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THE RELATION BETWEEN ERGONOMIC FACTORS, EMPLOYEE TURNOVER AND CUSTOMER COMPLAINTS. AN EMPIRICAL CASE STUDY IN AN AUTO REPAIR SHOP

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***Abstract:** Job satisfaction and work well-being are fundamental needs of every employee. Of course, because of their relative and personal level of perception, sometimes management are not up to date with their personnel opinions and feelings about work environment conditions. Staff dissatisfaction leads to high employee turnover and the fluctuation of staff results in errors and faults, further causing customer complaints and in the end loss of profit. In this research, by examining the case of a maintenance and car repair company, the scope is to establish a link between the performance of the employees and the improvement of their working conditions and how ergonomics can support a company's business strategy to stay competitive. Also, we establish that there is a correlation between ergonomic factors, employee satisfaction, employee turnover and customer complaints.*

***Key words:** ergonomics, workplace well-being, employee turnover rate, customer complaint rate, job satisfaction, environment ergonomics factors.*

1. INTRODUCTION AND LITERATURE REVIEW

One of the most important variable assets of any company is the human resource [1]. All employers should focus on the fundamental principles, such as well-being and working conditions improvements, of the scientific discipline of ergonomics, to reduce their employees' turnover rate, thus increasing their productivity and profits. The value of ergonomics principles and their implementation in organizations extends beyond health and safety. Also, Thun et al. [2] state that over recent years, the design of ergonomic workplaces has become increasingly significant in various areas of business. Adopting and carrying out ergonomic strategies, to maintain and improve the environmental conditions of the organization's workforce, are methods gaining popularity as they boost their competitive edge.

In this paper, we employ the extended definition of ergonomics, as defined by the International Ergonomics Association (IEA): "Ergonomics / human factors (HFE) is the scientific discipline concerned with the understanding of interactions among humans

and other elements of a system. HFE professionals apply theory, principles, data and methods to design to optimize human well-being and overall system performance. They contribute to the design and evaluation of tasks, jobs, products, environments and systems to make them compatible with the needs, abilities and limitations of people" [3]. Santos et al. [4], also, mentioned that the leading goal of ergonomics is to try to adjust a worker to his task and responsibilities at work, in a safe, efficient and comfortable manner. As a result, these will lead to the well-being of the worker and better productivity.

As the definition given by IEA explains, ergonomics consists in an economic component and it examines both human aspects, physical and psychological; seeking to figure out answers that satisfy both technical and organizational areas [5].

Successfully accomplishing job tasks translates into terms of the organization's effectiveness, productivity, quality, safety and much more. Well-being covers more relative notions, such as health and safety, pleasure, satisfaction, personnel development and training. These two notions have a strong

connection and they influence each other, so we cannot address one of them, without changing the other [6].

The aim of organizational ergonomics is to attain a harmonious balance between the work environment, employees' abilities, and their physical and mental constraints and different aspects linked to the company's day-to-day activities like work shifts, employees' satisfaction and motivational policies. Ergonomics rules provide the attentive examination of the workers' positions at the workstation, motions and gestures, the physical environment of the workplace, and the equipment used [4].

Some mechanical handling, machining, maintenance and repair workshops are very demanding jobs. The type of work, level of work, work context and ergonomic factors affect job performance in different ways [7].

Badayai [8] points out that the physical work environment is essential to employee performance, satisfaction, social relationships and health and that physical catalysts in a work environment can be classified into five different categories, such as: sounds (positive sounds - music, harmful sounds - noise), temperature (heat, cold), air quality, depending on company's area of expertise (pollution, freshness), light (sunlight, incandescent, fluorescent, windows, views) and chromatic ambience (colors have good or bad psychological effect) and space (easy access, logical positioning at workstations, closeness or distance). When the work environment does not meet the expectations and needs of workers, their dissatisfaction will cause further distress, which will ultimately affect their job performance, ultimately resulting in lost profits and/or of customers.

In their research, the authors [9] also, point out that human factors and ergonomics as an architecture-oriented framework to optimize and upgrade compatibility, efficiency, safety, ease of execution, human well-being and quality life while performing their job duties. Although, *artificial intelligence* and robots have replaced some human tasks or activities in many sectors of industry, performing various tasks, in electronics and automotive sectors, humans perform approximately 90% of the

assembly/disassembly [10] tasks and due to the fact, that in vehicle maintenance and repairs area, the procedures and the movements are neither repetitive, nor identical, because of the vehicle construction diversity, it means that applying the principles of ergonomics is more important than ever.

Tasks in certain areas of industries, like mechanical processing, painting, and maintenance, are carried out in challenging working conditions. In work assessment literature, workplace conditions encompass two angles: environmental conditions and hazards. Once an employee is exposed to hard job factors focusing on tasks will be very challenging, a fact that will lead to a diminished employee performance including productivity, quality, emotional stress, and on the short term, this will cause higher costs [1].

The importance of an ergonomic conception of the work post is also at the heart of a research study launched by the German initiative "New Quality of Work". Most of the people questioned in this matter considered that an improvement in the workplace that contributes to maintaining health and work capacity is important or very important and only 11% of the people questioned in this survey did not identify with any negative aspects related to their working conditions [2].

The discipline of ergonomics is considered today, having three important components: a physical one which comprises elements such physical, anthropometric and anatomical, a cognitive one relating to different mental processes and the last one referring to organizational ergonomics which comprises a larger perspective view [2].

Ergonomics plays an important role in creating a good environment which leads to employee satisfaction and consequently to increase productivity and reducing errors as revealed in research by Eklund [11].

In another research it is shown that about 50% of all quality differences come from manufacturing which does not comply with the ergonomics principles. The same result has been found in a different study [12]. Moreover, authors [13] identified that the assembly ergonomics has an impact on product quality,

which strengthens the importance of ergonomics related to quality responsibilities at work.

In her paper, Dewicka-Olszewska [14], also, underlines the fact that the principles and rules of ergonomics field are a mixture of human sciences and technical and organizational knowledge that are put together to solve complex issues in human resources management, quality management, safety and security at the workplace, using psychological notions to provide an insight in employees behaviors and needs, in order to supply clear solutions to improve conditions and well-being in organizations. Ergonomics as a scientific discipline has a practical objective which is to use the background and the information of other disciplines, because only a multidisciplinary approach, could solve major issues in a company, like low quality, high customer complaints, personnel fluctuation, absenteeism or defective labor and errors tendencies due to environment displeasure [15].

New and improved ergonomic changes, upgrading working conditions, increase the safety and efficiency of the work tasks performed. Ergonomic innovations also lead to enormous business benefits, such as:

- Improve employee and user well-being, usually known as work motivation;
- Expends the focus on work activities, labor quality and their aims;
- Reshaping to work and support a healthy mental state;
- Decreases the number of interpersonal conflicts that can occur between co-workers or between the workers and the organization management [14].

The conclusions of the literature review chapter are that ergonomics involves two objectives, a social and an economic objective [5]. Also, the well-being of workers is reflected in different perspectives of an organization: satisfaction, health, safety, personal development and learning [6].

Taking into consideration the fact that the reviewed literature constantly evaluates ergonomics principles as highly important, we conducted empirical research, examining the evolution of ergonomics and human factors in a company that provides maintenance and car

repair services. The research was carried out, looking over a ten-year period, between 2015-2024. During this time, ergonomic environmental conditions fluctuated over two intervals of time: 2015 – 2021, when due to factors independent of the management discretion, working conditions were not in accordance with the ergonomics principles and after 2021 until 2024. Between March – August 2021, various workplace improvements were implemented, such as the space was extended and all the mechanics were given their own workstation equipped with car lift, tool bench, special devices and digital tablets. Starting with 2022, the other areas of the building were upgraded, including one more floor and special rest and relaxation areas (snooker, barbeque, deck terrace with flowers, swings, coaches). The entire staff has a lunch break every day, with different freshly cooked menus, according to their requests. Their special uniforms and work clothing are washed and prepared for the next day, by a person designated specially for this task. On Fridays, the working schedule is shorter. For our research, we used two key performance indicators: employee turnover and customer complaint rate.

The purpose of our study is to establish if there is a correlation between ergonomic factors, employee satisfaction and the two key performance indicators previously mentioned.

2. RESEARCH METHODOLOGY

In order to achieve the proposed objective, we calculated the two key performance indicators using the company statistical data and the equation 1 [16] and 2 [17].

$$\text{Annual employee turnover rate} = \frac{\text{number of employees who left}}{\text{average number of employees}} \times 100 \quad (1)$$

$$\text{Annual customer complaint rate} = \frac{\text{total number of complaints}}{\text{total number car serviced}} \times 100 \quad (2)$$

We, also, conducted survey research based on a questionnaire examining ergonomics of the workstations, microclimate factors – brightness, noise, colors, temperature and air quality as well as factors of the psychological environment, respectively physical and mental stress. These factors have been chosen because of their

significance, importance and correlation with employees' level of satisfaction as mentioned in ergonomics literature [18].

The questionnaire has 19 items with answers classified on a Likert scale with one of 4 options (four-point scale) with the following answers: strongly agree, agree, disagree and strongly disagree and with 1 item with an open answer. There were also classification questions, in which, elements such as: age, sex, education were identified. The questionnaire was applied to all employees. Out of the total of 20 applied questionnaires, 20 were answered.

3. RESULTS

The authors used their own observations, interviewed all employees and consulted company records with information on activities performed before and after work conditions improvements and achieved the following results.

3.1 Annual employee turnover

To observe the annual variation of personnel, in the proposed time frame, namely 2015-2024, we applied equation (1) and obtained the results presented in Table 1.

3.2 Annual customer complaints rate

Customer complaints rate was calculated using equation 2, by documenting all services entries reports for various maintenance and repair procedures and the number of complaints submitted by clients. The results attained are presented in Table 2.

3.3 Employees' level of satisfaction

In the questionnaire applied the respondents are from 2 areas of the business, namely the administrative area and the car service area. The employees are equally divided in the company's departments, 10 administrative personnel and 10 mechanics.

2019	7	46,67%
2020	3	20%
2021	6	40%
2022	1	6,667%
2023	0	0%
2024	1	6,667%

Table 2

Annual customer complaints rate.

Year	No. of complaints	No. of cars serviced	Annual customer complaints rate
2015	5	2.069	0,242%
2016	19	3.719	0,511%
2017	20	4.057	0,493%
2018	74	4.610	1,605%
2019	54	3.871	1,395%
2020	29	2.795	1,038%
2021	18	3.304	0,545%
2022	12	3.686	0,326%
2023	14	3.848	0,364%
2024	4	2.085	0,192%

There are 6 women (1 in the car service area) and 14 men (5 in the administrative staff). The youngest employee is a 22-year-old mechanic and the oldest is 58-year-old cook. Three of the employees have university studies and seventeen have high school level studies.

The 19 statements compiling the questionnaire were divided into seven categories of ergonomics factors: questions concerning the workstation, microclimate factors like brightness, sound, colors, temperature, air quality and factors belonging to the psychological environment, respectively physical and mental stress.

There were 6 statements pertaining to the workstation ergonomics:

1. The workplace is well equipped with work equipment. As shown in Figure 1, 85% strongly agreed with this and 15% agreed.

2. The workstation has enough space. 90% of the respondents strongly agreed and 10% agreed.

3. My position at work is comfortable 95% of members of the staff strongly agreed with this statement and 5% agreed.

4. The equipment provided helps me lift heavy objects without much effort. Figure 2 presents the following results: 85% of

Table 1

Annual employee turnover.

Year	No. of employees left	Annual employee turnover
2015	2	13,33%
2016	5	33,33%
2017	3	20%
2018	11	73,33%

employees strongly agreed, 5% agreed, 5% disagreed and 5% strongly disagreed.

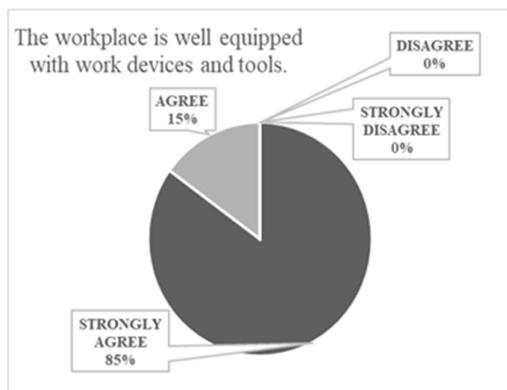


Fig. 1. Statement 1.

5. Machinery, equipment, and devices are placed in a logical sequence, easy to access and use. 70% of the respondents said that they strongly agreed and 30% that they agreed.

6. I believe that I have been provided with sufficient protective equipment. 85% of the staff strongly agreed with this and 15% agreed.

One of the most important microclimate factors is brightness. Two statements fit in this category.

7. The light intensity is good and on a normal working day I have no vision problems. Observing Figure 3, note that 85% of the staff strongly agreed with the statement, 10% agreed and 5% disagreed.

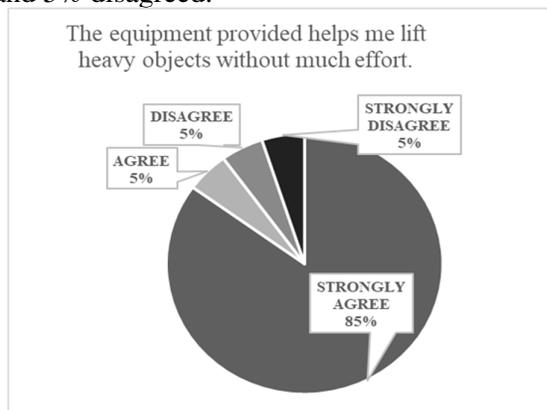


Fig. 2. Statement 4.

8. The light sources are sufficient and well positioned. Regarding this statement, 90% of the employees responded with strong agreement and 10% agree.

9. The ambient colors are well chosen and I consider them suitable for the workplace. This statement refers to the category regarding chromatics and 95% of the personnel said they

strongly agree and 5% agreed, as shown in Figure 4.

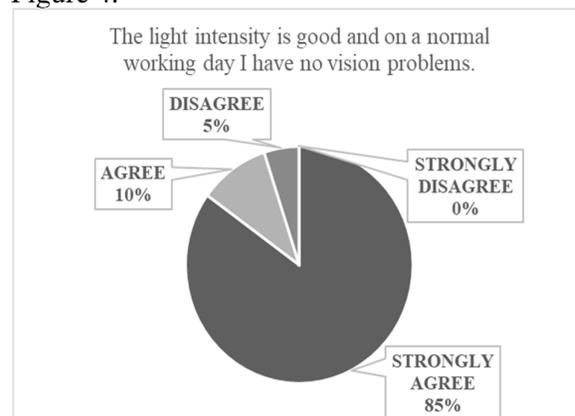


Fig. 3. Statement 7.

Two statements were considered for the noise factors:

10. The noise is not disturbing throughout the working day. Figure 5 presents the responses, as follows 75% of the employees strongly agree, 20% agree and 5% disagree.

11. I find background music to be beneficial and put me in a good mood. 85% of the staff strongly agreed with the statement, 5% agreed and 10% disagreed.

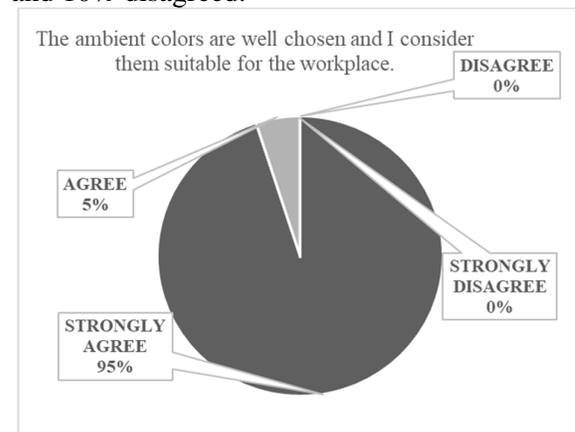


Fig. 4. Statement 9.

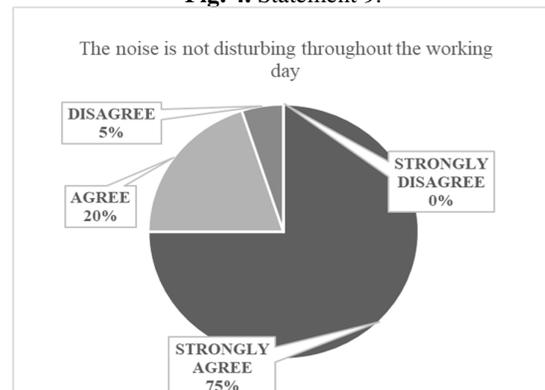


Fig. 5. Statement 10.

One statement was related to temperature category:

12. I believe that the existing temperature is suitable and does not require changes. Observing Figure 6, it points out that 85% of the staff strongly agreed with the statement, 5% agreed and 10% disagreed.

The air quality category consisted of one statement:

13. I consider the air quality to be within acceptable parameters, considering the specifics of the workplace. As we can see from Figure 7, 65 % of the personnel members said that they strongly agree with this statement, 30% agreed with this statement and 5% disagreed.

Next category of factors pertaining to the psychological environment, respectively physical and mental stress, was assigned 5 statements.

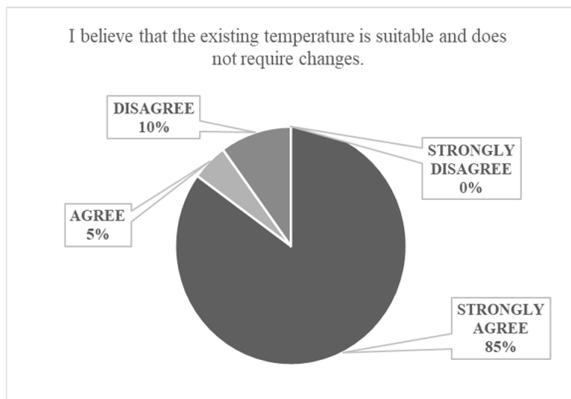


Fig. 6. Statement 12.

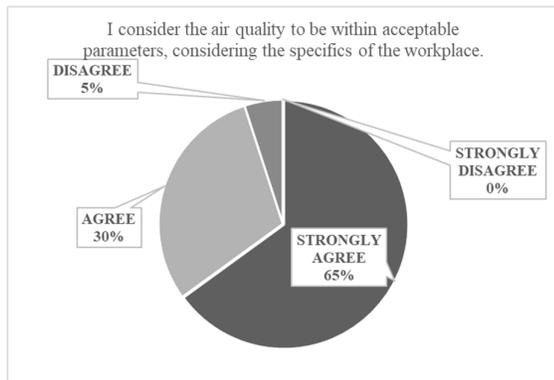


Fig. 7. Statement 13.

14. I consider that the level of physical effort to which I am subjected is normal for the workplace. To make this statement, 90% of the

employees responded strongly agree, 5% agree and 5% disagree.

15. I consider that the level of mental stress to which I am subjected is normal for the workplace. Figure 8 presents the following results: 50% of employees strongly agreed, 30% agreed, 10% disagreed and 10% strongly disagreed.

16. My relationship with other employees is good, collegial, without conflicts. To this statement 70% of the respondents said that they strongly agreed and 30% that they agreed.

17. My relationship with superiors is good, based on respect and trust. This was the only statement upon which all the staff strongly agreed with.

18. Communication at collegial level is good. Figure 9 presents the following results: 50% of employees strongly agreed, 40% agreed, 10% disagreed.

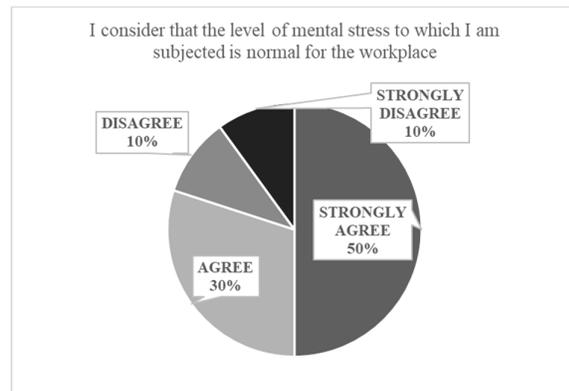


Fig. 8. Statement 15.

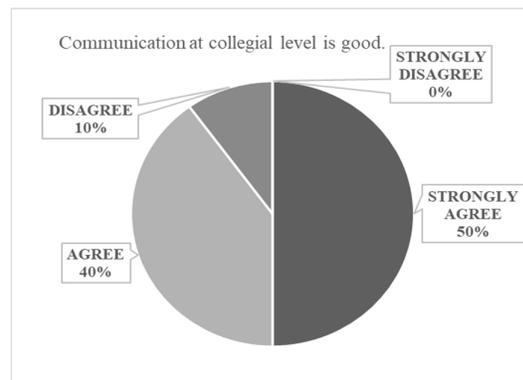


Fig. 9. Statement 18

19. Communication at managerial level is good, encouraging problem solving through open discussions. 85% of the staff strongly agreed with this and 15% agreed.

As to the open question number 20, employees were asked to name a factor or several factors mentioned in the previous statements that they would like to change. Employees responded as follows: 10 employees said that they would not change anything, 5 of them said that they would like to change some of their co-workers, one employee mentioned temperature, stress level, light intensity, another one said he would change the temperature, work space, equipment order, one mentioned the intensity of light, other said more space would be better and the last of them said that he would change communication between colleagues.

4. DISCUSSION

Analyzing the data from table 1 it can be observed that the annual employee turnover fluctuated during the period considered. In the year 2018, we have a peak of 73,33% employee turnover caused by the personnel dissatisfaction regarding the working conditions. In the following years the trend will go down with relatively high values until 2021.

From the data and personal observations, we have seen that after the improvements regarding the ergonomics of the workstations, microclimate factors – brightness, noise, colors, temperature and air quality and the factors of the psychological and physical environment, the annual employee turnover has decreased from 6,66% to 0%.

The data from Table 2 reveal that another relevant performance indicator has suffered changes throughout this period. The highest rate of complaints is between 2018 and 2020, bigger than 1%. As the number of cars serviced rose, the number of customers and employees also rose.

Due to these factors and having to work in the same space and with the same equipment passed from one mechanic to the other, the level of stress and errors has gotten higher. Once errors started to occur, customers began to complain, therefore increasing the disagreements between co-workers and the level of stress.

Because the physical space of the building could not allow for expansion and the number of cars serviced grew constantly, staff members

chose to leave their jobs. The complaint rate started to decrease starting from 2021 to value close to 0.35%.

Taking into consideration that the management did not suffer any changes and the level of salaries corresponded with the other values (or were better) in the auto car repair sector, we can ascertain that the decisive factor of improvement for the key performance indicators was the beneficial changes regarding the ergonomic factors.

The analysis of the survey results confirms our opinion regarding the ergonomic factors improvement and the employees' level of satisfaction. In our interpretation responses like "strongly agree" and "agree" implies a positive perception of the satisfaction level.

As shown in Figure 10 the summed item results indicate that 96% of the answers are "strongly agree" and "agree" which translates into a very good employee satisfaction regarding the working conditions and overall well-being. This affirmation is also confirmed by the fact that at the open question 20, 10 employees said they would not change anything about their job duties and environment.

There were only two mechanics who pointed out that there is room for improvement to various factors like: temperature, lighting, equipment order and place. Their observations were legitimate, because their workstations remained in the part of the building, where renovations are scheduled for next year.

Therefore, we can establish that most positive responses are found in the statements related to the ergonomics of the workplace, the environment, etc. Our findings are also supported by theorists, practitioners, professors and business managers, who have dedicated a lot of time and constant endeavors to generate a pattern of workplace behaviors and organizational performance.

To this extent, connections between concepts such as satisfaction with management, job structure, job satisfaction, turnover, well-being, organizational citizenship, and customer satisfaction have all been closely analyzed [18].

However, the results also revealed some concerning facts about collegial relationships. First, 5 employees said that if it were possible,

they would change their co-worker. Secondly, the diagnosis and computer testing mechanic and two employees sharing the same job duties and desk office, responded that the level of mental stress which they are subjected to is very high.

These inconveniences must be addressed, otherwise the organization might lose valuable employees and their replacement will cause delays in the diagnoses department or lack of personnel in certain positions. Most of the time, the departure of a good, senior employee will negatively impact the others, causing them stress and insecurities [19].

Because all employees totally agreed that their relationship with management level is good, based on respect and trust, measures should be taken to encourage the amical resolution of co-workers' differences of opinion or frictions, so that their dissatisfaction will not lead them to change jobs. Team-buildings or conflict resolution management seminars could increase goodwill and communication among co-workers.

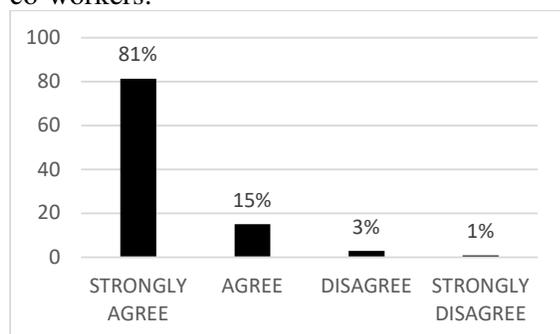


Fig. 10. Results of the survey.

5. CONCLUSIONS

To be profitable, all organizations must know, at any time, the evolution of their employees' turnover, their satisfaction regarding work environment conditions, so that they can act, immediately, if one of these indicators varies more than normal. In the presented case study, the management of the company started to examine these factors once they reached a dangerous peak. However, the quick implementation and the efficient alignment to ergonomics rules and principles diminished the consequences of ignoring ergonomics, in the first place.

All the changes and upgrades were rapidly observed, in the key performance indicators and in the results of the survey designed to analyze the opinion of the employees regarding the new improved working environment. Once the working conditions and the well-being factors increased, job satisfaction among personnel also increased, meanwhile the employees' turnover rate and the customer complaints rate decreased. Nevertheless, the survey still pointed out minor disagreements, which could be easily resolved, if addressed in a timely fashion.

By completing this research, we arrived at the conclusion that there is a link among the ergonomics work factors, the employees' level of satisfaction at work and the following key performance indicators: the employees' turnover rate and the customer complaints. The link is inversely proportional: if the first two indicators grow, the other two will diminish and vice versa.

Furthermore, we consider that implementing periodical ergonomics surveys to measure these indicators might indicate the management level, the status of their labor force, in terms of work psychological well-being, and enable them to take proactive actions, to achieve the balance between these conflicting aims: organization profit and competitiveness and the employees wishes of satisfaction at work.

6. ACKNOWLEDGEMENTS

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Relația dintre factorii ergonomici, fluctuația personalului și reclamațiile clienților. Un studiu de caz empiric în cadrul unui service auto

Satisfacția și bunăstarea la locul de muncă sunt nevoi fundamentale ale fiecărui angajat. Desigur, din cauza nivelului lor relativ și personal de percepție, uneori managementul nu este la curent cu opiniile și sentimentele personalului despre condițiile mediului de lucru. Nemulțumirea personalului duce la o fluctuație mare a angajaților, iar variația personalului duce la erori și greșeli, provocând în continuare reclamații ale clienților și în final, pierderi de profit. În această cercetare, am realizat o analiză în cadrul unui service auto, cu scopul de a stabili dacă există o legătură între performanța angajaților și îmbunătățirea condițiilor lor de muncă și modul în care ergonomia poate sprijini strategia de afaceri a unei organizații pentru a rămâne competitivă. De asemenea am identificat existența unei corelații între factorii ergonomici, satisfacția angajaților, fluctuația personalului și reclamațiile clienților.

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