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APPLICATION OF BIDIRECTIONAL ASSOCIATIVE MEMORIES (BAM)

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ABSTRACT

In this paper a present study focused on analysis of the women getting stress in industries using Bidirectional Associative Memories (BAM) Model. For this research we have collected the data from expert opinion. The three major domains of the problems are Causes of Physical problem, Psychological problem,Behavioral problem for women getting stress in industries is discussed.Section one, gives the introduction of the problem. Basic definitions of Bidirectional Associative Memories (BAM) are given the section two. The third section demonstrates analysis of the problem using BAM Model. Based on present study conclusion and suggestion were given in final section.

KEYWORDS: Stress, Physical problem, Psychological Problem, Behavioral Problem and Bidirectional Associative Memories.

INTRODUCTION

Over the last decade and a half India has emerged as a strong provider of IT enabled services (ITeS) to US, European and Asian companies. Governmental agencies from several western countries have also lately begun to embrace IT outsourcing, and much of this business has been has been directed towards India. As a result, India's ITeS sector has seen meteoric growth in recent times. In the year 2004-2005, the five-year old Business Process Outsourcing (BPO) segment in India enjoyed revenues of $5.2 billion (Nasscom, 2005). "BPO" is the practice of outsourcing various business processes that occur along various parts of the value chain of a business enterprise. Indian BPO firms currently provide a variety of ITeS including customer care, payment services, finance, administration, Human Resource management and content development in sectors such as banking, financial services, insurance, manufacturing, retail, government, utilities, transportation and healthcare. Over the last few years the Indian ITeS sector has rapidly developed into a highly capable, vertically-integrated BPO industry player. Its BPO firms offer a range of services, from low-level call-center services to high-level knowledge processing, IT consulting, design and R & D services. According to Kapur and Ramamurthy (2001), in the year 2001 alone there were "more than 800 firms, located in Indian cities like Bangalore, Hyderabad, Pune, Chennai, and New Delhi that provided a range of software services, mostly targeted at foreign customers." The BPO services which originated in the IT sector have now expanded into other sectors such as bio-technology, medicine, legal, publishing, accounting and financial analysis, just to name a few. This growth in India's BPO sector is projected to continue over the next several years.

Definition of Stress

Stress is an imprecise term. It is usually defined in terms of the internal and external conditions that create stressful situations, and the symptoms that people experience when they are stressed. McGrath (1976) proposed a definition based on the conditions necessary for stress.

So there is a potential for stress when an environmental situation is perceived as presenting a demand that threatens to exceed the person's capabilities and resources for meeting it, under conditions where he expects a substantial differential in the rewards and costs from meeting the demand versus not meeting it.

McGrath's definition implies that the degree of stress is correlated with a person's perceived inability to deal with an environmental demand. This would lead to the conclusion that a person's level of stress depends on their self-perceived abilities and self-confidence. Stress is correlated with a person's fear of failure.

Arnold and Feldman (1986) define stress as "the reactions of individuals to new or threatening factors in their work environment. since our work environments often contain new situations, this

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definition suggests that stress in inevitable. This definition also highlights the fact that reactions to stressful situations are individualized, and can result in emotional, perceptual, behavioral, and physiological changes.

Symptoms of Stress

Selye (1946) was the first to describe the phases that the body goes through in response to a threat. The general adaptation syndrome model states that the body passes through three stages. The first stage is an alarm reaction. The body prepares for a potential emergency. Digestion slows down, the heart beats faster, blood vessels dilate, blood pressure rises, and breathing becomes rapid and deep. All bodily systems work together to provide maximum energy for fight or flight. The second stage is resistance. If the stress continues, the body builds up a tolerance to its effects. The body becomes habituated to the effects of the stressor, however, the bodies adaptive energies are being used as a shield against the stressor. The third stage is exhaustion. When the body's adaptive energies are depleted, the symptoms of the alarm reaction reappear, and the stress manifests itself as an illness, such as ulcers, heart ailments, and high blood pressure. During the first or second stages, the removal of the stressor will eliminate the symptoms.

Ivancevich and Matteson (1980) point out that during the early days of our evolution, we needed the fight-or-flight response for our survival. "The problem we encounter today is that the human nervous system still responds the same way to environmental stressors, although the environment is radically different. The tigers are gone and with them the appropriateness of the fight-or-flight response."

Reitz (1987) writes that individuals in modern society often substitute other psychological reactions for flight-or-flight. Substitutions for fighting include negativism, expression of boredom, dissatisfaction, irritability, anger over unimportant matters, and feelings of persecution. Substitutions for fleeing include apathy, resignation, fantasy, forgetfulness, inability to concentrate, procrastination, and inability to make decisions.

Short-term stress has served a useful purpose in our survival. Long-term stress, however, involves increasingly higher levels of prolonged and uninterrupted stress. The body adapts to the stress by gradually adjusting its baseline to higher and higher levels. For example, workers in stressful jobs often show an increased "resting" heart rate. Pelletier (1977) believes that the deleterious effects of stress are created only by unrelieved long-term stress. Albrecht (1979) also believes that the effects of stress are cumulative in nature. Ulcers do not just happen overnight in a high stress situation; they are generally the result of long extended exposure to stress. "The health breakdown is simply the logical conclusion of a self-induced disease development over a period of 10 to 20 years."

Job stress can have a substantial negative effect on physical and emotional health. Williams and Huber (1986) provide a comprehensive list of the symptoms of stress. These are: "constant fatigue, low energy level, recurring headaches, gastrointestinal disorders, chronically bad breath, sweaty hands or feet, dizziness, high blood pressure, pounding heart, constant inner tension, inability to sleep, temper outbursts, hyperventilation, moodiness, irritability and restlessness, inability to concentrate, increased aggression, compulsive eating, chronic worrying, anxiety or apprehensiveness, inability to relax, growing feelings of inadequacy, increase in defensiveness, dependence on tranquilizers, excessive use of alcohol, and excessive smoking." Furthermore, job stress can make people more susceptible to major illnesses. High stress managers are twice as prone to heart attacks as low stress managers. (Rosenman and Friedman, 1971)

Recent studies have found evidence of dangerous physical changes attributed to prolonged stress. One New York study reported a twenty gram increase in heart muscles of those suffering from job stress. There was a significant "thickening of the heart's left ventricle, or chamber, a condition that often precedes coronary heart disease and heart attacks." (Pieper, C., 1990) *Omni* magazine (March, 1991) wrote about a series of experiments with rats to examine the physiological effects of prolonged stress. The researchers found that there was actually a loss of neurons in the hippocampus section of their brains. The article concluded with a warning that there is some evidence of a similar neuron loss occurs in humans.

Many researchers have studied the effects of stress on performance. McGrath (1978) reported that mild to moderate amounts of stress enables people to perform some tasks more effectively. The rationale is that improved performance can be attributed to increased arousal. However, if the stressor continues, it eventually takes its toll, and results in decreased

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performance and deleterious health consequences. Furthermore, workers are aware of the toll that stress has had on their own performances. Half of all workers say that job stress reduces their productivity (Lawless, 1992).

BASIC DEFINITIONS OF BAM

Now we describe the mathematically structure of the Bidirectional Associative Memories (BAM) model. Neural networks recognize ill defined problem without an explicit set of rules. Neurons like functions, neurons transduce an unbounded input *x(t)* at time t into a bounded output signal *S(x(t))* i.e. Neuronal activation change with time.

Artificial neural networks consist of numerous simple processing units or neurons which can be trained to estimate sampled function when we do not know the form of the functions. A group of neurons form a field. Neural networks contain many fields of neurons. In our test F_x will denote a neuron field, which contain *n* neurons, and $F_y$denotes a neuron field, which contains *p* neurons. The neuronal dynamical system is described by a system of first order differential equation that govern the time-evolution of the neuronal activations or which can be called as membrane potential.

$$\dot{x}_i = g_i(X,Y,...)$$

$$\dot{y}_i = h_i(X,Y,...)$$

Where $\dot{x}_i$ and $\dot{y}_i$ denoted respectively the activation time function of the i^{th} neuron in F_x and j^{th} neuron in F_y . The over dot denotes time differentiation, g_i and h_i are some function of *X, Y,..* where $X(t) = (x_1(t), ... ,x_n(t))$ and $Y(t)=(y_1(t), ... , Y_p(t))$ define the state of neuronal dynamical system at time *t*.

The passive decay model is the simplest activation model where in the absence of the external stimuli , the activation decay in its resting value

$$\dot{x}_i = x_i$$

$$\dot{y}_i = y_i$$

The passive decay rate $A_i > 0$ scales the rate of passive decay to the membranes resting potential resting potentials $\dot{x}_i = -A_i x_i$. The default rate is $A_i=1$, i.e. $\dot{x}_i = -A_i x_i$. The membranes time constant $C_i > 0$ scales the time variables of the activation the dynamical system. The default time constant is $C_i = 1$ Thus $C_i \dot{x}_i = -A_i x_i$.

The membrane resting potential $P_i$defined as the activation value to which the membrane potential equilibrates in the absence of external inputs. The resting potential is an additive constant and its default value zero. It need not be positive

$$P_i = C_i \dot{x}_i + A_i x_i$$

$$I_i = \dot{x}_i + x_i$$

is called the external input of the system. Neurons do not compute alone. Neurons modify their state activations with feedback from one another. Now, how do we transfer all these actions of neurons activated by inputs their resting potential etc., Mathematically. We do this using what are called synaptic connection matrices.

Let us suppose that the field $F_x$with *n* neurons is synaptically connected to the field the $F_y$of *p* neurons. Let m_{ij} be a synapse where the axon from the i^{th}neurons in F_x terminates. M_{ij}can be positive, negative or zero. The synaptic matrix M is a n by p matrix of real numbers whose entries are the synaptic efficacies m_{ij}.

The matrix *M* describes the forward projections from the neuronal field F_x to the neurons field F_y. Similarly a *p* by *n* synaptic matrix *N* describes the backward projections from F_y to F_x. Unidirectional networks occur when a neuron field synaptically intra connects to itself. The matrix *M* be a *n x n* square matrix. A Bidirectional network occur if $M = N^T$and $N = M^T$. To describe this synaptic connection matrix more simply, suppose the *n* neurons in the field F_x synaptically connect to the p-neurons in field F_y . Imagine an axon from the i^{th} neuron in $F_x$that terminates in a synapse m_{ij}, that about the j^{th} neuron in F_y. we assume that the real number m_{ij} summarizes the synapse and that m_{ij} changes so slowly relative to activation fluctuations that is constant

Thus we assume no learning if $m_{ij} = 0$ for all *t*. The synaptic value m_{ij}might represent the average rate of release of a neurotransmitter such as norepinephrine . So, as a rate, m_{ij}can be positive, negative or zero.

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When the activation dynamics of the neuronal field F_x and F_y lead to the overall stable behavior the bidirectional networks are called as Bidirectional Associative Memories (BAM). Further not only a Bidirectional network leads to BAM also a unidirectional network defines a BAM if M is symmetric i.e. $M = M^T$. We in our analysis mainly use BAM which are bidirectional networks. However we may also use unidirectional BAM chiefly depending on the problem under investigation. We briefly describes the BAM model more technically and mathematically.

An additive activation model is defined by a system of $n + p$ coupled first order differential equations that inter connects the field F_x and F_y through the constant synaptic M and N.

$$x_i = -A_i x_i + \sum_{j=1}^{p} S_j(y_j) n_{ji} + I_i \quad \ldots (2.1)$$

$$y_j = -A_j y_j + \sum_{i=1}^{n} S_i(x_i) m_{ij} + J_j \quad \ldots (2.2)$$

$S_i(x_i)$ and $S_j(y_j)$ denotes respectively the signal function of the i^{th} neurons in the field F_x and the signal function of the j^{th} neuron in the field F_y. Discrete additive activation models correspond to neurons with threshold signal functions.

The neurons can assume only two values ON and OFF. ON represent the signal *+1*, OFF represent *0* or *-1* (*-1* when the representation is bipolar). Additive bivalent model describe asynchronous and stochastic behavior.

At each moment each neuron can randomly decide whether to change state or whether to emit a new signal given its current activation. The Bidirectional Associative Memory or BAM is a non adaptive additive bivalent neural network. In neural literature the discrete version of the equation (2.1) and (2.2) are often referred to as BAMs.

A discrete additive BAM with threshold signal functions arbitrary thresholds inputs an arbitrary but a constant synaptic connection matrix M and discrete time steps K are defined by the equation

$$x_i^{k+1} = \sum_{j=1}^{p} S_j(y_j^k) m_{ij} + I_i \quad \ldots (2.3)$$

$$y_j^{k+1} = \sum_{i=1}^{n} S_i(x_i^k) m_{ij} + J_j \quad \ldots (2.4)$$

Where $m_{ij} \in M$ and $S_i$and $S_j$are signal function.

They represent binary or bipolar threshold functions. For arbitrary real valued thresholds $U = (U_1, \ldots, U_n)$ and $V = (V_1, \ldots, V_p)$ for F_y neurons the threshold binary signal functions corresponds to

$$S_i(x_i^k) = \begin{cases} 1 & \text{if } x_i^k > U_i \\ S_i(x_i^{k-1}) & \text{if } x_i^k = U_i \\ 0 & \text{if } x_i^k < U_i \end{cases} \quad \ldots (2.5)$$

$$S_j(x_j^k) = \begin{cases} 1 & \text{if } y_j^k > V_j \\ S_j(y_j^{k-1}) & \text{if } y_j^k = V_j \\ 0 & \text{if } y_j^k < V_j \end{cases} \quad \ldots (2.6)$$

The bipolar version of these equation yield the signal value *-1* when $x_i < U_i$ or when $Y_j < V_j$. The bivalent signal functions allow us to model complex asynchronous state change patterns. At any moment different neurons can decide whether to compare their activation to their threshold. At each moment any of *2n* subset of F_x neurons or *2p* subset of the F_y neurons can decide to change state. Each neuron may randomly decide whether to check the threshold condition in the equation (2.5) and (2.6). At each moment each neuron defines a random variable that can assume the value ON(*+1*) or OFF (*0* or *-1*). The network is often assumed to be deterministic and state change are synchronous i.e. an entire of neurons is update at time. In case of simple asynchrony only one neuron makes a state change decision at a time. When the subset represents the entire field $\boldsymbol{F}_x$ and F_y synchronous change result.

In a real problem the entire of the constant synaptic matrix M depends upon the investigator's feelings. The synaptic matrix is given a weightage according to their feelings. If $x \in F_x$ and $y \in F_y$ the forward projection from $F_x$to F_y is defined by the matrix M.

$\{F(x_i, y_j)\} = (m_{ij}) = M$, $1 \le i \le n$, $1 \le j \le p$.

The backward projection is defined by matrix M^T . $\{F(y_i, x_i)\} = (m_{ji}) = M^T$, $1 \le i \le n$, $1 \le j \le p$. It is not always true that the backward projection from F_y to $F_x$is defined by the matrix M^T.

Now we just recollect the notation of bidirectional stability. All BAM state change lead to fixed point stability. The property holds for synchronous as well as asynchronous state changes.

A BAM system (F_x, F_y, M) is bidirectionallly stable if all inputs converge to fixed point equilibria.

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Bidirectional stability is a dynamic equilibrium. The same signal information flows that back and forth in bidirectional fixed point. Let us suppose that A denotes a binary n-vector and B denotes a binary p-vector. Let A be the initial input to the BAM system. Then the BAM equilibrates to a bidirectional fixed point (A_f, B_f) as

$A \rightarrow M \rightarrow B$
$A' \leftarrow M^T \leftarrow B$
$A' \rightarrow M \rightarrow B'$
$A'' \leftarrow M^T \leftarrow B''$ etc.,
$A_f \rightarrow M \rightarrow B_f$
$A_f \leftarrow M^T \leftarrow B_f$ etc.,

Where A' and $A''\ldots$ and $B', B''\ldots$ represents intermediate or transient signal state vectors between respectively A and A_f and B and B_f. the fixed point of a Bidirectional system is time dependent.

The fixed point for the initial input vector can be attained at different times. Based on the synaptic matrix M which is developed by the investigator feeling the time at which bidirectional stability is attained also varies accordingly.

DESCRIPTION OF THE PROBLEM

According to expert opinion we analyzing the relation among

J. Causes of Physical problem for women getting stress in industries.
O. Causes of Psychological problem for women getting stress in industries.
E. Causes of Behavioral problem for women getting stress in industries.

We take some subtitles for each of these three main titles. For the sake of simplicity we are restricted to some major subtitles, which has primarily interested these experts. We use BAM model on the scale [-5,5]. Here we mention that the analysis can be carried out on any other scale according to the whims and fancies of the investigator.

J. Causes of Physical problem for women getting stress in industries.

J_1 - Headaches
J_2 - Chest pain
J_3 - Muscle aches
J_4 - Frequent illness
J_5 - High blood pleasure
J_6 - Shortness of breath

O. Causes of Psychological problem for women getting stress in industries.

O_1- Irritability
O_2 - Sadness
O_3 - Anger and Mood swings
O_4 - Feelings of helplessness, hopelessness

E. Causes of Behavioral problem for women getting stress in industries.

E_1- Overeating or loss of appetite
E_2- Increased use of alcohol/drugs/smoking
E_3- Neglect of responsibility
E_4- Poor job performance
E_5- Changes in close family relationships

A. Experts opinion on the causes of Physical problem and Psychological problem

Taking the neuronal field F_X as the attributes connected with the causes of physical problem and the neuronal field F_Y is taken as causes of psychological problem of working women in industries.

The 6 x 4 matrix M_1 represents the forward synaptic projections from the neuronal field F_X to the neuronal field F_Y.

The 4 x 6 matrix M_1^T represents the backward synaptic projections F_X to F_Y. Now, taking J_1, J_2,….,J_6 along the rows and O_1, O_2,…, O_4 along the columns we get the synaptic connection matrix M_1 which is modeled on the scale [-5,5].

$$M_1 = \begin{array}{c} \\ J_1 \\ J_2 \\ J_3 \\ J_4 \\ J_5 \\ J_6 \end{array} \begin{array}{c} \begin{array}{cccc} O_1 & O_2 & O_3 & O_4 \end{array} \\ \begin{bmatrix} 4 & 2 & 5 & -1 \\ 3 & 4 & -1 & 3 \\ 0 & 1 & 4 & 5 \\ -2 & 3 & -3 & 0 \\ 0 & 1 & 4 & 5 \\ -4 & 2 & 1 & 4 \end{bmatrix} \end{array}$$

Let X_K be the input vector given as (2 -5 -1 -3 2 1) at the K^{th} time period. The initial vector is given such that headaches, high blood pleasure, shortness of breath have the strong impact of physical problem of women stress in industries. We suppose that all neuronal state change decisions are synchronous.

The binary signal vector

$S(X_K)$ = (1 0 0 0 1 1)

From the activation equation

$S(X_K)M_1$ = (0 5 10 6)
= Y_{K+1}
Now $S(Y_{K+1})$ = (0 1 1 1)
$S(Y_{K+1})M_1^T$ = (6 6 10 1 0 0 10 7)
= X_{K+2}
Now $S(X_{K+2})$ = (1 1 1 0 1 1)
$S(X_{K+2})M_1$ = (3 10 13 16)
= Y_{K+3}.
Now $S(Y_{K+3})$ = (1 1 1 1)
$S(Y_{K+3})M_1^T$ = (10 9 10 -2 10 3)
= X_{K+4}.
Thus $S(X_{K+4})$ = (1 1 1 0 1 1)
= X_{K+2}
$S(Y_{K+4})$ = Y_{K+3}

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The binary pair {(1 1 1 1), (1 0 1 1 1) represents a fixed point of the dynamical system. Equilibrium of the system has occurred at the time K+2, when the starting time was K. Thus this fixed point suggests headaches, muscle aches, frequent illness, high blood pleasure, shortness of breath are ON state only chest pain is OFF state.

B. Experts opinion on the causes of Behavioral problem and Physical problem

Taking the neuronal field F_X as the attributes connected with the causes of behavioural problem and the neuronal field F_Y as the attributes connected with the as causes of Physical problem of working women in industries.

The 6 x 5 matrix M_2 represents the forward synaptic projections from the neuronal field F_X to the neuronal field F_Y.

The 5 x 6 matrix M_2^T represents the backward synaptic projections F_X to F_Y. Now, taking E_1, E_2,….,E_5 along the rows and J_1, J_2,…, J_6 along the columns we get the synaptic connection matrix M_2 which is modeled on the scale [-5,5].

$$M_2 = \begin{array}{c} \\ E_1 \\ E_2 \\ E_3 \\ E_4 \\ E_5 \end{array} \begin{array}{c} \begin{array}{cccccc} J_1 & J_2 & J_3 & J_4 & J_5 & J_6 \end{array} \\ \begin{bmatrix} 2 & 4 & 1 & -3 & 2 & 5 \\ 4 & 3 & -2 & 1 & -4 & 3 \\ 5 & -1 & 2 & 4 & 2 & -1 \\ -3 & -5 & 3 & 2 & -3 & 1 \\ 2 & 4 & 1 & 5 & -2 & 4 \end{bmatrix} \end{array}$$

Let X_K be the input vector given as (-3 5 -2 4 -1) at the K^{th} instant. The initial vector is given such that increased use of alcohol/drugs/smoking, poor job performance have the strong impact of physical problem of women stress in industries. We suppose that all neuronal state decisions are synchronous.

The binary signal vector

$S(X_K)$ = (0 1 0 1 0)

From the activation equation

$S(X_K)M_2$ = (1 -2 1 3 -7 4)
= Y_{K+1}

Now $S(Y_{K+1})$ = (1 0 1 1 0 1)

$S(Y_{K+1})M_2^T$ = (5 6 10 3 12)
= X_{K+2}

Now

$S(X_{K+2})$ = (1 1 1 1 1)

$S(X_{K+2})M_2$ = (10 5 5 9 -5 12)
= Y_{K+3}.

Now

$S(Y_{K+3})$ = (1 1 1 1 0 1)

$S(Y_{K+3})M_3^T$ = (9 9 9 -1 16)
= X_{K+4}.

Thus

$S(X_{K+4})$ = (1 1 1 1 1)
= X_{K+2}

$S(Y_{K+4})$ = Y_{K+3}

The binary pair {(1 1 1 1 1), (1 1 1 1 0 1) represents a fixed point of the dynamical system. Equilibrium of the system has occurred at the time K+2, when the starting time was K. Thus this fixed point suggests overeating or loss of appetite, increased use of alcohol/drugs/smoking, neglect of responsibility, poor job performance, changes in close family relationships are ON state.

C. Experts opinion on the causes of Psychological problem and Behavioral problem

Taking the neuronal field F_X as the attributes connected with the causes of psychological problem and the neuronal field F_Y as the attributes connected with the as causes of behavioral problem of working women in industries.

The 4 x 5 matrix M_3 represents the forward synaptic projections from the neuronal field F_X to the neuronal field F_Y.

The 5 x 4 matrix M_3^T represents the backward synaptic projections F_X to F_Y. Now, taking O_1, O_2,…, O_4 along the rows and E_1, E_2,….,E_5 along the columns we get the synaptic connection matrix M_3 which is modeled on the scale [-5,5].

$$M_3 = \begin{array}{c} \\ O_1 \\ O_2 \\ O_3 \\ O_4 \end{array} \begin{array}{c} \begin{array}{ccccc} E_1 & E_2 & E_3 & E_4 & E_5 \end{array} \\ \begin{bmatrix} 4 & 0 & 5 & 3 & 4 \\ 3 & -2 & -4 & 4 & 3 \\ 3 & 0 & 4 & -1 & -2 \\ 2 & 1 & 0 & 5 & 4 \end{bmatrix} \end{array}$$

Let X_K be the input vector given as (-2 1 4 -1) at the K^{th} instant. The initial vector is given such that increased sadness, feelings of helplessness, hopelessness. We suppose that all neuronal state decisions are synchronous.

The binary signal vector

$S(X_K)$ = (0 1 1 0)

From the activation equation

$S(X_K)M_3$ = (6 -2 0 3 1)
= Y_{K+1}

Now

$S(Y_{K+1})$ = (1 0 1 1 1)

$S(Y_{K+1})M_3^T$ = (16 6 4 11)
= X_{K+2}

Now

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$S(X_{K+2})$ = (1 1 1 1)
$S(X_{K+2})M_3$ = (12 -1 5 11 9)
= Y_{K+3}.
Now
$S(Y_{K+3})$ = (1 0 1 1 1)
$S(Y_{K+3})M_3^T$ = (16 6 9 11)
= X_{K+4}.
Thus
$S(X_{K+4})$ = (1 1 1 1)
= X_{K+2}
$S(Y_{K+4})$ = Y_{K+3}

The binary pair {(1 1 1 1), (1 0 1 1 1) represents a fixed point of the BAM dynamical system. Equilibrium for the system occurs at the time K+4, when the starting time was K. Similarly by taking a vector Y_K one can derive conclusions based upon the nature of Y_K. A complete conclusion about women getting stress in industries based on the BAM model is given in the fifth chapter on conclusions. Thus these illustrations are given only for the sake of making the reader to understand the working of the fuzzy model.

CONCLUSION AND SUGGESTION

Conclusion

Stress is not something to be dismissed as being just part of the job, or the price you pay for being successful in your career. Stress has been shown to be either directly or indirectly responsible for early and untimely deaths through heart attack, stroke, high blood pressure, and a multitude of other stress - related illnesses. While the mental and physical health of employees are suffering due to unhealthy work environments, stress is still seen as a sign of weakness in many organizations, and is kept quiet so as to avoid negative repercussions. Stress tends to be either ignored or dismissed by the very people who are best placed to do something about it – managing and senior directors, personnel and training managers, occupational health workers, and departmental managers and supervisors.

The opportunity exists for employers and employees to get together and make way for changes that will reduce stress-related illness. Change must come from the top, and it is therefore imperative for managers to recognize that they have a legal and moral responsibility to protect the physical and mental well-being of their workers.

It is the intention of this report to educate on the damaging effects of workplace stress, and increase awareness of the widespread nature of this problem. It is hoped that this knowledge will motivate organizations to explore the stressors that are present in their own work environments, and to take steps to reduce and/or prevent stress in the workplace, thereby working to maintain the health and well-being of employees.

Suggestion

Based on our research here we derived some suggestion for what ways that woman can reduce work place stress?

- **Recognize that stress is a killer and not to be taken lightly.**

Stress related illnesses are the leading cause of death and disability in women today. Recognition is the first step in any change process.

- **Take real breaks from work.**

If your business requires that you be on the job at “normal" lunch times or other break times, make sure that you find time at other times in the day. Studies show that small breaks actually increase our efficiency, so you really can “afford" it. Walking outside can work wonder. Have a pair of walking shoes on site.

- **What, in your work environment, are you “tolerating" and allowing for on-going stress?**

Cluttered space, equipment that needs repaired, lack of organization, tasks that need to be delegated, noise level, ergonomically unhealthy workplaces, and any number of other tolerations is worth the effort to resolve.

- **Communicating cleanly and assertively is a great way to reduce stress by addressing boundaries, expectations and needs in the workplace.**

Women, many times, communicate on an emotional level. Unfortunately, with this sort of communication, the real message is lost in the feeling versus the doing.

- **Eat a good breakfast.**

Studies show that eating breakfast is one of the healthiest habits we can adopt. Our bodies and brain has been without carbohydrate fuel for 12 hours or more. Time to fill up. Smoothies are great ways to get a great boost on the go. Yogurt, fruit, juice and a blender and you can start your day with protein, good carbohydrate, calcium and vitamins. Add some linseeds/flaxseeds and you have fiber and phytoestrogens too. All are significant for women’s good health!

- **Ideas you might like to try at the work place for stress reduction.**

Calming oils of floral scents (rose, vanilla, lavender and nutmeg), a tennis ball to roll back and forth under

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the ball of your foot, and massage an acupressure calm point in the area of the hand between the index finger and thumb.

- **Self-care outside the workplace is of paramount importance for women.**

Adequate sleep provides our bodies with chemical balancing and healing at a cellular level. Find out what needs to "give" to get you to bed for 7-8 hrs of sleep. Eating a diet of real food (limit or eliminate additives and chemicals) that fuels our bodies gives us a reserve to run on during stressful time. Exercise, though hard to timetable in our packed schedules is a great stress reducer.

- **Learn ways to relax that are meaningful for you.**

This might seem like an obvious, overused, token suggestion. Most women do not really know how to relax. We have been so programmed to look after everything and everyone else. This feeling of responsibility carries over into our work as well. Learning what is relaxing to you is worth the effort. Turn off the T.V. Call a friend. Listen to some relaxing music. Commit to picking up an interest from the past, even if you do it in small steps. Time taken for pleasure will pay off in the long run in work efficiency.

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