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Applying Multiple Linear Regression Analysis In The Prediction Of Job Performance

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ABSTRACT: *This research investigated the prediction of a dependent variable, job performance of workers, based on a set of five independent variables viz: age, work experience, motivation and compensation, job satisfaction, organizational support and justice. The relationship between job performance and each of these predictors was examined and analyzed among a field sample of 50 participants who are staff of a fast food and catering services firm, effectively surveyed with the aid of a self-developed questionnaire. Consistent with our hypothesis, these five independent variables were related to job performance, in that each variable had some impacts on the job performance of workers in a workplace as it related to various work attitudes and behaviors and certain organizational features in the work system deemed it fit for a standard statistical tool, the Multiple Regression Analysis, which was deployed to analyze and develop a model. The Multiple Regression Model developed was used to predict job performance based on the influence of the five independent variables.*

KEYWORDS: *Regression, Sampling, Variable, Rating, etc.*

I. INTRODUCTION:

Ergonomics is concerned with making the workplace as efficient, safe and comfortable as possible. It is from the Greek word ergon meaning work, and nomoi meaning natural laws), and can also be seen as the science of enhancing the design of products to optimize them for human use, Nidhi D (2017). Effective application of ergonomics in work system design can achieve a balance between worker characteristic and task demands. Industries today are facing numerous challenges to maintain the health and performance of employees while attempting to integrate new technologies, Akkshhey et al(2016).This can enhance worker productivity, provide worker safety and physical and mental well-being and job satisfaction. While not all manual tasks are high risk, effective manual task risk management requires identification of hazardous tasks followed by assessment of the degree and source of risk associated with the task before effective controls can be implemented to either eliminate or reduce the risk, Danellie L. et al (2013). Many research studies have shown positive effects of applying ergonomic principles in workplace design; machine and tool design, environmental and facilities design and occupational considerations Research studies in ergonomic have also produced the concept of occupational ergonomic considerations and principles as it applies in the workplace. Here the welfare and other organizational features of the worker are laid out and analysis are made and monitored as to how they affect the job performance of the worker in the workplace. The main concern of occupational ergonomics is usually the improvement of the working conditions and organizational variables which have the capacity to positively or negatively affect the job performance of a worker in terms of productivity, quality, effectiveness or efficiency. Human body is still in the process of evolution. Incorrect ergonomics at workplace including working from home is not free from serious long-term health effects, Bakhtiar C. et al (2020). In predicting job performance, certain independent variables would be measured against it in order to evaluate their respective resultant effects in the system. The concept of job performance is one of the most important dependent variables in work systems and has been studied for a long decade, identified two types of employee behavior that are necessary for organizational effectiveness: task performance and contextual performance. Task performance refers to behaviors that are directly involved in producing goods or service, or activities that provide indirect support for the organization's core technical process. These behaviors directly relate to the formal organization reward system. On the other hand, contextual performance is defined as individual efforts that are not directly related to their main task functions. However, these behaviors are important because they shape the organizational, social and psychological contexts serving as the critical catalyst for task activities and processes. Ergonomic factors such as provision of backrest and frequent rest periods could remediate the musculo-skeletal symptoms Metgud D.C et al (2008)Therefore, this project borders on making accurate predictions on the dependent variable, job performance of a worker in a workplace as measured against five independent variables (predictors) viz:

- Age of the worker

- Work Experience (technical know-how)
- Motivation and compensation
- Organizational support and justice
- Job satisfaction

And how these independent variables directly have effects towards job performance using a standard statistical tool called the Multiple Regression Method for our analysis and investigation of primary and secondary data inorder to construct a conceptual frame work for implementation of structural equation model that predicts job performance in a workplace.

II. LITERATURE REVIEW.

According to federal employment laws, it is illegal to disqualify an employee for reasons of race, color, religion, gender, national origin, or disability tests to determine an individual ability to safely perform job tasks. This section of the chapter reviews the pertinent literature related to replacement screening. Both management and workers benefit from the increased productivity and safety resulting from a well-constructed replacement screening process.

ergonomics has emerged as being extremely useful, given the contribution of studies and research emphasizing the need for continuous change and improvement, both for production and the labour activity of workers. Claudilaine C.O et al(2017).When hiring new personnel, management has a vested interest in having workers succeed in their jobs. Workers who will have an acceptable level of productivity and will perform the job safely are needed to run an efficient operation. In physically demanding jobs, there is a concern that smaller, weaker individuals may be at greater risk for injury and may be less productive. Job redesign, worker selection, and training are used in an attempt to ensure safe execution of job requirements. Of these approaches, it is preferred to design the equipment, job or task so the majority of workers can perform the task safely and efficiently. In the early stages of manual workplace design the workers are not effectively considered which is one of the top challenges in the factories of the future Turk M. et al (2018)A redesign of a more enabling environment and organizational features is developed in order for workers to improve on their job performance. For example, considering 'age' factor, the tasks of fire fighters, police, rescue workers, and soldiers cannot always be anticipated or redesign in order to permit persons with lower levels of physical fitness and strength to complete them. Instead, worker selection procedures are used to select personnel for these procedures physically demanding jobs. Productivity and motivation are well affected as well due to limitation caused by health issues, which affects the quality of life as well. This matter has to be attended to avoid accidents and injuries to occur amongst workers, Baba M.D et al (2015) Pre-employment and pre-placement screening refer to the process of administering a test or set of tests to job applicants in order to discern whether they can safely perform the expected job and finally A person will not be able to concentrate continuously for mental activity. After experiencing tension during a certain period, there will be a disturbance in perception, and the speed of the reaction becomes slow Widana I.K et al (2018) .

III. METHODOLOGY

This research effort focuses on predicting the theory of job performance in a workplace as measured against independent variables namely: age of the worker, jobs satisfaction, motivation and compensation, work experience, organizational support and justice, and analyzed with a standard statistical tool: the Multiple Regression method, in order to determine whether the predictive generalizations hold true. The data for this research project are quantitative in nature, therefore a quantitative research design will serve best to answer the research question of this project. An analytic survey design is implemented. This is because the research is only interested in determining how the afore listed independent variables have influence on, and predict the dependent variable "Job Performance".

3.1 Rating Scale

Likert – type scale of five (5) response pattern was used based on the weights needed for scoring respondents choice(s).

Strongly Disagree	SD
Disagree	D
Strongly Agreed	SA
Agreed	A

The respondents (workers) were required to read the statements and tick
(√) to show the one that most described their opinions in the five (5) points rating scale as given above and the reverse for negative statement.

IV. ANALYSIS OF RESULTS

The presentation of results and analysis of data gathered from the sampling of questionnaires at a fast food plaza in Nigeria, is the focus of this chapter. The opinions sampled by the respondents (workers) were based on independent and objective judgment. Each research question is presented in tables and the responses are itemized according to their individual rating scale on the Likert scale.

Table 4.1: Research Question 1

SS/N	Predictors (Independent variable)	Strongly Disagree	Disagree	Undecided	Agreed	Strongly Agree
a.	The prediction of the job performance of a worker can be influenced by the age of the worker	-	-	-	45	5
%		-	-	-	90%	10%
Code		-	-	-	+1	+1

Table 4.2: Research Question 2

Outlined below is the response to research question two (2) on how work experience could be a predictor of job performance. The total population of respondents is stated according to the rating scale.

S/N	Predictors (Independent variable)	Strongly Disagree	Disagree	Undecided	Agreed	Strongly Agree
b.	Work experience is a predictor of job performance	-	-	-	10	40
%		-	-	-	20%	80%
Code		-	-	-	+1	+1

Table 4.3: Research Question 3

The presentation of the data from respondents on the influence of the level of job satisfaction of the worker on the performance is outlined on the table below.

S/N	Predictors (Independent variable)	Strongly Disagree	Disagree	Undecided	Agreed	Strongly Agree
c.	Job performance can be predicted by the level of job satisfaction of the worker.	-	-	-	-	50
%		-	-	-	-	100%
Code		-	-	-	-	+1

Table 4.4: Research Question 4

The presentation of the data gathered from respondents on how motivation and compensation have direct effects towards job performance of workers in the organization.

S/N	Predictors (Independent variable)	Strongly Disagree	Disagree	Undecided	Agreed	Strongly Agree
d.	Workers motivation and compensation are variable which have direct effects towards job performance	-	-	-	2	48
%		-	-	-	4%	96%
Code		-	-	-	+1	+1

Table 4.5: Research Question 5

Outlined in the table below is the result which shows how organizational support and justice are independent variables which have direct effects towards job performance of workers in a workplace.

S/N	Predictors (Independent variable)	Strongly Disagree	Disagree	Undecided	Agreed	Strongly Agree
e.	Organization support and justice are independent variable which have direct effects towards job performance of workers in a workplace	2	-	2	43	3
		4%	-	4%	86%	6%
Code		-1	-	0	+1	+1

Table 4.6: Respondents Data Factorial Table 1

1.	1	-1	0	0	0	0	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2.	1	0	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0	0	0
3.	1	0	0	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0	0
4.	1	0	0	0	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0
5.	1	0	0	0	0	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1
6.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7.	1	+1	-1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
8.	1	-1	+1	-1	-1	-1	-1	+1	-1	-1	-1	-1	+1	+1	+1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1
9.	1	-1	-1	+1	-1	-1	-1	-1	+1	-1	-1	+1	-1	+1	+1	-1	+1	+1	-1	-1	+1	+1	+1	+1	+1	+1
10.	1	-1	-1	-1	+1	-1	-1	-1	-1	+1	-1	+1	+1	-1	+1	+1	-1	+1	-1	+1	-1	+1	+1	+1	+1	+1
11.	1	-1	-1	-1	-1	+1	-1	-1	-1	-1	+1	+1	+1	+1	-1	+1	+1	-1	+1	-1	-1	+1	+1	+1	+1	+1
12.	1	+1	+1	-1	-1	-1	1	+1	-1	-1	-1	+1	-1	-1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1
13.	1	+1	-1	+1	-1	-1	1	-1	+1	-1	-1	-1	+1	-1	-1	-1	+1	+1	-1	-1	+1	+1	+1	+1	+1	+1
14.	1	+1	-1	-1	+1	-1	1	-1	-1	+1	-1	-1	-1	+1	-1	+1	-1	+1	-1	+1	-1	+1	+1	+1	+1	+1
15.	1	+1	-1	-1	-1	+1	1	-1	-1	-1	+1	-1	-1	-1	+1	+1	+1	-1	+1	-1	-1	+1	+1	+1	+1	+1
16.	1	-1	+1	+1	-1	-1	-1	+1	+1	-1	-1	-1	-1	+1	+1	+1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1
17.	1	-1	+1	-1	+1	-1	-1	+1	-1	+1	-1	-1	+1	-1	+1	-1	+1	-1	-1	+1	-1	+1	+1	+1	+1	+1
18.	1	-1	+1	-1	-1	+1	-1	+1	-1	-1	+1	-1	+1	+1	-1	-1	-1	+1	+1	-1	-1	+1	+1	+1	+1	+1
19.	1	-1	-1	+1	+1	-1	-1	-1	+1	+1	-1	+1	-1	-1	+1	-1	-1	+1	+1	-1	-1	+1	+1	+1	+1	+1
20.	1	-1	-1	+1	-1	+1	-1	-1	+1	-1	+1	+1	-1	+1	-1	-1	+1	-1	-1	+1	-1	+1	+1	+1	+1	+1
21.	1	-1	-1	-1	+1	+1	-1	-1	-1	+1	+1	+1	+1	-1	-1	+1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1
22.	1	+1	-1	+1	-1	-1	1	+1	+1	-1	-1	+1	+1	-1	-1	+1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1
23.	1	+1	-1	+1	+1	-1	1	-1	+1	+1	-1	-1	+1	+1	-1	-1	-1	+1	+1	-1	-1	+1	+1	+1	+1	+1
24.	1	+1	+1	-1	+1	-1	1	+1	-1	+1	-1	+1	-1	+1	-1	-1	+1	-1	-1	+1	-1	+1	+1	+1	+1	+1
25.	1	+1	+1	-1	-1	+1	1	+1	-1	-1	+1	+1	-1	-1	+1	-1	-1	+1	+1	-1	-1	+1	+1	+1	+1	+1

Table 4.7: Respondents Data Factorial Table 2

26.	1	+1	-1	-1	+1	+1	1	-1	-1	+1	+1	-1	-1	+1	+1	+1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1
27.	1	+1	-1	+1	-1	+1	1	-1	+1	-1	+1	-1	+1	-1	+1	-1	+1	-1	-1	+1	-1	+1	+1	+1	+1	+1
28.	1	-1	+1	+1	+1	-1	-1	+1	+1	+1	-1	-1	-1	-1	+1	+1	+1	-1	+1	-1	-1	+1	+1	+1	+1	+1
29.	1	-1	+1	+1	-1	+1	-1	+1	+1	-1	+1	-1	-1	+1	-1	+1	-1	+1	-1	+1	-1	+1	+1	+1	+1	+1
30.	1	-1	-1	+1	+1	+1	-1	-1	+1	+1	+1	+1	-1	-1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1
31.	1	+1	+1	+1	+1	-1	+1	+1	+1	+1	-1	+1	+1	+1	-1	+1	+1	-1	+1	-1	-1	+1	+1	+1	+1	+1
32.	1	+1	+1	+1	-1	+1	+1	+1	+1	-1	+1	+1	+1	-1	+1	+1	-1	-1	-1	+1	-1	+1	+1	+1	+1	+1
33.	1	+1	+1	-1	+1	+1	+1	+1	-1	+1	+1	+1	-1	+1	+1	-1	+1	+1	-1	-1	+1	+1	+1	+1	+1	+1
34.	1	+1	-1	+1	+1	+1	+1	-1	+1	+1	+1	-1	+1	+1	+1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1
35.	1	-1	+1	+1	+1	+1	-1	+1	+1	+1	+1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
36.	1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
37.	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
38.	-1	-1	-1	-1	-1	-1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
39.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41.	+1	+1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0	0	0	0
42.	+1	0	+1	0	0	0	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0	0	0
43.	1	0	0	0	+1	0	0	0	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0	0
44.	1	0	0	0	+1	0	0	0	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0
45.	1	0	0	0	0	+1	0	0	0	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1
46.	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47.	0	+1	+1	+1	+1	+1	0	0	0	0	0	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1	+1
48.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
∑ =	39	+1	-1	+1	-1	-1	+1	-1	+1	+1	-1	5	3	5	5	5	3	+1	5	5	3	37	37	37	37	37

4.1 The Multiple Regression Method

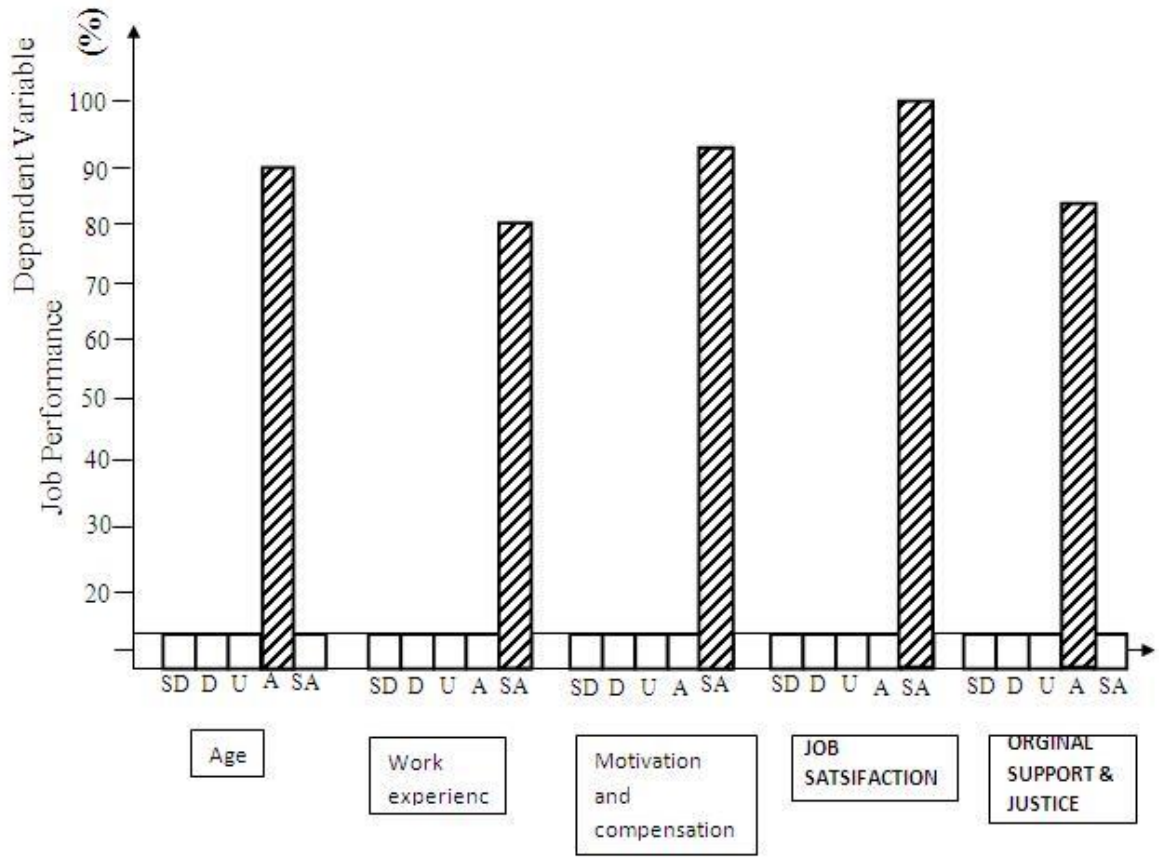
The multiple regression method is deployed to solve models with just one dependent and two or more independent (exploratory) variables**.** Inorder to develop the multiple regression model, we use the values of all the possible parameters as shown in the table below.

Table 4.8: Showing the values of the β correlation coefficients of each of the independent variables and the total sample population, n.

n	β_0	β_1	β_2	β_3	β_4	β_5	
50	0.78222	0.055556	-0.055556	0.055556	0.055556	0.00000	

Therefore the Multiple Regression Model developed to analyze the prediction of the dependent variable y (job performance) based on the effects of the five (5) independent variables: age, work experience, motivation and compensation, job satisfaction and organizational support and justice of the fifty (50) sampled workers at Sizzlers Corporate Nigeria Limited is shown below:
The Multiple Regression Model is:
Y = 0.78222 + 0.05556 - 0.05556 - 0.05556 + 0.05556 + 0.00000.

HISTOGRAM SHOWING THE DISTRIBUTION OF RESPONDENTS DATA USING THE 5-POINT LIKERT SCALE



KEY:
SD: Strongly Disagree
D: Disagree
U: Undecided
A: Agree
SA: Strongly agree

Fig 4.0: Showing the distribution of respondents' data; the five independen variables and their rating scale against the dependent variable job performance graduated in percentage.

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