STEM methodology.

To determine Table 2 (aij) characteristics were grouped into four groups of importance.

Construct the matrix coefficients given the importance of characteristics. Based on the matrix is calculated weights i influence (see you table 3)

The next and final step is to determine the technical level indicators: absolute technical level, respectively relative technical level of the product 1. (HUROM masticating juicer).

$$H_{ta1} = 1000 \cdot \left[\left(\frac{1,4}{1,5} \right)^{0,009} \cdot \left(\frac{2}{2} \right)^{0,116} \cdot \left(\frac{67,4}{56,7} \right)^{0,116} \cdot \left(\frac{35}{84} \right)^{0,074} \cdot \left(\frac{1}{3} \right)^{0,009} \cdot \left(\frac{1}{3} \right)^{0,009} \cdot \left(\frac{1}{1,5} \right)^{0,009} \cdot \left(\frac{150}{1200} \right)^{0,116} \cdot \left(\frac{3,3}{6,2} \right)^{0,074} \cdot \left(\frac{300}{155} \right)^{0,074} \cdot \left(\frac{300}{213} \right)^{0,074} \cdot \left(\frac{400}{400} \right)^{0,074} \cdot \left(\frac{8000}{70} \right)^{0,074} \cdot \left(\frac{68}{56} \right)^{0,027} \cdot \left(\frac{729}{2149} \right)^{0,116} \cdot \left(\frac{30}{30} \right)^{0,027} \right] = 942.71$$

$$H_{tr1} = \frac{H_{ta1}}{1000} \cdot 100 = 94.27\%$$

5. Conclusions

Using the STEM method of the fruit and vegetables, taking as reference product centrifugal juicer, I obtained the following indicators for HUROM masticating juicer:

- absolute technical level $H_{ta1}=942,71$
- relative technical level $H_{tr1}= 94,27\%$

Analyzing the results we see the need for some improvements on our product analyzed masticating juicer.

In order to improve the product concerned we'll change the following features:

- power-mouth 50 mm,
- price of the product-1400 lei
- power-200W,
- 42 revolutions per minute

After we obtain the following values changes to tracked indicators:

$$H_{ta1} = 1000 \cdot \left[\left(\frac{1,4}{1,5} \right)^{0,009} \cdot \left(\frac{2}{2} \right)^{0,116} \cdot \left(\frac{67,4}{56,7} \right)^{0,116} \cdot \left(\frac{50}{84} \right)^{0,074} \cdot \left(\frac{1}{3} \right)^{0,009} \cdot \left(\frac{1}{3} \right)^{0,009} \cdot \left(\frac{1}{1,5} \right)^{0,009} \cdot \left(\frac{200}{1200} \right)^{0,116} \cdot \left(\frac{3,3}{6,2} \right)^{0,074} \cdot \left(\frac{300}{155} \right)^{0,074} \cdot \left(\frac{300}{213} \right)^{0,074} \cdot \left(\frac{400}{400} \right)^{0,074} \cdot \left(\frac{8000}{70} \right)^{0,074} \cdot \left(\frac{68}{56} \right)^{0,027} \cdot \left(\frac{729}{1400} \right)^{0,116} \cdot \left(\frac{30}{30} \right)^{0,027} \right] = 1085.9$$

$$H_{tr1} = \frac{H_{ta1}}{1000} \cdot 100 = 108.6\%$$

We highlight that determine the quality was done very objectively, based on the values of product characteristics and their importance.

Compared to the reference product, the technical level of the product analyzed in the first variant was lower with:

$$100-94.27 = 5.73\%,$$

and in modified variant it increased with:

$$108.6-100 = 8.6\%.$$

The changes made to the product pursues the client's desire to facilitate the work when it produces juice and purchase the product at a lower price.

Improving product quality characteristics analyzed - HUROM masticating juicer meets customer's requirements. Marketing studies determine the similar characteristics to those of existing products on the market and it's observed that, in the product design process analyzed for some features it can't find technical solutions realization and improvement. In this context, the role of the quality management system by applying

the method to improve the characteristics of the product (example-calculation of technical level) allows to increase the qualitative level of the product concerned- HUROM masticating juice.

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ANNEX

Table 1 [6, 7]

| No. crt. | Features | Masticating juicer HUROM | Centrifugal juicer BOSH |
|----------|---|--------------------------|-------------------------|
| 1 | Power - P (W) | 150 | 1200 |
| 2 | Dimensions (lxLxH-mm) | 155x213x400 | 300x300x400 |
| 3 | Weight – w (kg) | 6,2 | 3,3 |
| 4 | Rotations/minutes – rot | 70 | 8000 |
| 5 | Cable length - Lc(m) | 1,4 | 1,5 |
| 6 | Warranty - warst (years) | 2 | 2 |
| 7 | Efficiency - (%) | 67,4 | 56,7 |
| 8 | Supply opening – s.o. (mm) | 35 | 84 |
| 9 | Continuous use – umc (minutes) | 30 | 30 |
| 10 | Number of speeds – nsp (steps) | 1 | 3 |
| 11 | Container for fruit pulp – cpf (litres) | 1 | 3 |
| 12 | Juice container capacity – cj (litres) | 1 | 1,5 |
| 13 | Sound level – ls (db) | 50 | 56 |
| 14 | Price – p (ron) | 2149 | 729 |

Table 2

| Group I | Group II | Group III | Group IV |
|---------------|-----------------------|-----------|--------------------|
| , P, p, warst | s.o., rot, w, H, l, L | umc, s ls | cpf, cj, r nsp, Lc |

Table 3

| | p | P | warst | s.o. | rot | w | L | L | H | umc | ls | cpf | Cj | nsp | Lc | | i |
|-------|---|---|-------|------|-----|---|---|---|---|-----|----|-----|----|-----|----|-----|-------|
| | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 39 | 0,116 |
| P | 1 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 39 | 0,116 |
| P | 1 | 1 | 0 | 1 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 39 | 0,116 |
| warst | 1 | 1 | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 39 | 0,116 |
| s.o. | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 4 | 4 | 4 | 4 | 25 | 0,074 |
| rot | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 4 | 4 | 4 | 4 | 25 | 0,074 |
| w | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 2 | 4 | 4 | 4 | 4 | 25 | 0,074 |
| L | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 4 | 4 | 4 | 4 | 25 | 0,074 |
| L | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 2 | 4 | 4 | 4 | 4 | 25 | 0,074 |
| H | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 2 | 2 | 4 | 4 | 4 | 25 | 0,074 |
| umc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 2 | 9 | 0,027 |
| ls | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 2 | 2 | 9 | 0,027 |
| cpf | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 0,009 |
| cj | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 3 | 0,009 |
| nsp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 0,009 |
| Lc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 3 | 0,009 |
| | | | | | | | | | | | | | | | | 336 | |

