PLANNING OF EXPERIMENTATION TO STUDY THE WOMEN WORKERS WORKING ON AMBER CHARKHA

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ABSTRACT

The paper presents the planning of experimentation to study the women workers working on Ambar Charkha. The authors in their research paper published earlier have suggested the design of the Experimentation for the formulation of such model. The experimentation has been carried out on a Ambar Charkha. In this paper the basic steps followed in experimentation is mention which may generate the correct values of the output parameters corresponding to the various values of the input parameters. The instruments such as puls oximeter, sound level meter, hand grip strength and thermometers to determine the humidity etc, are used to gives input parameter to determine the output parameters. By using experimentation one can improve the productivity of an experimental setup. Mathematical models can be formulated, validated and optimized as per the suggested procedure

KEY WORDS: Gandhi, Ambar charkha, Experimentation, women factors.

1 INTRODUCTION

Ekambar Nath, a Gandhian worker from Tamil Nadu designed a new tool for increasing productivity and that tool is known as A AMBAR CHARKHA now a days. As amber charkha means sky wheel. Mahatma Gandhi thinks that with the help of this wheel people became a self sufficient and can achieve a sky touching success in their life. Following is an appeal by the Mahatma for a more productive version of the charkha. It may not look like the typical charkha made of wood and a wheel attached to it. But it is still a simple device and can be operated even by a child. Charkha is a unique device to spin yarn. About 40 years ago, had increased the productivity of user spinners and enabled them to earn up to Rs 50 per day by working. Two types of Ambar Charkha used at Gram Seva Mandal, Wardha, 6 spindle and 8 spindle.[3]

Figure 1. President of India working on Ambar Charkha

1.1 Experimentation

The theory of experimentation as suggested by Hilbert is a good approach of representing the response of any phenomenon in terms of proper interaction of various inputs. The concept of least-square multiple regression curves as suggested by Spiegel has been used to develop the model .An entrepreneur arranging optimized inputs so as to get targeted responses. An entrepreneur of an industry is always ultimately interested in arranging optimized inputs so as to get targeted responses. Once models are formulated and they are optimized using the optimization technique. The optimum conditions, which the independent variables should satisfy for maximum productivity, have been deduced.[6,8]

2. WOMEN FACTORS

The literature cited on manual handling performance during menstrual cycle, pregnancy etc. which is one of the 'phase' of women as per K. M. Birch and T. Relly (1999). [4]

2.1 Women Phases

Female are undergoing physiological, physical as well as biological changes during these phases. The phenomenon of menstrual cycle is both complex and fascinating. It spans the reproductive life of women from menarche (puberty) to the menopause and represents the entire notion of womanhood (Delaney J et al, 1976). The cyclic nature of the secretion allows the cycle to be divided into sub-phases during menstruation that may be consistent with variation in many physical, biochemical and systemic measures (Southam and Gonzapa, 1965). The cycle is approximately 28 days (26-35).[9]
The investigators reported no influence of menstruation identified for lifting performance but Heart Rate (HR) response increases. A perceived back pain reported. Thus, many other phases of women needs imperative investigation. safe and acceptable working condition will help to reduce the health complaints of pregnant female population. The following phases are identified by medical science.

1. Menopause - 44 to 55 years of age
2. Menarche - 13 to 15 years
3. Menstruation - 4 days per month
4. Pregnancy - upto 4 months to 8 months
5. Normal - healthy condition
6. Milk feeding to infant - 2-14 months of delivery

2.2. Menstrual Cycle and Its Relevance To Work

The effects of menstrual cycle phase on manual handling performance is studied by K. M. Birch and T. Reilly (1999). Menstruation is one of the 'phase' of women creating the disturbances biologically, with fluctuations in the female hormonal environment. The physical stress and physiological strains are developed during physical work performance. The paper discussed in earlier section 2.1.1 described the results of examination whether these fluctuations affect the strenuous performance required in MMH.

2.3.Pregnant Women – Mood and Cognition

The study is made by Neil Morris et al (1998) is an attempt to compare the mood and cognition in pregnant and non-pregnant workers on psychological dimensions. The investigator examined the cognitive and mood states of a sample of women, who were in their late second and early third trimester of pregnancy, with a view to clarify psychological adaption to work environment. Cognitive Failures Questionnaire (CFQ) by Broadbent et al. (1982) to elicit self reports of a frequency of a range of cognitive failures. It encompass act of absent- mindness, forgetfulness and clumsiness due to lapses of attention. CFQ scores have been shown to be positively correlated with some mood states (Mathews and Wells, 1988) suggesting a close relationship between two. It showed mild increase in depression and negative shifts in other mood states in pregnant women in late pregnancy (O'hara et al, 1990) Thematic appreciation test (TAT). UWIST mood adjective checklist has aggression – frustration (A-F) dimension. Thirty-eight women were participated. Subjects were required to refrain from discussing the questionnaires while filling out the 15 minutes test.

CFQ, EA, TA, HT, A-F, GA are statistically compared to find out the results. The pregnant women reported significantly lower energetic arousal than non-pregnant women and all mood measures, except for Tense Arousal correlated with CFQ score in pregnant women. No mood measures correlated with CFQ score in non-pregnant women. [7]

3. EXPERIMENTAL APPROACH

Figure 2. Women Worker Working On Ambar Charkha

In this we take the woman operator operating on Ambar Charkha under consideration no known logic can be applied correlating the various dependent and independent parameters. As there is large difference in work output obtained from a Male worker and female worker, again work output is changes as per different categories of female worker according to their age. The experimentation of Ambar Charkha involves the following steps.[6]

i] Identification of Ambar Charkha workplace with women workers.

ii] Measurement of worker anthropometry data.

iii] Type of Ambar Charkha.

iv] Per day output.

v] Working cycle of women worker

vi] Interaction with women worker.

vii] Identification of dependant & independent parameter.

viii] Establishing the relation between dependant & independent parameter i.e mathematical modeling by dimensional analysis.

ix] Observation of all independent parameter for all season i.e summer, winter, rainy for all women phases.(as existing)

x] Instrument for observations

xi] Pulse Oximeter [FP050]

Figure 3. Pulse oximeter [FP050]

The pulse oximeter shines red and infrared light through the tissue and detects the fluctuating signals caused by arterial blood pulses. The ratio of the fluctuation of the red and infrared light signals received determines the oxygen saturation content. Conditions such as steady venous blood flow, skin thickness, fingernail thickness, etc. do not affect the saturation reading because they are constant and do not cause fluctuations. Note that the pulse oximeter readings do not depend upon the absolute light intensity, rather upon the fluctuations in light intensity. If too little light passes through, the pulse oximeter will not display values. Pulse oximeters use two different wavelengths of light (red and infrared), providing the ability to determine one component of blood. The pulse oximeter is calibrated to closely approximate functional oxygen saturation values. These values will closely approximate laboratory instrument fractional saturation values.

Specifications:

- Current = < 60ma
- Battery: Dc 2V or 3.3V
- Safety class: type bf

x.ii]Sound level meter [Lutron SL- 4001]

It has large LCD display which is easy to read, it uses a warning indicator which is used to indicate over and under load and have time weighting dynamic characteristic modes such as

slow and fast. For high accuracy and long term stability condenser microphone is used.

Activation:

Digital sound level meter is the signal sensible instrument it take readings itself only a primary setting is to be needed. It has a sensor at the top which senses the signal coming from surroundings and gives the output reading. To activate this instrument we only need to press the on switch and other switches are kept in neutral position and then readings are noted down

Figure 4. Sound level meter [Lutron SL- 4001]

Specification:

1] Display: 18mm LCD, 3 ½ digits
2] Size of microphone: ½ inch standard size
3] Range selector: 30-130dB; 30-80 dB; 50-100 dB; 80-130db.
4] Precision; ± 1.5 dB.
5] Frequency: 31.5Hz- 8000Hz.
6] Power consumption: approximately 6Ma.

xiii] Hand Grip Dynamometer:

This instrument is used to measure the maximum isometric strength of the hand and forearm muscles. Handgrip strength is important for any work or activity in which the hands are used.

Figure 5. Hand grip dynamometer

The subject holds the dynamometer in the hand of which strength is to measure, with the arm at right angles and the elbow by the side of the body. The base should rest on first metacarpal (heel of palm), while the handle should rest on middle of four fingers. When ready the subject squeezes the dynamometer with maximum isometric effort, which is maintained for about 5 seconds. No other body movement is allowed. The subject should be strongly encouraged to give a maximum effort.

xiv] Humidity Measurement:

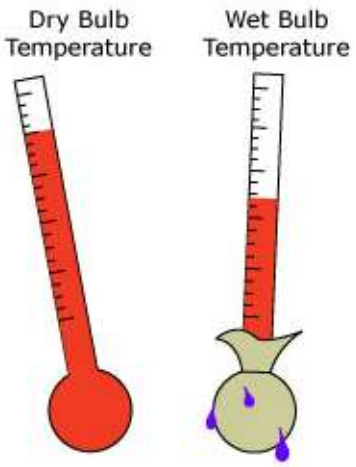

Figure 6. Thermometers to measure dry and wet bulb temperature

As we know air Humidity can be estimated by measuring dry bulb temperature and wet bulb temperature. Therefore we find out dry bulb temperature and wet bulb temperature separately using thermometers.
We take dry bulb temperature [T_{db}] with the help of laboratory thermometer or simple thermometer and wet bulb temperature [T_{wb}] can be measured with a standard thermometer with some wet clothing, cotton or similar, around the bulb as per there standard definitions. There should be a continuously air flow is important to evaporate water from the wet clothing and achieve a correct wet bulb temperature. Then Humidity is calculated by taking the intersection of dry and wet bulb temperature by plotting these values on psychrometry chart.

xi] Stastical analysis.

xii] Relational relativity between parameter with different season & with different phases.

4 CONCLUSION

This paper gives the experimentation procedure for Ambar Charkha workers which will proves the relation between input & output parameter, their effect and relativity with each others in different season i.e summer, winter, rainy for different phases of women worker. With the help of planning of experimentation one may differentiate and know the dependent and independent parameters. We also seen that there is interconnection between output obtained and the phase of women worker i.e. to check effect of change in woman worker phases on Output.

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