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Communication Model Assessment Based on Organizational Emotional Intelligence

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Abstract. *Emotional intelligence involves the ability to have an adaptive, flexible response in different contexts of the communication process. The paper presents a model about the influences of emotional intelligence in verbal communication contexts with the main objectives to identify and evaluate the possible differences between two groups (M/F) and to create a qualitative and quantitative pattern for Emotional Intelligence in formal groups. The authors used the questionnaire of H. A. Robbins as an instrument to evaluate the ability to efficiently communicate in an oral situation and the emotional intelligence questionnaire of David Whetten and Kim Cameron – which includes four dimensions: Emotional Awareness, Emotional Control (Balance), Emotional Diagnosis (Empathy), Emotional Response. For experimental research, the authors used statistical methods – analysis of the internal consistency of questionnaire scales, series normality tests, media equality tests on samples from independent populations, correlation tests and statistical regression models to reach relevant conclusions. The necessity of the research comes from the importance of Emotional Intelligence in the individual and group communication process and as part of a better understanding of the influence at the verbal level.*

Keywords: communication model, emotional intelligence, statistical evaluation, organizational group.

Introduction

Many authors and researchers emphasize the importance of emotional intelligence: Goleman (1998) notes that individual success in formal communication depends 80% on the emotional intelligence quotient compared to the 20% attributed to the IQ. Also, Gardner (1995), mentions that emotional intelligence can be improved through learning processes, experience and training, with individuals reaching over time to acquire and develop skills of emotional control and empathy according to communication contexts. Thus, communication becomes essential for streamlining interactions and controlling and creating connections between the individual and the other participants (Gabbott & Hogg, 2001). People with a significant emotional intelligence score have developed skills of understanding and empathy towards the differences that arise between group members. Diagnosing the fundamental differences of others is an essential part of affective activation at the individual level. Emotional intelligence indicates the extent to which individuals can recognize and control their own emotions, as well as the correct recognition and reaction to the emotions of others (Whetten & Cameron, 2011). Boyatzis (2000) include all capabilities that help people manage themselves and others in the concept of emotional intelligence: influence, solving

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conflict, communication, self-confidence, and capability to work efficiently with others. Mayer, Caruso, and Salovey (1998) refer to emotional intelligence as an ability to respond adequately to emotions.

Verbal communication is the essence of human relationships, becoming an essential factor of connection and efficiency of a group in order to achieve objectives (Sommerville, 1982). Also, due to the possibility of transmitting information expressing thoughts and emotions, verbal communication must be clear and precise, allowing the message to be correctly decoded and integrated by the receptors (adapt. Kim, 2005). The degree of mutual trust and understanding increases by transferring the necessary information whose meaning is given by the desire to reach the proposed results. The correctness of verbal communication can maximize the transmission of the message (Jones & Le Baron, 2002).

Recent studies indicate that people with a high level of understanding of emotions received a better external score for verbal communication. However, as self-assessors, they did not judge their performance significantly higher than their smaller counterparts in understanding emotions (Udayar et al., 2020). Researches also show that people with high self-confidence have used their emotional abilities to adapt to the verbal communication context and eventually overcome possible perturbations. Instead, emotional intelligence's trait better predicts subjective performance because emotional intelligence's ability does not affect it. So far, the latest studies have focused on the correlation between emotional intelligence and ESL or EFL learners using verbal communication abilities (Andrienko et al., 2020; Roohani et al., 2020) and also in areas such as medical education (Singh, N. et al. 2021), academic education (Kastberg et al., 2020), business - all indicating that there is a significantly positive relationship between emotional intelligence and verbal communication skills.

Methodology

The main objective of the research

The main objective of the research consists in determining a model of verbal communication within formal groups according to the respondents' emotional intelligence level.

Models for the *Communication-Emotional Intelligence* system are gradually designed by adding the four dimensions of emotional intelligence [IE] variable: emotional reaction [IE_ER], empathy [IE_ER], emotional control [IE_EC] and emotional awareness [IE_EA] (one by one) to the Gender variable are presented in Table 1. The dependent variable is communication level [Com].

Table 1. Types of models for the [Com]-[IE] system

Model	Independent variables	Dependent variable
M1	[Gender]	[Com]
M2	[Gender] + [IE_ER]	
M3	[Gender] + [IE_ER] + [IE_ER]	
M4	[Gender] + [IE_ER]+[IE_ER] + [IE_EC]	
M5	[Gender] + [IE_ER] + [IE_ER] + [IE_EC] + [IE_EA]	

Source: Authors' own research.

The importance of the research derives from the fact that within the formal groups, we want a more accurate evaluation of the level of communication from the perspective of the transmission of the message, its understanding and the effects it produces on an emotional level. The link between communication and emotional intelligence was analyzed statistically in the research works

(Kastberg E. et al., 2020; Mayer J. D. et al.,2000), the authors highlighting a positive correlation between these dimensions. The strength of the correlation is another objective of this research, achieved through the hierarchical modelling of this *Communication-Emotional Intelligence* system.

Hypothesis

Working hypotheses are defined, analyzed and validated or invalidated following the main objective of the research – modelling verbal communication according to emotional intelligence. Thus, they are grouped into three categories - hypotheses on the communication dimension: H0 - the mean values of the Verbal Communication variable on the two groups of respondents (M/F) are different, H1 - the histograms (M/F) on four levels of values of the *Communication* variable are different; hypotheses on the *Emotional Intelligence* dimension: H2 - the mean values of the *Emotional Intelligence* variable organized on the two groups of respondents (M/F) are different; H3 – the histograms (M/F) on three levels of values of the *Emotional Intelligence* variable are different; hypotheses on the relationship between *Verbal Communication* and *Emotional Intelligence*: H4 – There is a positive correlation between the two variables; H5 – the strength of the correlation between the variable of *Communication* and *Emotional Intelligence* is high.

Samples

In order to operationalize the research, a statistical approach was used.

The target population of the study is formed by students. The participants are 109 first and second-year students (74 – female and 35 – male) studying at "Gheorghe Asachi" Technical University of Iași, Romania, from the Faculty of Chemical Engineering and Environmental Protection, Faculty of Machine Manufacturing and Industrial Management, Faculty of Electrical Engineering, Faculty of Industrial Design and Business Management, study program: Business Engineering and Management. The participants were informed regarding the questionnaire contents and the scale, and they were encouraged to use the feedback in case of misunderstands

Methods

The *instruments* used to develop the research were the questionnaire of H. A. Robbins referring to effective speaking and listen to abilities, including 27 items for four types of scores from an excellent, good, moderate and poor understanding of the interpersonal communication process with a Likert scale 0 - strongly disagree, 1 - disagree, 2 - neutral, 3 - agree, 4 - strongly agree and emotional intelligence questionnaire of David Whetten and Kim Cameron including 12 items with three types of responses referring to specific reactions in different situations. The questionnaire includes four dimensions: Emotional Awareness, Emotional Control (Balance), Emotional Diagnosis (Empathy), and Emotional Response.

The scores for H. A. Robbins questionnaires are: 81-108: you have an excellent understanding of the interpersonal communication process and you are a competent speaker; 54 – 80: you have a good understanding of the communication process and often you communicate at a competent level. You also have some areas of communication that must be improved; 27-53: you have a general understanding of the communication process and sometimes you are a competent communicator. Often, you have communication problems, so it is important to improve yourself in more than one communication areas; 0-26: it is necessary to make serious efforts in order to improve communication abilities. For the moment, it is not enough to ensure a precise message in

a communication context. Often you are misunderstood by others and you may prejudice the relationships around.

The dimensions of the *emotional intelligence questionnaire* are: *emotional awareness*: the ability to recognise and to make sense of one's emotions correlated with the others emotions; emotional control: the ability to manage and respond in a socially adequate way in a communication context, especially in a stressful context. emotional diagnosis (empathy): the ability of understanding and sharing feelings with others; emotional response: the emotional reaction or response of people in the communication process.

The *statistical methods* used to achieve the research's primary objective - develop *a model of the Communication – Emotional Intelligence system within the formal groups. Statistical techniques* are applied gradually and are grouped into the following categories: *validation of the research instrument* (verification of the internal consistency of the questionnaires) – determination of the alpha Cronbach coefficient for determining the correlations between the variables of the questionnaire (Schrepp, 2020), *tests to verify the normality of the series of values* –the application of the K-S and S-W normality tests (Aslam, 2020), *parametric/non-parametric tests for the equality of the mean parameter on series of values* – the parametric test for the equality of the means of two samples respectively the Mann-Whitney U test for the equality of the ranks of the means on 2 independent samples from the series whose distribution is different from the normal one (Emerson, 2023), *methods of grouping the values* – methods of grouping used measure Log-probability to calculate the similarity between clusters (Bouveyron et. al., 2019), *correlation methods between the series of values* - calculation of the Pearson correlation coefficient (Deng, et. al., 2020) and *regression methods for modeling the Communication-Emotional Intelligence system* – linear regression based on the method of least squares (Maulud & Abdulazeez, 2020).

The information processing programs are IBM SPSS Statistics 22 version and MS Excel 2020.

Results and discussions

The methodology proposed in the research scheme was applied to a set of answers of 109 respondents to two questionnaires of verbal communication and emotional intelligence, respectively.

Processing the answers to the two questionnaires

The two questionnaires completed by the 109 respondents (F group =74 and M group =35) include 27 items for the communication dimension and 12 for the Emotional Intelligence dimension. The inverted items from the Communication Level Evaluation questionnaire (1,2,3,6,7,8,12, and 24) were processed in SPSS by changing the response values.

The responses from the emotional intelligence questionnaire were numerically quantified according to the questionnaire legend.

Checking the internal construct consistency of the communication values.

The high consistency of the questionnaire derives from the fact that all items correlate additively towards a result. Cronbach's Alpha coefficient gives a numerical value to this scale's consistency.

Table 2. Reliability Statistics

Cronbach's Alpha	N of Items
0.830	27

Source: Authors' own research.

The value of Cronbach's Alpha coefficient is 0.83, which shows a good consistency of the questionnaire scale on the Verbal Communication dimension.

Validation of hypothesis *H0*: *the mean values of the [Com] variable on the two groups of respondents (M/F) are different.*

A new variable was created to concentrate the values of all 27 items:

$$[Com] = \sum_{i=1}^{27} Item_com_i$$

The Kolmogorov-Smirnov test for evaluating the normality of the value series leads to the result that the value series corresponding to the new [Com] variable is normally distributed, pvalue=Sig.=0.200 > 0.005, the threshold value for a normal distribution (table 3).

Table 3. The normality test

	Kolmogorov-Smirnov		
	Statistic	**df**	**Sig.**
Com	0.060	109	0.200

Source: Authors' own research.

The histogram of the variable values presented in Figure 1 follows the curve of a Gaussian distribution.

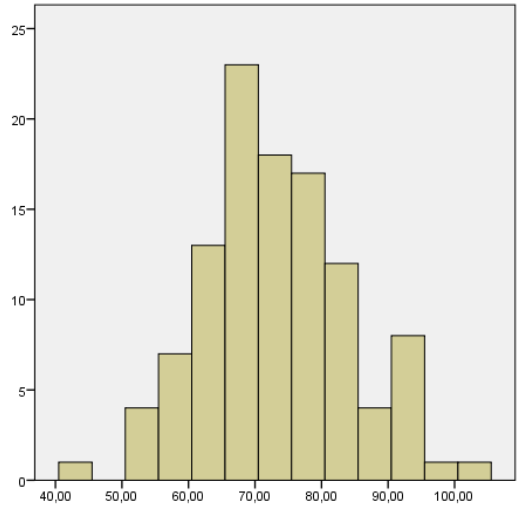


Figure 1. Histogram of [Com] variable values

Source: Authors' own research.

For the analysis of the equality of means on the two groups of respondents (F/M), the Mann-Withney U test is applied for the independent series because the [Com] variable for group 2 of the [Gender] variable is not normally distributed, Sig. value = 0.026 (table 4).

Table 4. The normality test

		Shapiro-Wilk			
	Gender	**Statistic**	**Statistic**	**df**	**Sig.**
Com	1	0.097	0.986	35	0.916
	2	0.102	0.962	74	0.026

Source: Authors' own research.

Applying the Mann-Whitney U test for the equality of means on the two groups of answers (F/M) leads to the result that there are no differences between the two means (Figure 2), and also, the distribution of the values on the two groups is the same (Figure 3).

Table 5. Validation of the hypotheses of similarity of the two groups of respondents (M/F)

No.	Null Hypothesis	Test	Sig.	Decision
1	The medians of Communication are the same across categories of Gender.	Independent Samples Median Test	0.199	Retain the null hypothesis
2	The distribution of Communication is the same across categories of Gender.	Independent Samples Mann-Whitney U Test	0.305	Retain the null hypothesis

Source: Authors' own research.

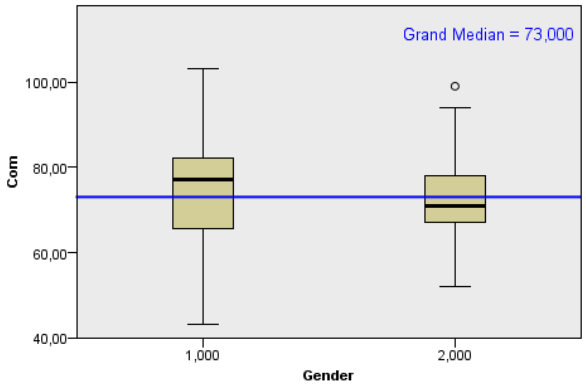


Figure 2. Independent Samples Median Test for [Com] variable

Source: Authors' own research.

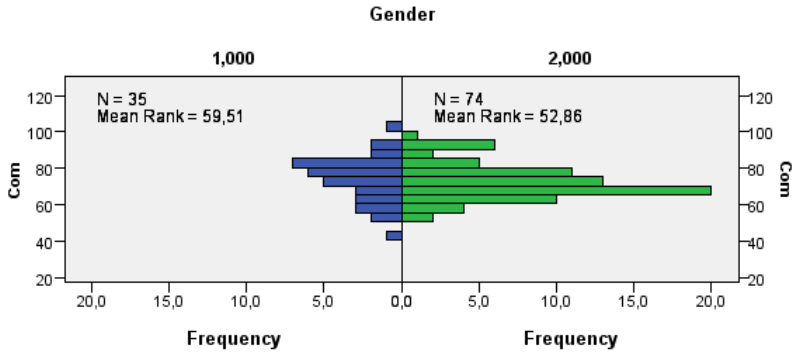


Figure 3. Independent Samples Mann-Whitney U Test for [Com] variable

Source: Authors' own research.

Thus, the H0 hypothesis of equality of the averages of the two groups of respondents (M/F) is statistically disproved.

The comparative analysis of the distributions of the values of the [Com] variable is completed with two techniques for grouping the values on the four levels of [Com] highlighted in the questionnaire analysis and with a clustering ([Gender] and [Com]).

Table 6 and Figure 4 show the grouping of respondents from the point of view of Gender on the four levels of communication.

Table 6. The number of M/F on four levels of Communication

		M	F	Total	M[%]	F[%]
Communication level	1	0	0	0	0%	0%
	2	2	1	3	6%	1%
	3	21	59	80	60%	80%
	4	12	14	26	34%	19%
Total				109	100%	100%

Source: Authors' own research.

It is observed that no respondent falls into the first level of communication. Level 3 includes the most respondents, the difference being made when reporting the percentage of the total number of respondents by gender, 80% (F) and 60% (M). There is a difference in the extreme levels of communication - level 4 contains a higher percentage among respondents B (34%) compared to only 19% (F).

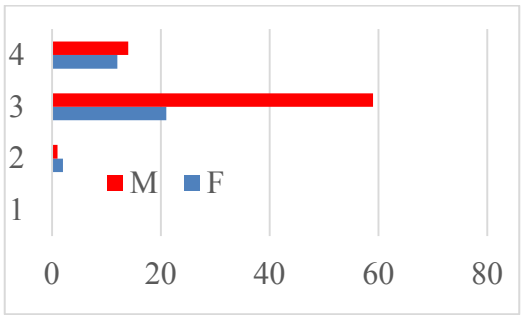


Figure 4. Histogram [Com] = f([Gender])

Source: Authors' own research.

For the analysis of the average level of communication among the respondents (M/F), a grouping was made on ([Gender], [Com]) using a clustering analysis. The first grouping criterion was [Gender], and then the communication values obtained in the [Com] variable. The quality of the clustering model is "good", and the means on the clusters are different (figure 5).

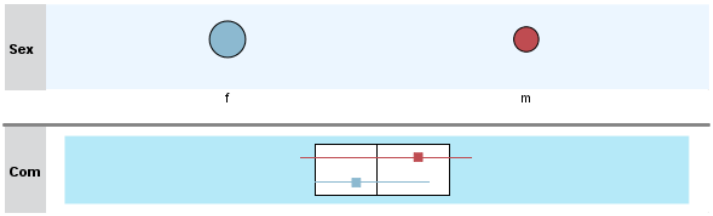
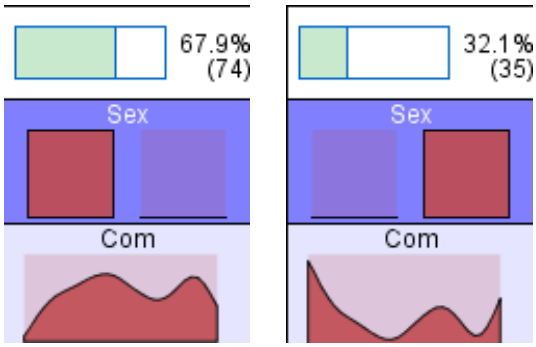


Figure 5. Cluster comparison

Source: Authors' own research.

Even if the average of the communication variable is higher than the average of the M group compared to the average of the F group, it is made up of extreme values of the [Com] variable – a low level of communication combined with a high level of communication.

The cluster distributions according to the [Com] variable for the F group keep an approximately normal distribution, while for the M group, a distribution on the extreme values of the communication variable is observed (Figure 6.).



F group/Cluster 1 M group /Cluster2

Figure 6. Distribution of [Com] values on the 2 clusters

Source: Authors' own research.

From our analysis, hypothesis H1: *the histograms (M/F) on four levels of values of the Communication variable are different*, is statistically invalid from the point of view of the histogram of the values of the two groups of respondents (M/F) on the four levels of the [Com] variable.

Analysis of the level of emotional intelligence among the respondents.

The grouping of respondents by levels of emotional intelligence is centralized in table 7.

Table 7. The number of M/F on three levels of [IE] variable

		M	F	Total	M[%]	F[%]
Emotional intelligence level	1	1	1	2	3%	1%
	2	27	51	78	77%	69%
	3	7	22	29	20%	30%
Total				109	100%	100%

Source: Authors' own research.

There is an approximate equality of the weights of the respondents' answers for each category, with a plus for the F group on the maximum dimension of IE 30% compared to 20%.

In order to deepen the distribution of respondents in the dimensions of Emotional Intelligence, a clustering technique is applied (Figure 7).

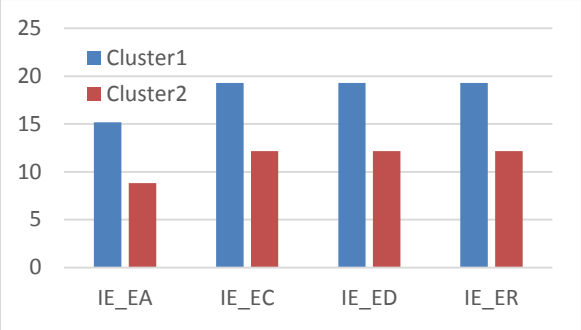


Figure 7. Grouping the responses of the Gender Variable on the levels of the [IE]

Source: Authors' own research.

The descending order of the importance of the four dimensions of the [IE] variable in the formation of the two clusters is empathy [IE_ED], control [IE_EC], emotional awareness [IE_EA] and lastly, the emotional reaction [IE_ER] (figure 8).

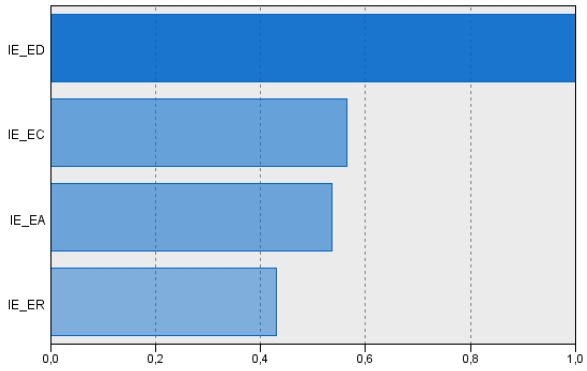


Figure 8. The predictor's importance

Source: Authors' own research.

The share of respondents according to the Gender variable on the 2 IE clusters - the first characterized by a high [IE], the second by a low [IE], is approximately the same (Figure 9 and Table 8).

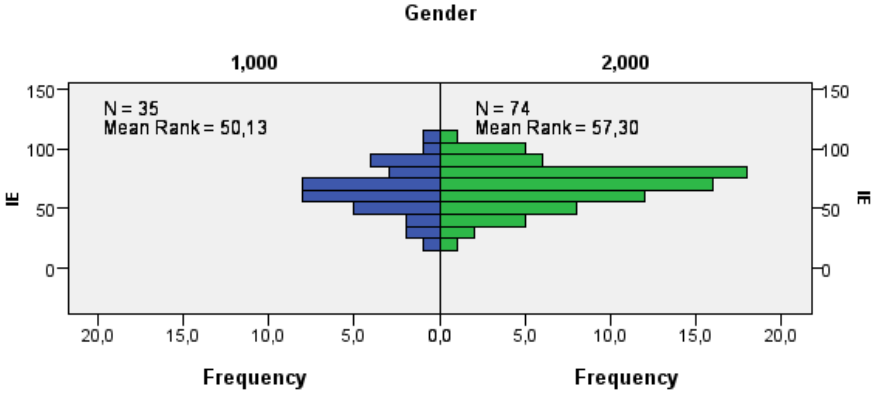


Figure 9. Independent Samples Mann-Whitney U Test for [IE]

Source: Authors' own research.

Table 8. Validation of the hypotheses of similarity of the two groups of respondents (M/F)

No.	Null Hypothesis	Test	Sig.	Decision
1	The medians of Emotional intelligence are the same across categories of Gender.	Independent Samples Median Test	0.623	Retain the null hypothesis
2	The distribution of Emotional intelligence is the same across categories of Gender.	Independent Samples Mann-Whitney U Test	0.267	Retain the null hypothesis

Source: Authors' own research.

Thus, hypothesis H3: *the histograms (M/F) on three levels of values of the Emotional Intelligence variable are different*, is statistically invalidated.

Correlation analysis between the level of communication and the level of emotional intelligence (validation of hypothesis H4)

The Pearson correlation coefficient (Pearson R statistical test), measures the strength of relationships between statistical variables.

Between the two variables [Com] and [IE], there is a weak positive correlation R=0.253, with a statistical certainty of value p_value=0.008 (Table 9).

Table 8. The [Com]-[IE] correlation

		EI	Com
[IE]	Pearson Correlation	1	0.253**
	Sig. (2-tailed)		0.008
	N	109	109
[Com]	Pearson Correlation	0.253**	1
	Sig. (2-tailed)	0.008	
	N	109	109
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Authors' own research.

Thus, hypothesis H4: *there is a positive correlation between the two variables [Com] and [IE]*, is statistical validation.

Regression models

According to table 1, five models were generated whose validity was statistically verified (Table 9).

Table 9. The ANOVA table for statistical validation of regression models

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.162	1	46.162	0.385	0.536
2	Regression	351.362	2	175.681	1.486	0.231
3	Regression	356.832	3	118.944	0.997	0.397
4	Regression	1134.496	4	283.624	2.510	0.046
5	Regression	1493.411	5	298.682	2.701	0.025

Source: Authors' own research.

It can be seen that only the last two models are statistically validated after we introduced the dimensions of [IE]: [IE_EC] and [IE_EA] into independent variables.

The coefficients of the two statistically validated models are presented in Table 10.

Table 10. Model coefficients [Com] = f(IE)

Model		Unstandardized Coefficients	t	Sig.
4	(Constant)	65.968	13.094	0.000
	Sex	-1.360	-0.617	0.539
	IE_ER	0.178	1.170	0.245
	IE_ED	-0.036	-0.276	0.783
	IE_EC	0.418	2.624	0.010
5	(Constant)	64.119	12.599	0.000
	Sex	-1.624	-0.743	0.459
	IE_ER	0.180	1.196	0.234
	IE_ED	-0.096	-0.717	0.475
	IE_EC	0.358	2.223	**0.028**
	IE_EA	0.323	1.801	**0.045**

Source: Authors' own research.

In Model 5 it can be seen that the only predictor variables for the [Com] variable, statistically validated, are [IE_EC] (p_value=0.028) and IE_EA (p_value=0.045).

This result is not surprising because good communication implies a high level of emotional control and a superior awareness of one's own emotions.

Thus, the statistically validated model that explains the [Com] component from [IE] dimensions is the following:

[Com]=0.3588*[IE_EC]+0,323*[IE_EA]

Source: Authors' own research.

Hypothesis H5: *the level of correlation between [Com] and [IE] is high* - it is only partially true because only 25% of the variation of the [Com] variable can be explained by the predictor variable, [IE] (table 8).

Conclusion

The current research has as its primary objective the realization of a structural model of the level of verbal communication within formal groups, having as predictors dimensions of Emotional Intelligence - awareness of emotions, empathy, emotional control and emotional response. The authors are aware of the complexity of the model from the perspective of the fact that it is influenced by many variables specific to the environment to which the respondents belong: the level of education, age, and the M/F ratio within the respondents. For these reasons, the authors limit the research, the formulation of hypotheses, the statistical analysis, the structural modeling of the Verbal Communication-Emotional Intelligence system and the conclusions to the academic environment, students aged between 19-25 years, with a ratio of respondents of approximately M/F= 1/2.

Hypothesis H0, corresponding to the Verbal Communication dimension, H0: the average communication level of the two groups of respondents is different and statistically invalid. This is due to the homogeneity of the group of respondents and their level of training - all respondents took a capacity test at a time very close to completing the questionnaire.

Hypothesis H1, corresponding to the Verbal Communication dimension, H1: the histograms of the responses of the M/F groups on communication levels are different and are statistically invalid. Even if the statistical tests do not detect differences in absolute frequencies on levels of verbal communication, from the graphic representations, we can see that the F group has

an approximately normal distribution of responses, and the M group is also present on the extreme levels of the communication variable.

Hypothesis H2: the average level of Emotional Intelligence of the two groups of respondents (M/F) is different and is statistically invalid. This is possible due to the cohesion of the group of respondents, especially since the dimension of empathy is the essential component of emotional intelligence by which the respondents can be grouped.

Hypothesis H3: the histograms of the responses of the M/F groups on levels of the predictor variable Emotional intelligence are different; it is statistically invalid. There are differences, but insignificant, in the ratios between M/F at the three levels of the EI variable.

Hypothesis H4: there is a correlation between the variable Verbal communication and the dependent variable Verbal communication; the value of the correlation coefficient and the obtained structural, linear regression models statistically validate it. The dimensions of Empathy and Reaction do not appear statistically validated in the structural model of the communication variable. Moreover, the empathy component enters the model with a changed sign, expressing an inverse relationship in the communication process.

Hypothesis H5: the correlation between [IE] and [Com] is strong; it is partially true, and correlation tests and linear regression models give the result.

The research limitations are clear: the research tools, the applied techniques, the models, and the conclusions can only be designed in academic environments where the respondents have important educational and moral training and high consciousness.

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