

EXPLANATORY ECONOMETRIC METHOD FOR THE ANALYSIS OF THE BEHAVIOR MANAGEMENT IN ORGANIZATIONS IN ROMANIA - GUIDE FOR DEVELOPING THE PILOT STUDY

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Abstract: Our paper, entitled "Explanatory Econometric Method for the Analysis of the Behaviour Management in Organizations in Romania" reflects the wide opening of econometric modelling to quantify the Romanian management issues, representing a practical guidance on multiple recovery plans to fund the huge data collected as part COMOR project launched by the Scientific Society of Management in Romania to characterize the behaviour of managers in the Romanian economic organizations. Construction of these models offers possibilities for complex analysis, descriptive and factorial sequence of firms, counties, geographical areas, but comprehensive summary of studies on the macroeconomic level. Scientific knowledge through a comprehensive assessment of managerial behaviour in the most representative types of business organizations of all geographical areas of the country are, in the context of globalization, one way to prevent surprises market economy. Thus, the results of this exploratory research will provide economic environment, and not only strong argument for anticipating decisions in order to choose the best economic policies, with beneficial effects as conclusive and with as few undesirable implications. Research based on the opinions of thousands of respondents approved, processed through a variety of instruments subject of extensive econometric and interdisciplinary interpretation, psycho-socio-economic management, is a modest contribution to the affirmation of local scientific research that aim for theoretical and applied Romanian school of management by defining:

- knowledge of behaviour management in all types of business organizations in Romania;
- identifying the Romanian space dimensions of organizational culture as a reflection of the peculiarities of national culture and especially of the main ethnic-specific subcultures;
- profile defining effective manager and leader of excellence in terms of character traits and their behaviour.

Keywords: econometrics, management, organizational culture, descriptive analysis, factorial analysis.

Coduri JEL: M12

1. Preamble

Without proposes to develop the defining elements of econometrics, the specific features of this scientific field in relation to statistics, mathematical statistics or in the preamble of our approach using econometric method in an exploratory research on behaviour management in large scale economic organizations Romania, makes some-option argument on the use of econometric indicators to quantify the value judgments of various socio-economic variables of our research.

According to this, we refer to adopt the following key behaviours of econometrics, the study undertaken in this specific case, namely:

- factual component that the specific area under investigation is a reality of management processes in a well defined geographical area: economic organizations in Romania as the unit of observation, that respondents from these organizations as units of sampling;
- conceptual component of economic management for the dimensions of

organizational culture, specific types of managerial behaviour different subcultures of the Romanian space and effective leader and the typology of excellence;

- logical-formal component that we built quantitative models and rational behaviour on different sides of managerial and calling their methods inferential statistics (theory and theory tests estimate) that draw a general conclusion from the quantitative analysis of several private facts I checked the assumptions made in terms of management theory in general and human resource management theory in particular.

2. The construction of econometric models

Depending on the scale and complexity of research, but also the degree of deepening the analysis, econometric models used in research as set out above as shown in Fig. 1 managerial explanatory models are composed of a more or less complex input variables, a process of transformation of probability distributions mathematically range of views expressed by the exponents, a set of variables leads to the result (the outputs).

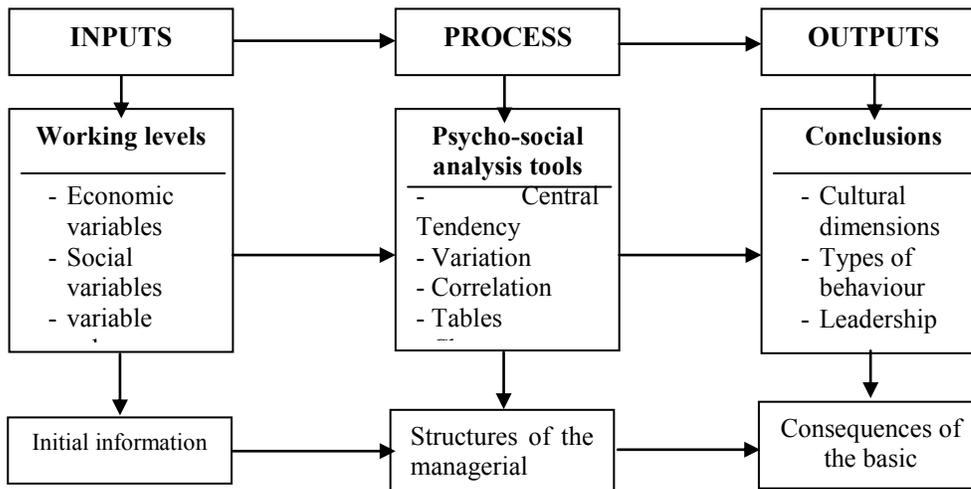


Fig. 1 The systemic structure of the econometric model

Building models based on the initial capitalization of knowledge in the context of econometrics integrated knowledge management and organizational psycho specific limits of investigator.

Assumptions that formed the basis for models reflect the volume and quality of information we had about the reality investigated using the following input variables:

- *economic variables* of the statistical units of observation of the firms: the field of activity according to CAEN code, size of organization based on the number of employees, ownership of equity;

- *social variables* of the statistical unit surveyed (respondents): sex, age, marital status, level of schooling and education in management, the position in the organizational hierarchy (managers, performers);

- *variable value judgments*, those measurable by designating entities beach views expressed, and which were assigned numerical values on the scale from highly positive (strongly agree) to highly negative (disagree).

The information held in the observation data was processed using the managerial structure of the variables of a system of statistical and mathematical indicators consisting of: position indicators (weights), indicators of central tendency (arithmetic mean, median, modulus and asymmetry); indicators of change (amplitude variation, individual deviation, standard deviation, the dispersion, coefficient of variation); indicators correlation (regression coefficient, correlation table, the correlation chart).

The conclusions derived through econometric models are logical consequences of assumptions underlying the inferential analysis process allowed the release of initial information content of their dormant state to highlight the following variables outcome (output):

- dimensions of organizational culture: power distance, individualism-collectivism,

- masculinity-femininity, uncertainty avoidance, future orientation (long-short);

- types of managerial behaviour: management approach, work style, attitude toward change, policies and practices of motivation, organizational communication procedures and practices, and / or interpersonal, concern for performance;

- behavioural profile of character and effective leader;

- typology of excellence leader.

3. The econometric method, basis for analysis

Ultimately seeking a comprehensive and as accurate characterization of the different structures of management variables, we focused our approach on two lines of analysis: a *quantitative analysis* focused on value judgments, on the one hand by the statistical units of observation (firms), and secondly by statistical sampling units (respondents) and the second direction oriented *qualitative analysis* with indicators of variation and correlation.

The two types of correlation analysis (quantitative and qualitative) we decided to identify and characterize managerial behaviour in key areas of economic activity across different subcultures of the Romanian territory and into the major temperamental traits of different managers and executors geographical areas of the country.

To meet this requirements-goal, we adopted a systemic approach, whereby we develop an analysis stratified by different levels of aggregation (system elements) as follows:

- for large enterprises at the microeconomic level (on request);

- mezo-economic level with aggregated counties, regions and macro-economic development;

- at the macroeconomic level, with conclusions on the national economy.

3.1. Descriptive Analysis

The quantitative analysis (descriptive) was used in structure relative sizes (weights) calculated as percentage ratio to the whole party, namely:

$$p\% = \frac{\text{part}}{\text{whole}} \cdot 100$$

With the help of weights, which are indicators of position, it is argued:

- a) representativeness of the total economic organizations observed, reflecting the domain structure of economic activity (agriculture, mining, manufacturing, construction, transport, trade, etc.), by the degree of size (50-100 employees, 101-250, 251-500, over 500 employees), by type of capital ownership (public, private);
- b) the reliability of judgments of value (total agreement, partial agreement, indecision, partly disagree, strongly disagree) expressed by respondents in different social variables (gender, age, education, hierarchy within the organization) for each item (question) that characterize a specific variable Managerial dimensions of organizational culture, managerial behaviour, characteristic traits of leadership.

3.2. Factorial Analysis

Unlike the descriptive analysis, in which we used a single indicator, one that characterizes

the position of a given quantitative variable (part) throughout the community studied, **the factor analysis** we made use of a true system of indicators with which we managed many sides to put out quality of managerial behaviour in its various aspects.

Without abusing detail on the material we present a brief overview of these indicators, their relationships with computers and how to use the process to review the research, according to the valence of each of them. Thus, the system of indicators that I did not use the factor analysis, is composed of: measures of central tendency, simple indicators of change, synthetic indicators of variation, correlation indicators.

3.2.1. Specification

Before developing each indicator used in factor analysis, we make two methodological notes:

1. Calculating each of the indicators that are part of the groups mentioned above, a process required to convert the numeric expression value judgments on a Likert-type scale. Thus, depending on the range of value judgments provided by the construction of the questionnaire respondents used the primary data collection, conversion was done on 5, 3 or 2 levels, as in the models below:

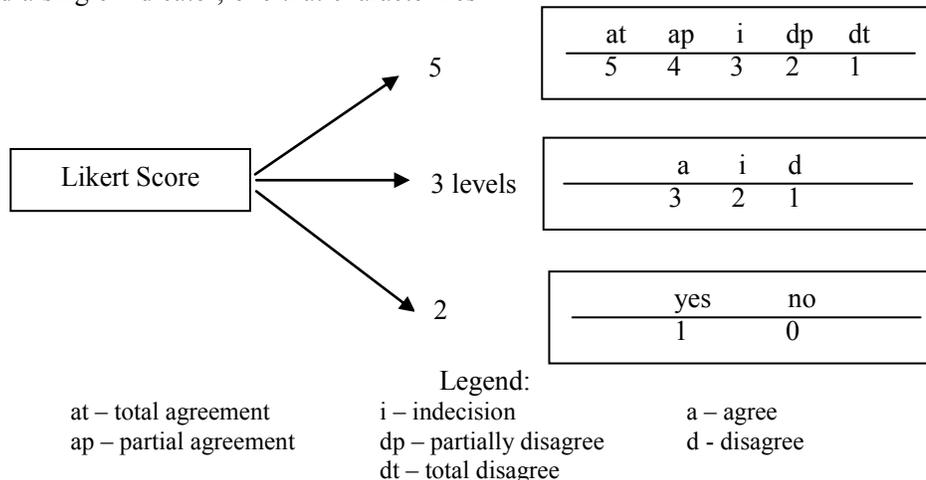


Fig. 2. Model of conversion of opinions to numerical expressions

2. To measure respondents' opinions on a particular variable studied, we started from the premise that people are honest in expressing their beliefs and opinions, however, to arrive at generalized conclusions, we have relied on a single question.

Therefore, for each variable outcome (dimensions of organizational culture, behaviour management, effective leader or typology profile leader of excellence), the questionnaire applied, we have formulated a set of questions that allow us to establish the position of respondents to a variable or another. For example, to measure the cultural dimension "individualism - collectivism" were formulated 16 questions, or to characterize the size of "masculinity - femininity" were used six questions etc.

3.2.2. Indicators of central tendency

From this group of indicators have appealed to the mean, median and dominant module. These indicators, allowed us to put out the essential trends of the variability of responses to the questions in the questionnaire. Thus, **the mean value** (\bar{x}), as a synthetic expression levels of individual value judgments embodied in a single representative level, which highlights the average scores of opinions expressed by respondents to each question in questionnaire responses from the entire range of intensely positive the intensely negative, was calculated as a weighted arithmetic mean formula:

$$\bar{x} = \frac{\sum_{i=1}^n x_i f_i}{\sum_{i=1}^m f_i}, \text{ where:}$$

\bar{x} - means medium value;

x_i - Spectrum opinions expressed on the scale of values (i) from 1-5;

f_i - the number of respondents, m , varying according to the level of aggregation: business, county, region developing, country.

The median (Me) is the average score occupying the central place statistical series ordered in ascending or descending, so the average scores of the series number of values which divides into two equal parts. When the series has an odd number of terms, the median score is given by the rank $\frac{n}{n+1}$;

where the series has an even number of terms, the median is given by the central terms of simple arithmetic.

Statistics compiled for each question series that helps to characterize a variable result, has different meanings depending on the content and the level at which lies such analysis:

- at the firm level, the series is comprised of average score of the views expressed by each respondent;

- at the county level, the average score is made up of the views expressed by the average sample firm in each county;

- development in the region, the average mean score of opinions expressed by counties comprising the region's development.

At any level of aggregation, median highlights the question that was most meaningful significance to characterize the result of research variable. It is important, in terms of theory, construction of the questionnaire in future research.

Module (Mo) or dominant frequency is the value that has score greater.

Is determined using the statistical series as the median scores obtained by highlighting the tendency of respondents to a particular judge stated value of the spectrum: from highly positive to highly negative, and from total acceptance to total rejection.

Asymmetry (As) is the indicator that allows us to know the degree of skew or non symmetry dimensional distribution of symmetry, from the position and values of the indicators of central tendency: mean, median and the module.

Form distribution with left and right asymmetry can be analyzed either by using

graphical methods or calculating indicators of asymmetry.

Graphical representation of statistical series provides a suggestive picture of the degree of asymmetry using, on a case by case frequency polygon and histogram.

Indicators of asymmetry are expressed both in absolute size and in relative sizes. Asymmetry is calculated absolute relationship:

$$As = \bar{x} - Mo$$

To make comparisons between statistical series resort to indicators of asymmetry relative. Among them, we stopped at what is called the asymmetry coefficients authors: Pearson and Yule.

Pearson coefficient of asymmetry (C_{as}) is calculated using the formula:

$$C_{as} = \frac{\bar{x} - Mo}{\sigma}$$

This coefficient can take values between -1 and +1, as the absolute value is less than the Pearson coefficient, the asymmetry is smaller. The value of this coefficient has the following meanings:

$C_{as} = 0$ symmetry means the terms of the series;

$C_{as} > 0$ distinguish a left skewed distribution;

$C_{as} < 0$ we deal with a distribution skewed to the right.

Yule asymmetry coefficient (C'_{as}) is calculated in cases where we determined the median statistical series (Me), using the formula:

$$C'_{as} = \frac{3(\bar{x} - Me)}{\sigma}$$

Yule coefficient can take values between -3 and + 3 and used when between three measures of central tendency relationship is verified:

$$\text{Module} = \text{Average} - 3 (\text{Average} - \text{Median})$$

Coefficient will show a higher degree of symmetry as will be closer to zero.

3.2.3. Indicators of change

If our research, the value judgments expressed by different respondents, more or less with each other, may be more or less scattered close to the average score, regarded as the most representative value for the research unit (sample taken enrolment).

These indicators allow us to characterize the degree of homogeneity or opinions expressed in the scattering of a social group in general (at the company, county, geographic area, etc.), as well as some of its structures (gender, age, education, hierarchy).

In this group of indicators of change there are two groups: simple indicators of change (amplitude variation, e.g. individual deviations) and synthetic indicators of variation (standard deviation, the dispersion, coefficient of variation).

With these indicators we develop the analysis at different degrees of depth, allowing us to put some light on the qualitative side of the value judgments expressed by respondents.

Amplitude variation (A) is the indicator by which, in-depth analysis, especially analysis of the company or the county, determine the differences between extreme values of the views expressed by respondents. The amplitude of variation is greater, the opinions are different, and vice versa. It is expressed in two forms: absolute amplitude (A_a) and relative amplitude ($A_{\%}$), relationships with the following calculation:

$$A_a = x_{\max} - x_{\min}$$

$$A_{\%} = \frac{A_a}{\bar{x}} \cdot 100$$

represents the opinions score; \bar{x} - means value scores

Individual deviations (d_i) are calculated as the difference between each variation recorded (score value judgments) and their arithmetic means (average score), using equations:

$d_a = x_i - \bar{x}$ for individual absolute deviations; $d\% = \frac{d_a}{\bar{x}} \cdot 100$ for individual absolute deviations

It is mainly used in the analysis at the firm level, and only exceptionally in the county.

Standard deviation, standard deviation or standard deviation (σ) is calculated as the average squared deviations of the score recorded for each item determined opinions characterizing variable outcome (dimensions of organizational culture, behaviour management, etc.) from their arithmetic mean. To this end we used the relationship:

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2 f_i}{\sum f_i}}$$

Thus, using this indicator consider how the respondents opinions vary on the scale of value judgments (from *at* to *dt*) calculated from the average of each variable result.

Example:

Variable result sought: Behaviour managers in different situations.

Faces situational managers:

1. Attitude towards settling tensions/conflict in the workplace.
2. Attitude towards the expression of the performers, opinions about their work address.
3. Attitude towards mistakes by employees during the activities.

Number of statistical units of observation in Suceava County = 15

Number of statistical sampling units (respondents) = 222

Based on data from Appendix 1, Table present standard deviations below the mean score calculated from the views expressed by respondents to characterize both the current state and considered to be normal in the organizations surveyed.

Managers' behaviour in different situational

Analysis indicators	Symbol	Current practice	Desired practice
1. Average value judgments	\bar{x}	3,727	4,183
2. Standard deviation	σ	0,258	0,279

Summary interpretation of these indicators leads to the following conclusions:

1. Almost $\frac{3}{4}$ of respondents say that current practice managers are interested in maintaining a spirit of understanding and cooperation between employees and are involved as mediators between the parties when there are situations of tension or conflict, are open to collaboration in the team encouraging employee participation in solving practical service problems and is also tolerant of the mistakes they inadvertently committed during the activities.

2. Value judgments expressed by respondents is quite high values clustered around (partly agree to strongly agree).

3. Despite the favourable findings about the behaviour of managers in the three situational instances, the number of respondents who believe it would be better place, is almost 10% higher than the existing situation (83.7% vs. 74.5%).

A hierarchy of employees who desire signifies a strong attachment to the goals of the organization is working is as follows:

- 86.3% (11.8% more than the current situation) believes that managers should make greater use of employee participation with solutions to solve the tasks;

- 89% (8.1% more than the current situation) believes that managers should intervene more effectively and to ease tension or conflict between state employees;

- 75.7% (7.4% more than the current situation) believes that managers should be more sympathetic to unintentional mistakes committed during the activities, especially by young people who need more support to their immediate bosses.

4. Even if the range of value judgments is somewhat higher in practice desired by respondents, (standard deviation 0.279 to 0.258) shows that the average score is 12.2% higher than the current practice, which means that "total agreement", the whole scale of assessment is crucial.

Dispersion or variance σ^2 a variable result is calculated with a simple arithmetic average of the squared terms of statistical series which consists of questions score variable that is characterized by the relationship:

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}, \text{ where } n \text{ is the number}$$

of items that characterize each variable outcome (dimension of organizational culture, types of managerial behaviour etc.).

The coefficient of variation (v) is the ratio between the average standard deviation and statistical series, and shows us the degree of homogeneity of the collectivity of questions / answers that characterize a variable outcome, using the relation:

$$v = \frac{\sigma}{\bar{x}} \cdot 100$$

The higher the coefficient of variation is close to zero, the variance is lower, so statistical collectivity is more homogeneous and the media has a higher level of significance.

3.2.4. Indicators of correlation

In our research we are dealing with direct factorial correlations, simple linear type, which led us to make use of the following indicators of intensity commensurate factorial causal links between variables symbolized by x_1, x_2, \dots, x_n and the variable outcome or effect variable y symbolized: the correlation table, the graphic method and the regression coefficient.

With the **correlation table** identifies issues such as: the existence and meaning of correlation, the shape and intensity of causal links. Thus, we use the correlation table analysis of causal links between traits of

character which designates the profile of the effective leader, the variables x and types of managerial behaviour, the variable result. So, for example, may reveal the correlation between some features of the leader, such as courage, self-confidence, will, its rigor on the one hand, his attitude toward change, on the other side.

Corelograma as a graphic expression of the correlation, is constructed as follows: the abscissa scale is going to represent the values of variable x factorial, and the ordinate y pass variable values result by uniting intersection points of coordinates x, y , is obtained expressing corelograma suggestive correlation that we want to highlight in particular.

Regression coefficient. As a method of econometrics, regression helps to determine the contribution of the factors underlying (causative) effect of variability phenomena. Since in our research are linear causal links, to measure the strength of correlation using linear function of the form:

$$Y_x = a + bx, \text{ where}$$

Y_x - are theoretical variables; $a - y$ result variable values are determined outside the influence of variable x factorial;

b - is the regression coefficient;

x - represents the values of x_1, x_2, \dots, x_n factorial of variable x .

The coefficients a and b is determined using ordinary least squares method, using relations:

$a = \bar{y} - \mu_{u(x)}$, where: $\mu_{u(x)}$ represents the first order centered factor for variable x . It has zero value.

$$b = \frac{\sum xy}{n\sigma_x^2}, \text{ where: } x - x_i \text{ variants are}$$

deviations from their average

$y - y_i$ variants are deviations from their average

In our research we measure the linear correlation between the intensity of respondents' social variables (gender, age, marital status, education level, the position in

the organizational hierarchy), as variable factors and value judgments, as a floating effect. Thus, we build correlation coefficients entering the following notation for the variable factor x:

Sex: male x_1 , female x_2

Age: 30 years x_1 , 30 - 44 years x_2 , between 45 - 60 years x_3 , x_4 over 60 years

Education: elementary x_1 , x_2 environments, beyond x_3

Hierarchy: top managers x_1 , x_2 middle managers, managers of basic x_3 , x_4 performers.

Similarly, we introduce the following notation for the variable y result (value judgments about the dimensions of organizational culture, types of managerial behaviour, effective leader profile, types of Excellence leader):

Total agreement

y_1

Partial agreement

y_2

Indecision y_3

Partial disagree y_4

Total disagree y_5

or

agreement y_1

indecision y_2

disagree y_3

Conclusions

The models described in this paper is the set of indicators is based on an econometric variety of descriptive and factor analysis, structural and managerial behaviour in comparative economic organizations in Romania. Among them were:

- to characterize the dimensions of organizational culture at all levels of

aggregation: the big companies, counties, regions, macro, national economy;

- characterization of managerial behaviour in all types of business organizations by field of activity according to CAEN code, by type of ownership of capital, depending on their size as number of employees;

- description of character and behavioural profile of the effective manager;

- characterization of the leader of excellence; - according to various categories of respondents (by sex, age, education, hierarchy) on the various elements listed above characterization etc.

These econometric models, with minimal possibilities for the interpretation of measured results are used in the study phase of the pilot - the example of Suceava county, to develop national analysis by established analytical team in Bucharest, Craiova, Oradea, Suceava, Targu Mures, Galati, Resita, Braşov most competent scholars with interests in management, sociology and organizational psychology, computer science, econometrics.

Bibliography

1. Chelcea S., *Metodologia cercetării sociologice. Metode cantitative și calitative* (ediția a III-a, revăzută și adăugită), Editura Economică, București, 2007

1.1. Georgescu V., *Econometrie*, Editura Universitaria, Craiova, 1997

1.2. Pecican E. S., *Econometrie*, Editura ALL, București, 1994

1.3. Tövissi L., Pecican E. S., *Curs de calcul economic. Metode și tehnici econometrice ale calculului economic*, Lito ASE, București, 1974

Annex 1

Elements of synthetic indicators of change,
based on scores from 1 (strongly disagree) to 5 (strongly agree)

Actual practice

Item	Score x_i	Respondents f_i	$x_i f_i$	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	$(x_i - \bar{x})^2 f_i$
51	4,045	222	897,95	0,318	0,101124	22,4495
53	3,725	222	826,95	-0,02	0,004	0,0888
64	3,412	222	757,46	-0,315	0,0992	22,0224
Total	\bar{x} 3,727	*	$\sum x_i f_i$ 2482,36	*	$\sum (x - \bar{x})^2$ 0,200724	$\sum (x_i - \bar{x})^2 f_i$ 44,5607

$$\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n} = \frac{0,200724}{3} = 0,0669;$$

$$\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2 f_i}{\sum f_i}} = \sqrt{\frac{44,5607}{666}} = 0,258$$

$$v = \frac{\sigma}{\bar{x}} \cdot 100 = \frac{0,258}{3,727} \cdot 100 = 6,9\%$$

Desired practice

Item	Score x_i	Respondents f_i	$x_i f_i$	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	$(x_i - \bar{x})^2 f_i$
51	4,450	222	987,90	0,267	0,071289	15,8262
53	4,315	222	957,93	0,132	0,002299	0,5106
64	3,784	222	840,05	-0,399	0,159201	35,3426
Total	\bar{X} 4,183	*	$\sum x_i f_i$ 2785,88	*	$\sum (x - \bar{x})^2$ 0,232789	$\sum (x_i - \bar{x})^2 f_i$ 51,6794

$$\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n} = \frac{0,232789}{3} = 0,0776; \quad \sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2 f_i}{\sum f_i}} = \sqrt{\frac{51,6794}{666}} = 0,279$$

$$v = \frac{\sigma}{\bar{x}} \cdot 100 = \frac{0,279}{4,183} \cdot 100 = 6,67\%$$

Annex 2

Content questions to characterize the behaviour of managers in different situations

				Opinion score \bar{x}
Q51	If a state of tension or conflict, managers	Pa	work for reconciliation through dialogue with those involved	4,045
		Pd	should work for reconciliation through dialogue	4,450

				Opinion score \bar{x}
Q53	To impose their views in solving work tasks, employees	Pa	by managers are encouraged to respect the opinions of others	3,725
		Pd	should be encouraged by managers to respect the opinions of others	4,315

				Opinion score \bar{x}
Q64	Compared mistakes during their work, managers	Pa	are sympathetic (tolerant)	3,412
		Pd	Should be sympathetic (tolerant)	3,784