

Survey Research for Productivity Improvement and Assigning the Job According to Ergonomic Considerations

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Abstract—As far as a particular muscular work of a labour is considered various physical factors comes into picture such as physical ability, built and sound condition of body. The study and analysis of determining the ability of the body to perform a particular task is called as “ergonomics”. Drawing upon human biology, psychology, engineering and design, ergonomics aims to develop and apply knowledge and techniques to optimize system performance, while protecting the health, safety and well-being of individuals. By proper analysis of the field data, one can develop an assignment criterion which will serve the purpose. The study is purely done by the statistical analysis of a field data which was done on the basis of Sampling. The size of sample is very crucial as it affects the reliability of result. The approach is to design an assignment criterion by which on the basis of ergonomic considerations, the worker can be assigned with a job which will suite his physical ability and thus overall optimizing the activity and improving the productivity.

Keywords : *Android gadgets; confidence; population; sample size; regression; rating scale technique.*

I. INTRODUCTION

In this study of months, survey is conducted by recording the various physical measurements of a labour working in plywood manufacturing factory. The survey recordings were taken with utmost possible consciousness. Analysis and survey involves the consideration of various attributes which can affect the production rate and the accuracy of work like age, weight, anthropometric data, pulse rate, and affecting environmental conditions. The respective instruments with an optimum precision were used with smart measurement.

The other important thing is as the population for our analysis is “infinitely large” a statistical technique of Research Methodology called as “Sampling” is used. The sampling is the method of achieving a target or a conclusion by the analysis of proportionately reduced size as compared to population. The size of sample is so calculated which gives the assurance that the decision will be close or approximately equal for the total population. The accuracy of sampling is ensured by statistical tools viz.

- 1) Central Tendency
- 2) Measure of Dispersion

II. ROLE OF SAMPLING

Sampling is the method of selecting a particular amount of units from a huge lot randomly without any mind bias and then

the inspection of that much units is carried out and whatever the judgment is, is considered as the universal judgment for the whole population (i.e.) lot.

The three aspects around which the sample size research revolves are listed viz.

- Data
- Crucialness
- Dependencies

III. DETERMINATION OF SAMPLE SIZE

On the basis of selected factors, a questionnaire is prepared. As the study is of descriptive type. And the data collection is through the survey, it is necessary to find out the sample size for the study. For this purpose, initially, 30 subjects are surveyed as a test sample for pilot study.

An Equation for Determining Sample Size for infinite population

$$n = (Z \times \sigma/E)^2$$

Where,

n= sample size

Z= tail value

σ = standard deviation of Population

E= error of estimation or margin of error (5% maximum)

Now tail value for 95% confidence in sampling

Z = 1.96 and margin of error during taking of sample is 5%

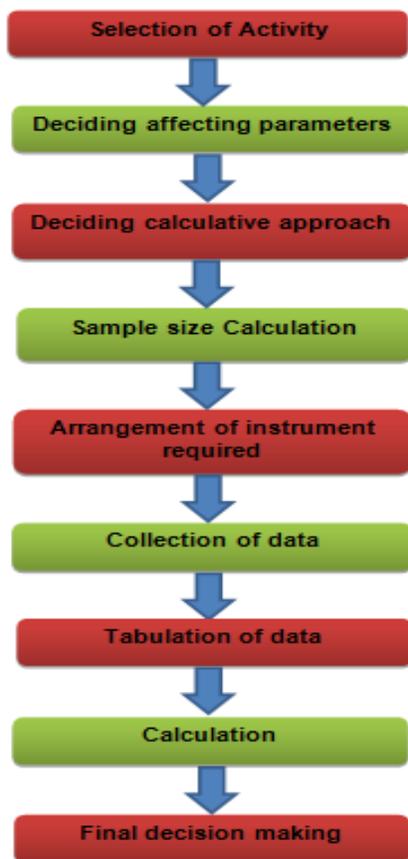
$$\begin{aligned} \text{Sample size } (n) &= (Z^2 \times SD^2) / E^2 \\ &= (1.96^2 \times 0.367^2) / 0.05^2 \\ &= 163 \end{aligned}$$

IV. ADVANTAGES OF SAMPLING

- Provides the approximated same result as that of population.
- Complexity of 100% inspection is eliminated.
- The cost and time of inspection is saved.
- Permits greater balancing of statistical power of tests of differences between strata by sampling equal numbers from strata varying widely in size.

V. ACTIVITY DETAILS

The activity which is considered includes large and considerable amount of human effort. The activity in which there must be greater emphasis on manual work rather than automation. The workers working on shop floors, workshop, polishing, pressing machine, etc.



The main objective is to assign the job according to the capacity of the worker so that we can achieve a dual objective of not only increasing the productive output from him but also

reducing the health hazards caused due to functional overloading par the worker’s capacity.

The flow chart shows the details right from activity selection to final results including parameters consideration, sample size calculation, data collection, tabulation, calculation and analysis.

VI. INSTRUMENTS USED IN STUDY

- Measuring tape (for height)
- Weighing machine (for weight)
- Pulse rate meter (for pulse rate)
- Android Gadgets (for temperature, humidity, air velocity)

VII. RATING SCALE TECHNIQUE

We have converted the data decision into the three range levels which are separated by the dimensional distance. The center band indicates the most appreciable band while the left hand and right hand band indicates the lower range and upper range values. [2]

We are taking the most consistent values on the neutral range and the like values are near to the neutral value on both sides which forms a central band and we consider this band as a most suitable and desired band while the two dimensional outer bands are of positive and negative type respectively. This approach we are using just to give a verbal decision that for a particular worker, the work is

- Assignable
- May Assignable
- Not Assignable

As shown in following figures;

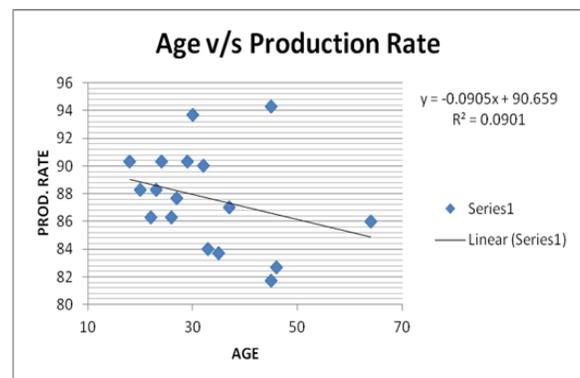


Figure.1 Relationship between worker’s ages with production rate.

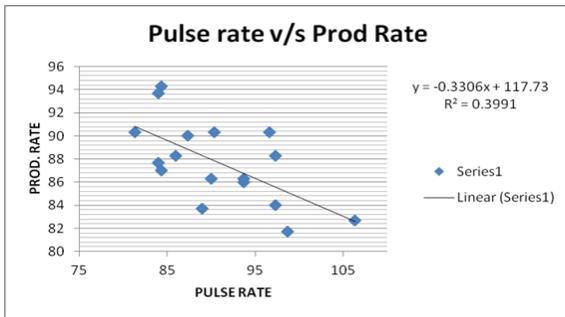


Figure 2. Relationship between worker’s pulse rates with production rate.

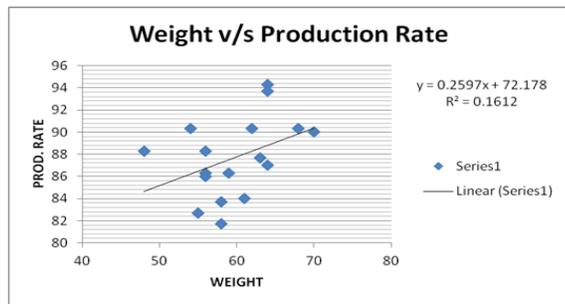


Figure 3. Relationship between worker’s weights with production rate.

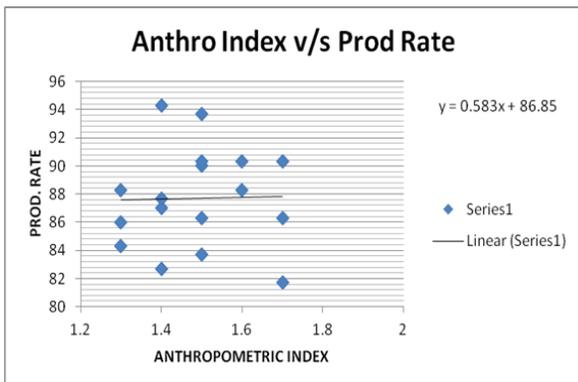


Figure 4. Relationship between worker’s anthropometric indexes with production rate.

- The various health related problems such as carpal tunnel syndrome, back pain, sprain, etc. can be avoided

TABLE 1. DECISION TABLE

Factors	Assignable	May Assignable	Not Assignable
Age	18-28 years	28-35 years	36 above
Weight	55-60 kg	60-78 kg	78 above
Anthropometric Index	1.4-1.5	1.5-1.6	below 1.2 above 1.6
Pulse Rate	77-86 bpm	87-97 bpm	above 97 bpm

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VIII. CONCLUSION

By the field study and survey, it can be concluded that;

- There is a great impact of the anthropometric parameters of the human body on the physical work.
- By this approach, a proper assignment of work can be done under the bars of ergonomics.
- By the following results we can design a criterion of selection which can increase the productive efficiency with parallel consideration of ergonomics.