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ADVANCED VISUALIZATION TECHNIQUES FOR ASSESSING BUSINESS IMBALANCES IN CONSTRUCTION AND TRANSPORT INFRASTRUCTURE MANAGEMENT

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Abstract

This paper represents an addition to the methodology described in previous research, introducing new methods of visualizing the results obtained through applying the integrated management analysis. The objectives of the research are to identify the methods that can be used by managers for visualizing the results of the integrated management analysis, to establish when a system is balanced or not and to find solutions to balance it. The first method is named the cardinal model, inspired by the four cardinal points used for terrestrial orientation. The second method is named territorial model, called like this based on the idea that a manager is a leader who wants to cover / conquer new territories that may belong to the external environment of the company or the internal one. These methods serve as a way for the consultant or manager to understand the orientation of the business, the scale of the existing resources within the business, and the effective use of those resources. The following representations are also useful for presenting the set of measures that must be taken in order to increase the productivity of the business, thus increasing the profits. The proposed solution should be simple and effective, thus appealing to a wide range of users. The results obtained in this paper are fundamental type.

Keywords: management analysis methodology, integrated management theory, the cardinal model, resultant, territorial model.

1. INTRODUCTION

The integrated management of a company is a management system, which integrates all the processes and systems of a company into one unit with one unified objective. In reality, however, there is no single rule to integrate the management system. Each company must decide to employ the integration according to the nature of the business, to obtain the best results.

Referring to the integrated management analysis, the purpose of this analysis is to find the optimal efficiency to balance the potential gains and losses. "It assures the coherence between the different domains/functions of the business, as well as the harmony between the organization, the society and the cultural environment." (Institute for Integrated Management, 2024). Unlike individual or collective management, "the integrated management promotes equilibrium between the interconnected domains".

This piece of research answers the question "What methods can the managers use to visualize the results of the integrated management analysis?" starting from the hypothesis that the cardinal method and the territorial one can be successfully used by manager, due to their suggestive ways of presenting the results.

Thus, the objectives of this research are to identify the methods that managers can use for visualize the results of the integrated management analysis and to present the benefits of using them. Starting from the ideas of Professor PhD Nicolae Postăvaru (2011), new methods of viewing the results of integrated management analysis of a business are proposed. As defined by Dalling (Dalling, 2007), "The integrated management of a business utilizes new concepts and managerial systems, emphasizing the systemic processes."

The originality of the research consists in creating and presenting suggestive graphical representations, that can certify if the system (the business) is balanced or not. In case the system is not balanced, it must figure the company orientation to pinpoint where action must be taken to eliminate the imbalances between different directions and domains. Referred domains are management, economic, marketing and production. Popescu (2019) described each of them regarding analysis directions and indicators. The four main domains within a company are treated as a whole. To analyze the combined entity, it needs to understand how each direction within the whole works. In theory, each domain is made up of four sub domains (directions), which can in turn be derived, forming an arborescent structure. This theory can be presented through a regular tetrahedron inscribed within a sphere which represents the space of regulations and which varies from one economic environment to another. The present paper takes into account only the pyramidal elements, four elements, considering the applicability to the Romanian economic environment.

The relevance of the research consists in the fact that the representations proposed in this article are useful for consultants or managers to understand the orientation of the business, the scale of the existing resources within the business, and the effective use of those resources. The representations are simple and effective, thus appealing to a wide range of users.

The paper is structured as follows: it begins with a review of the specialized literature on the topic of integrated management analysis, highlighting its significance and evolution and discussing the main results of research in the field. Then, the methodology is explained in detail and the main results are presented for both cardinal and territorial model. Finally, conclusions are drawn answering the research question and verifying the hypothesis.

1.2. Literature review

The integration of management systems that work in separated ways has been pointed out in literature by many researchers as a way to improve the overall management system efficiency (Nunhes et al., 2019). Detailed literature was carried out regarding the integrated management systems, most of it highlighting its benefits towards separated management systems (Sanz-Calcedo et al., 2015), (Saritas et al., 2004). These benefits are improved efficiency, profitability, customer satisfaction, relationship with staff, and image (Bernardo et al., 2015). Moreover, Ferron and Darnall (2016) argued that integrated management system allows achieving more benefits than the situation in which management systems are managed separately.

In the last decades, great changes reshaped the business environment of most industries, requiring reorganization and integration (Hvolby and Trienekens, 2010). Worldwide, businesses are developing a new model of organization based on systems integration (Hobday et al., 2005). Systems integration has started in military, engineering-based, origins in the 1940s and 1950s and transformed to a modern strategic capability across a large variety of branches. Then, between 1960 and 1970, computer oriented techniques for system analysis have been developed (Couger, 1973). Nowadays, one of the results of the evolution of business process management is the development of information technology (Szelągowski and Lupeikiene, 2020).

Systems must be analyzed, using large volume of data. Systems analysis refers to collecting, organizing, and evaluating data about a system and the environment in which it operates (Tilley and Rosenblatt, 2017). Data must be visualized. Data visualization reveals methods and provides insights leading to actions and decisions from management, playing a significant role in the performance of a firm (Cuthbert and Pearse, 2022). Data that are visually presented and interpreted into strategic decisions is seen as a tool for managers to increase firm performance (Akter et al., 2016).

Managers use large volumes of information in decision-making processes, therefore the way the information or data is visualized is reflected in the time

managers save and the quality of their decisions. Data visualization is the art of transforming complex data into visual representations like charts and graphs. A visualization is a representation of data, results, information or concepts as a mental image that is aiming to communicate a message (Padilla et al., 2018), aiding clarity (Bresciani, 2019). Allen (et al., 2014) argued that the most obvious aim of visualizations is to communicate information, to shape the understanding and actions of users.

In the age of big data, often seen as the lifeblood of modern business, organizations across sectors are dealing with an ever-growing influx of information. The data volume in industries, research, and technology is immense, and it continues to expand daily. Leveraging this data effectively enhances decision-making processes, but the sheer abundance makes extracting valuable insights increasingly challenging. Data visualization addresses this issue by simplifying large datasets into intuitive, easy to interpret visuals, ensuring that critical information is communicated clearly and efficiently (Embarak, 2018; Steed, 2025). This paper focuses on the data that small and medium sized companies (SME) have to analyze. These companies do not have a very large volume of data to analyze, but the accuracy of the analysis process and the visualization of the results must be efficient and effective for the management of the respective organization. There have been attempts in this regard, for this the following works can be consulted (Hadjimichael et al., 2024; Bhuvanya et al., 2025).

Rapid data visualization allows managers and teams within SMEs to make informed decisions in real-time. For instance, a graph showing daily sales or available stock helps quickly identify trends and issues, preventing financial losses and optimizing operations. Data visualization tools reduce the time needed to analyze and interpret information. This frees up human resources within SMEs, allowing them to focus on other strategic activities, such as business expansion or the development of new products and services (Choudhury et al., 2025).

The relationship between management decisions and results visualization is demonstrated in the literature. Eberhard (2021) argued that information visualization improves decision accuracy and quality and Yildiz and Boehme (2017) found that data visualization directly impacts managerial decision-making.

So far, research focused more on separate domains, and less on integrated management analysis. Popescu (2019), who proposed models for viewing the results of integrated management analysis, considering the business as a system with four main domains, has studied integrated management analysis: management, economic, marketing and production.

Continuing his research and, in addition to this, original graphical representations are created in this article, suggesting whether the system is balanced or not and proposing solutions in the case of imbalances. Usually, data visualizing methods such as matrices and networks are utilized to enhance the results' analysis (Verdinelli and Scagnoli, 2013). The current research proposes mathematical tools for visualizing the results/data, methods that are scientifically demonstrated.

Thus, the article fills in the gap existing in literature referred to practical models of viewing the results of integrated management analysis in suggestive and easy to apply methods. The results of the research will help managers in their decision-making processes, saving their time.

2. MATERIALS AND METHODS

For the purpose of the research, the construction company is split into four large domains of interest for analysis: management, production, economic and marketing. Each domain is organized into four main directions, as it can be seen in the tables 1-4.

Table 1. The directions of the management domain

MANAGEMENT DOMAIN	**1)** *Direction organisation – restructuring*
	2) *Direction strategy –planning - decision*
	3) *Direction of informational systems*
	4) *Human resources direction*

Table 2. The directions of the economic domain

ECONOMIC DOMAIN	**1)** *The financial and accounting direction*
	2) *Cost economy direction*
	3) *Direction of relations with bank and insurance companies*
	4) *Economic efficiency direction*

Table 3. The directions of the marketing domain

MARKETING DOMAIN	**1)** *The product sales direction*
	2) *Direction of marketing studies and analyses*
	3) *Direction of image – promotion*
	4) *Direction of contracting relations*

Table 4. The directions of the production domain

PRODUCTION DOMAIN	**1)** *Quality direction*
	2) *Production direction*
	3) *Direction of technology–refurbishment*
	4) *Research and development direction*

(*source*: Popescu, 2019)

Then, to each direction, a number of relevant indicators have been introduced, resulting 16 indicators for each analyzed domain. A detailed presentation of the considered indicators for each direction can be found in (Popescu, 2019). Thus, 64 indicators can be analyzed, but this would require a highly developed company. Each indicator was graded between 1 and 5. In case the analyzed indicator does not exist, it will receive grade 0. The company's success in construction and transport infrastructure can be assessed by adding up all the grades. In the end, a maximum score of 320 points can be achieved. The formula used to calculate the total score obtained through the integrated management analysis method is:

$$Tp = \sum_{i=1}^{n} \left(ID_i \times p_i \right), \tag{1}$$

where ID_i is the i^{th} indicator considered for analysis, $p_i \in \{0,1,...,5\}$ represents the awarded grade after the indicator analysis ID_i, with $n \in \{1,2,3,...,64\}$ which represents the number of indicators considered for analysis. In reality, it may be the case that the analysed company receives a score lower than 320 points. However, this does not necessarily mean that the company did not reach its best performance given its available resources. As a result, there may be instances in which not all of the pertinent indications are present. The domain in which the business operates, its modest scale and lower level of complexity, and other factors may be the reason of the absence of pertinent indications. The evaluator's conclusions on the final score must contain all of this information.

Viewing the results of integrated managerial analysis. Some mathematical elements First, a few mathematical concepts will be introduced. One drawing (*F*) that admits at least one such axis and one such center is said to have a known axis of symmetry and center of symmetry. Free vectors will be used in the next one. Consider a plane α and a convex regular polygon with *n* sides $A_1A_2...A_n$ within. Let *G* be the centre of gravity of the polygon, where $G \in \alpha$ which, compared to any point Ω, has the position vector:

$$\overrightarrow{\Omega G} = \frac{\overrightarrow{\Omega A_1} + \overrightarrow{\Omega A_2} + ... + \overrightarrow{\Omega A_n}}{n} \tag{2}$$

The regular polygon $A_1A_2...A_n$ has at least n axis of symmetry, more precisely the lines that link the tips A_1, A_2,..., A_n of the polygon. with its centre O of the circumscribed circle of the polygon.

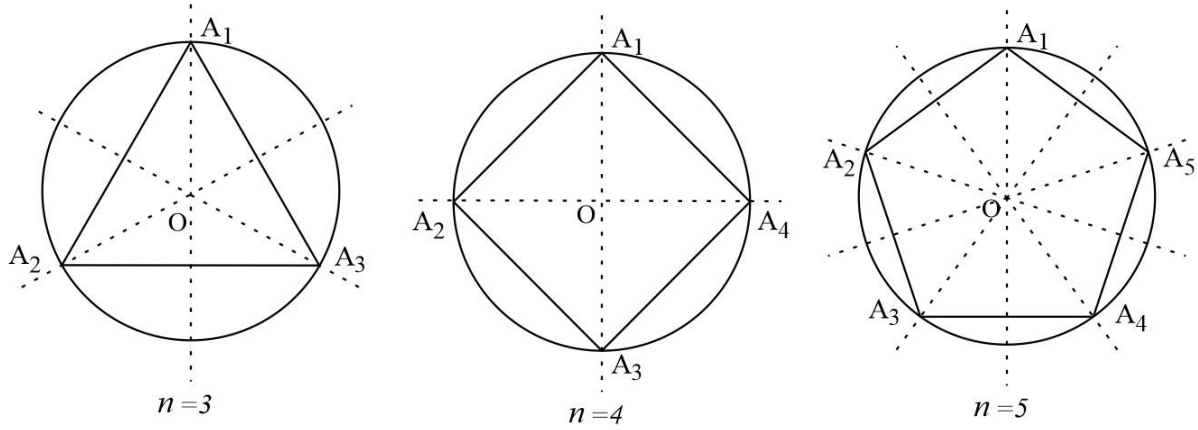

Figure 1. The symmetry axes of the main regular polygons (*source*: authors' representation)

According to (Mocanu, 2024; Krantz et al., 2024), it is known that:

1) any axis of symmetry of a figure (F) contains its eventual centre of gravity,
2) if figure (F) admits at least two symmetry axis, then at their intersection is the centre of gravity G of the figure (F).

It obviously follows that for the regular polygon $A_1A_2...A_n$ the centre O of its circumscribed circle is the very center of gravity G of the polygon, that is $G \equiv O$. Then, from the formula (2), it is deduced that:

$$\overrightarrow{OA_1} + \overrightarrow{OA_2} + ... + \overrightarrow{OA_n} = \vec{O} \tag{3}$$

It should be noted that this equivalence can be directly demonstrated for $n = 2m$, namely, n even, because the vectors $\overrightarrow{OA_1}, \overrightarrow{OA_2},...,\overrightarrow{OA_{2m}}$ are grouped in m pairs of opposite vectors $\vec{v}$ and $-\vec{v}$ and, obviously, $\vec{v} + \left(-\vec{v}\right) = \vec{0}$.

2.1. Results and Discussions

The cardinal model

The integrated management analysis will only contain four domains (directions or equivalent components) for study:

1) the management of the business; 2) the economy of the business; 3) the marketing of the business; 4) the production of the business (goods and/or services).

Since these components may differ from one nation or economy to another, it is not possible to analyse the laws that the company operates under. To analyse each domain's potential at the corporate level, one will proceed by representing the four examined domains in a reference system. One will make advantage of the reference and representation systems. One provides values for:

"*economic*" – max value $E = 100\%$; "*management*" – max value $C = 100\%$;

"*marketing*" – max value $M = 100\%$; "*production*" – max value $P = 100\%$.

The total of the percentage for each domain is calculated as the arithmetic mean of the grades obtained for each direction, as illustrated by the formula below:

$$T_p D_k = \frac{\sum_{k=1}^{4} D_{i_k}}{4}, \tag{4}$$

where $T_p D_k$ – the total percentage for the domain D_k, and D_{i_k} – represents the directions which make up domain D_k.

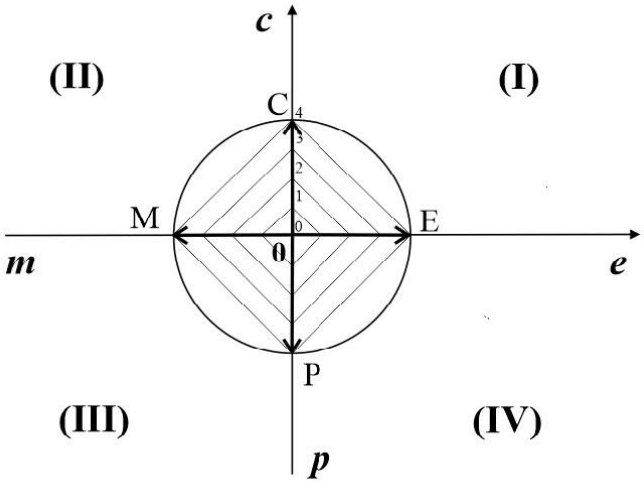

Figure 2. The reference system with the four analysed domains (*source*: authors' representation)

A four level square can be obtained in this manner (Figure 2). Let O be the centre of the circumscribed circle of this square and let:

$$\vec{R} = \overrightarrow{OC} + \overrightarrow{OM} + \overrightarrow{OP} + \overrightarrow{OE}.$$

Using formula (3) for the square one, one gets: $\overrightarrow{OC} + \overrightarrow{OM} + \overrightarrow{OP} + \overrightarrow{OE} = \vec{O}$.

Therefore, the value of the *resultant* $\vec{R}$ is $\vec{R} = \vec{O}$. Consequently:

$$\left|\vec{R}\right| \overset{not}{=} R = 0\,. \tag{5}$$

Since each of the four examined domains reached its peak value, it is reasonable to read relation (5) as indicating that the system is balanced. In this manner, the management reference system employed in integrated analysis may be visualized and each analyzed domain can be derived into the four directions. The potential of each domain and the resulting outcome can then be ascertained by adding up the scores of the indicators that were analyzed, based on the levels attained by each direction that was examined and indicated in green. The obtained resultant will indicate the presence of an imbalance within the analysed direction, and its absolute value R_{D_i} will tell us the scale of the imbalance. The direction of the domain and the business under analysis will be shown by the resultant's orientation. The acquired percentages are sketched in the Figure 3 as a numerical example to support the preceding text.

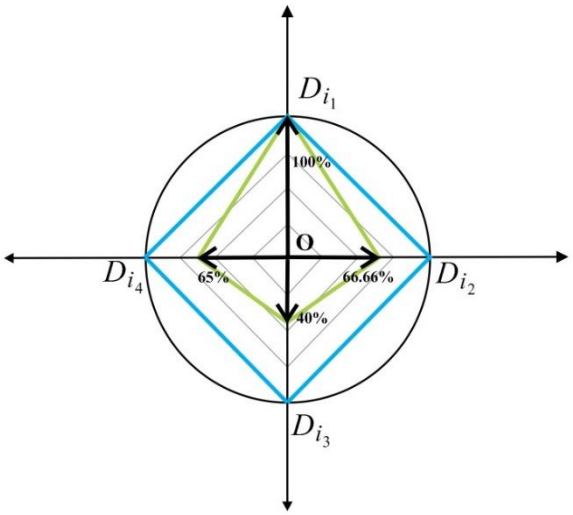

Figure 3. Viewing the potential of the company for the cardinal model for a domain D_k (*source*: authors' representation)

Beginning with the values shown in Figure 3, the following numerical example will show how to obtain the resultant by adding the vectors using the triangle rule:

$$\vec{R}_{D_i} = \vec{v_1} + \vec{v_2} + \vec{v_3} + \vec{v_4}\,. \tag{6}$$

This leads to the illustration in Figure 4, where the orientation towards the

direction is indicated by the resultant. To gauge the extent of the imbalance between the domain's directions, one is also interested in the resultant's absolute value.

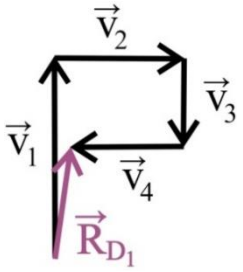

Figure 4. Representation of how to obtain the resultant $\vec{R}_{D_i}$ for a domain D_k (*source*: authors' representation)

Consequently, the following value is obtained $\vec{R}_{D_i} = 1.66\,\vec{i} + 60\,\vec{j}$. From which it can be inferred that $\left|\vec{R}_{D_i}\right| = R_{D_i} = \sqrt{(1.66)^2 + 60^2} = 60.02$. As a percentage, the value can be evaluated as follows $R_{D_i} = 60.02\%$. Sketching the resultant within the domain will indicate the direction in which the domain is headed as it can be seen in Figure 5, where the domain D_k is oriented in the direction D_{i_1}.

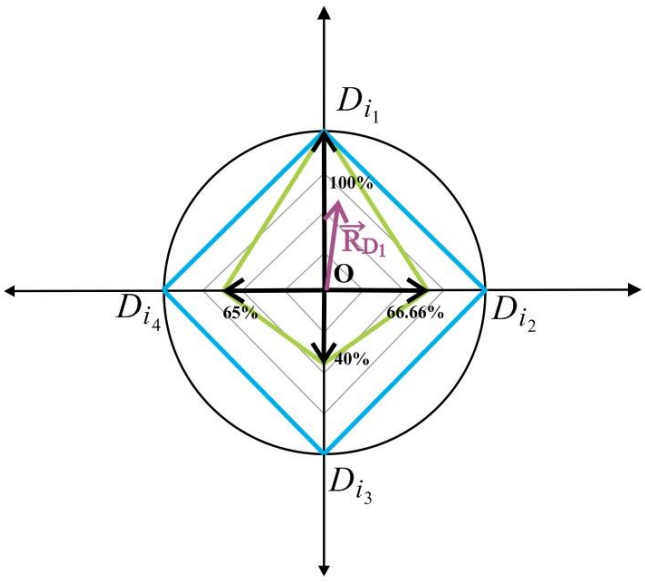

Figure 5. The resultant view of the cardinal model for a domain D_k (*source*: authors' representation)

Depending on the scale of the resultant $\vec{R}_{D_i}$, written as $\left|\vec{R}_{D_i}\right|^{not} = R_{D_i}$, one might evaluate the imbalance that the organization is experiencing and suggest ways to bring the relevant domain back into balance. Similarly, the company's potential can be represented on its four analyzed directions, revealing the company's direction and the worth of the outcome for the business under analysis.

Examine the following numerical example, where the values for each domain are displayed in Table 5.

Table 5. Calculating the total percentage for the company

Percentage evaluation of the company	
(1)	***Management domain*** **– 67.91%**
(2)	***Economic domain*** **– 56.08%**
(3)	***Marketing domain*** **– 64.58%**
(4)	***Production domain*** **– 75.83%**
Total percentage ([(1)+(2)+(3)+(4)]/4): **66.1%**	

Source: authors' representation

Here, the value of the potential, according to the integrated managerial evaluation, is described by the formula (7):

$$T_pF = \frac{\sum_{k=1}^{4} T_pD_k}{4} = \frac{T_pD_{management} + T_pD_{economic} + T_pD_{marketing} + T_pD_{production}}{4}$$
$$= \frac{67.91\% + 56.08\% + 64.58\% + 75.83\%}{4} = 66.1\%.$$

The obtained value suggests that the company only reached two thirds of its maximum potential, which should lead to important decisions being taken to improve the situation.

The outcome and its absolute worth will next be ascertained in order to identify whether the company is unbalanced and in what direction it is moving. Finding the resultant's value is another goal.

After the integrated managerial review, one will use the cardinal model to illustrate the company's potential.

In Figure 6, the quadrilateral whose sides are represented by the red line represents the company's reached potential at the moment, while the $M_1C_1E_1P_1$

square represents the maximum potential of the company, which should be reached in the future.

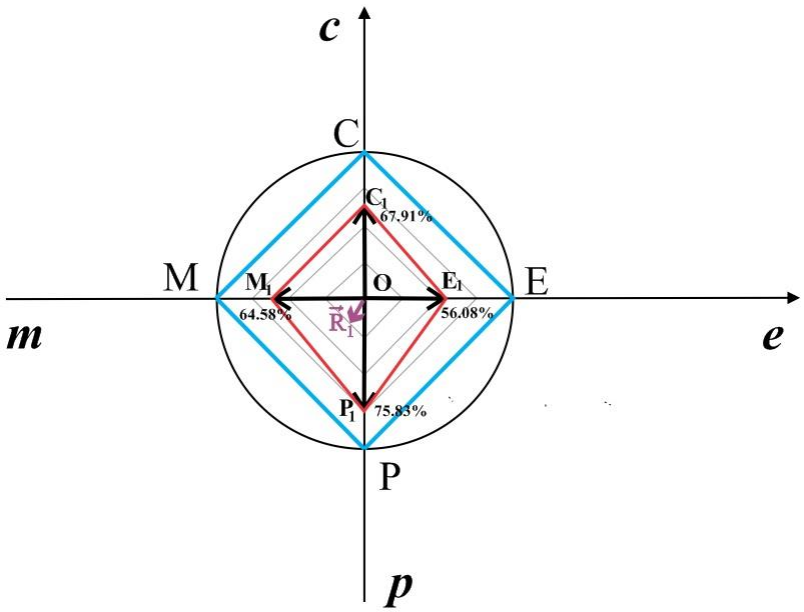

Figure 6. Percentage representation for the four main areas analysed and representation of the resultant $\overrightarrow{R_1}$ and the outcome that shows the path the business is taking (*source*: authors' representation)

As it can be seen in Figure 7, resultant $\overrightarrow{R_1}$ did not have its absolute value R_1 equal to zero.

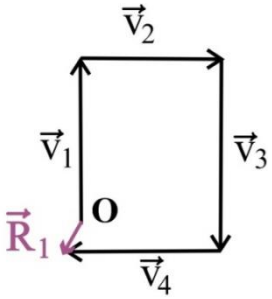

Figure 7. Representation of the resultant $\overrightarrow{R_1}$ as a vector sum (*source*: authors' representation)

Therefore, if one looks at the vectors $\overrightarrow{v_1}, \overrightarrow{v_2}, \overrightarrow{v_3}, \overrightarrow{v_4}$, the resultant $\overrightarrow{R_1}$ was calculated as the sum of the four vectors:

$$\overrightarrow{R_1} = \overrightarrow{v_1} + \overrightarrow{v_2} + \overrightarrow{v_3} + \overrightarrow{v_4}. \quad (8)$$

The value $\overrightarrow{R_1} = -8.5\vec{i} - 7.92\vec{j}$ can be obtained by applying the triangle rule. Calculating the absolute value one obtains:

$$\left|\overrightarrow{R_1}\right| \overset{not}{=} R_1 = \sqrt{(-8.5)^2 + (-7.92)^2} = 11.29.$$

A percentage can be used to express this value as $R_1 = 11.29\%$. In case the resultant $R_1 = 0$, the company is well balanced between all its domains, whereas in the example, case the value obtained was $R_1 = 11.29\%$ which points to an imbalance, and *the direction of this imbalance indicates the orientation of the business towards production.*

Classification of imbalances

The degree of imbalances that can exist inside a business that is the focus of integrated managerial analysis can be categorized. The classification is illustrated in Table 6.

Table 6. Classification of imbalances

Value of resultant	**Interpretation of the value of resultant**	**Proposed measures for the company management board**
$R = 0$	The company is well balanced	The management should maintain the current strategic policies and ensure that they are implemented according to the strategic plan.
$0 < R \leq 33\%$	The company has a small imbalance	The management should supervise the operational part of the strategic plan more carefully in order to reduce the value of the resultant to 0.
$33\% < R \leq 66\%$	The company has a medium imbalance	The management should revise the strategic plan,

		adopting measures to reduce the value of the resultant to 0.
$66\% < R \leq 100\%$	The company has a severe imbalance	The management should change the current strategy and elaborate a new strategic plan, which should aim at bringing the value of the resultant to 0 within 18 months at most.

(*source*: authors' representation)

The authors will use a case study in a later paper to demonstrate the specific actions required in integrated management analysis and to apply the previously mentioned approach to a business context for a company activating in the construction field.

Territorial model

The territorial model, which is based on the notion that a manager is a leader who seeks to cover or conquer new areas that may be part of the company's internal or external environment, is described in the following.

This kind of reference is made to maximize the company's internal environment in terms of increasing the efficiency and efficiency of each area under review. The following will be taken into consideration:

"E" (from economic) – is in the quadrant (I), placed on the first bisector with equation $y = x$,

"C" (from conquer or management) – is in the quadrant (II), placed on the second bisector with equation $y = -x$,

"M" (from marketing) – is in the quadrant (III), placed on the first bisector with equation $y = x$,

"P"(from production) – is in the quadrant (IV), placed on the second bisector with equation $y = -x$.

Vectoring

$$\vec{R} = \overrightarrow{OC} + \overrightarrow{OE} + \overrightarrow{OP} + \overrightarrow{OM}. \tag{9}$$

Once more, one gets that:

$$\left|\vec{R}\right| \overset{not}{=} R = 0, \tag{10}$$

which means that the company is in the equilibrium state.
The following symbols will be introduced:
$\mathcal{C}$ from *management* (*conquer*) for the region defined by the triangle COE,
$\mathcal{M}$ from *market* for the region defined by the triangle MOC,
$\mathcal{P}$ from *production* for the region defined by the triangle MOP,
$\mathcal{E}$ from *economic* for the region defined by the triangle POE.

It should be noted that the regions $\mathcal{C}$, $\mathcal{M}$, $\mathcal{P}$ and $\mathcal{E}$, painted in green, have the same surface, that is interpreted as the maximum value achieved for the time being, because they are represented by congruent triangles (Figure 8).

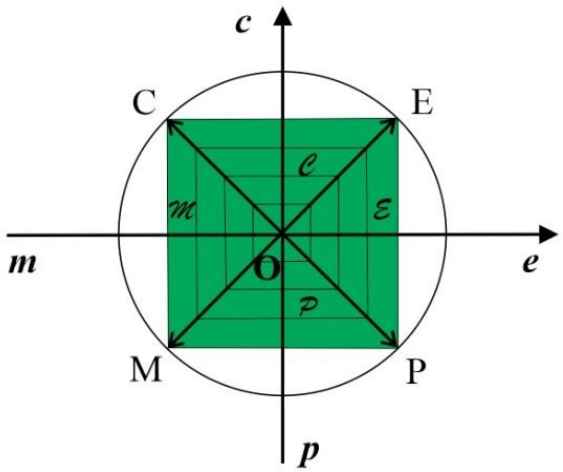

Figure 8. Reaching the maximum potential in the cardinal method (*source*: authors' representation)

The circumscribed circle, in this case, has at least one double meaning.

1. The first one, mentioned above, represents the law (the legal) where the company operates in the sector in which it activates, and it may differ more or less from one state to another and/or from one market to another. The centre of a circle being equidistant from any point on its circumference makes the circle a symbol of balance.

2. The second meaning of the circle that surrounds the company's potential is given by the company's desire to expand globally in the field in which it activates. In this sense, one may observe the logos of numerous large corporations operating globally that recognize that by including circle concepts into their designs, they are announcing their desire for worldwide growth and ongoing market capture.

Additionally, one observes γ, μ, ρ and ν, which represent the points of intersection of the axes Oc, Om, Op and Oe with the circumscribed circle to the square $CMPE$. By joining these points with the closest peaks of the square $CMPE$ will result the octagon $\gamma C \mu M \rho P \nu E$ (Figure 9).

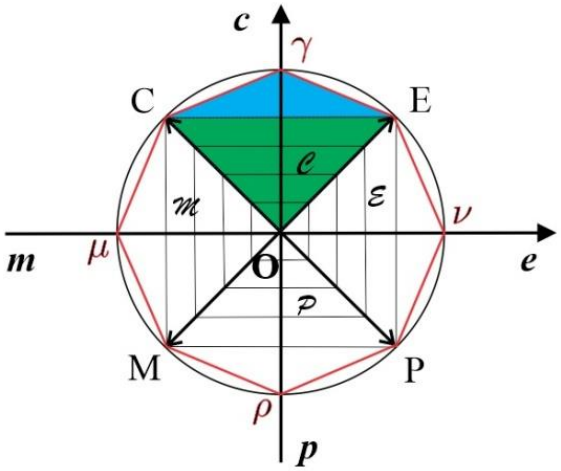

Figure 9. Viewing the potential growth in the management area C up to an octagon by increasing the number of indicators taken into account for analysis (*source*: authors' representation)

The following will link the regions provided by:

a) $\mathcal{C}$ with the quadrilateral γCOE – region representing the potential achieved and the maximum possible potential, under the terms of the legislation, from the point of view of *management* (*conquer*).

b) $\mathcal{M}$ with the quadrilateral μMOC – region representing the potential achieved and the maximum possible potential, under the terms of the legislation, from the point of view of *the market*.

c) $\mathcal{P}$ with the quadrilateral ρPOM – region representing the potential achieved and the maximum possible potential, under the terms of the legislation, from the point of view of *production*.

d) $\mathcal{E}$ with the quadrilateral νPOE – region representing the potential achieved and the maximum possible potential, under the terms of the legislation, from the point of view of *economy*.

The question that arises is: *When would it be possible to surpass the potential attained in the fields of management, marketing, production, and economy under current circumstances*? The solution is straightforward from the perspective of the final illustration created to aid in visualization: when one transitions from the square to the regular octagon $\gamma C \mu M \rho P \nu E$. To be noted that

this happens within the same circle representing the law, which means under the same legislation considered to be perfect (or near to perfection).

Another legitimate question that arises is: *what is this managerial way of going from* $n=4$ *to* $n=8$?

Obviously, it means to take into account eight domains instead of the four initial ones (management, marketing, production, economic). It follows that even more (eight) potential values for evaluation should be taken into account, along with multiple indicators eight for each domain.

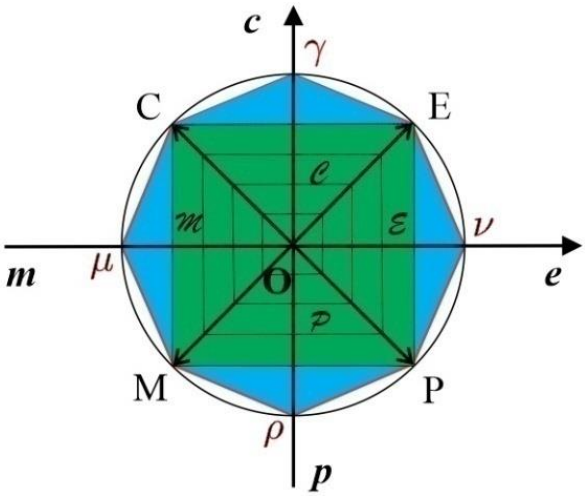

Figure 10. Viewing the maximum potential by analysing the four areas under analysis and the potential that can be covered by increasing the number of domains to eight (*source*: authors' representation)

In this situation, a certain gain will be the increase of the fineness of the analysis by taking into account several performance indicators of the company, thus creating the possibility to locate in any narrower, but deeper, possible deficiencies.

It was started from the quadrilateral of the square $\left(P_4\right)$ and it was built the regular octagon $\left(P_8\right)$, enrolled in the same circle (that, not to forget, represents the perfection of law) and having four of the common peaks.

It is noticed that $4=2^2$ and $8=2^3$, so that a string of regular polygons can be built progressively to continue the method $\left(P_{16}\right),\left(P_{32}\right),\left(P_{64}\right),...,\left(P_{2^n}\right),...$ all written in the same circle $\left(\Gamma\right)$ of radius r (Fig. 11).

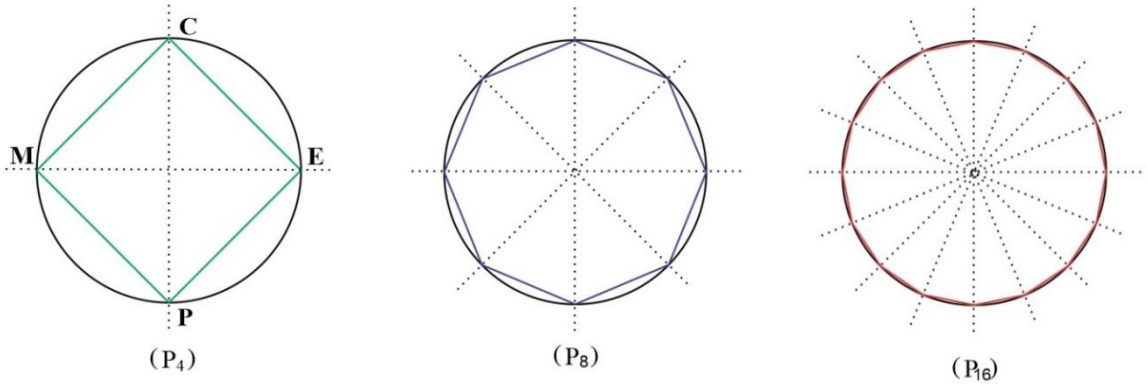

Figure 11. Representation of the transition from the cardinal model (P_4) to the models (P_8) and (P_{16}) (*source*: authors' representation)

Using the cardinal model as an example, one will provide below the territorial model's depiction of the company's level of achieved performance. Beginning with the above described methodology, one can see the representation in Figure 12 that must be used to give better recommendations to the company's decision makers as well as the current state of the business and what it can accomplish with its current resources, as well as what should be accomplished in the future by expanding the number of areas and directions to be considered. The company's future development is indicated by this final point.

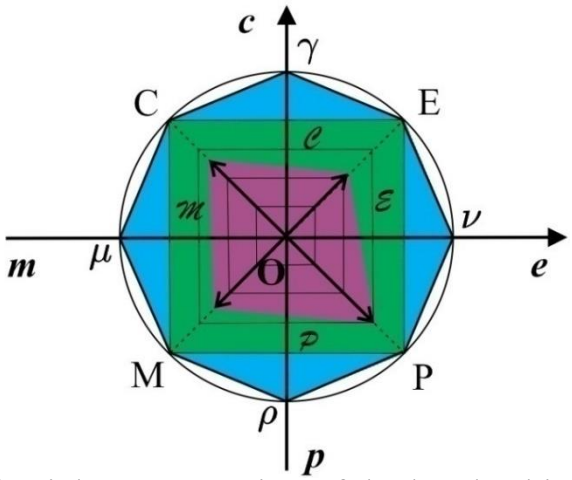

Figure 12. Territorial representation of the level achieved by the company according to the integrated managerial analysis (*source*: authors' representation)

The Figure 12 depicts the purple coloured part as the company's coverage level when compared to its maximum potential; the quadrilateral's area is represented by the green colour. The company's potential can be reached by adding new areas that are subject to integrated managerial analysis, which is giving by the $M\mu C\gamma E\upsilon P\rho$ octagon whose maximum area is highlighted by the blue zone. The company's management must aim to maximize the current potential, up to the green area, and then increase it to a higher level, the blue area.

3. CONCLUSIONS

This study will contribute to integrated management of businesses in a scientific and useful way. It proposes a way of visualizing the results obtained by applying the method of integrated managerial evaluation of a business, by introducing the cardinal model and territorial model. Therefore, the percentages attained by each direction in each domain have been computed and the cardinal model emphasised the existence of a resultant $\vec{R}_{D_i}$, its orientation and its value.

The existence of $\vec{R}_{D_i}$ indicates an imbalance within the analysed domain, and the orientation of the imbalance dictates the direction in which the domain is headed to. Analysing the entire business on its four domains, *management*, *production*, *economic* and *marketing*, the representation of the cardinal model will indicate the company's reached potential, but also it highlights the presence and scale of an imbalance given by the resultant $\overrightarrow{R_1}$. The paper ultimately suggested a classification of the degree of the outcome that ought to show the kind of imbalance that was discovered following the integrated management research. The territorial model was introduced as an alternative to perceiving the level of performance achieved by the company. This model gives the company's management the opportunity to view the surface coverage of the quality of the firm's decisions. It also indicates the development horizon that the company must aim for by increasing its complexity. The obtained results must be interpreted by the evaluator, which applies the analysis, and the company's management board must adopt solutions.

Moreover, the proposed methods for visualizing the results enables interdisciplinary communication between academic and practitioners, between data scientists and managers, through the translation of statistical patterns into practical management decisions.

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