

ANALYSIS OF THE QUALITY OF WORKING LIFE OF A HIGHER EDUCATION INSTITUTION IN THE SOUTH OF SONORA, THROUGH THE ANALYSIS OF ARTIFICIAL NEURAL NETWORKS

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Abstract

The purpose of this study is to investigate and analyze the Quality of work life of a Higher Education institution in the South of Sonora, through the analysis of artificial neural networks; where a result of 4.75 was obtained on a scale of one to five; considering it to percentage a general 95% of the study. Where the population under study 58% is married, 51% academic staff, and 49 administrative. With a level of studies 61% postgraduate, 28% undergraduate and 11% preparatory. Regarding the result of the variables, the best evaluated is quality of life with 100%, quality of life at work with 95%, organizational performance with 94% and organizational management with 93%. Regarding the summary of the model, it is observed that there is a significant relationship to the female sex with 55.7% and in terms of the predominant age it ranges between 31 to 40 years with 42.9%. It was possible to observe the correlation of results with the methods used in this research of the focus group and the use of artificial neural networks, obtaining that the most influential dependent variable of the quality of life at work is the type of hiring of contract personnel and being the reagent I am proud of my work that I do in the institution with the highest degree of importance. The model shows the importance of the 100% normalized independent variables of being proud of the work you do in the institution.

Keywords: quality of working life, institutions, higher education, artificial neural network.

I. Introduction

The purpose of this study is to investigate the analysis of the Quality of work life of a Higher Education institution in the South of Sonora, through the analysis of artificial neural networks. Özçelik & Hardalaç (2011), in a study focused on

students, used the neural network to classify the subjects of their research, considering it extremely important for their statistical interpretation. Lau et al (2019) state that performing a statistical analysis based on a neural network model has achieved a good prediction accuracy of the results in their research.

It is important to point out that artificial neural networks are algorithms that can be used to perform nonlinear statistical models and that this method has the ability to implicitly detect complex nonlinear relationships between dependent and independent variables and this can be of great help for the analysis and interpretation of in-depth studies, regardless of the specialty of the research to be carried out (Tu, 1996). In a publication by Kardan (2013), he used neural network analysis to describe a result with different statistical options within the field of higher education institutes.

The artificial neural network model has the function of performing highly non-linear function mapping; considering it within the studies a great advantage for the development of new trends in statistical analysis in university education studies (Hu, 2017). Different investigations over the years have been using this type of statistical method to have relevant results and programs to improve the quality of working life can be applied, such as the research carried out by Quiroz & Espinoza (2021), since it entails to great benefits not only for the company, but also for the worker.

The quality of work life is perceived and expressed by the employees of an organization about their degree of satisfaction or dissatisfaction in relation to the work environment, which results in an evaluation to know the degree of well-being and the development that these conditions generate in the employees. human resources, as well as its positive and negative impact on the company (Cruz, 2018).

There is a trend about statistical neural networks, since, given some parameters and indicators, there is a way to combine them to predict a certain result. Neural networks are a model to find that combination of parameters and at the same time, apply the resulting model for problem solving. This technique has been widely accepted by researchers and analysts due to the achievements and goals achieved by representing the functioning of the human brain applied to a computer or any such technology (Julián, 2016).

Studying the concept of quality of work life (CVL) has as its main objective to make an assessment of the perception of workers according to their work environments, as well as to identify the main

factors that make this perception positive or negative (Cruz, 2018).

Neural networks have become very important in recent years because they allow us to find solutions to problems that are difficult to solve using ordinary rule-based programming. Its applications have revolutionized the world of data algorithms and the trend that has been generated is due to its prediction and simulations, character recognition and classification, model creation and control engineering (González, 2021).

The term “quality of work life” originated in the late 1960s and early 1970s by the US Department of Labor and the FORD Foundation. These conferences were prompted by “worker alienation” as represented by strikes among the largely young workforce at the then-new General Motors plant in Ohio. The attendees considered that the term went beyond job satisfaction and that it included some notions, such as participation in at least some of the decision-making moments, increased autonomy in daily work, and redesign of jobs, and systems and structures of the organization in order to stimulate learning, promotion and a satisfactory form of interest and participation in work. The quality of life at work achieved social and institutional recognition through the actions of the CVL Movement.

The demands of this movement stem from the need to humanize the work environment, paying special attention to the development of the human factor and improving their quality of life. From this moment on, the issue of quality of working life became popular both in the US and in Europe, where the trajectory and the nuances that the movement acquired moved away from the initial approaches linked to the current of organizational development. , to receive the influences of the sociotechnical approach and Industrial democracy. Due to such ideological differences, the study of the quality of working life in Europe is identified with the current of the humanization of work, while in the United States, faithful to its origins, it maintains its initial name as the “CVL” movement (Granados, 2011).

In 1948 the World Health Organization (WHO) defined health as the complete state of physical, mental and social well-being, and not only the

absence of disease, with which the term evolved, from a conceptual definition, to objective methods, which, through questionnaires or instruments, generate scales and indices that allow measuring the dimensions that make up the state of health (Velarde & Avila, 2002).

The benefits of health will always be essential for the human being, since, without it, people cannot be active in a productive way. For the International Labor Organization (ILO), decent work synthesizes the aspirations of people during their working lives. It means the opportunity to access productive employment that generates a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for individuals to express their opinions, organize and participate in the decisions that affect their lives and equal opportunities and treatment for all, women and men. The Organization for Economic Cooperation and Development (OECD) through the Better Life Index, allows comparing the actions of countries in order to measure well-being to achieve a better life, using 11 dimensions, including aspects such as income, jobs, health and work-life balance, among others.

On the other hand, the definition of quality of life that is covered by the World Bank focuses on material factors, since its definition is strictly related to monetary poverty, therefore, within its publications, a factor that stands out over the social variables is infrastructure (Escobar 2019).

Walton (1973) says that CVL has been used over time to describe some environmental and human values, which have been overlooked by industrial societies due to technological progress, productivity and economic growth. Remuneration for work performed is a relative concept, not something particular, absolute, and is merely a consensus of objective and subjective criteria by which the level of performance can be judged. The work of this author has led to the proposal of eight types of concepts for the evaluation of CVL.

Hackman and Oldham (1975) suggested that CVL assessment should be done in three dimensions: the task, critical psychological states, and personal and professional outcomes. These three dimensions were given the model designation of

the basic dimensions of the task. In the task dimension, six important attributes of job satisfaction are identified: skill variety, task identity, task meaning, interrelationship, autonomy, and feedback. The "critical psychological states" dimension encompasses the visualization of the meaning of the work, of the responsibility for the results and the knowledge of the real results of the work. In the "personal and professional results" dimension, general satisfaction is identified as the result of a pleasant balance between an individual and his or her occupational department (Alves et al, 2013).

The Model of quality of life at work according to Westley (1979) maintains that four aspects directly affect QWL and that these aspects can become obstacles to its development: the political aspect (insecurity), the economic aspect (injustice), the psychological aspect (alienation) and the social aspect (anomie).

Security and injustice are among the oldest problems. The concentration of power is the main cause of insecurity, while the concentration of profits and the exploitation of workers are the variables that cause injustice. Both of these aspects were greatly reduced in most industrialized countries with the growth of socialist movements, while alienation (lack of concern for work and self) and anomie (mechanization and automation) arose. To address these four aspects, the author refers to the following measures: job enrichment, which must be applied at the individual level, and socio-technical methods for restructuring work groups. Job enrichment includes improving job qualifications and socio-technical methods that consider more humane conditions in the processes carried out during work (Alves et al., 2013).

Model of quality of life at work according to Werther and Davis (1983) consider that there are several factors that can occur in a job which directly affect, such as wanting to improve, remuneration, benefits or simply the working conditions. They affirm that the position within a job is the one that affects the worker the most, during an arduous analysis they consider that the position is made up of three levels: the first is constituted by the organizational level, this level is based more on the company on the efficiency of

the worker, output, if this job has a continuous workflow.

According to Werther and Davis (1983), the quality of life at work is an interest in improving, worrying about the social welfare of the company's workers, worker education, democratization at work so that all workers accept it. authority without questioning it, that workers have more solutions to their problems about their workflow, obtaining renewal and constant adaptation.

According to the Model of quality of life at work according to Nadler and Lawle (1983) people within their work or in the organization, in the CVL field they consider two fundamental elements which are concern about the impact that a job can have on people as well as the efficiency in the process within an organization, on the other hand the participation that workers can have on the resolution of problems within an organization.

The authors Nadler and Lawle (1983) point out that there are programs of quality of life at work within which treatment is obtained as answers on the CVT, which have a base existence of solid conceptual theory and a good structuring, the Theoretical base shows the contexts in which they are created and how the Program for the Quality of Work Life (PCVL) will be developed. During an ardent investigation, the authors concluded with six aspects that can contribute to the observation of the success of quality of life programs at work, which are the following: the perception of the needs of either the worker or what the company needs that the worker does his part, the focus of the problem identified in the organization, the structure to identify and solve the problem that is arising, the projected effects for the processes as well as for the results, the multiple systems that can be reached, and lastly, the commitment of the workers' organization and the company for an excellent contribution to the quality of life program at work.

Management theories

Within the administrative theories there is the so-called "Fayolism", named after the theories proposed by Henri Fayol. The theories start from the organizational and its structure to achieve efficiency. They are formed by a synthetic and

universal approach to the organization where the operations and functions that people must fulfill are specified in detail. This current states that all organizations require elements and principles to strengthen the social body and facilitate its operation. The organization is conceived in formal and rational terms, emphasizing logical and pre-established schemes (Espinoza, 2009).

On the other hand, there are other theories proposed by the engineer Frederick Taylor that with his methodologies that maximum prosperity is the result of greater productivity which, in turn, depends on the training of each one. Establishing in this way a series of mutually determined causalities, even going so far as to affirm that the scientific administration of work could achieve that the intermediate periods were much more prosperous and free of discord and dissension, and the periods of crisis were shorter and less frequent. and cruel. "I am convinced that, sooner or later, these principles will be in general use throughout the civilized world, to the happiness of all" (1969), thus responding to his critics by demonstrating the benefit of applying his theory. Taylor criticized the influence exerted by sentimentality and group pressure, when establishing productivity levels (Carro & Caló, 2012)

Theory X and Y

Douglas McGregor (2007) analyzed and related people to aspects of human behavior and motivation that later became known as theory X and theory Y in which they are part of the human resource of organizations for the different resolutions of related problems. with its workers.

Theory X are propositions and beliefs that relate to a management approach and control through a negative view of human nature. Theory X favors an authoritarian leadership style where its emphasis is mainly focused on the productivity of the workers as well as the organization, the fair work that is provided to them and the reward for the performance that they can have during their flow of work. This theory may reflect unexpected attitudes of workers such as avoiding work, and that is where the administration must counteract this attitude through practices that have greater control and moderate surveillance.

On the other hand, theory Y is the opposite of theory X, in this theory it is more focus and empowerment to the administration in which it is related to helping managers see employees with prospects of wanting to excel that they are capable of doing, and act independently and that their responses to tasks or assignments of the same organization are adequate and favorable for their development and that there is a superior motivation to be able to achieve a commitment to the objectives that are desired to be achieved either within the work as well as with collaborators such as administrators, most workers learn and even want more responsibility in order to develop problem-solving skills within the organization as well as develop the ability to perform fast and efficient work following a correct process and release potential.

Humanistic Theory

The humanistic theory is a psychology of "being and not having" this according to Abraham Maslow this because it takes more into account the conscience, ethics, individuality and values that each human being has is known as creative, free and conscious. Basically, the humanistic theory refers us to experience, freedom of choice and the meaning of individuality as was discussed a little earlier, therefore, during this theory the great virtues begin to be pointed out, where the way of thinking begins to be emphasized. of the human being taking into account his own ideas and thinking of himself. However, according to McGregor, it was based on Maslow's theory to look at the human being in a different way in the context of work, emphasizing human potential, unleashing it in human development to elevate the role of people in society.

In addition, due to the human condition, there are psycho-social factors that focus on humanistic theory in organizational or institutional analyzes that are of great importance for each employee of said institution that integrates it to have a success of it. Since it stimulates culture and communication, which influences motivation, teamwork, type of leadership, identity, commitments, participation, job satisfaction, among others. It could be said that they are aspects of quality of work life in an organization or institution that will depend on the construction of

their culture that they exercise in the world of work.

Motivation Theory

In 1968 Frederick Herzberg (1923-2000) through his book "One More Time, How Do You Motivate Employees?" proposes a theory that refers to the fact that the human being is influenced by satisfaction that is the result of motivational factors that help increase the individual's satisfaction but have little effect on dissatisfaction; and dissatisfaction that is the result of hygiene factors, which, if missing or inadequate, cause dissatisfaction but their presence has little effect on long-term satisfaction.

Abraham Maslow's Hierarchy of Needs Theory

Abraham Maslow representative of humanistic psychology. Support in your theory of needs an analysis of the factors that influence the development, motivation and personal fulfillment of a human being. graphically, his theory consists of a pyramid that hierarchizes human needs. His theory acquires very visual information as it is structured in the image of a pyramid that contains five different sections.

Homeostatic theory of well-being

Homeostatic theory of well-being Social psychology borrowed the term homeostasis, typical of biology and ecology, to be applied to the subject of psychological well-being. According to the dictionary, homeostasis: "is a characteristic of an ecosystem that resists change and maintains a (self-regulatory) state of balance. It is also defined as the tendency of a living organism to stabilize its various physiological constants. (The little illustrated Larousse 2007, p. 530). With this notion in mind, Cummins and colleagues (2000; Cummins, Eckersley, Pallant, Van Vugt, Shelley, Pusey, & Misajon, 2001; Cummins, Eckersley, Pallant, & Davern, 2002) developed their homeostatic theory of subjective well-being. This theory indicates that subjective well-being operates at an abstract level, that is, non-specific, which can be measured -in the case of life satisfaction- by asking: "How satisfied are you with your life as a whole?". Despite the generic nature of the question, the answer that people give reflects their general state of subjective well-

being, which is the level at which the homeostatic system works as a consequence of adaptation (Durán, 2010).

II. Research Methods

This section of the research shows the methodological design that was carried out, in order to fulfill the objectives of this study, in which the type of research, study subjects, instrument, materials, procedure and resources are described.

Kind of investigation

The type of research of this work is qualitative since according to Blasco and Pérez (2007) (cited in Ruiz, 2011), they define that a qualitative research analyzes the real and natural context on a study objective, interpreting the qualities of the people involved, using different instruments such as interviews, observations, life stories to obtain information that people describe from their point of view.

Participants

The human resources of the upper secondary education institution in the Mayo region are divided between teaching and administrative staff, adding a total of seventy subjects. The sample is probabilistic, because all the elements of the population have the same chances of being chosen for the sample, which is based on obtaining defined characteristics of the population, as well as the size of the sample, and by a random selection of the sampling or analysis units (Hernandez et al, 2014).

This sample was selected so that each person surveyed has the same probability of being included; There is no universal method to select a random sample from a population of interest, but the method used will depend on the characteristics of the population. However, all random sampling methods have a similar goal: to give all elements of the population an equal chance of being included in the sample.

Instrument

It was taken from Quiroz et al (2021) of 31 items that evaluates three dimensions related to the quality of work life. The dimensions that were evaluated were quality of life (8 items), organizational management (10 items) and organizational performance (13 items). Each of the items was answered based on the Likert scale with values 1 to 5 to which the following categories were accommodated: Totally Disagree (scale 1), Disagree (scale 2), Neutral (scale 3), Agree (scale 4) and Totally agree (scale 5), three types of validity were evaluated: content, criterion and construct.

Process

The process to be carried out was to apply the quality of work life instrument to all the participants, to later carry out a focus group with the subjects to obtain more detailed information. Using the focus group technique helps us collect detailed data and analysis information as a means of organizing the results (Silveira et al., 2015).

Focus group

According to Gibb (1997) the main objective of the focus group is to make attitudes, feelings, beliefs, experiences and reactions emerge in the participants; In addition, compared to the individual interview, focus groups allow obtaining a multiplicity of views and emotional processes within the context of the group (Escobar & Bonilla, 2017). The steps for conducting a focus group are described below: setting objectives, research design, developing the schedule, selecting participants, selecting the moderator, preparing stimulus questions, selecting the meeting site, developing the information session and analysis.

The focus group was carried out with the participation of 11 attendees to investigate the most relevant aspects of the quality of work life experienced in the contingency period by COVID-19.

Analysis of the results found through artificial neural networks.

This statistical method consists of solving problems and obtaining generalities individually or combined with other methods, for those tasks of

classification, identification, diagnosis in which the data/knowledge balance leans towards the data (Asanza & Olivo, 2018).

Simón (1999) found that ANNs (Artificial Neural Networks) are used in fields as diverse as modeling, time series analysis, pattern recognition, signal processing and control by virtue of an important property: the ability to learn from data. input data with or without a teacher (Montaño, 2002).

The basic structure of a neural network according to Olabe & Basigain (2001, p. 2), a neuron constitutes a fundamental unit within a nervous system, each neuron is a processing unit that can receive and send signals to other units, and so on. , if an input system is strong, a specific output is activated (Asanza & Olivo, 2018).

In the construction of the neural network model, a neural network was used, with a multilayer perceptron-type architecture of two hidden layers with a hyperbolic Tangent activation function and a Sigmoid output layer activation function. In the analysis of the variables, they were standardized and the IBM SPSS Statistics 26 software was used. The following figure shows the structure of the designed ANN model.

III. Results

The results of the focus group and the use of artificial neural networks to analyze the quality of working life of a Higher Education institution in the South of Sonora, through the statistical package for the social sciences (SPSS) version 26, were satisfactory, obtaining the following results. Regarding the questioning, teleworking can improve the quality of work life. The attendees argued that there are advantages, disadvantages and different perspectives on teleworking, according to each individual's own situation, such as their lifestyle, their personality and the type of activities of their position.

As for the benefits, there were for having worked from home. The attendees expressed that they had a reduction in stress due to saving time and money in moving from home to the workplace and personal image projection. In addition, they

mentioned that the institution acted in an ethical and empathetic manner with employees who are fathers or mothers of families, giving flexibility to care for their children, who were also in confinement receiving classes virtually and requiring support from their parents.

In relation to the advantages that they perceived from their area of working from home. Attendees commented that health care played an extremely important role for their mental and physical well-being, as well as for their families. The action of the institution was considered positive and benevolent. They mentioned that there were no cuts in personnel, but in budgets in general, so carrying out some activities in their areas was a bit difficult to carry out. Due to the fact that no one was prepared for a situation of this nature, new labor criteria began to emerge, empathically, not formally established, for example, the flexibility of telecommuting when required in certain types of circumstances in which employees do not can attend the venue physically.

They mentioned that they reinforced the sense of work responsibility, as well as new technological skills. A disadvantage mentioned by the attendees was the lack of computer equipment in their homes, basic office furniture, adequate work spaces and technical resources-consumable materials.

As for the tools needed to work from home. More than half of the attendees answered yes, but some people expressed that they had to make adjustments in their homes, acquire computer equipment and install internet and communication networks. Some had difficulties with internet service due to the geographical area where they reside, so when they could not fulfill their obligations, their colleagues had to support them in carrying out their activities. Given the problems that arose, the institution's library area facilitated the loan of laptops to administrative personnel so that they did not have to buy one. According to what a participant commented, the same situation leads you to adapt to the needs and circumstances. In addition, he commented that there was not really a fixed work schedule, due to the circumstances that their areas presented in the service they offer, so there was an emphasis on the application of individual professional ethics.

Regarding the balance of work between the quality of personal life and the level of quality of life that the institution gives them. The attendees answered yes, since the institution behaves in a noble way due to the flexibility that exists and there are no direct sanctions on salary, therefore the workers perceive that they have a good level of quality of working life.

Regarding the training they received to adapt to teleworking as it was considered. The attendees stated that they received sufficient training to adapt to the remote mode of work. The institution trained academic and administrative staff to use Google's virtual platform with all its application packages named "Gsuite". A member of the focus group mentioned that people must be open to adapt to new systems, and also commented that, in his experience, there were areas that showed

resistance to technological adaptation. Some workers expressed that they had the ability to see new opportunities for improvement in their processes, facilitating their functions and benefiting their clients.

In the case of carrying out the neural network model, Figure 1 shows the use of a multiplied perceptron-type neural network with two hidden layers with a hyperbolic tangent activation function and an output each activation function.

Artificial neural network results

Table 1 shows the results of the variable dependent on the type of contract, where the type of temporary contract predominates.

Table 1

Model Summary

Training	Sum of squares error	5.938
	Percentage of incorrect forecast	15.1%
	Stop rule used	1 Steps in a row, no decrease in error *
	Training time	0:00:00.00
Test	Sum of squares error	2.166
	Percentage of incorrect forecast	17.6%

Dependent variable: What is your type of contract

a. Error calculations are based on the test sample.

Source: self made.

De manera general, el modelo muestra que la importancia de las variables independientes según la tabla 1 se muestra con una importancia

normalizada del 100% de estar orgulloso del trabajo que realiza en la institución

Table 2

Importance of independent variables

Ítem	Importance	Importance normalized
I am proud of my work that I do in the institution	.171	100.0%

I am satisfied with the quality of work life that I have.	.170	99.4%
The relationship with my co-workers is adequate for a healthy coexistence at work.	.119	69.7%
The degree of satisfaction is adequate for my professional performance	.092	54.2%

Source: self made.

Table 2 shows the normalized importance of the best evaluated items, where the predominant one is I am proud of my work that I do in the institution.

Table 3

Result by dimensions

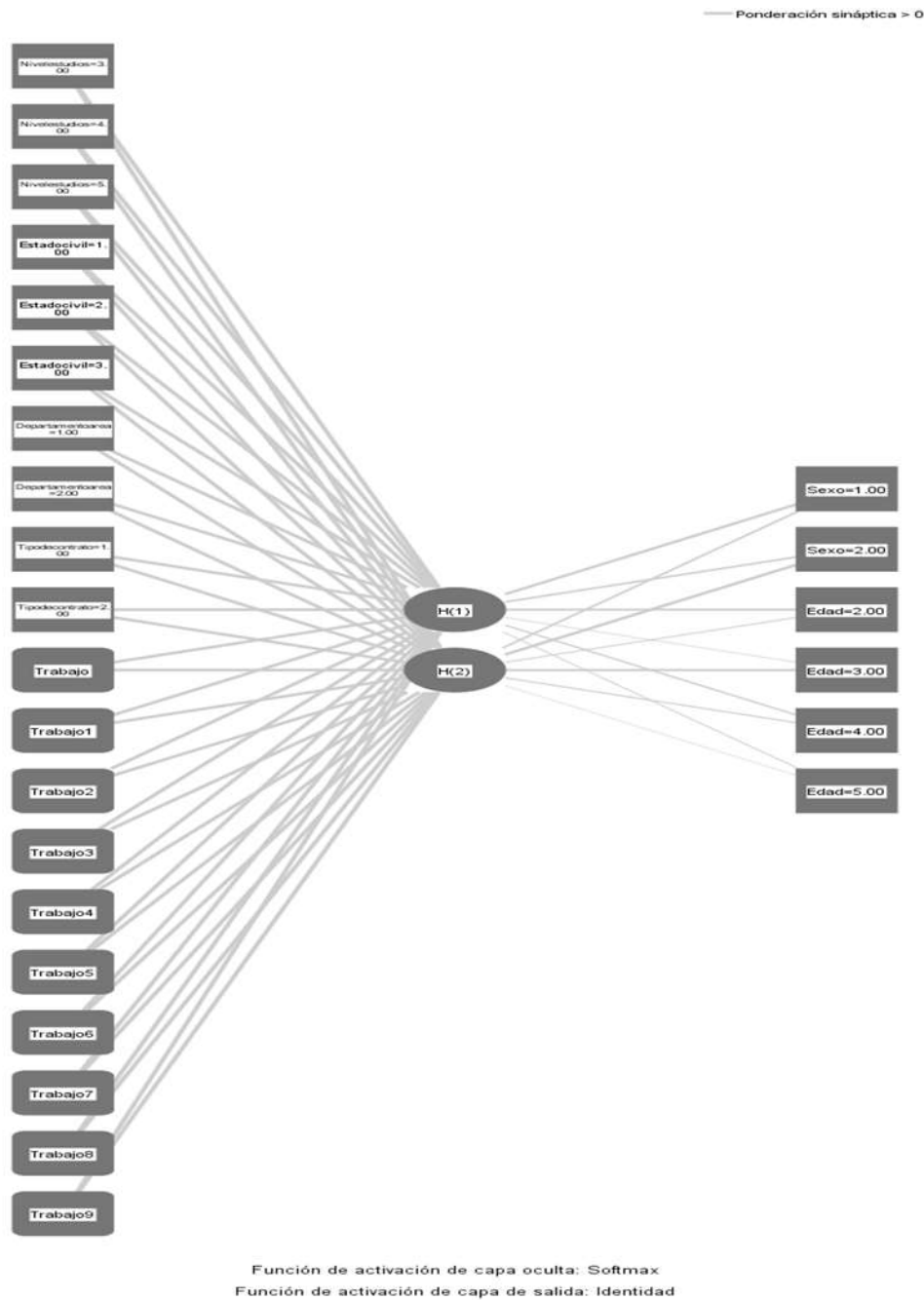
Indicator by dimension	Half
Organizational performance	94%
organizational management	93%
Quality of life	100%
General result of the study	95%

Source: self made.

Table 3 shows the general results for each of the variables, where the best evaluated is quality of life with 100%, organizational performance with 94% and organizational management with 93%, having a general result of the study of the 95%.

Figure 1.

Neural network for the prediction of quality of working life variables



Regarding the summary of the model, it is observed that there is a significant relationship to the female sex with 55.7% and in terms of the

predominant age it ranges between 31 to 40 years with 42.9%.

IV. Discussion

The objective of the research was to analyze the Quality of work life of a Higher Education institution in the South of Sonora, through the analysis of artificial neural networks; where a result of 4.75 was obtained on a scale of one to five; considering it to percentage a general 95% of the study. Where the population is 58% married, 51% academic staff, and 49 administrative. With a level of studies 61% postgraduate, 28% undergraduate and 11% preparatory. The predominant age level with 42.9% ranges between 31 to 40 years of age.

It was possible to observe the correlation of results with the methods used in this research of the focus group and the use of artificial neural networks, obtaining that the most influential dependent variable of the quality of life at work is the type of hiring of contract personnel and being the reagent I am proud of my work that I do in the institution with the highest degree of importance. These methods can be replicated and used in institutional diagnoses and subsequent studies.

Of the results obtained, the two lowest reagents were I agree that my superiors show interest in the quality of life in the institution with a degree of normalized importance of 20% and the reagent I consider that my proposals are listened to and applied with a degree of normalized importance of 28.60%.

Therefore, it is extremely important to continue carrying out this type of research related to this issue of quality of life at work, because the human factor of any organization is the most valued.

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