A CONTRIBUTION TO THE MEASUREMENT OF STRESS LEVELS IN THE ACADEMIC ENVIRONMENT IN ROMANIA AND THE DEVELOPMENT OF A MODEL FOR THE INCREASE IN ECONOMIC EFFICIENCY

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Existing studies show that stress has become a major problem in that which concerns effectiveness and productivity at work. As a consequence to this observation, several questionnaires have been used in order to identify stress levels in the academic environment, followed by a calculation of the statistic indicators, achieved by means of the MatLab software. Based on the statistic results, a model for growth in economic efifciency has been ellaborated; this model can be applied to any company or organization and aims at an increase in work productivity, a decrease in medical costs etc.

The hystorical benchmarks in the study of stress have existed since ancient times, but it was not until 1956 that the endocrinologist Hans Selye introduced the concept of stress into the medical terminology and therefore, into the field of science. The concept of occupational stress first came up in 1976 [1].

The general impression that stems from the entire processbehind the writing of this paper is that, despite there being thousands of treatises on this subject, as well as multiple theoretical and applied practical developments, the concept of stress still remains a subject that is open to debate, and other approaches will continue to exist.

Keywords: stress, questionnaires, management, model

1. Introduction

Following the documented steps, I have noticed different historical approaches from a lot of research area experts referring to the concept of "stress".

Hans Selye, the founding father of research in the field of stress, says that “stress is not necessarily something bad – it all depends on how you take it. The stress of exhilarating creative successful work is beneficial, while that of failure, humiliation or infection is detrimental [2]”. So the effects of stress depend on one’s positive or negative perception over the situation.

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"Stress is the body's reaction to a mentally or emotionally disruptive or upsetting condition; to adverse external influences capable of affecting our physical health [3]."

Stress has become an enemy of society and it represents the basis of research for a multitude of doctoral theses and scientific articles. Therefore, over the course of time, stress has been defined in various ways:

"Job stress can be defined as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker. Job stress can lead to poor health and even injury. The concept of job stress is often confused with challenge, but these concepts are not the same.[4]".

Essential research papers were mentioned by Kelly McGonigal in her TED Talks speech, "*How to Make Stress Your Friend"* [5]. In this study, over 30.000 adults in the U.S.A. were monitored over a period of eight years, and it started out by asking people questions such as: "How stressed out have you felt during the past year?", "Do you think stress is harmful to your health?"

Research carried out on the matter showed that people who had been very stressed during the previous year were at a 43% higher risk of mortality, but this was only true for those who were convinced that stress was damaging their health. The very stressed ones, but who did not see stress as harmful, were not more exposed; on the contrary, they were at the lowest risk of mortality, even when compared to the less stressed ones.

During the eight years, 182.000 Americans died prematurely, not because of stress, but because of their belief that stress was harmful. Approximately 20.000 deaths/year occurred due to the belief that stress was harmful. Last year's 15^{th} major cause of death in the U.S.A. was the belief that stress is harmful, thus killing more people than AIDS, skin cancer and homicide. Science says that changing our perception over stress would make us healthier.

Kelly McGonigal claims that those who attend lectures on stress would be able to remember fragments from the lectures when under a lot of stress. An example of such a fragment would be: "This is my body helping me rise to this challenge". When stress is perceived this way, the body perceives this distinction and its response to stress becomes a much healthier one. Kelly states that stress makes people more sociable.

Occupational stress represents one of the major problems that employees face in Romania. A study conducted by the Romanian League for Mental Health shows that the amount of people suffering from mental disorders has been on a rising trend. Data are even more alarming as the prognosis of the World Health Organization for the year 2025 mentions suicide due to occupational stress as the top cause of death. Among the most common health risk factors, along with

obesity, alcoholism, drugs and smoking, there is stress. There are currently no statistics available regarding costs related to occupational stress in Romania.

In the European Union, occupational stress is the second greatest health issue related to professional activity, after conditions that are strictly medical. It affects approx. 28% of employees, i.e. 40 million employees. Along with health-related costs, the total annual costs generated by occupational stress are estimated to 20 billion euro for the E.U. countries, without considering the loss in productivity.

The European Commission has already implemented some measures in order to ensure the health and safety of employees.

The 89/391 Framework Directive provides fundamental regulations in the field of occupational health and safety, which clearly state the obligation of employers to ensure the safety and health at work, thereby including the occupational stress effects [6].

2. Case study on measuring the level of stress in the academic environment in Romania

Over the time, many of the studies conducted in the field of stress took have been targeting the academic environment: the students or even the entire staff.

In order to verify the validity of the hypotheses and to achieve the objectives that had been previously set, I have used the following tools:

- The Cohen Williamson questionnaire, to identify the level of stress [7];
- The Holmes and Rahe Scale Questionnaire, to identify stress factors [8];
- The General Questionnaire on work and health, to identify the effects of stress [9].

There were 76 questionnaire respondents from the academic environment in Romania, aged 18 to 55, who took part in this study. The age distribution was the following: 63% of respondents aged 18 to 25, 25% of respondents aged 26 to 35, 8% of respondents aged 36 to 45, and 4% aged 46 to 55. In that which concerns gender, out of the total amount of respondents, 14 of them were males (18%) and 62 were females (82%). The research took place between the months of April and June of the year 2014, and the respondents came from universities situated in cities such as: Bucharest, Cluj-Napoca, Craiova, Iasi, Timisoara, Oradea, Ploiesti, Sibiu [10].

The demographic data related to the questionnaires used in Romania are presented below:

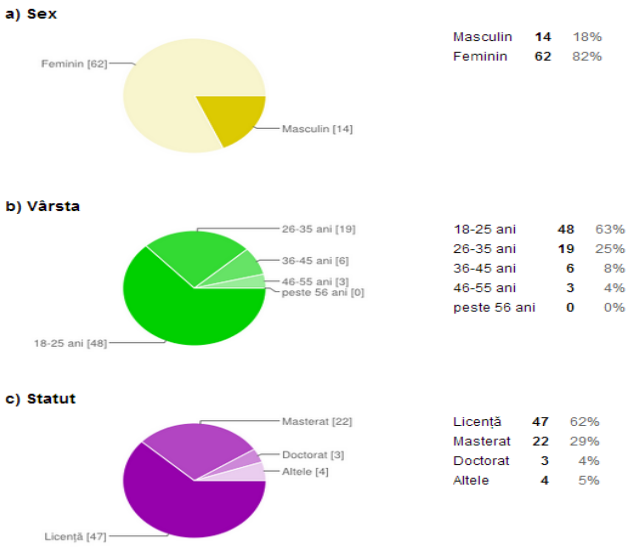

Fig. 1. Demographic data for the questionnaires in Romania

2.1 Statistic processing of the questionnaires regarding stress detection

The three questionnaires that were used in this subsection represent the basis of the analyzed data to which statistic calculations were applied using formulas (1) through (11).

Cohen Questionnaire

The average for the group of 76 respondents was 20 points. According to the answers quota, results show that the group is under heavy stress. Out of the 76 respondents, a number as high as 37 (approx. 48.68%) scored equal to or higher than 20 points, thus falling in the category of people under heavy stress. The other 39 respondents (approx. 51.32%) scored less than 20 points, therefore falling outside the category of people under heavy stress.

$$\text{Average} = \frac{\sum_{i=1}^{76} \text{Interview results}_i}{76} = \frac{1496}{76} = 19{,}68 \approx 20 \quad (1)$$

$$\%\ \text{of respondents under heavy stress} = \frac{37}{76} \approx 48{,}68 \quad (2)$$

$$\%\ \text{of respondents who are not under heavy stress} = \frac{39}{76} \approx 51{,}32\% \quad (3)$$

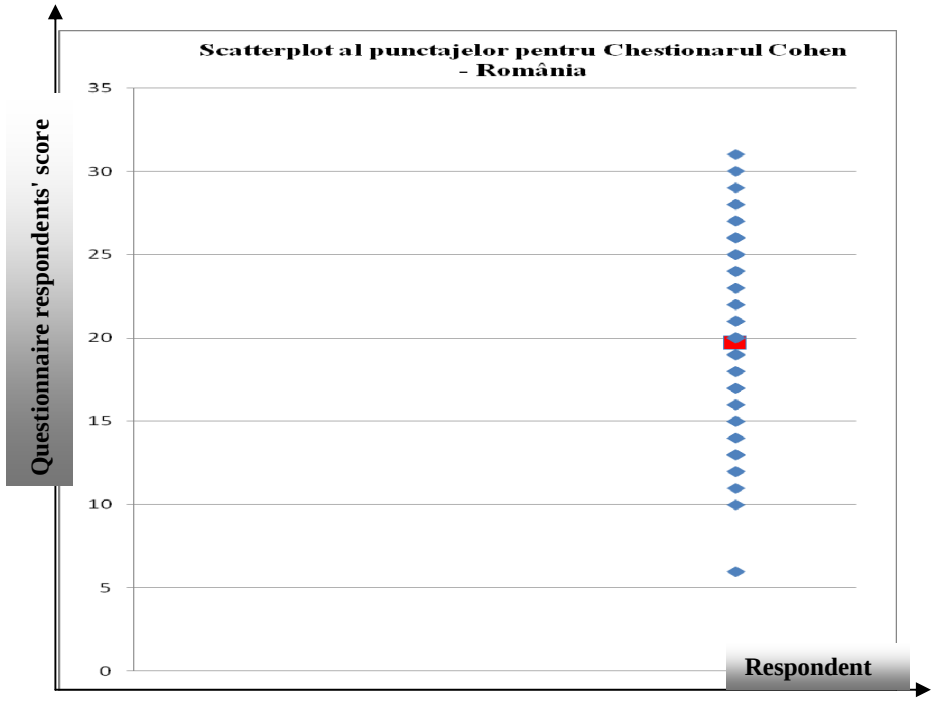

Fig.. 2. Representation of the average scores corresponding to the Cohen Questionnaire – Romania

The Holmes – Rahe Scale Questionnaire

The average score for the group of respondents was extremely high, of approx. 1266 points. Therefore, it may be concluded that the subjects who took part in this interview may consider stress a health issue and may be exposed to a major risk of stroke or mental illness.

Out of the 76 respondents, only one (approx. 1.32%) scored below 150 points (135 points), thus presenting a low risk of illness. Another respondent (approx. 1.32%) scored between 150 and 299 points (284 points), thus presenting a moderate risk of illness (a 50%) probability of stress turning into a health issue). The other 74 respondents (approx. 97,37%) scored above 300 points, thus presenting a high risk of illness (a 90% probability of stress turning into a health issue).

$$\text{Average} = \frac{\sum_{i=1}^{76} \text{Interview results}_i}{76} = \frac{96253}{76} = 1266{,}49 \approx 1266 \quad (4)$$

$$\% \text{ of respondents with low risk of illness} = \frac{1}{76} \approx 1{,}32\% \quad (5)$$

$$\% \text{ of respondents with moderate risk of illness} = \frac{1}{76} \approx 1{,}32\% \quad (6)$$

$$\% \text{ of respondents with high risk of illness} = \frac{74}{76} \approx 97{,}37\% \quad (7)$$

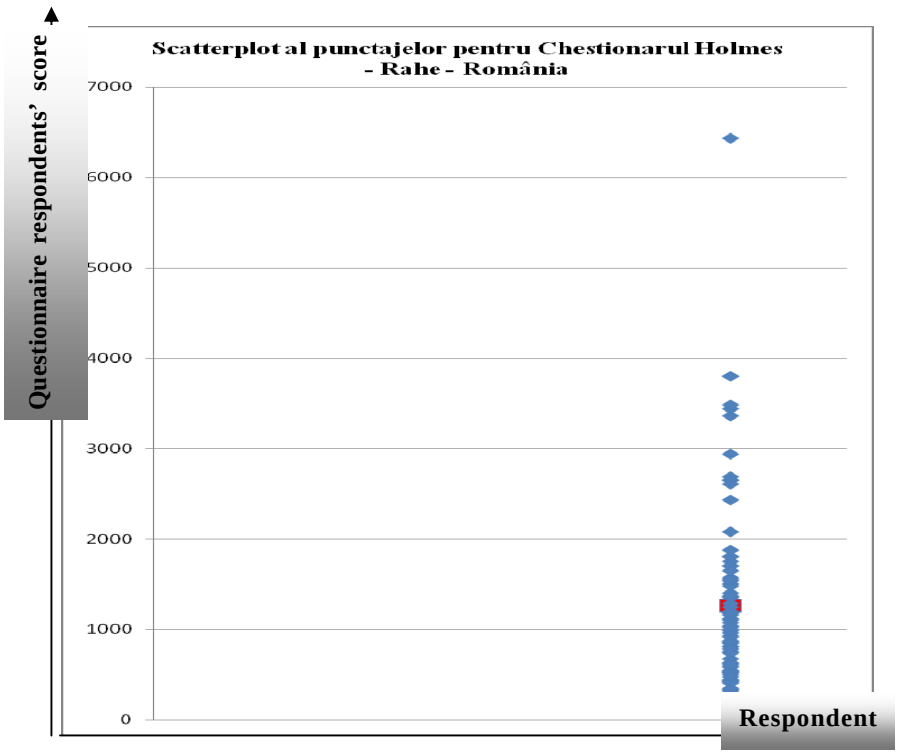

Fig..3. Representation of the corresponding average to the Holmes-Rahe Questionnaire - Romania

General questionnaire on work and health

The average score was 14 points, the interviewed group falling, therefore, under the category of groups that are not under heavy stress.

Out of the 76 respondents, 47 (approx. 61.84%) scored equal to or lower than 15, hence falling in the category of people without significant stress-related issues. 13 respondents (approx. 17.11%) scored between 16 and 20 points, revealing some stress issues. The other 16 respondents (aprox. 21.05%) scored more than 20 points, a score pointing to severe stress-related issues.

(8)

(9)

(10)

(11)

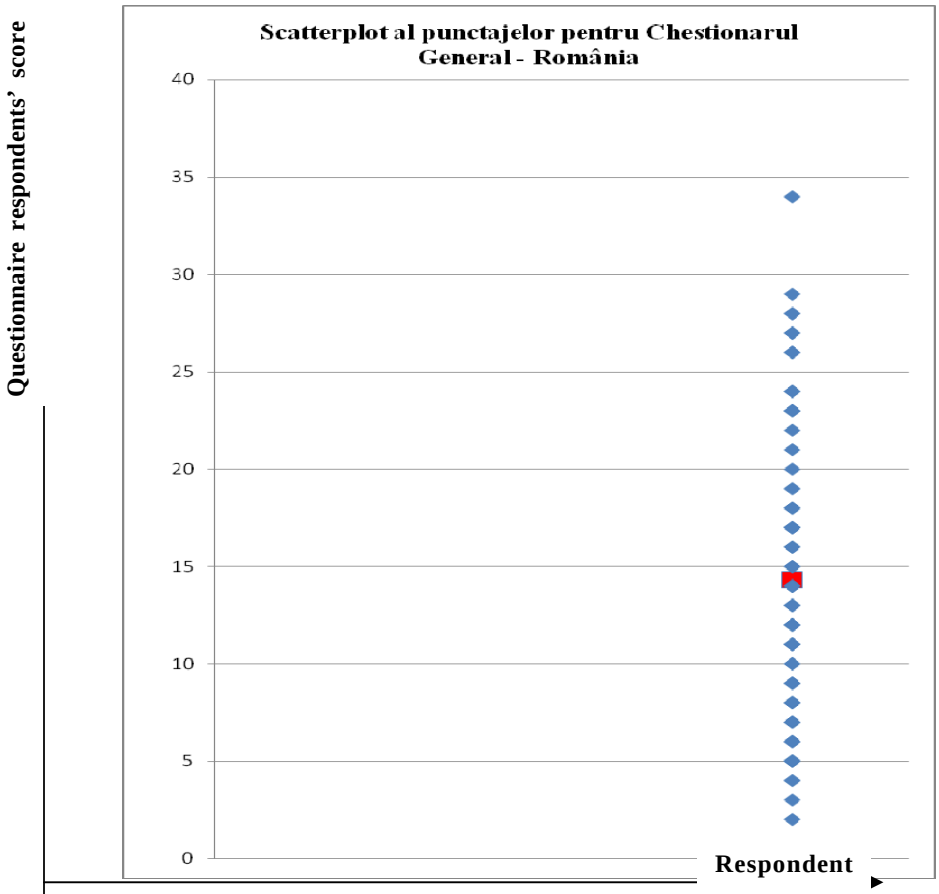

Fig. 4. Representation of the corresponding average to the General Questionnaire – Romania

2.2 The processing of statistic indicators in the Matlab software

Below there are the meanings of the Matlab functions used to calculate the statistic indicators *(theoretical average, standard deviation, variance)*:

mean = average; var = variance/dispersion; std = standard deviation

This is an example of a calculation procedure for the Cohen Questionnaire, with the mention that the same method was applied to the other questionnaires, as well:

```
cohen_ro=xlsread('anova.xlsx','cohenro')
mean(cohen_ro)
var(cohen_ro)
std(cohen_ro)
```

The results are as follow: Average = 19.68 ≈ 20

Variance/Dispersion = 26.5923; Standard deviation = 5.1568

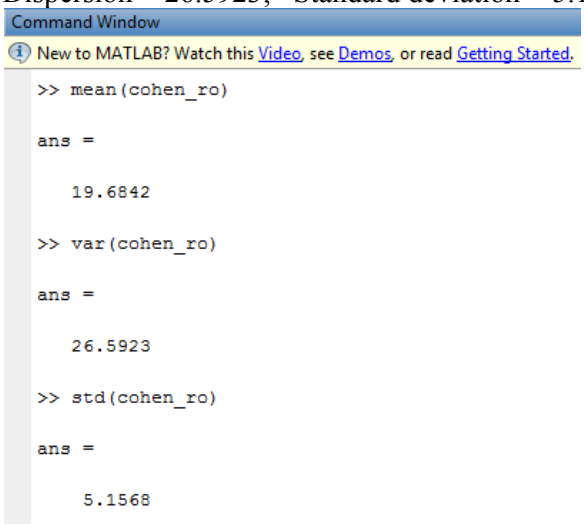

Fig.5. Calculation procedure for the Cohen questionnaire statistic indicators - Romania

Table 1 below sources the Cohen, Holmes-Rahe and the General Questionnaire surveys that were used with the academic staff in Romania.

The results of the statistic indicators for the three questionnaires, as well as their corresponding data can be found in the table below:

Table 1

Results of the 3 questionnaires

Respondent/ Group	Cohen Questionnaire	Holmes –Rahe Questionnaire	General Questionnaire
1	30	2691	22
2	26	6434	19
3	20	3803	26
4	19	551	10
5	11	1199	20
6	14	866	15
7	19	877	16
8	19	348	12
9	23	966	16
10	15	932	14

Respondent/ Group	Cohen Questionnaire	Holmes –Rahe Questionnaire	General Questionnaire
...	...	....	....
75	31	1652	24
76	18	135	6
Avrage (m)	***19,68***	***1266,487***	***14,29***
Standard deviation (s)	***5,16***	***1021,567***	***7,23***
Variance ($s^{2)}$	***26,69***	***104359,8***	***52,34***

The conclusion reached for the 3 questionnaires:

- regarding the **Cohen Questionnaire**, the average score was 20 points and, according to the quota of answers, the group is under heavy stress;

- the average score for the group of respondents to the **Holmes-Rahe Stress Scale Questionnaire** was exceedingly high, of about 1266 points, and in this case the subjects who took part in this interview may consider stress a health issue and may be exposed to a major risk of stroke or mental illness;

- the average score for the **General Questionnaire on Work and Health** was 14 points, which places the interviewed group outside of major stress risks.

The conclusion drawn by analyzing these questionnaires is that the staff in the academic environment is exposed to a high level of stress. As a consequence, a model for the increase in the organizational economic efficiency has been ellaborated [11].

3. Implementing the evaluation model for an increase in economic efficiency

The main occupational-stress-related costs that a company is faced with are: costs caused by the absence of the employees from the work place due to stress-related issues, costs generated by the recruitment and training of new employees, costs caused by disturbances in the production flow, medical costs etc [12].

In Fig. 6, there is a chart that is closely related to the model for the increase in organizational economic efficiency.

This model has been ellaborated for use in companies and organizations that aim for a low risk of stress-related work impediments. By implementing this model, stress relieving can bring about a significant growth in efficiency and effectiveness at work.

I personally consider that one of the steps towards decreasing stress levels would be ensuring staff training in order to increase efficiency and to promote health in general, and this aspect is a part of the model that I propose.

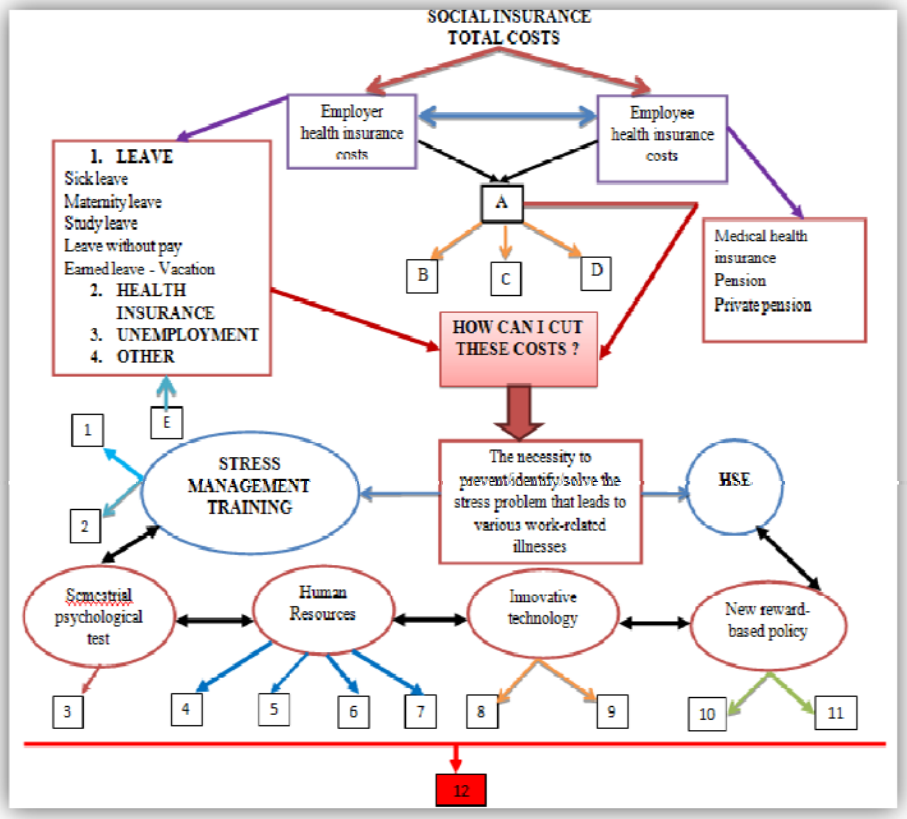

Fig. 6. The implementation of the economic efficiency growth model

Legend: A – The average of expenses needed in order to maintain the wellness of employees; B Clinically healthy personnel; C – Personnel suffering from occasional health issues; D - Personnel suffering from chronic health issues; E – Expenses for managing health and safety at work (HSE) 1 – Increase in productivity by reducing the amount of sick leaves; 2 – Decrease in health service expenses; 3 – Decrease in unfavourable contingent hidden economic effects on the company; 4 – Decrease in the amount of ill health early retirements; 5 – Increase in professional motivation among employees; 6 – Appropriate distribution of the employees on the job positions offered by the company; 7 – Avoidance of risks due to faulty distribution of personnel; 8 – Factors that can ease work and streamline; 9 – Downsizing personnel due to implementing new technologies; 10 – Prizes/Rewards; 11 – Salary + Bonus; 12 – Increasing productivity at work; -Lowering medical costs; -Continually watching the psychological state of staff members; -Increasing the efficiency and performance of the HR department; -Reducing staff-related costs by introducing new technologies and by increasing efficiency; - Introducing a new policy in order to stimulate employees by granting bonuses and rewards aimed at generating competitivity and professional development; - Introducing trainings on organizational stress management for better awareness of the damage that stress can cause; - Health and Safety at Work

The resulting model may significantly contribute to:

- Growth in productivity inside companies;
- Reduction of medical expenses in companies;
- Optimization of the professional performance due to work-related stress relief;
- Continual watching of the psychological state of staff members;
- Increase in the efficiency and performance of the HR department;
- Reduction of staff-related costs by introducing new technologies and increasing efficiency;
- Introduction of a new policy in order to stimulate employees by granting bonuses and rewards aimed at generating competitivity and professional development;
- Introduction of trainings on organizational stress management for better awareness of the damage that stress can cause;
- Health and safety at work through the elimination of major financial losses caused by absenteeism, medical expenses, and the decrease in productivity at work.

The economy and evolution of an organization can be affected due to the fact that stress may significantly take its toll on productivity and performance.

I consider the implementation of such a model is absolutely necessary, because beyond the multitude of effects that stress may have over humour and health of individuals, it may also have a socio-economical impact.

The contributions to this thesis consist of:

- Using the questionnaires in the academic environment in Romania, thus inviting future research based on the obtained statistic data, for an optimal validation of the results;
- Calculating statistic parametres (by means of the Matlab software) and interpreting statistically the study based on using the questionnaires out of which the stress level of employees could be established
- Implementing a model for economic growth inside an organization (see fig. 6), with the following recommendations: introducing new technologies, granting bonuses by implementing a new bonus policy, and maintaining stress at a minimum/average level with the help of occupational stress management training programs.

Conclusion

I consider that the positive results in the field of stress control can be substantial, and this enemy of people can be defeated by acting both at an individual level, and at an organizational level.

In the model that I have created, I have highlighted the future implementation of a training program that is supposed to represent a warning about the involvement of stress in the professional activity of the individual; this is to be done through techniques for the increase in professional efficiency by means of occupational stress management, as well as through methods of prevention against negative consequences of stress.

The aim of this paper was to bring into discussion, on the one hand, the necessity for more research on stress at work, as well as to raise awareness in employers and employees about stress prevention and treatment methods, and on the other hand, the necessity of implementing some training programs for an effective occupational stress management, a decrease in stress inside a company, and the creation of a working environment that would increase work efficiency.

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