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IDENTIFICATIONS OF ABSENT FACTORS TO GENERATE SECOND-ORDER CHANGES IN UNDERGRADUATE STUDENTS ABOUT THE FUTURE LABOR MARKET

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ABSTRACT

The objective focuses on the identification and development of behavior patterns in the activities of the individual in the organization on the disposition to acquire new competences that allow to generate the change, as well as the formal management of the acquired knowledge are necessary elements to generate the change of second order. In this work we propose a mechanism with cognitive and emotional elements that activate the declarative knowledge (explicit) that is developed from behavioral knowledge (tacit) through the OSAR model, the perceptron type training algorithm is implemented to classify the synaptic weights on the threshold of activation on the cognitive and emotional elements in causal relation with the elements of knowledge management, competence and availability to change. Thus, the neural network allows the generation of the synaptic weights matrix to predict the processes of structural change evaluation and the second order changes (SOC) in order to generate learning in the organization.

Keywords

Knowledge management, second order change, cognitive, emotional, neural networks

GELECEK İŞGÜCÜ PIYASASINA KATILACAK LİSANS ÖĞRENCİLERINDE İKİNCİL DERECEDE DEĞİŞİKLİK YARATACAK FAKTÖRLERİN BELİRLENMESİ

ÖZ

Organizasyonda bireyin faaliyetlerinde, değişikliğin yaratılmasına izin veren yeni yeterlilikler edinme eğiliminde davranış şekillerinin tanımlanması ve geliştirilmesine ve ayrıca edinilen bilginin resmi yönetiminin, ikinci dereceden değişikliktir. Bu çalışmada, OSAR modeli aracılığıyla davranışsal bilgilerden (örtük) geliştirilen bildirimsel bilgiyi (açık) aktive eden bilişsel ve duygusal unsurları olan bir mekanizma önerilmektedir, sinaptik ağırlıkları eşik üzerinde sınıflandırmak için algılayıcı tipi eğitim algoritması uygulanmaktadır. Bilgi yönetimi, yetkinlik ve değişimin kullanılabilirliği unsurları ile nedensel ilişkide bilişsel ve duygusal unsurların harekete geçirilmesidir. Böylece sinir ağı, sinaptik ağırlık matrisinin oluşumunun, organizasyonda öğrenmeyi sağlamak için yapısal değişim değerlendirme süreçlerini ve ikinci derece değişiklikleri (SOC) tahmin etmesini sağlar.

Anahtar Kelimeler

Bilgi Yönetimi, ikinci dereceden değişim, bilişsel, duygusal, nöral ağlar

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1. INTRODUCTION

In the multidisciplinary field of cognitive science converge computational models of artificial intelligence and experimental techniques of psychology trying to develop precise and verifiable theories about the functioning of the human mind; (Russell, et. al. , 2004). Our argument focuses on the relationship of strategies with cognitive and emotional bases on changes in learning and transformation of the individual in organizational development (OD). Based on the observer, system, action and results (OSAR) model (Echeverria, 2009), the analysis is subject to conditions on the specific actions in each system in which the competences and the emotional intelligence of the individual, as observer for the generation of knowledge, intervene. The dynamic interactivity with the systems by the individual can be a trigger and generator of important decisions in the organization, and even better, if these decisions are socialized in a group of experts for validation (Nonaka &Takeuchi, 1999). Many times, decision making involves producing profound changes with a perspective of stability and well-being in organizational behavior. However, the incorporation of new repertoires of action or changes of the observers is not enough, but it is necessary to modify the system (Watzlawick, Weakland &; Fisch 1974; Huff 2002, Echeverria, 2009). Thus, if the change of the observer is insufficient, it is necessary to convert new leaders capable of modifying the strategies of action in the systems Tichy (2004), so that the observer becomes his own evaluator of his results, and when these are not satisfactory lead to an ontological problem, which requires the observer's deepest reflection on the obtained results based on its boundaries between the biological and ethical domain that are manifested, Echevarría (2009). The failure to obtain the desired results the observer falls into justifications about the unsatisfactory results and the possible relationship that these have with the so-called outsourcing, which result in elements for the observer to be shielded from all responsibility, according to the obtained results and provokes the routinization of vices (Nelson R. R. 1991, Winter S. G. 1982). In this sense, the modifications of the actions intervene to obtain different results, known as first order change. Moreover, if this does not satisfy the demands of the moment, it requires analysis and deep reflection in order to enrich learning, which forces new ways of acting in formal schemes of transformational learning with a view to modifying the structures of the system, known as second order change (Bartunek et al., 1987, Echevarría R. 2009).

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The changes and experiences of learning focus on the core of the observer and this can be different orders and interventions at different levels of depth. The learning experience intervenes in a conservation and knowledge management process, which regularly tends to be greater than transformational learning (Probst, et al 2001, Echevarría R. 2009). However, transformational learning directly impacts the individual and their relationships with the environment. Thus, the possibility of altering perspective in its instrumental (technical) relationship and its ethical domain are permanent. That is, there is a metanoia in the individual, Echeverría (2009).For the purpose of relating the theory of organizational development on the OSAR model and the cognitive and emotional influence on the second changes (SOC) that intrinsically intervenes the competences (C), the knowledge management (KM). We present a focus on synaptic weights on the network of cognitive and emotional variables (subjective) with the level of response in organizations facing the current demands of the market, which demands skilled labor, adaptability to stochastic changes and the management of expertise.

Organizations in the global economy face more and more competition each day in the face of the increasingly demanding market and how to process information in the short term so as not to be left out of the market itself. The quick adaptation of the changes with a flexible policy and committed to rapid and often radical changes, Robbins P. S. (1999). However, changes are accompanied by other dimensions such as emotional intelligence, knowledge management and the formation of well-designed skills that facilitate changes in strategies. Thus, in the processes of teaching and training there are levels and stages that are conforming of structure and composition towards a specific profile, so that the accompaniment in the learning process (incubation), will be fundamental to reach the objectives raised in the training. This training process is related to elements of emotional intelligence of the individual for acquisition of skills (S), availability to change (AC) and knowledge management (KM). This conversion of knowledge may be in partial agreement with the adaptive control of thought model (ACT), (Anderson J.R., 1976; Anderson J. R. 1983) proposed by cognitive psychology.

The structure of this paper is composed of: 1) Introduction of the elements that intervene in relations with cognitive and emotional bases with the dimensions of analysis: knowledge management, availability to change and competences, 2) Individual's cognitive and emotional influence as a theoretical basis in organizational behavior, which is divided into: 2.1) Cognitive and emotional relationship with knowledge management

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and competence, 2.2) Cognitive and emotional relationship with availability to change and competencies, 3) OSAR model adapted to knowledge management, competencies and availability to change, the model is included in the first order change the intervention of knowledge: tacit, experience, simultaneous and analog; and in the change of the second order, knowledge intervenes: explicit, rational, sequential and digital for a transformation of structures. 4) Training algorithm (perceptron) of the system as an instrument of weight valuation between those desired in the labor market and the reality of the graduate. 5) Method is a survey of 78 reagents to 480 students and seven professionals related to the labor market. 6) The results obtained through the neural network. 7) Discussions about to results and theory. 8) Conclusions and 9) References.

2. COGNITIVE AND EMOTIONAL INFLUENCE

According to Goleman (1998) emotional intelligence is the capacity that determines the learning of practical skills based on one of the following five compositional elements: self-awareness, motivation, self-control, empathy and the ability to relate. Likewise, Extremera and Berrocal (2002): "Emotional Intelligence is the ability of people to attend and perceive feelings appropriately and accurately, the ability to assimilate and understand them adequately and the ability to regulate and modify our state of encouragement or that of others. " So, emotional intelligence intervenes in the daily activities of human beings and their development.

Emotions and feelings are collected from people depending on the area with which they have some kind of partial or permanent relationship with the social environment. Vargas (2013), establishes some of the basic principles that have demonstrated the importance of emotions and feelings in people's lives: human beings have basic emotional needs; each one has similar emotional needs, although different; emotional needs vary more in degree than in type; emotional needs vary more than physical needs; destructive feelings are indicators of emotional not found needs; the feelings are real and not debatable; invalidation destroys self-esteem; High self-esteem is needed for productivity, satisfaction at work and service to others. These elements are essential for group harmony, which in turn becomes mutual satisfaction of needs and mutual respect of feelings. There are several types of patterns that manifest the emotions of the human being, and the importance of communicating them. The more communication people express emotions and potentiate them by linking and connecting social networks,

emotions can serve as an internal moral and ethical compass and emotions are essential for good decision making. On the other hand, and according to Goleman (1998) he defined the characteristics of emotional intelligence: Independence (each person contributes a unique contribution to the performance of their work); Interdependence (each individual depends to some extent on others); Hierarchy (the capacities of emotional intelligence reinforce each other); Need (but not sufficiency, owning capabilities does not guarantee that they will end up being developed); Generic (usually applied to all jobs, but each profession requires different skills).

Cognitive and emotional process

In the development of second order changes, the individual intervenes as an initiator of changes and transformation in the organization, which forces us to consider cognitive and emotional processes. So, we resort to the description of variables using the Bar-On model, in which the individual is related to people inside the organization, as well as the external environment (networks). Thus, five components of the model are derived: intrapersonal, interpersonal, adaptability, stress management and general mood (Bar-On et al 2000, Ugarriza, 2001). In turn, Saarni (1990) describes emotional competence as the inclusion of eight interrelated emotional and social skills, which were demonstrated by Bar-On R. (2006), which when combined determine the effectiveness of human development:

Intrapersonal component-ability to understand and express our emotions and feelings. They are related to the variables: emotional self-knowledge, assertiveness, self-esteem, self-development and emotional independence. It evaluates the general self-identification of the individual in emotional self-awareness, assertiveness, self-realization and emotional independence and self-awareness. It comprises the following subcomponents: emotional comprehension (EC) of the self, assertiveness (AS), self-concept (SC), self-realization (SR) and Independence (IN).

Interpersonal component - ability to understand the emotions and feelings of others and to relate to other people. Then, the variables refer to empathy, social responsibility, and social relationships. The subcomponents are the following: empathy (EM), interpersonal relationships (IR) and social responsibility (SR).

Adaptability-ability component to manage change and solve intrapersonal or interpersonal problems. It refers to the ability to correctly assess reality, to be flexible in

the face of new situations, as well as to create solutions and solve problems. It includes the following subcomponents: problem solving (PS), reality test (RT) and flexibility (FX).

Component of stress management-ability to manage and control our emotions. It refers to the ability to tolerate pressure and to control impulses. It includes the following subcomponents: stress tolerance (ST) and impulse control (IC).Mood component-ability to generate positive attitudes and to self-motivate. It refers to optimism and happiness. This last variable acts as an indicator that measures the general degree of our social and emotional functioning. Optimism refers to the ability to know how to enjoy the presence of others, in addition to maintaining a positive attitude in adverse situations. Satisfaction refers to the ability to be satisfied with oneself and one's life. It includes the following subcomponents: happiness (HA) and optimism (OP).

2.1 Cognitive and emotional relationship with knowledge management (KM) and competences (C)

The creation of organizational knowledge should be understood as a multiplying effect on all systems that make up the organization, so that the contributions made from the individual will have their fruits in the well-being for everyone in the organization and later, in society; the crystallization of these multiplier effects are manifested through the networks of knowledge. The origins of knowledge have their foundation from the epistemological dimension Polanyi M. (1966) Nonaka & Takeuchi (1997), who established the difference between tacit knowledge for first order change and explicit knowledge percussion transformation in formal and systematic language.

Labor, educational and leadership competences have a strong relationship with the acquisition, innovation and transfer of knowledge to generate second-order changes in organizations (see figure 1). For Nonaka & Takeuchi (1997), the evolution of knowledge has its origins in the beliefs and thoughts of people, knowledge is classified into tacit and explicit knowledge: tacit knowledge, consists in threefold: knowledge of the experience, the learning acquired by the person through the senses and corporal abilities; the simultaneous knowledge where its function is presented at the moment of applying it, that is, the here and now, the sensitivity of experimenting with the available resources at the moment and, the analogous knowledge, this has its effect of practical actions, (Aduriz-Bravo, 2001). On the other hand, explicit knowledge influences three types of knowledge as well: rational knowledge which is developed on the basis and application of scientific

methodology, aware of the self-criticism that promotes the evolution of one's knowledge; sequential knowledge with the visionary perspective on future events and predictions of agreements to the learned patterns; digital knowledge, the transformation of all those elements that make up knowledge and register it in a theoretical way for a complete socialization that generates autonomy (see Figure 1).

The main purpose of the knowledge-creating organizations is to generate certain autonomy and competitiveness, expressed as an autopoietic system, Matura H. Varela F., (1980). In business organizations, self-organizing teams provide powerful tools to adapt the circumstances in order for individuals to act autonomously. But everything demands a preparation and training, in turn induces the type to change and stability of the structures that consciously dispose to operate using different individual approaches, Bartunek, et al (1987). The training can be divided into three types Nonaka & Takeuchi (1997), type "A", similar to a relay race, in which group relations are independent, likewise, their development is clearly separated from each other , that is, the courier is passed from one group to another; the second type "B" (sashimi system in Fuji Xerox), where the relationship is minimal, but sufficient to function as a kind of incubation when they are in intersection, and the "C" type where the levels of involvement and relationship between groups is more extended. In this stage, the interaction of the organization and the external environment is stimulated.

The training processes have fluctuation, which is different from the total disorder and is characterized by the "order without recurrence" a type of order whose pattern is difficult to predict at the beginning, (Gleick, 1987). So, the processes of prediction and measurement of knowledge can be affected by other factors; it is difficult to consider knowledge as an asset in current accounting systems, so that it remains hidden Probst G. et. al (2001). Then, the need arises to incorporate cognitive and emotional aspects that are related to the knowledge acquired in the different stages of formation of the individual in the organization. Regularly, attention is focused on aggregating financial indicators that do not show causal relationships, therefore, we cannot know how much these aggregated figures affect changes in the knowledge base, Probst G. et. al (2001). On the other hand, Burgelman R. A. (1996) affirms that competences promote learning. Likewise, Chang (1996) says that learning allows diversification and corporate success. The competences in the modified OSAR organizational system (Figure 1), advance through different stages of development, starting from the total lack of understanding of the causal relationships

involved, or in the routinization of the knowledge acquired in their representations: tacit, by experience, the simultaneous and the analog; in a state of first order change. And when this state is unsatisfactory, it forces the reprogramming of training processes and the formalization into a more complex knowledge represented by: explicit, rational, sequential and digital as a basis for second order change. In an organization, knowledge can be evaluated by adopting an evolutionary model of competences in the search for: influences, how to measure them, control and stability (statistical methods); followed by the prediction, understanding and identification of patterns that identify cause and effect relationships on knowledge, Probst G. (2001).

2.2. Cognitive and emotional relationship with the availability to change (AC) and competences (C)

Today's organizations face a dynamic and changing environment, immersed in the factors that affect the nature of workforce, technology, economic crises, the demand for specific skills, social trends and world politics; Robbins P. S. (1999). In this sense, the behavior and organizational performance strongly influences the cognitive and emotional elements on the new increasingly complex challenges, according to Jellison JM (2007), the behavior of the worker's performance is shown in the curve of J (according to his form), which has five stages: the first "the plateau", in which the new strategies conflict with the comfort state of the workers, who operate with established patterns. The individual feels comfortable, or else in a state of programmatic behavior, Davenport, (1999); propitiated by the stability of thought and economy where the risks tend to zero and the execution of a change is reduced to an oppression to it, Jellison J. M. (2007). Thus, a process of routinized in the behavior of the individual is established (Nelson R. R. 1991, Winter S. G. 1982). In this stage, it triggers an automatic resistance to the information and to its refutation that natural are guided and developed in dominant emotions by fear and anxiety. When it is not known exactly what a change will imply a lack of knowledge and information (Probst, et al, 2001) that result in anger and negative effects on the state of mind, Colleman (1996). At this stage he has an approach to the emotional cliff and falling into the cliff. Second stage: "the cliff", the awareness of facing new challenges and ways of doing things creates uncertainty and entropy in individuals. Where the patterns of the first stage are reversed and with it, the growth of consecutive failures, similarly with the state of emotions. In a natural way, a defense or resistance mechanism is created. When

the new forms do not work, almost always resort to return to previous practices, the seduction of the past becomes stronger presenting a strong opposition or "inertia" according to Huff S. A. et al. (2002). Followed by the third stage: "the valley", significant positive changes can be presented, when the mastery of the tasks is being successful, they encourage a motivation, however, the failures may persist, in a trial and error trajectory that will result costly Although the performance can decrease and with it the negative effect, their worst fears have already been overcome, and over time the successes begin to accumulate and mood is positive. Continuing with the fourth stage: "the ascent", the performance improves substantially and with it, the emotions activating the motivational factor. As the curve begins to rise, people respond to problems and possible solutions and start the constructivist and formal quest to solve contingencies (Nonaka, Takeuchi, 1997). Finally, the fifth stage: "the top", from the second stage to the fourth the performance was below the level of the plateau. With the accumulation of promotions reaches the level of tie with the old way of doing things (plateau). Now the workers are skilled in the new way of doing business, during this stage the performance is increasing and the accumulation of successes generating tension favor change (Huff S. A. et al., 2002), substantially reducing errors and reducing costs, and thus, propitiate availability to change.

3. OSAR MODEL ADAPTED TO KM, C AND AC

The proposal starts based on the OSAR model, focused on the analysis of emotional intelligence and knowledge during the process of induction, training and operability that affect the satisfaction of the parties involved. The system contains the observers as the elements of participation on organizational development, which affects the set of actions according to the competences, autonomy and reinforcement of the processes of transformation of goods and services marked by the understanding, acceptance and alignment of the current strategy (Davenport T. 1999, Huff SA et al. (2002). The actions are evaluated by the observer (Echevarría, 1999) through tacit knowledge, experience knowledge, simultaneous knowledge and analogical knowledge, Nonaka and Takeuchi (1997) So, when evaluating, it will be possible to establish whether there is satisfaction according to the expected patterns, being positive it will be in a state of first order change, (Echevarría, 2009), or of routinization, Nelson RR 1991, Winter SG (1982), otherwise, the organizational behavior will be in a state of uncertainty and discontent, which forces to reformulate the strategies. New strategies in the organization may create even more

uncertainty at the beginning, however, the conscious modification of the present scheme in a particular direction to the new structure, Bartunek et al (1987), and with the socialization of the new objectives and vision to improve the current situation to reach acceptable levels on the new provisions, this obliged to establish an induction and training program aligned to the new strategies. Meanwhile, there will be those who are in favor of the new initiative (increase of Stress) and those who do not (increase in Inertia), generating a dichotomy between both parties. What demonstrates the "discontent" and availability to change, which is related to the motivation and emotional stability of the staff, therefore, there are barriers of second order change, Peggy A. (1999). In this sense, the availability to the second order change will be when the tension (stress) is greater than the inertia, Huff S. A. et al. (2002).

When there is availability of the workforce for change, the formalization process begins based on the relationship of emotional intelligence with knowledge management: explicit, rational, sequential and digital; the relationship between the emotional situation and the new competences that motivate the purpose of organizational change, White R. W. (1956); and the relationship between emotional situation and availability to change (Huff S. A. et al., 2002). Thus, training of members of the organization aware of the new scheme is required and thus, more available to the change they see in a clear way, or a change of the third order, Bartunek et al. (1987).

Training occurs in the relationship between the dimensions of competence, knowledge management and availability to change are applied in a perceptron-type neural network, the input variables being the emotional intelligence of the individual. It is thus, in the formalization of the system where we want to know the prognosis of transformational learning that allows to consolidate the second order change, Figure 1.

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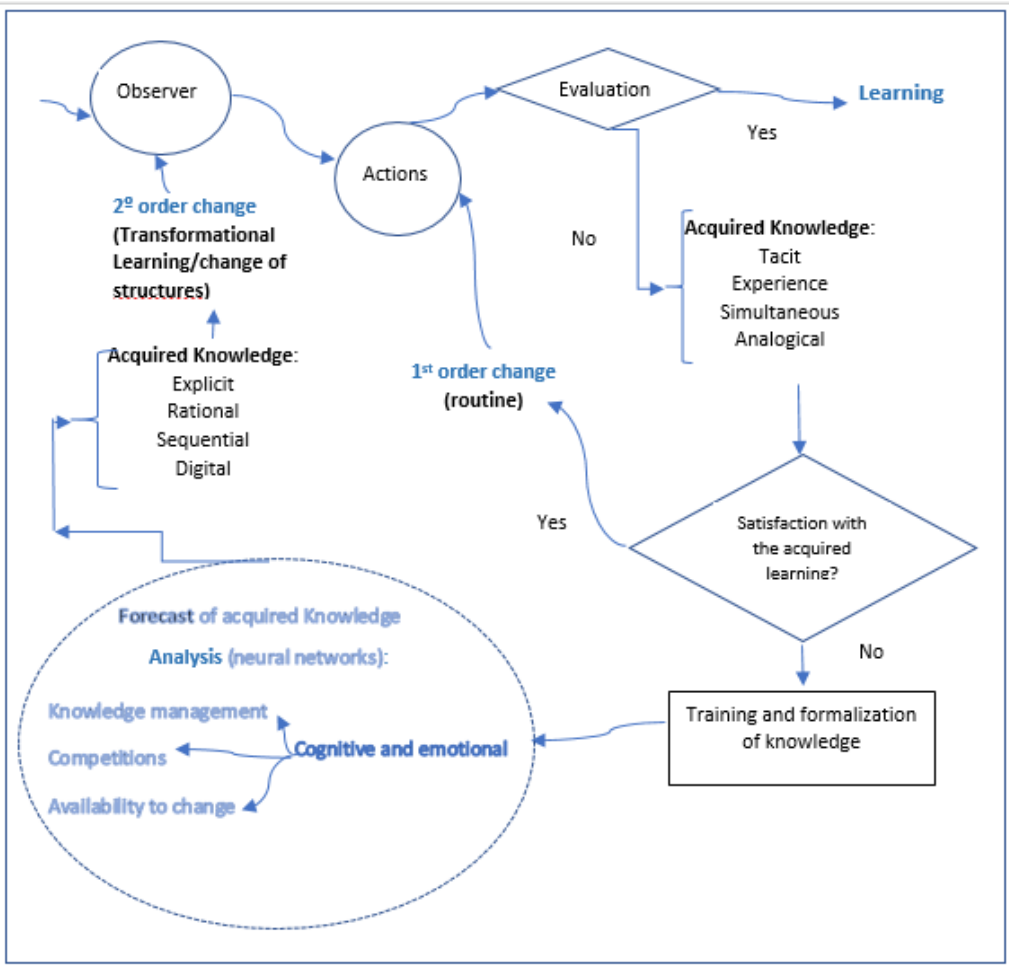

Figure 1. OSAR model adapted to KM, C and AC

4. SYSTEM TRAINING ALGORITHM

Many valuations on the performance of personnel in the training, acquisition of knowledge, skills and training of the people results in having very few reliable bases of consolidation to guarantee efficiency, since there are no tools that allow to value the qualitative (intangible asset). And even more so when you want to make predictions or forecasts about the levels of learning and knowledge acquisition of individuals and, often it turns into responses with a high level of subjectivity, according to the appreciation of the knowledgeable people of the topic to be evaluated for the best of the cases. So, it is necessary that the assessments can be made through the analyzed information on the knowledge base (Matviychuk A. 2006, Probst G. 2001) and thus, have consistent basics on decision making, but when requires formalizing the findings is even more complex. However, due to this subjectivity, a tool is used that can value these assessments through

linguistic labels transformed on a quantitative basis (considering the knowledge base), and if, in addition, there are multiple factors that intervene in the conceptualization of the variables and their different weights for each variable, under these conditions it is very complicated to arrive at the solution manually. Therefore, these phenomena with so many variables and weights are treated with neural networks that are part of artificial neural networks and through several successions of registered values according to the knowledge base; new values can be obtained in the network output, and thus, the neural networks model learns to optimize these parameters represented in their minimum deviation between the forecast and the data of the knowledge base. The knowledge base allows to establish the set of rules that are necessary to formalize the entry and exit of the variables. The assignment of the set of input variables, $\{x_1, x_2, x_3, \ldots, n_n)$ and the proposed output values.

The artificial neural networks only emulate a very simple part to what is the functioning of the human brain, Ponce C. P., (2010). However, the application of this tool allows the starting point to represent the rules and additional instructions, with which the development of the phenomenon is described. The neural network is generalized through the learning model through the comparison of neuron results with respect to previously identified patterns, so that we have a forecast of the behavior of the phenomenon, wishing it to be the minimum possible value on the criteria of quality and the optimization of these criteria and decisions, according to:

$$\varepsilon_i = (t_i - a_i) \quad (1)$$

Where: t_i is the expected exit value for the model, while a_i is the real neuron value, representing the i stage of learning.

There are many approaches in which the development of minimizing the learning criteria of the neural network is specified. The application opportunity of many algorithms depends on the type of membership function. The estimation of the error with propagation Networks, the initiation in weights and random activation threshold, in cycles (epochs) of training, in the transfer function; log-sigmoide, Hagan T. M. et al. (2015):

$$a_i = \frac{1}{1+e^{-n}}, \quad 0 \leq n \leq 1 \quad (2)$$

therefore, the transfer function in MatLab code is:

$$a_q = logsig(w_{qj}p_q + b_k) \quad (3)$$

Where:

$$a_q = neuron\ exit$$

$$w_{qj} = weight\ matrix$$

$$p_q = training\ pattern$$

$$b_k = activation\ threshold$$

The weights are adjusted:

$$w = w + \varepsilon_q p_q^T \quad (4)$$

Activation threshold:

$$b_k = b_k + e_q \quad (5)$$

For the learning model, recurrent relationships can be used, which minimize the criterion of weights and activation threshold (Matviychuk A. 2006, Ponce C. 2010).

5. METHOD

The main objective is to know, if the students are prepared to face the change of second order according to the demands of the labor market. The analysis and processing of the data are performed in two stages, the first one gathers the data from the questionnaire to students graduated from the chemical-biological area at the Universidad Michoacana, Mexico, in three factors: knowledge management (KM), competences (C) and availability to change (AC). In addition, the survey is also applied to professionals, academics, managers of the chemical, pharmaceutical and clinical laboratories, which establish the learning vector. The survey is based on the model of Bar-On, 2000, which was applied to students in the degrees of Chemical Engineering, Chemical Pharmacobiology and Biotechnology of a total of 480 students of the last year of the degree and 17 external professionals. The data are collected from 78 items that are related to the cognitive and emotional elements and KM, C and AC factors; in turn, these make up the SOC and through the confirmatory factorial analysis and the mean on items (software: SPSS, table 1) of the survey the values are obtained in a range of [0, 1]. The second stage is the conformation of the matrices: p and me of the graduates and professionals (experts), respectively. Finally, the matrices are applied in a neural network

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of the perceptron type, with the aim of knowing those elements of (KM), (C) and (AC) that are weaker and able to establish strengthening strategies.

Table 1. Concentration of results of the confirmatory analysis survey (SPSS) in the three factors:

	Kaiser-Meyer-Olkin measure of sampling adequacy	Sphericity test Bartlett, χ^2	l d	Sig	% of cumulative variance by component	Number of components
cognitive and emotional vs KM	.800	563.329	210	.000	73.578	8
cognitive and emotional vs C	.699	155.231	55	.000	64.142	4
cognitive and emotional vs AC	.706	325.901	171	.000	41.065	3

Thus, the matrix p (table 2), is composed in the first eight columns to the knowledge management (KM):

A = administration by objectives, B = vision of the environment, C = knowledge spaces, D = construction of formal structures, E = comparative tests, F = knowledge assets, G = knowledge flow, H = adequate transfer of information.

The following four columns correspond to the competences (C):

I = mastery of fundamental competences, J = learning to know, K = learning to do, L = learning to convert.

And finally, the remaining three columns are for availability to change (AC):

M = availability to change, N = generate changes in structures, O = influence others to improve the work environment.

Likewise, the cognitive and emotional elements are in the rows of matrix p, (table 2):

EU = emotional understanding, AS = assertiveness, SC = self-concept, SR = self-realization, IN = independence, EM = empathy, IR = interpersonal relationships, SR = social responsibility, PS = problem solving, RT = reality test, FX = flexibility, ST = stress tolerance, IC = impulse control, HA = happiness, OP = optimism

The relationship of cognitive and emotional elements are arranged in rows and the elements of second order change are arranged in columns on the consultation with experts to form the incidence matrix p, (Kaufmann A. Gil A; 1988), which is expressed in perceptron code in MatLab, for the expected vectors (patterns) of each of the dimensions: Knowledge Management, Competences and availability to change, according to the matrix, p:

Table 2. Matrix p of the bachelor interns

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
CE	.57	0	.54	.65	0	0	.65	.64	0	0	.57	0	.57	.31	.57
AS	.54	0	.6	.54	.54	0	.54	.54	0	.54	.54	.54	.54	0	.57
AC	.83	0	0	.83	0	0	.58	0	0	.6	0	0	.63	0	.83
AR	.84	0	.63	.61	.63	.63	0	0	0	0	0	.77	.63	0	.63
IN	.78	0	0	.5	0	0	0	0	0	.8	0	.78	.6	0	.86
EM	.64	0	.53	.65	0	.76	.65	.65	.65	0	0	.61	.64	0	.49
RI	.65	.65	.65	0	0	0	.65	.56	0	.57	0	0	.65	.65	.65
RS	.37	.36	0	.83	0	0	.83	.83	.82	0	0	.37	.37	.77	.63
SP	.76	.62	.59	.61	.59	0	0	.62	.56	.62	.58	.76	.62	0	.82
PR	.66	0	.3	.66	.6	.76	.76	0	.58	.75	.75	.75	.6	.75	.58
FX	.59	.59	.59	.57	.59	0	.59	.59	.59	0	0	.65	.59	.59	.65
TE	.76	0	.79	0	.76	.76	0	0	0	.54	.55	0	0.6	0	.76
CI	.54	.54	.54	0	.54	0	0	.62	.56	0	0	.59	.54	.62	.86
FE	.58	0	0	.56	0	0	.59	0	0	.56	0	.51	.6	0	.83
OP	.63	.65	0	0	0	.63	0	0	0	.79	0	0	.75	.68	.78

The matrix of professionals (experts):

Table 3. Matrix of experts, me

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
CE	.83	**0**	**.88**	.9	0	0	.9	**.81**	0	0	**.83**	0	.83	**.81**	.83
AS	.77	0	**.81**	.59	.59	0	**.77**	.77	0	.77	.59	**.59**	.77	0	**.84**
AC	.83	0	0	.83	0	0	**.81**	0	0	**.83**	0	0	**.88**	0	.83
AR	**.88**	0	.88	**.87**	.76	.88	0	0	0	0	0	**.83**	.88	0	**.88**
IN	**.88**	0	0	**.84**	0	0	0	0	0	**.8**	0	**.86**	**.9**	0	.86
EM	.77	0	**.88**	.81	0	**.9**	.81	**0.81**	.81	0	0	**.75**	.77	0	**.71**
RI	.8	.8	.8	0	0	0	.8	**.9**	0	**.83**	0	0	**.8**	.8	.8
RS	.5	**.5**	0	**.9**	0	0	.9	.9	**.8**	0	0	.5	.5	**.88**	**.84**
SP	**.81**	**.84**	**.77**	**.77**	.76	0	0	**.84**	**.64**	.84	**.76**	.81	.84	0	**.88**
PR	**.77**	**0**	**.81**	**.88**	**.76**	**.88**	.88	0	**.75**	**.75**	**.75**	**.75**	**.77**	**.75**	**.61**
FX	.81	**.81**	.81	**.81**	.76	0	.81	.81	.81	0	0	**.83**	**.81**	.81	**.9**
TE	.83	0	**.88**	0	.76	.83	0	**0**	0	**.76**	**.83**	0	**.8**	0	.83
CI	.6	.81	**.81**	0	.76	0	0	**.81**	**.62**	0	0	**.8**	**.81**	**.77**	**.77**
FE	**.75**	0	0	**.64**	0	0	**0**	0	0	**.83**	0	**.76**	**.88**	0	.83
OP	.7	**.81**	0	0	0	**0**	0	0	0	**.86**	0	0	**.9**	**.81**	**.84**

The learning vector for the perceptron, is composed by the product of the matrix of experts, me and the activator vector of ones, as follows: $VI = [1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1] * me$. Thus, the multiplication of diffuse matrices, are combined with operators $max - min$.

$$\vee(\mu(a_1, b_2) \wedge \mu(b_2, c_1)), \ldots, \vee(\mu(a_1, b_3) \wedge \mu(b_3, c_1)), \ldots, \vee(\mu(a_1, b_4) \wedge \mu(b_4, c_1)), \ldots, etc \quad (6)$$

Then, the learning vector is: $soc = [.88\ .84\ .88\ .9\ .76\ .9\ .9\ .9\ .8\ .86\ .83\ .88\ .88\ .88\ .9]$

So, the code in MatLab, is considered the random process of the synaptic weights, w and the threshold of activation, b in an iterative process that goes from q = 1 to Q in the activation function aq = logsig (wpq + b), evaluating the error between the learning vector

(expert professionals) and the activation function of the matrix p, expressed as: eq = tq - aq, followed, by the update of the synaptic weights and the activation threshold ; finally, the iterative cycles are closed.

6. RESULTS SIMULATION

Result of the simulation in four cases of iterations of 100, 500, 750 y 1000:

Case 1: the simulation is through 100 iterations or epochs, so that a second order change can be generated, applying the code in MatLab:

Table 4. Simulation to 100 iterations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
eaverage (1.0e-04):	.008	.138	.066	.080	.425	.0001	.002	.013	.015	.009	.371	.228	.206	.038	.042
w =	-.984	.073	-.495	-.356	.261	.407	.330	0.091	-.056	-.673	.278	-.204	.565	-.279	1.282

b = 1.0789

The elements that present an important level to attend are the comparative tests (5 or E), followed by learning to do (11 or L), continuing in descending order for availability to change (12 or M) and vision of the environment (2 or B)

Case 2: SOC in 500 iterations:

Table 5. Simulation at 500 iterations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
eaverage (1.0e-05):	.041	.040	.206	.160	.420	.0002	.059	.006	.040	.055	.862	.270	.375	.003	.004
w =	-.30	-.185	-1.100	-.244	.716	.856	.536	1.248	-.855	-.649	.114	-.049	1.173	-.085	2.025

b = -0.6409

Here the elements to attend are 11 or K (learn to do), followed in descending by 5 or E (comparative tests), 13 or M (availability to change) and 12 or L (learn to convert).

Case 3: SOC in 750 iterations:

Table 6. Simulation to 750 iterations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
eaverage (1.0e-05):	.030	.019	.117	.131	.307	.0001	.052	.0005	.0360	.037	.648	.171	.239	.008	.005
w =	-.05	-.180	-1.267	-.394	.764	.786	.559	1.259	-.807	-.701	.140	-.060	1.181	-.149	1.723

b = -0.442

Similar to case 2, the elements to be addressed are learning to do, followed downward by comparative tests, readiness to change and learn to convert.

Case 4: SOC in 1000 iterations:

Table 7. Simulation to 1000 iterations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
eaverage (1.0e-05):	.023	.012	.081	.103	.234	.0002	.042	.0001	.029	.027	.496	.124	.173	.008	.004
w =	.007	-.191	-1.296	-.412	.778	.785	.567	1.287	-.811	-.702	.135	-.059	1.193	-.150	1.700

b = -0.4602

The summary of average errors and missing factors identifiers for the four cases that correspond to 100, 250, 750 and 1000 iterations are:

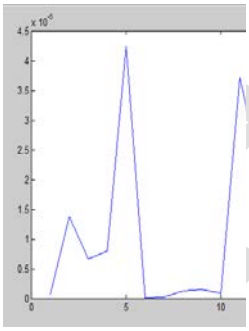

Figure 2. Avarege error for every 100 iterations

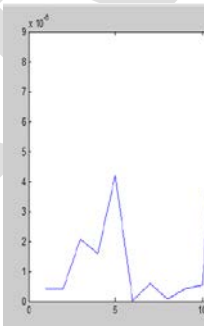

Figure 3. Avarage error for every 500 iterations

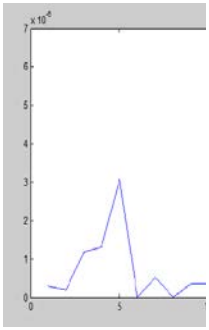

Figure 4. Avarege error for every 750 iterations

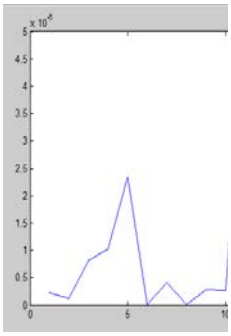

Figure 5. Average error for every 1000 iterations

Finally, in all the presented cases, there are four peaks of elements that have to be addressed in order to favor the SOC. The highest peak corresponds to the K (learn to do) of competences, followed downwards by E (comparative tests) of the knowledge management factor, the other peak is M (availability to change) in competition and L (learn to convert) also in the competences factor.

7. DISCUSSIONS

In the differences of errors between what is desired by the professional in the labor market and the real values of the students (Figures 2 to 5), four significant patterns are identified, which are difficult to assimilate by graduate. Thus, after more than 500 iterations the patterns identified are “Learn to do” related to competencies, with greater difficulty to assimilate, followed by “Comparative tests” related to knowledge management continuing with “Availability to change” related to availability to change and, finally, the one with the lowest degree of assimilation "Learn to convert" related to competencies. Then, it can be inferred that the graduate presents insecurity and ignorance of facing the provisions of the labor market. Which leads to the implementation of tasks that foster innovation and the development of behavioral knowledge (tacit), experience, simultaneus and analogical that generate a knowledge base, (Matviychuk A. 2006, Probst G. 2001), which a first order context, based on current needs. The evolution knowledge base, that subsequently be formalized in dissemination events to generate explicit, rational, sequential and digital knowledge (Nonaka & Takeuchi, 1997) through the modified OSAR model to consolidate the transformation of structures and achieve a Second Order Change.

8. CONCLUSIONS

In internal evaluation models, internal indexes are used, without clear evidence of how knowledge resources are being developed, compared to competitors. The skills and abilities of individuals are measured, but collective knowledge is neglected. It usually happens that only the inputs are measured (cost of training) and not the results (the success of the training). Tangible and intangible assets are measured at different scales. According to Probst et al (2001) the knowledge indexes through the Balance Record Card (BRC), which is an activity of non-isolated knowledge management must be compatible with the administration and supervision systems (Kaplan and Norton , 1996, "The Value Explorer" Andriessen D. 2000, Technology Broker, Brooking A. 1996, University of West

Ontario Bontis N. 1998, Navigator of Skandia, Konrad de Sveiby and Norton & Kaplan among others) where joint knowledge is included in the objectives to evaluate. This strategic administrative tool seeks to link operational interventions in the knowledge base with long-term objectives. However, in the perspective of learning and growth, only the people of the organization, through their knowledge, skills and attitudes will be able to devise and raise processes and products for compliance and customer satisfaction. In this consideration of learning, that provides the organization to be able to count on sufficiently prepared workers propitiating the growth and integral development, Fernández Hatre (2001). Therefore, through the proposal made here, is to offer an alternative or support methodology (BSC) that integrates cognitive and emotional elements, in relation to KM, C and AC according to the OSAR model to assess the second order change based on the probabilistic model Huff SA et al. (2002) on acquired knowledge: tacit, experience, simultaneous and analog. In order to achieve that the tension in probabilistic terms is sufficient greater than the inertia, and then there is a possibility of change. Followed by the formalization of acquired learning processes, on the classification of cognitive and emotional patterns that most influence the process of knowledge transformation: explicit, rational, sequential and digital to generate new structures. This classification facilitates the process of relationship between cognitive and emotional elements with the elements: knowledge management, competences and availability to change. Thus, the formalization of the acquired knowledge and its transformation allow complete formalization in its structures and the increase of explicit knowledge in the organization.

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