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The components and vectors of excellence

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The components and vectors of excellence

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Abstract. This work aims at identifying the components of excellence (market, products / service, development) through a new contextual approach. An interdisciplinary scientific instrumentation is utilized, by placing, into the space of the vector theory in physics, the economical sizes that, by summing, can provide a real quantification (concrete, precise) of the excellence in business. The work proposes a new quantification modality of the excellence level through the method of vectorial composition, taken over from physics (mechanics). After the components of excellence (market, product / service, development) have been established and represented as vectors, the calculation of the resulting vector (excellence) can be done, through the classical vectorial composition, into a system of axes, determined by the excellence components.

1. Introduction

The New Economy “refers to a set of quantitative and qualitative changes that have transformed the structure, functioning and rules of the economy.” It is “based on knowledge and ideas where the key factors, such as creation of jobs and higher life standards are innovative ideas and technologies, incorporated to the manufactured products and services. It’s the economy where risk, uncertainty and constant changes are rather a rule than an exception” (Işanu, 2002).

Through an explicative construing, the New Economy means conceptual activity before the physical (mechanical) activity and communication technologies that lead to a generalized (global) concept. In other words, innovations and inventions precede the production through acquiring new concepts and their means of achievement. The organizational changes take place rapidly and constantly.

In this context, the concept of excellence has appeared, a manner of making the globalized problems within the organizations compatible. Excellence in business seems to be the highest common factor without which the sizes, of any kind, cannot be correctly divided. In other words, it is the common denominator of the fractions that build the resistance structure of the economy. Through it, the precise coordinates along the variable directions of the progress and development are obtained.

Excellence is, as such, an advantage on the market competition, determining higher income rates. By definition, if we take into account all the points established, excellence becomes “improved quality of the products and services, competitive costs and satisfied consumers”. It may outline a model through consumer orientation, managerial techniques and, especially, performing results.

2. Determining Excellence

Excellence can be generated / determined / influenced through cultural differences existing between



nations. These derive from traditions, habits, language, quality or services, civilization level etc. The cultural dimensions make Geert Hofstede (1980) (author of this theory along with Van Hool) state: “Culture is more often a source of conflicts than of synergy. Cultural differences are a nuisance at the best and often a disaster”.

The cultural differences may have important consequences in the business context. The conduct is marked by the person’s image, attitude towards action, individual or group importance. Through cultural differences, the organizational structures and the firm strategies can be marked. “Conceptual analysis of the culture” utilizes, practically, a classical grill, structured on elements that can be ranked according to importance: strong / weak context; communicative values (writing, words, gestures); humans as vision (religion, traditions); action, risk, work.

Time, as relation, imposes three milestones: mono - chronism; tradition / force - in the past, present and future; time as relative value (“time is money”). In terms of vision on humans and their destiny, it can be judged through descending (“what it is”) or through becoming (“what it is doing”). In

both cases the attitudes to value become important. Eventually, through action, risk, work, it is the entrepreneurs that can be appreciated, not the thinkers; the American pragmatism “to make” matters. Another aspect may be when humans surrender to their condition in search for natural harmony

3. Coordinates of Excellence

3.1. Components

Excellence, as a result of the processes of successive changes, may be derived through precise coordinates. By considering that innovation leads, by default, to changes, three steps, not four, are proposed for the coordinates of excellence, respectively: consumer, human resource and innovation - change. With these notations, the resulting vector of excellence (\bar{e}) appears, in a geometrical system, tri-axial, as shown in Fig. 1.

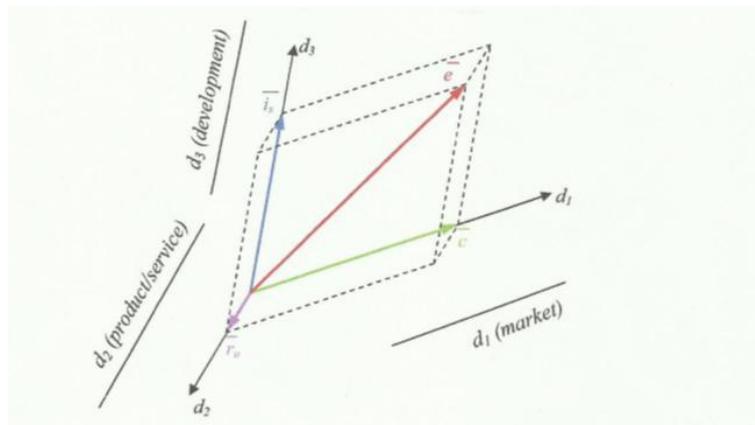


Figure 1. The components and vectors of excellence

Notations: d_1 - market; d_2 - product / service; d_3 - development; c - consumer; r_u - human resource
 i_s - innovation-change.

The motivation of the three sides (axes) of the orientation to quality (attention to consumer, personnel and innovation belongs to Tom Peters (1982), the “father” of excellence in business, who, in the eighties, along with Robert Waterman, published “In Search of Excellence”. The work proposes 8 themes (bases, principles) for searching excellence. These are:

- Action (“A bias for action - getting on with it”);

- Consumer (“Close to the customer - learning from the customer”);
- Entrepreneur (“Autonomy and entrepreneurship”);
- Productivity through personnel motivation (“Productivity through people”);
- Relating to fundamental values (“Hand-on, value-driven-management, walk the talk”);
- Respect for those who know to do (“Stick to the knitting – do what you know”);
- Constructions with simple and adaptive structures (“Simple form, lean staff”);
- Efficient results (“Simultaneous loose-tight properties – have autonomy in some areas, central ideas / values in others”).

The formula for Excellence is summarized thus:

$$\text{Excellence} = \text{efficiency} + \text{effectiveness} + \text{stimulating environment} \quad (1)$$

By corroborating this relation to the above context, excellence, according to Tom Peters, seems to become the sum of the eight themes, each of them keeping, in its contents, a discreet, but suggestively outlined secret. Such secrets might be the ascent in action, capacity of listening to the consumer, favouring the autonomy and innovating spirit, motivating the personnel for productivity, mobilizing fundamental values, appreciation of those who know how to do, simple and, especially adaptable constructive forms and combining rigor with flexibility (Marian, 2007).

By reverting to Fig.1, it may be asserted that excellence, thus represented, as touchable size, leads to success. It can be maintained through strategies (at the level of each coordinate).

3.1.1. Consumer

For surviving, the firm is aware that the final of the product / service quality is the consumer. This awareness seems to be suggestively given by the direction (d_1) indicating the market that provokes the motion needed by the system.

All aspects of perspective regarding the value addition for consumer are considered. This perceives a value prospectively evaluated. It includes, through summing, benefits and costs from the alternant comparative offers that are known. Satisfaction is associated, as size, to the manner of perception of the level being achieved on the product / service characteristics related to expectancies. If the created value is important, it may lead to the consumer’s loyalty and, eventually, through extension, to his fidelity. The firm is obliged to differentiate, as much as possible, its products / services from the competition, but it has to increase the innovative degree with which the consumer will be satisfied, both through expectancies and the qualitative surprise. The strategies of the company are expressed through competence, flexibility, added value and new opportunities.

3.1.2. Human Resource

The direction (d_2) — product / services - that means action, is the human resource, determined at the excellence level. Through their scientific contents, from strategic planning to the personnel’s satisfaction, all the concerned aspects are considered for calculation, respectively:

- Recruiting, selection, integration and vocational training, career development;
- Evaluations (jobs, performance of the personnel);
- Rewards, equity, equal chances;
- Rights, obligations;
- Labour protection and safety;
- Conflict management, communication and relations with the trade unions;
- Efficiency of the human resources usage;
- Total quality management in the field of human resources;
- Orientations, trends, objectives.

“Human is the centre of all business. All other resources, grounds, building, mechanisms, equipment, vehicles or money are of secondary importance only. Without people business cannot be done. Business has no other purpose but to serve the people’s needs” (Professor Dr. Michael C. Wilkinson, dean of the Faculty of Management, Derby University, UK) (Mathis, Nica, Rusu, 1997).

The management of the human resources requires an updated approach of the contents and objectives (concepts, politics and management responsibilities), types of specialists in the fields and activity organizing. From this perspective, the company is outlined as a subsystem of the human resource and is involved in the internal organization of the human resources department, whose attributions and types of organizational structures are settled.

We can quote again Prof. Wilkinson “(. . .) people have various roles within a business and have many connections with other business. People are committed to a business. In some cases they are its managers, in others they are suppliers, customers, creditors, debtors and often they are shareholders of an initiative. However, frequently they may have all these attributes at a time” (Mathis, Nica, Rusu, 1997).

The inter-functional collaboration inside a company eventually determines excellence. Among the structural organization, processes, managerial functions and aptitudes, the suitable lubricant needs to be inserted in order to provide an optimal running of the entire assembly. The human resource puts together knowledge, talent, imagination, creation (Mathis, Nica, Rusu, 1997).

3.1.3. Innovation – Change

The differentiation of the products / services from the competition is performed through innovation that, in all cases, leads to change (Fig.1. - direction (d_3) development). As a result of a creative activity, innovation requires superior engineering / managerial solutions, able to change a compromise / conflict (technical, economical or mixed) among at least two systems involved in business. It directs the company towards new performances (Stegăroiu, Niculescu, 2000). Innovating and innovation can be explained separately, but independently. If “innovating” means a process of renewing, innovation is its result.

In dictionaries the term is explained as: “new, change, transformation or solution to a technical problem or a problem of work organizing intended for improving the work productivity, technical perfection or rationalization of the solutions being applied” [21].

In this entire explicative introduction “innovation is considered, in general, the main motor of the economical increase of the nowadays global economy. By implementing innovations into practice products can be obtained with improved quality features, service of superior quality, new production processes, more efficient and cleaner (ecologic), enhanced models of the business management system, modern methods of workmanship management etc. There are multiple motivations for the companies and organizations to innovate, such as: increasing their market quota, conquering new markets, improving the product quality, widening the product range, replacing the obsolete products”, diminishing the impact on environment etc. Innovation is indissolubly created by creativity (...) [18].

Innovation has been classified into four types: product innovation, process innovation, marketing innovation and organizational innovation [17]. The OSLO manual, version 3 (2005) recommends the following definition: “An innovation is the implementation of a new product or significantly improved (a product or a service) or of a process, a new marketing method, or a new organizational method in the business practice, work place organizing or foreign relationship”. The condition is for the product, process and marketing or organizational methods to represent novelties (or significant improvements) for the company [18].

Innovation leads to change. According to the extent of change needed for implementation and to the technological intensity, innovations are radical (*or breakthrough innovations*) and *incremental*.

The term of product is used for both goods and services [18]. In virtue of this, radical innovations are considered dimensions of newness and produce absolutely new solutions in systems, processes, goods / services. They get developed in new business that will lead to important chances. These affect branches of the existing industries or the bases of other prospective industries and create new

markets. Here come, as examples, the optical fibers, lasers and computer industry [18]. They assure a much higher value to consumers. The radical innovations to product distinguish between the old and the new product through the description of its usage as a result of several performance or material features and superior components. These innovations induce new technologies (in exclusivity) or combinations usable at a superior level compared to the existing ones. However, a definition of radical innovations does not meet an acceptable consent of the researchers yet (McDermott, 2002).

Incremental innovations “adapt, simplify, refine and improve product and / or extant production / distribution systems” [18]. Definitions of incremental innovations were formulated by CM Banbury and W Mitchell in 1995. They present them as “refinements and expansions of the settled projects that lead to substantial price or functional benefits to the users” (Banbury, 2005) [18]. It has also been asserted that “incremental innovations are, usually, minor improvements of the existing products and processes” [18, 20]. When the performances of an existing product / service get improved during the life cycle through successive versions, the incremental innovation comes up. Products can be simple or complex. Their improvements consist of components or materials with superior performances (simple products) or partial changes brought to the structural subsystems (complex products). The existing production limits can be expanded or additional (complementary) functions can be added to the existing functions. If the radical innovations are discontinuous, the incremental ones are continuous, of a higher frequency, motivated by the needs for market satisfaction. The former bring a much higher profit to the companies, compared to the latter category.

There are “imitated” innovations, as well. These are “new for the company, not for the market”. They are marked by low technological innovating extent and market (Garcia, 2002).

Another notion that has to be introduced to the context is invention. If invention means discovery through creation, innovation is its trading, so, the confusion between them has to be avoided. “An invention consists of creating a new configuration, composition or material, device or process” [19].

In addition “an invention is the first occurrence of a new idea (concept) for a new product (process), whilst innovation is the first trading of the new idea”. The invention becomes innovation after processing through activities of production and marketing and traded on the market [19].

Edward B. Roberts (2007) considers that innovation is a process composed of:

- Generation of an idea or invention;
- Transforming that idea into a business or other useful application.

The innovating activities have a scientific, technological, organizational and economical (financial, commercial) content. These actions materialize and implement the innovations [17]. These activities are correlated with the research - development domain where the technical – scientific novelties are categorized.

The innovating activities are protected by the curtain of company secrets (scientific, technological and economical).

The innovation sources can be internal and external (Drunker, 2002). The internal ones are: *the unexpected event* (a surprise commercial success must be exploited); *non-concordances* (between expectancies and results or suppositions); *process necessities* (creating opportunities through the improvement of processes); *changes in industry and on the market* (increases of the request on the market or increase of the industry are favorable for new innovative processes). The external sources of the company may be: *demographic changes*, *perceptive* (understanding the consumer’s perceptions) and *new knowledge* (patents, know-how) [18].

The innovative action produces changes. Changes require “replacement, modification, transformation or changing into shape and / or content of an object, product, work, service, activity or process” (Burduş, 2000). By generalizing, “the change represents a permanence of our life, finding it in the evolution of all states and structures”, the organization is (...) an entity in change, obliged to permanently enhance and adapt its level, structure and quality of the transformations that it produces on several input elements in order to meet the needs of the market, personnel and administration and to earn on its own in terms of profit, image, market quota, expansion capacity, resistance to competition

etc.” (Rusu, 2003).

The management of change approaches specific aspects within the organizational area and outside it, too. Among these, the following may be emphasized: imperative of the change (development of the organizations, organization based on knowledge, implementation of the permanent learning concept); the organizational structure and change (classical and modern structures, remodeling of several structural elements); organizational culture in front of the change (element of strong impact in change); diagnostic; planning of the change process (strategies, politics, stages, models, their implementation into the organization); provision of the conditions for implementing the change (the consolidation of the changes to be efficient); strategic and leadership changes (negotiation elements, styles of managers and leaders, risk and complexity in change); instruments of change (procedures, techniques) (Rusu, 2003).

4. Vectors of excellence

Vectors are physical symbols that represent a size in physics, such as speed, acceleration, force etc. They are characterized by size (module) and orientation (direction and sense).

Vectors can operate through addition, subtraction and product (scalar and vectorial). Related to the application point, its orientation in space is given by direction and angle with the reference axes (e.g. X, Y and Z).

In a plane, vectors get composed by the parallelogram rule, and in space it is the parallelepiped rule that applies. The resulting vector will be the diagonal of the parallelogram (in a plane) or parallelepiped (in space).

In the case of any disposition, in space, the three directions (d_1 - market, d_2 — product / service, d_3 - development), can be translated parallel up to a point of intersection (application point). Through vectorial composition, the three components, the vectors \underline{c} (consumer), \underline{r}_h (human resource) and \underline{i}_s give the resultant that in this case is \underline{e} - excellence, as shown in Fig.1 and 2.

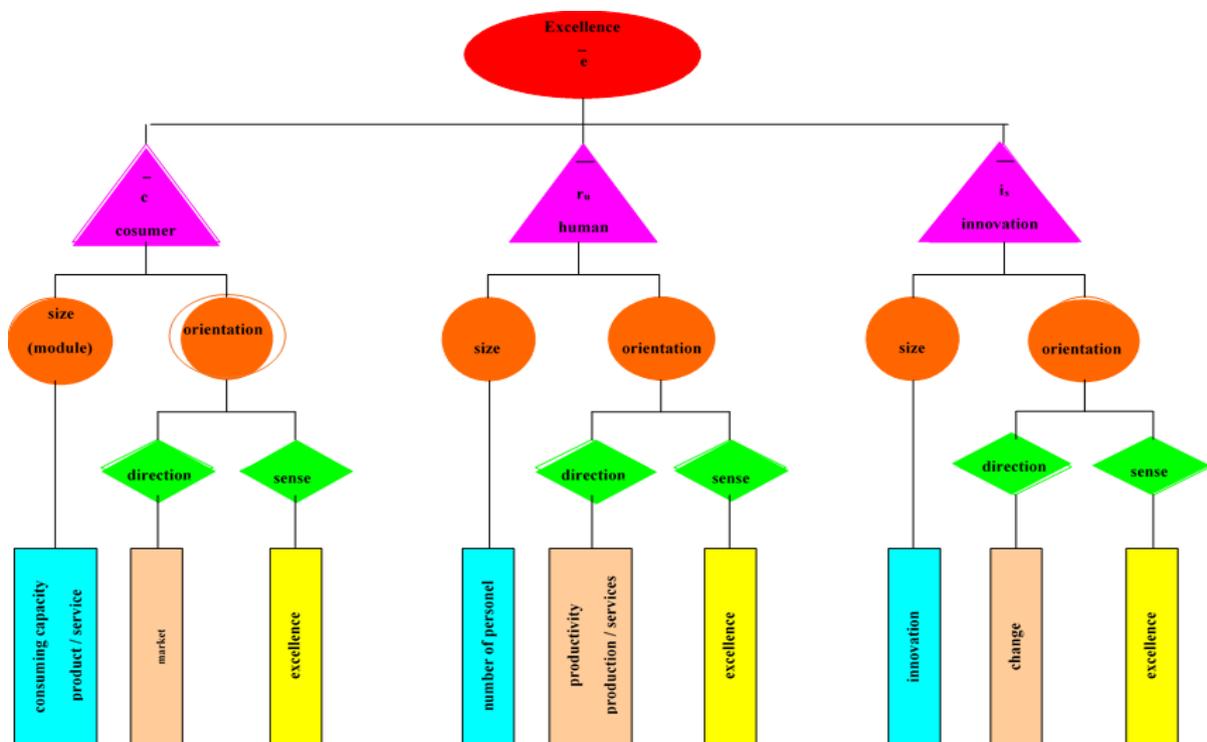


Figure 2. Vectours of excellence

5. Calculation Model

Based on the motivations and considerations presented so far and reverting to Fig.1, a model of estimation of excellence through a vectorial method is proposed. By intersecting parallels to the three directions (d_1 - market, d_2 - production / services and d_3 - development) a generalized system of axes will be obtained along which the excellence vectors can move: consumer (c), human resource (r_u) and innovation-change (i_s). By composing them, the resulting vector will be excellence, (\bar{e}).

Vectors, in physics, are represented by size (module) and orientation (direction and sense). These, transposed to our context, are shown in Fig. 2.

The vector consumer (c) has as size (module) the product / service consuming capacity related to the degree of satisfaction; as direction tire market appears and the sense is given by excellence.

The vector human resource (r_u) is characterized by the number of personnel members (as size or module), production / services as direction and excellence as sense. The vector innovation-change (i_s) is defined in size (module) as innovation, direction means change and sense is excellence as well.

Through their composition the vector excellence (\bar{e}) will result, characterized by a size (module) expressed in units of excellence and direction and sense that depend on the angles with the system axes. This vector is the diagonal of the oblique parallelepiped formed by the vectors (c), (r_u) and (i_s). The vector excellence (\bar{e}) is expressed through a relation in the form of:

$$\bar{e} = \bar{c} + \bar{r}_u + \bar{i}_s \tag{2}$$

If the three directions are particularized to three orthogonal axes Ox (d_1), Oy (d_2), Oz (d_3), the configuration illustrated in Fig. 3 will result.

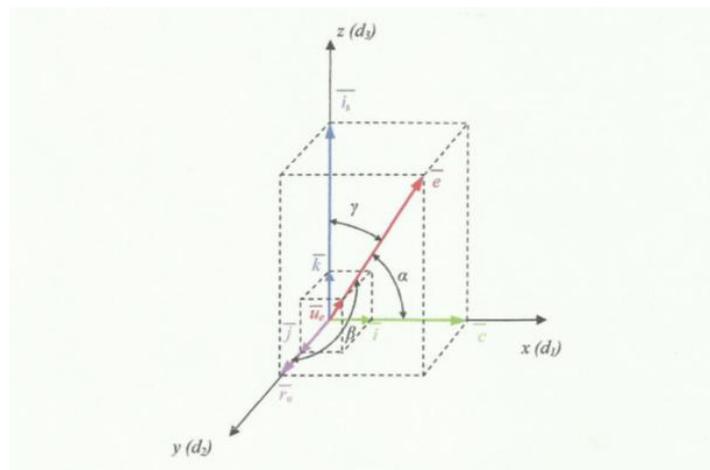


Figure 3. Versors of excellence

The versors (unit vectors) (i), (j), (k) are considered. Their module (size) is equal to 1 (unit of excellence). In this case, the projections of the vectors (c), (r_u) and (i_s) along the three coordinates will become:

$$\begin{aligned} \bar{c} &= c_x \bar{i} \\ \bar{r}_u &= r_{uy} \bar{j} \\ \bar{i}_s &= i_{sz} \bar{k} \end{aligned} \tag{3}$$

The sizes (modules) of the three vectors (components of excellence) will become:

$$c_x = \text{pr}_{\text{OX}} \bar{e} = e \cos\alpha$$

$$\begin{aligned} r_{uy} &= pr_{OY} \bar{e} = e \cos\beta \\ i_s &= pr_{OZ} \bar{e} = e \cos\gamma \end{aligned} \tag{4}$$

The angles α , β and γ are position angles of the vector (\bar{e}) towards the axes x (d_1), y (d_2) and z (d_3):

$\alpha = \langle \bar{e}, \bar{i} \rangle$, $\beta = \langle \bar{e}, \bar{j} \rangle$; $\gamma = \langle \bar{e}, \bar{k} \rangle$. Further, the size of excellence can be established through the relation:

$$e = (c_x^2 + r_u^2 + i_s^2)^{1/2} \tag{5}$$

The expression of the vector (\bar{e}) is:

$$\bar{e} = c_x \bar{i} + r_u \bar{j} + i_s \bar{k} \tag{6}$$

Of course, among the director cosines there is the relation:

$$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1 \tag{7}$$

The relations (4) give the proportionality among the sizes of the component vectors of excellence and the position angles of the vector of excellence:

$$\frac{c_x}{\cos \alpha} = \frac{r_u}{\cos \beta} = \frac{i_s}{\cos \gamma} \tag{8}$$

If the sign of the director cosines is changed, the orientation direction will also change. Thus, the following will result:

$$\cos \alpha = \frac{c_x}{\pm \sqrt{c_x^2 + r_u^2 + i_s^2}} = \frac{c_x}{\pm e}$$

$$\cos \beta = \frac{r_u}{\pm \sqrt{c_x^2 + r_u^2 + i_s^2}} = \frac{r_u}{\pm e} \tag{9}$$

$$\cos \gamma = \frac{i_s}{\pm \sqrt{c_x^2 + r_u^2 + i_s^2}} = \frac{i_s}{\pm e}$$

By knowing the position angles of the vector of excellence towards the three directions the components of excellence (projections) can be determined. This affirmation is reciprocally valid, i.e. if the projections of the vector of excellence are known, the angles, α , β and γ can be found depending on the size of the excellence vector.

If, to the initial system (x, y, z) a rotation determined by the cosines of the angles made by rotated axes is applied, a new system (x', y', z') will be obtained, as shown below (Table 1):

Table 1. Correspondence between system (x, y, z) and (x', y', z').

	O _X	O _Y	O _Z
O _X '	cos α_1	cos β_1	cos γ_1

$O_{Y'}$	$\cos \alpha_2$	$\cos \beta_2$	$\cos \gamma_2$
$O_{Z'}$	$\cos \alpha_3$	$\cos \beta_3$	$\cos \gamma_3$

The new coordinates can be calculated by means of the formulae:

$$\begin{aligned}
 x' &= x \cos \alpha_1 + y \cos \beta_1 + z \cos \gamma_1 \\
 y' &= x \cos \alpha_2 + y \cos \beta_2 + z \cos \gamma_2 \\
 z' &= x \cos \alpha_3 + y \cos \beta_3 + z \cos \gamma_3
 \end{aligned}
 \tag{10}$$

Where the symbols mean:

- α_1, β_1 and γ_1 - the angles of the Ox' axis with Ox, Oy, Oz and $\cos \alpha_1, \cos \beta_1, \cos \gamma_1$, are the director cosines of the new axis Ox'

- α_2, β_2 and γ_2 - the angles of the Oy' axis with Ox, Oy, Oz and $\cos \alpha_2, \cos \beta_2, \cos \gamma_2$ are the director cosines of the new axis Oy'

- α_3, β_3 and γ_3 - the angles of the Oz' axis with Ox, Oy, Oz and $\cos \alpha_3, \cos \beta_3, \cos \gamma_3$, are the director cosines of the new axis Oz' .

The demonstration of the formula (10) is immediate, by considering the projections of the excellence vector \bar{e} on the three axes Ox', Oy', Oz' and the scalar products between the versors.

$$\bar{e} = e_x \bar{i} + e_y \bar{j} + e_z \bar{k} = x \bar{i} + y \bar{j} + z \bar{k}
 \tag{11}$$

And the versors of the new axes i', j', k' with:

$$\begin{aligned}
 i' &= \cos \alpha_1 \bar{i} + \cos \beta_1 \bar{j} + \cos \gamma_1 \bar{k} \\
 j' &= \cos \alpha_2 \bar{i} + \cos \beta_2 \bar{j} + \cos \gamma_2 \bar{k} \\
 k' &= \cos \alpha_3 \bar{i} + \cos \beta_3 \bar{j} + \cos \gamma_3 \bar{k}
 \end{aligned}
 \tag{12}$$

The relations (10) will result.

Analogically, it will result:

$$\begin{aligned}
 x &= x' \cos \alpha_1 + y' \cos \alpha_2 + z' \cos \alpha_3 \\
 y &= x' \cos \beta_1 + y' \cos \beta_2 + z' \cos \beta_3 \\
 z &= x' \cos \gamma_1 + y' \cos \gamma_2 + z' \cos \gamma_3
 \end{aligned}
 \tag{13}$$

Thus, in the rotation of the coordinate axes in space nine angles come up, three for each new axis related to each of the three initial axes. These angles are not independent among them, but they are linked by the fundamental relations that are known:

$$\cos^2 \alpha_i + \cos^2 \beta_i + \cos^2 \gamma_i = 1 \quad i = 1, 2, 3
 \tag{14}$$

and

$$\sum_{i=1}^3 \cos^2 \alpha_i = 1, \quad \sum_{i=1}^3 \cos^2 \gamma_i = 1, \quad \sum_{i=1}^3 \cos^2 \beta_i = 1$$

A general change of the axes can be done as well, i.e. a translation and a rotation, first there will be the

translation given by the coordinates x_0, y_0, z_0 of the new origin O' towards the initial system $(O, x, y,$

$$\begin{aligned}x &= x_0 + x' \cos \alpha_1 + y' \cos \alpha_2 + z' \cos \alpha_3 \\y &= y_0 + x' \cos \beta_1 + y' \cos \beta_2 + z' \cos \beta_3 \\z &= z_0 + x' \cos \gamma_1 + y' \cos \gamma_2 + z' \cos \gamma_3\end{aligned}\quad (15)$$

$z)$, thus obtaining the system (O, x'', y'', z'') . Afterwards, by rotating this system, the translated and rotated system (O, x', y', z') will be obtained, where:

are the formulae giving the general transformation of the axes of coordinates. The axis rotation supposes orientation modifications of the excellence vector, through the angles of excellence (α, β and γ). Translations produce reorientations, through size, in the modules of the excellence vectors. Eventually, the general change (translation plus rotation) means reorientation and relation to new positioning.

The relations (16) that give the general transformation of the axes are a starting point in the mathematical approach (model) of the vectors of excellence. From this point, the graphical - vectorial model presented penetrates the perimeter of the economical superior mathematics, offering the basis of several calculation programs. The problems of maximum / minimum should be remodelled as well as, especially, the optimal conditions.

The last stage is represented by the usage of these programs by the operators specialized in quantifications of excellence in business.

6. Conclusions

The concept of *excellence* appeared as a modality of making the globalized problems within the organizations compatible.

Excellence in business is the common denominator of the fractious that build the resistance structure of economy. Through in the precise coordinates along variable directions of progress and development are obtained.

Innovating and innovation can be explained separately, but independently. If innovating means a process of renewal innovation is its result. The innovating activities have a scientific, technological, organizational (financial, commercial) content, materialize the innovations and implement them. These activities are correlated with the research - development domain, where the technical - scientific novelties are categorized. Innovative activities are protected by the curtain of the company secret (scientific, technological and economical).

A model of estimating business excellence through a vectorial method is proposed. By intersecting parallels to the three directions (d_1 - market, d_2 - production / services and d_3 - development) a generalized system of axes will be obtained along which the excellence vectors can move: consumer

(\bar{c}), human resource (\bar{r}_u) and innovation - change (\bar{i}_s). By composing them, the resulting vector will

be excellence, (\bar{e}). This vector is the diagonal of the oblique parallelepiped formed by the vectors (\bar{c}),

(\bar{r}_u) and (\bar{i}_s). The vector of excellence (\bar{e}) is expressed through a relation of the form (\bar{e}) = (\bar{c}) + (\bar{r}_u) +

(\bar{i}_s); \bar{i}, \bar{j} and \bar{k} are versors (unit vectors); their resultant is the unit of excellence. The size of excellence can be determined through the relation $e = (c_x^2 + r_u^2 + i_s^2)^{1/2}$.

The analytic expression of the vector (\bar{e}) is $\bar{e} = c_x \bar{i} + r_u \bar{j} + i_s \bar{k}$.

By knowing the position angles of the excellence vector, towards the three directions, the excellence components (projections) can be easily determined. This affirmation is reciprocally valid as well, i.e. if the projections of the excellence vector are known, the angles α, β and γ can be found, depending on the size of the excellence vector.

The rotation of the axes supposes orientation modifications of the excellence vector, through the excellence angles α , β and γ .

Translations produce reorientations, by size, in the modules of the excellence vectors.

Eventually, the general change (translation plus rotation) means reorientation and relation to new positioning.

The relations that give the general transformation of the axes are a starting point in the mathematical approach (model) of the vectors of excellence.

From this point, the graphical model – vectorial – being presented penetrates the perimeter of the economical superior mathematics, offering the basis of several calculation programs.

The problems of maximum / minimum should be remodeled as well as, especially, the optimal conditions.

The last stage is represented by the usage of these programs by the operators specialized in quantifications of excellence in business.

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