Comparative Study of Workplace Happiness of Men and Women Using Bidirectional Associative Memories (BAMS)

A. Victor Devadoss, D. Mary Jiny
Department of Mathematics, Loyola College, Chennai, India
Emil:djstudy.jiny94@gmail.com

Abstract- The rapid advancement in Technology, particularly in a modern office environment, awide and vast range of information has become easily available at employees fingertips. So the minimum expectation of a modern workplace is to keep the employees motivated, innovative and happy. Happiness at work is far more than job satisfaction. Happy employees are better employees. Happiness is an entirely subjective feeling of well-being experienced by the person, characterized by the presence of positive emotions and the absence of negative emotions. In this paper we discuss about Workplace happiness of men and women using Bidirectional Associative Memory (BAMs). We see that happiness related to subjective well-being plays a vital role in workplace happiness. So we use Bidirectional Associative memories to study the impact of happiness related to subjective well-being in Workplace happiness. The first section gives the concept of Workplace happiness. The section two introduces the basic concept and definitions of Bidirectional Associative Memory (BAMs). The section three contains the adoption of BAM model in to the concept of workplace happiness. And section four gives the conclusion and suggestions.

I. INTRODUCTION

Happiness may be defined as the experience of frequent positive affect, infrequent negative affect and an overall sense of satisfaction with life as a whole. Happiness at work is about mindfully making the best use of the resources you have, to overcome the challenges you face. Actively relishing the highs and managing the lows will help you maximize your performance and achieve your potential. And this not only builds your happiness but also that of others – who will be affected and energized by what you do. In this paper we discuss about the happiness of men and women in the +working environment and we see, how it is related to the individual happiness based on the concept of subjective well being.

1.1 The Concept of Workplace Happiness
University of Illinois ProfessorEdward Diener [6], a pioneering researcher on 'subjective well-being' points out that nobody can tell a person that he or she is, or should be, happy. Nor is there a set of circumstances that guarantees that the person experiencing them will be happy. Instead, happiness is an entirely *subjective* feeling of well-being experienced by the person, characterized by the presence of positive emotions and the absence of negative emotions.

1.2 Generators of Happiness
From the various generators of happiness in the concept of subjective well-being, we mainly concentrate on the five main generators of happiness they are; psychological well-being, Physical well-being, Wealth, Leisure, and Achievements.

Psychological well-being generates happiness; it plays major role in individual happiness. Since every person is unique, each individual consider happiness in their own perspective.Happiness is not a matter of events but it is a matter of the mind.

Physical well-being generates happiness i.e. physical health and physical safety.

Wealth does generate happiness for many people but only to a certain extent. Once a person passes the point of being able to afford 'the normal cost of everyday life', more wealth can increasingly be accompanied by less happiness and not more than that.

Leisure generates happiness. The amount of spare time people have, as well as their control over how much spare time they have, correlates with happiness.

Achievements generate happiness. Every person wants to make his name to be recorded in the History. They consider the sustainability of their names and the fame as happiness.

1.3 Drivers of Workplace Happiness
Among the different drivers of Workplace happiness, we consider the important ten drivers of Workplace happiness. They are: Acceptance, Meeting the challenges, Recognition, Assurance from boss, Positive feedback, Rewards and Awards, Meaningfulness, Fulfillment of target, Personal satisfaction and Workplace community.

1. Acceptance
Accepting each other i.e. deal with positive welcome, favor and endorsement with one another in work place increase the harmony and fellowship among the colleagues.

2. Meeting the challenges
Meeting challenges with strengthened cooperation and working together not only bring out better result but also develop self-confidence to face next challenger.

3. Recognition
Every employee in an organization crave for recognition by putting their efforts in better way and when they are recognized for their best, it develop a catalyst to go beyond miles with happiness

4. Assurance from boss
Positive assurance from boss certainly develop a hope in employees mind which intern create a secured work environment

5. Positive feed back

Culture of providing Positive Feedback on either good or bad performance of an employee in an organization clearly indicates that the management or people over there are interested in keeping the employees happy and up to date about the work requirements.

6. Rewards are awards

As said earlier recognition is joyful at workplace, but when it comes with Rewards and Awards, then happiness is preserved for years. Rewards and Awards make an employee feel proud and create a good image among others even in Society.

7. Meaningfulness

Doing the work with meaningfulness leads to success. A good employee does the works with meaningfulness and gets the pleasure of the fruit when time comes.

8. Fulfilment of target

It's really depressing feel for an employee, when he/she has provided word with targets. But they will be in Happiness of Mount Everest when they achieve it. So the catching point is though it feel bitter in beginning, Targets really bring out the potential of everyone to go an extra mile and bring out happiness too

9. Personal satisfaction

Choose the right job which you enjoy and do it with full dedication, this will give you personal satisfaction in your job. Once you are satisfied with your job the output you give to the organization is far better than before.

10. Workplace community

There will be always joy when friends gather together, same way communion of colleagues in events like Party, Birthday celebrations, Outings and Fun at Work Games etc makes the workplace colorful and cheerful.

II. BIDIRECTIONAL ASSOCIATIVE MEMORIES (BAMS)

2.1 Bidirectional Associative Memories (BAMs)

Bidirectional associative memory (BAM) is a type of recurrent neural network. BAM was introduced by Bart Kosko in 1988. There are two types of associative memory, auto-associative and hetero-associative. BAM is hetero-associative memory. The BAM consists of neurons arranged in two layers say A and B. The neurons are bipolar binary. The neurons in one layer are fully interconnected to the neurons in the second layer. There is no interconnection among neurons in the samelayer. The weight from layer A to layer B is same as the weights from layer B to layer A.

2.2 Neuron Fields

A group of neurons forms a field. Neural networks contain many fields of neurons. F_X denotes a neuron field which contains n neurons and F_Y denotes a neuron field which contains p neurons.

2.3 Neuronal Dynamical Systems

The neuronal dynamical system is described by a system of first order differential equations that govern the time evaluation of the neuronal activations or membrane potentials. Suppose t denotes the activation time andx_i and y_j denote respectively the

activation time function of the ith neuron in X(t) and the jth neuron in Y(t).

$$\text{Where} \quad X(t) = (x_1(t),\ldots\ldots,x_n(t))$$
$$Y(t) = (y_1(t),\ldots\ldots,y_n(t))$$

Define the state of the neuronal dynamical system at time t. Additive bivalent Models describe asynchronous and stochastic behaviour. At each moment each neuron can randomly decide whether to change state, or whether to omit a new signal given its current activation.

The BAM is a non- adaptive, additive, bivalent neural network.

2.4 Bivalent Additive BAM

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

$$x_i^{k+1} = \sum_j^p S_j(y_j^k)m_{ij} + I_i$$

$$y_j^{k+1} = \sum_i^n S_i(y_i^k)m_{ij} + I_j$$

Where S_i and S_j represent the binary or bipolar threshold functions.

2.5 Synaptic connection Matrices:

Let us suppose that the field F_x with n neurons is synaptically connected to the field F_y with p neurons. Let m_{ij} be a synapse where the axon from the ith neuron in F terminates, m_{ij} can be positive, negative or zero. The synaptic matrix M is an n x 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 neuronal field F_Y. Similarly, M^T, a p x n synaptic matrix and describes the backward projections F_Y to F_X.

2.6 Unidirectional Networks

These kinds of networks occur when a neuron synoptically interconnects to itself. The matrix N is n xn square matrix.

2.7 Bidirectional Networks.

A network is said to be a bidirectional network if $M = N^T$ and $N = M^T$

2.8 Bidirectional Associative Memories

When the activation dynamics of the neuronal fields F_x and F_y lead to the overall stable behaviour, the bi-directional networks are called as Bi-directional Associative Memories or BAM
A unidirectional network also defines a BAM if M is symmetric i.e $M^T = M$.

III. ADAPTION OF BAM MODEL INTO THE PROBLEM

This section, talks about the comparative study of work place happiness of men and women in the same working environment. Despite a dearth of women at the helm of organizations, women feel more job satisfaction than men.

Eighty-two per cent claim to be happy in their jobs compared to 78 per cent of men. It is imperative that Workplace Happiness is important for every person and every organization. Therefore, there is a felt need in the mind and the nerve center that would be responsible for generating and sustaining employees' workplace happiness. In this section, Individual's happiness of men and women related to the workplace happiness is studied using BAM model.

Among the different drivers of Workplace Happiness, we consider the most important ten drivers of Workplace happiness in the range space and the five basic generators of happiness related to the subjective well-being is in the domain space. Let M_1 and M_2 denotes the synaptic connection matrix of men and women respectively. It is formed separately by collecting data in different organizations.

Let F_x denotes the five generators of happiness related to subjective well-being in the domain space and F_y denotes the ten drivers of workplace happiness in range space.

F_x = {Psychological well-being, Physical well-being, Wealth, leisure, Achievements}

F_y = {Acceptance, Meeting the challenges, Recognition, Assurance from boss, Positive feedback, Rewards and Awards, Meaningfulness, Fulfillment of target, Personal satisfaction, Workplace community}

The data collected from working men's of various organizations, the synaptic connection matrix M_1 is determined for men and is given below

$$M_1 = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

We switch on the first generator of happiness related to subjective well being and allow it to pass on

$i.e \ \alpha = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \end{pmatrix}$

$\alpha M_1 = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix} = \beta$

$M_1 \quad \beta M_1^T = \begin{pmatrix} 1 & 1 & 0 & 1 & 1 \end{pmatrix} = \alpha'$

$\alpha' M_1 = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix} = \beta'$

$\beta' M_1^T = \begin{pmatrix} 1 & 1 & 0 & 1 & 1 \end{pmatrix} = \alpha''$

$\alpha' = \alpha''$ and $\beta = \beta'$

When we switch on the psychological well being we get all the drivers of Workplace happiness is in on state. So we conclude that psychological well being implies Workplace happiness and vice versa since it is bidirectional. We do the same procedure for all generators of happiness separately and the hidden pattern for each generator is given below

$(1 \ 0 \ 0 \ 0 \ 0) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(0 \ 1 \ 0 \ 0 \ 0) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(0 \ 0 \ 1 \ 0 \ 0) \hookrightarrow (0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$
$(0 \ 0 \ 0 \ 1 \ 0) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$

$(0 \ 0 \ 0 \ 0 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$

Thus, we can conclude that the Workplace happiness is in no way connected with the wealth. Now we allow all the generators in on state except the first one and allow it to pass on M_1, we do this procedure for all generators separately and the results are given below.

$(0 \ 1 \ 1 \ 1 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 0 \ 1 \ 1 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 1 \ 0 \ 1 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 1 \ 1 \ 0 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 1 \ 1 \ 1 \ 0) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$

The results show that the absence of any one of the generators of happiness related to subjective well-being will not affect the Workplace happiness of men.

The synaptic matrix M_2 for women is determined by collecting data from various organizations and it is given below:

$$M_2 = \begin{pmatrix} 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \end{pmatrix}$$

We switch on the first generators of happiness related to subjective well-being and allow it to pass on M_1

$\alpha = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \end{pmatrix}$

$\alpha M_2 = \begin{pmatrix} 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix} = \beta$

$\beta M_2^T = \begin{pmatrix} 1 & 1 & 0 & 1 & 1 \end{pmatrix} = \alpha'$

$\alpha' M_2 = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix} = \beta'$

$\beta' M_2^T = \begin{pmatrix} 1 & 1 & 0 & 1 & 1 \end{pmatrix} = \alpha''$

$\alpha'' M_2 = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix} = \beta''$

$\alpha' = \alpha''$ and $\beta' = \beta''$

$(1 \ 0 \ 0 \ 0 \ 0) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(0 \ 1 \ 0 \ 0 \ 0) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(0 \ 0 \ 1 \ 0 \ 0) \hookrightarrow (0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0)$
$(0 \ 0 \ 0 \ 1 \ 0) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(0 \ 0 \ 0 \ 0 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$

From the above finding we conclude that Workplace happiness is independent of wealth of women. Now we allow all the generators in on state except the first one and allow it to pass on M_1, we do this procedure for all generators separately and the results are given below.

$(0 \ 1 \ 1 \ 1 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 0 \ 1 \ 1 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 1 \ 0 \ 1 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 1 \ 1 \ 0 \ 1) \hookrightarrow (1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$
$(1 \ 1 \ 1 \ 1 \ 0) \hookrightarrow (1 \ 1 \ 0 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1)$

We see that for women the lack of achievements may lead to unhappiness in the working environment.

IV. CONCLUSION

The workplace happiness and happiness related to subjective wellbeing are bidirectional. Workplace happiness is very important to keep our mind fresh and stress less. If we are happy in our workplace, we can enjoy the family life also successfully. When we switch on each generators of happiness related to subjective wellbeing one by one, we get all the drivers of workplace happiness is in 'On State', except for the generator wealth. So we conclude that wealth doesn't play a vital role in workplace happiness for both men and women. And we see that for women lack of achievements may entail unhappiness in working environment. If men/women are happy related to subjective wellbeing he can also be happy in working place and vice versa. Therefore, we conclude that happiness in working environment does not depend on gender difference but it varies depend on the individuals happiness related to the subjective well being.

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