

Demand Forecasting and the Determination of Employee Requirements in Nigerian Public Organisations

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Abstract

The right quality and quantity of human capital (employed) is a measure of an organisation's strength and success. Where this optimum staff mix is not maintained, imbalances in surpluses or deficits of employees may arise leading to unmanageable increases in personnel costs, inefficiency, absenteeism, turnover and productivity problems. The determination of this optimum staff mix is subject to the application of certain methods. The principal objective of this paper is to assess the potency of demand forecasting in the determination of employee requirements. A hypothesis in line with this objective is drawn and tested based on the data generated through a questionnaire. The survey investigation method was used in collecting the primary data for the study. The sample consisted of 349 top, middle and low levels management staff of five public sector organisations in Nigeria. The result shows that demand forecasting is not a potent tool in the estimation of employee requirements in Nigerian public organisations. Based on the aforementioned, the paper concluded that although widely varying approaches to forecasting the employees needs of an organization exist, demand forecasting might not predict with certainty the exact employee needs of an organization. The paper recommends that human capital planners should adopt a strategy of combining both qualitative and subjective methods in

forecasting the employee needs of an organization;

Chief executive officers of organisations should make it mandatory for human capital planners to employ scientific methods in forecasting; and the adoption of a combination of the technical skills of experts from various fields in the forecasting efforts.

Introduction

The further into the future it takes to plan human capital, the greater will be the degree of certainty of the number and types of employees available for employment both within and outside the organization. Effective workforce planning for specific enterprises involves determining which actions are needed to achieve business objectives, identifying the types and quantities of skills that are necessary to accomplish those actions, determining how those skills may vary from the skills that are currently available, and developing strategies for closing the gaps between today's workforce and the workforce needed to accomplish the business objectives (Ward, 1996:1).

This brings to the fore the import of demand forecasting. Armstrong (2003:371) defines demand forecasting as the process of estimating the future numbers of people required and the likely skills and competences they will need.

The ideal basis of the forecast is an annual budget and longer term business plan, translated into activity levels for each function and department or decisions on downsizing. The information gathered from external environmental scanning and assessment of internal strengths and weaknesses is used to predict or forecast human capital supply and demand in the light of organizational objectives and strategies.

Forecasting uses information from the past and present to identify expected future conditions. Projections for the future are, of course, subject to error. Changes in the conditions on which the projections are based might even completely invalidate them, which is the chance forecasters take. Usually, though, experienced people are able to forecast with enough accuracy to benefit organizational long-range planning (Gerhart et al, 2000:803).

But what is the cost-benefit trade-off of the rigorous activities involved in demand forecasting? Why should organisations concern themselves with demand forecasting? There are several good reasons to conduct demand forecasting. It can help: (i) quantify the jobs necessary for producing a given number of goods, or offering a given amount of services, (ii) determine what staff-mix is desirable in the future, (iii) assess appropriate staffing levels in different parts of the organisation so as to avoid unnecessary costs, (iv) prevent shortage of people where and when they are needed most, and (v) monitor compliance with legal requirements with regard to reservation of jobs (Aswathappa, 2005:74). In spite of the numerous functions and advantages of demand forecasting, most organisations are yet to take advantage of this scientific way of estimating employee needs.

The problem

The absence of effective and scientific demand forecasting methods in most Nigerian public organizations seems to be the main bane of shortages and excesses in human resources resulting to unmanageable and expensive imbalances in the number and quality of employees needed to optimally achieve organizational objectives and plans. As a result, public organizations' scorecard has remained excessive costs associated with excessive turnover, absenteeism, stress, low morale, shift work, healthcare services, low productivity and internal market inefficiency.

Several demand forecasting techniques currently exist. They vary from fairly simple qualitative methods based on individual or group judgements to highly complicated methods involving sophisticated statistical computerization. What is not yet very clear is whether or not these forecasting methods are used and further still which particular techniques are used and what is the result of such efforts? Are there benefits derivable from such exercises?

Objectives of the study

The principal objective of the paper therefore, is to assess the potency of demand forecasting in the determination of employee requirements. Specifically the paper seeks to assess the extent to which demand forecasting techniques are used in the determination of employee requirements and to find out the degree to which demand forecasting leads to the determination of employee requirements.

Methodology

The research design used for the study is the survey research method.

Primary data for the study were sourced from five public sector organisations namely: National Directorate of Employment (NDE), Power Holding Company of Nigeria (PHCN), Plateau State Water Board (PSWB),

Federal Ministry of Finance (FMF) and Nigerian National Petroleum Corporation (NNPC). The population of the study includes all the 10,127 top, middle and lower management staff of the five organisations.

Given that the population of the study is finite, the Taro Yamane (1964) statistical formula for selecting a sample was applied.

The formula is given as:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = Sample size; N = Population; e = level of significance (or limit of tolerance error) in this case 0.05; 1 = Constant value

This gives a sample size of 385.

For its data collection, a suitable Likert Scale (5 Points) questionnaire was designed and developed. The data so collected was then analyzed using the chi-square (χ^2) test statistic.

Theoretical considerations

Methods for forecasting human resources range from a manager's best guess to a rigorous and complex computer simulation. Simple assumptions may be sufficient in certain instances, but complex models may be necessary for others. However, it has been observed that despite the availability of sophisticated mathematical models and techniques, forecasting is still a combination of quantitative methods and subjective judgement. In theory or in practice, the most commonly used techniques in forecasting the demand for human resources include the following:

Management / Executive Judgement

The simplest approach to manpower forecasting is to prepare estimates of future needs based on the individual opinions of departmental or line managers. The technique may involve a bottom-up approach by asking junior managers to sit down, think about their future workloads and decide how many people they need.

Alternatively, a "top downward" approach can be used, in which company and departmental forecasts are prepared by top management, possibly based on the advice/information available from the personnel, and organisation and methods departments. The suggested forecasts are circulated downwards for discussions and therefore reviewed and agreed with departmental managers (Sen, 2007:135).

Aswathappa (2005:74) indicates that in "bottom-up" and "top-down" approaches, departmental heads are provided with broad guidelines. Armed with such guidelines, and in consultation with the human resource section in the human resource management department, departmental managers can prepare forecasts for their respective departments. Simultaneously, top human resource managers prepare company forecasts. A committee comprising departmental managers and human resource managers will review the two sets of forecasts; arrive at a unanimity, which is then presented to top managers for their approval. Needless to say, this technique is used in smaller organisations or in those companies where sufficient data-base is not available.

Work Study Techniques

Work Study is as old as industry itself. In the opinion of Currie (1972:22), work study is the study of human work in the deepest sense and dignity of the word, and not merely in the special and more restricted meaning used in the physical sciences. Even today it is not limited to the shop floor, or even to manufacturing industry. In one or another form it can be used in any situation wherein human work is performed. In the book "Introduction to work study" (1983:29), the International Labour Organisation (ILO) defines "work study" as a generic term for such techniques, particularly, method study and work measurement, as are used in the examination of human work in all its contexts and which leads systematically to the investigation of all the factors that affect the efficiency and economy of the situation being reviewed in order to effect improvement".

Work study, therefore, has a direct relationship with productivity. It is most frequently used to increase the amount produced from a given quantity of resources with little or no further capital investment.

Work study technique can be used when it is possible to apply work measurement to calculate how long operations should take and the number of people required. Work study techniques for direct workers can be combined with ratio trend analysis to calculate the number of indirect workers needed (Armstrong, 2003).

The starting point in a manufacturing company is the production budget, prepared in terms of volumes of saleable products of the company as a whole, or volumes of output for individual departments. The budgets of productive hours are then compiled using standard hours for direct labour. The standard hours per unit of output are then multiplied by the planned volume of units to give the total number of planned hours for the period. This is then divided by the number of actual working hours for an individual operator to show the number of operators required. Allowance will have to be made for absenteeism and idle time. As already stated, work study techniques for direct workers can be combined with ratio-trend analysis to forecast for indirect workers, establishing the ratios between the two categories. The same logic can be extended to any other category of employees.

Ratio Trend Analysis

This is the quickest forecasting technique. The technique involves studying past ratios, like the number of workers involved in direct production (direct hours) and sales in an organisation and forecasting future ratios, making some allowance for changes in the organisation or its methods. Table1 shows how an analysis of actual and forecast ratios, between the number of routine proposals to be processed by an insurance company underwriting department and the number of underwriters employed could be used to forecast future requirement (Armstrong, 1988:209).

Table 1: Demand Forecast – Inspectors

	Year	No. of Employees		Ratio
		Production	Inspectors	Inspectors : Production
Actual	- 3	1500	150	1 : 10
	- 2	1800	180	1 : 10
	Last year	2000	180	1 : 11
	Next year	2200*	200**	1 : 11
Forecast	+ 2	2500*	210**	1 : 12
	+ 3	2750	230**	1 : 12

* Calculated by reference to forecast activity levels

**Calculated by applying forecast ratio to forecast activity levels.

Source: Armstrong (1988:209), A Hand book of Personnel Management, New Delhi: Kogan Page.

Delphi Technique – Expert Forecast

Named after the ancient Greek Oracle at the city of Delphi, the Delphi technique is a subjective method used to predict future personnel needs of an organisation by “integrating the independent opinions of experts”.

Schuler (1983:48) explains that the technique involves a large number of experts who take turns at presenting their forecasts and assumptions. An intermediary passes each expert’s forecast and assumptions to the others, who then make revisions in their forecasts. This process continues until a final forecast emerges.

The final forecast may represent specific projections or a range of projections depending on the position of the experts. Originally developed as a method to facilitate group decision making, it has also been used in workforce forecasting. Experts are chosen on the basis of their knowledge of internal factors that might affect a business (e.g. projected retirements), their knowledge of the general business plans of the organisation, or their knowledge of external factors that might affect demand for the firm’s product or service and hence its internal demand for labour.

Experts may range from first-line supervisors to top-level managers. Sometimes experts internal to the firm are used, but if the required expertise is not available internally, then one or more outside experts may be brought in to contribute their opinions. To estimate the level of future demand for labour, an organisation might select as experts, for example, managers from corporate planning, human resources, marketing, production and sales department.

Face-to-face group discussion is avoided since differences in job status among group members may lead some individuals to avoid criticizing others and to compromise on their good ideas. To avoid these problems, an intermediary is used. The intermediary’s job is to pool, summarize, and then feed back to the experts the information generated independently by all the other experts during the first round of forecasting. The cycle is then repeated, so that the experts are given the opportunity to revise their forecasts and the reasons behind their revised forecasts. Successive rounds usually lead to a convergence of expert opinion within three to five rounds.

Process Analysis

The widespread interest in reengineering activities has produced a hypothetical approach to workforce demand forecasting based on process analysis. Some articles on the topic suggest businesses should develop a detailed analysis of process components of work activities and that predictive ratios could then be designed to forecast the associated workload for each unit level of process output (Ward, 1996:2). Data collection and analysis phase of a process analysis approach according to Ward is similar to the traditional historical ratio approach.

Process steps are substituted for work activity steps, so that the analysis is done at an organizational level rather than a work group. Ward goes further to observe that the benchmark analysis showed some reengineered companies have developed the traditional historical ratio analysis described in section 3, and have then adjusted those ratios for their assumed productivity gains to be achieved via process improvements. In theory, the positive and negative aspects of this process would mirror those described for historical ratios.

The concept seems fundamentally sound, but the benchmarking efforts do not seem to find a single case where this concept has been translated into an operational model. In order for the process to work as hypothesized, the work load analysis should be incorporated within a reengineering study. It might fairly be questioned whether the extensive level of analysis should become part of an annual planning cycle or should only be done in conjunction with a major reengineering effort.

Flow Model

Flow models are very frequently associated with forecasting personnel needs. The simplest one is called the Markov model. In this technique, Rothwell (1988:175) outlines the activities to be carried out by the forecasters as follows:

1. Determine the time that should be covered. Shorter lengths of time are generally more accurate than longer ones. However, the time horizon depends on the length of the human resource plan which, in turn, is determined by the strategic plan of the organisation.
2. Establish categories, also called “states” to which employees can be assigned. These categories must not overlap and must take into account every possible category to which an individual can be assigned. The number of states can neither be too large nor too small.
3. Count annual movements (also called ‘flows’) among states for several time periods. These states are defined as ‘absorbing’ (gains or losses to the company) or ‘non-absorbing’ (change in position levels or employment status). Losses include death or disability, absences, resignations and retirements. Gains include hiring, retirements, transfer and movement by position level.
4. Estimate the probability of transitions from one state to another based on past trends. Demand is a function of replacing those who make a transition.

There are alternatives to the simple Markov model. One, called ‘Semi-Markov’, takes into account not just the category but also the tenure of individuals in each category. After all, likelihood of movement increases with tenure. Another method is called the ‘Vacancy model’ which predicts probabilities of movement and number of vacancies.

While the Semi-Markov model helps estimate movement among those whose situations and tenure are similar, the vacancy model produces the best results for an organisation. Markov analysis is advantageous because it makes sense to decision makers. They can easily understand its underlying assumptions. They are therefore, likely to accept results.

The disadvantages include: (i) heavy reliance on past oriented data, which may not be accurate in periods of turbulent change, and (ii) accuracy in forecasts about individuals is sacrificed to achieve accuracy across groups.

Statistical techniques

The most commonly used statistical approaches to human capital forecasting range from methods of simple scatter diagram through regression or correlation analysis, to economic models. All of these methods depend, for their validity, on the assumption that developments in the future will exhibit some continuity with the past. Simple extrapolation assumes that past trends will continue, regression analysis assumes that particular relationships will hold firm and econometric models assume that the basic inter-relationship between a whole range of variables will be carried on into the future.

Regression and Correlation

This method seeks to provide a measure of the extent to which movements in the values of two or more variables – as for example, labour input and sales are related (or correlated) with each other. The aim is to predict changes in one variable by reference to changes in the other or others, where the future value of these other (or explanatory) variables are already postulated. Regression therefore, is a technique used to describe a relationship between two or more variables, in mathematical terms. Francis (2004:173) asserts that regression is concerned with obtaining a mathematical equation which describes the relationship between two variables. The equation can be used therefore for comparison or estimation purposes. The process of obtaining a linear regression relationship for a given set of (bivariate) data is often referred to as fitting a regression line. Francis (2004:174) asserts that there are three methods commonly used to fit a regression line to a given set of bivariate data.

(a) Inspection

This method is the simplest and consists of plotting a scatter diagram for the relevant data and then drawing in the line that most suitably fits the data. The main disadvantage of this method is that different people would probably draw different lines using the same data. It sometimes helps to plot the mean point of the data (that is, the mean of the x's and y's respectively) and ensure the regression line passes through this. In Figure 1, possible relationships are examined to see whether they might prove useful for forecasting. Francis goes further to explain that for any set of bivariate data, there are two regression lines which can be obtained viz: i) The y on x regression line – that regression line which is used for estimating y given a value of x and ii) the x on y regression line – that regression line which is used for estimating x given a value of y. The two regression lines are quite distinct.

(b) Semi – averages

The method of semi-averages according to Francis is for obtaining the y on x regression line using the following steps: STEP 1 – Sort the (bivariate) data into size order by x-value. STEP 2 – Split the data up into equal groups, a lower half and an upper half (if there is an odd number of items, ignore the central one). STEP 3 – Calculate the mean point for each group. STEP 4 – Plot the above mean point on a graph within suitably scaled. This method is considered superior to the method of inspection. However, a major drawback of the semi average technique for obtaining a regression line is the fact that it relies on only two points, both means of the two respective data groups. If there are extreme values present either or both of the means are easily distorted, thus so is the regression line.

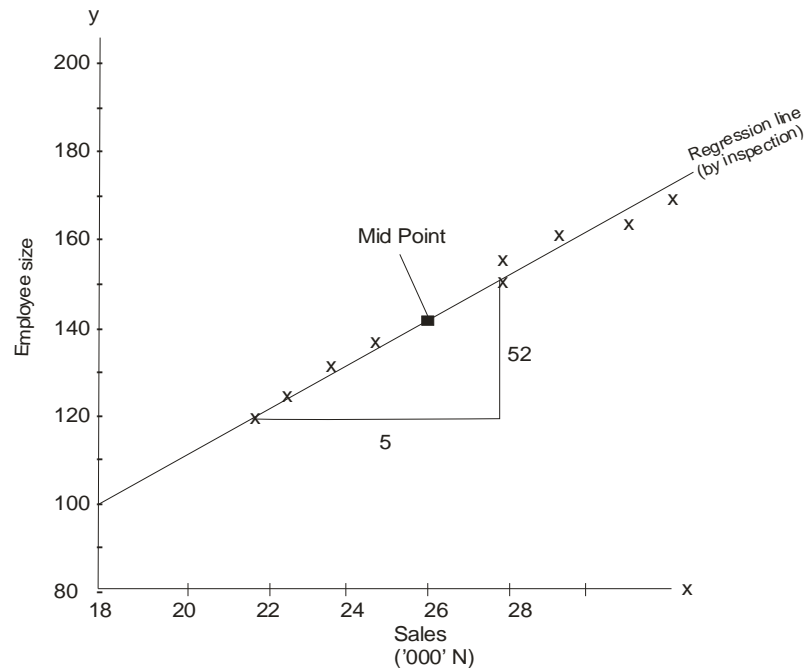


Figure 2.8- Regression line relationships between sales and employment size.

Source: Francis, A (2004:176), *Business Mathematics and Statistics*, London Bedford Row: Thomson Learning.

As already mentioned, an important use of regression lines is for estimating the value of one variable given a value of the other.

(c) Conventional Statistical Technique – Simple Linear Regression and Multiple Regression (Least Square Method).

The least squares regression method can be used to forecast direct labour employment needs of an organisation. In simple linear regression (least square method), a forecast of future human capital demand is based on past relationship between employment level and a variable related to employment.

For example, the number of beneficiaries supervised (x) determines the number of persons needed for employment (i.e. internal demand), y.

The least square method is considered to be the standard method of obtaining a regression line. The derivation of the technique has mathematical base which involves all values and

is thus considered to be superior. (Francis, 2004:173-174).

Berenson et al (1985:587) assert that the computation is represented by two simultaneously solved equations given as:

$$b_i = \frac{n \sum_{i=1}^n X_i Y_i - (\sum_{i=1}^n X_i) (\sum_{i=1}^n Y_i)}{n \sum_{i=1}^n X_i^2 - (\sum_{i=1}^n X_i)^2} \dots\dots\dots 1$$

$$b_o = \bar{Y} - b_i \bar{X} \dots\dots\dots 2$$

Where: b_o = Coefficient of y intercept, b_i = the slope used in predicting Y, X= number of beneficiaries selected, trained, placed and monitored/ Supervised (i.e. the work load). Y = Manpower demand (number of persons needed for employment), y_i = Actual value of y for observation,

x_i = Actual value of x,

$$\bar{Y} = \frac{\sum_{i=1}^n y_i}{n} \quad \text{and} \quad \bar{X} = \frac{\sum_{i=1}^n x_i}{n}$$

Examining the above equations, it is observed that there are five quantities that must be calculated in order to determine b_o and b_i . These are n, the sample size; $\sum X_i$, the sum of the X values;

$\sum_{i=1}^n y_i$, sum of the Y values, $\sum_{i=1}^n X_i^2$, the sum of the square of X values,
and $\sum_{i=1}^n X_i Y_i$, the sum of the cross product of X and Y.

Where there are more than one independent variables to be used for example, number of beneficiaries, productivity, turnover, absenteeism, etc, this method becomes ineffective and gives room to “MULIPLE REGRESSION MODEL” – One which could utilize several explanatory variables (x_i ,

x_2, \dots, x_n) to predict a quantitative dependent variable (y). If the least squares method is utilized to compute the sample regression coefficient (b_o, b_1 and b_2) we will have the following three normal equations (Berenson, et al, 1985:650):

$$\sum_{i=1}^n y_i = n b_o + b_1 \sum_{i=1}^n x_{1i} + b_2 \sum_{i=1}^n x_{2i} \dots\dots\dots 3$$

$$\sum_{i=1}^n x_{1i} y_i = b_o \sum_{i=1}^n x_{1i} + b_1 \sum_{i=1}^n x_{1i}^2 + b_2 \sum_{i=1}^n x_{1i} x_{2i} \dots\dots\dots 4$$

$$\sum_{i=1}^n x_{2i} y_i = b_o \sum_{i=1}^n x_{2i} + b_1 \sum_{i=1}^n x_{1i} x_{2i} + b_2 \sum_{i=1}^n x_{2i}^2 \dots\dots\dots 5$$

Standard Error of the Estimate

Although the least squares method results in the line that fits the data with the minimum amount of variation, the regression equation is not a perfect predictor, especially when samples are taken from a population, unless all the observed

data points fall within the predicted regression line. Thus, the regression line serves only as an approximate predictor of a y curve, for a given value of x.

Therefore, the measure, of variability around the line of regression is called the standard error of the estimate and is given by the symbol S_{yx} and defined as:

$$S_{yx} = \sqrt{\frac{\sum_{i=1}^n (Y_i - \hat{Y}_i)^2}{n-2}}$$

Where: Y_i = Actual value of Y for a given X_i ,

\hat{Y}_i

= Predicted value of Y for a given X_i .

In the final analysis, the standard error of the estimate S_{yx} can thus be obtained using the following computational formula:

$$S_{yx} = \sqrt{\frac{\sum_{i=1}^n Y_i^2 - b_0 \sum_{i=1}^n Y_i - b_1 \sum_{i=1}^n X_i Y_i}{n-2}}$$

Computer Simulations and Modeling

The most common packages available for use when developing regression models for business application are the statistical analysis system (SAS) (Reference 11 and 18), the statistical package for the social sciences (SPSS) (Reference 20), and Minitab (references 12 and 17) (Berenson, et al, 1985:711). Using any of the three packages, the values of the three sample regression coefficients in equations 3, 4 and 5 may be obtained. That is to say that the computer can be used to effectively forecast internal manpower demand even when there are many dependent variables. To improve human capital decision making, an organisation must also be concerned with its external demand conditions especially within the industry and in the economy as a whole.

This can also be predicted by the use of the Delphi and conventional statistical techniques, and estimating the needs of other organisations in the same industry, and the mass media.

Time Series Analysis

It is necessary to analyse past trends in human capital activities and sift the significant points while preparing a forecast. This requires an understanding of the concept of the time series. Francis (2004:214) asserts that a time series is the name given to the values of some statistical variables measured over a uniform set of time points. A time series therefore, is a name given to numerous data that is described over a uniform set of time points-'data classified chronologically'- for example, monthly absenteeism rates.

The recording of such casual relationships between different variables for example, is there a positive correlation between absence and age or length of service, or with prediction of future?

Depending on the nature, complexity and extent of the analysis required, there are various types of models that can be used to describe time series data. They include two models called simple additive and multiplicative models. The components that go to make up each value of a time series are described in the following definitions:

The time series additive model

$$y = t + s + r$$

Where: y = a given time series value, t = the trend component, s = the seasonal component and r = the residual component.

The time series multiplicative model

$$y = t \times s \times R$$

Where: y = a given time series value, t = the trend component s is the seasonal component, R is the residual component (Francis, 2004:215).

Trend (t) is the underlying, long-term tendency of the data. Seasonal variations are short-term cyclic fluctuations in the data about the trend which take their name from standard business quarters of the year. Season, however, can have many different meanings, for example, daily, monthly or quarterly seasons. Residual variations include other factors not included in trend or seasonal factors. Time series therefore, is an alternative method that can be used to analyse employment levels over a time and used as a basis for forecasting human capital levels. This means projecting the past into the future and then allowing for any foreseen changes resulting in a change in use of capital and machinery, change in external economic climate, internal problems within the organisation and emergence of competitors. Contrary to the three factors mentioned by Francis, Lynch (1982:72) mentions four factors or movements to be revealed by an analysis of a time series as: (a) a long-term (basic) trend; (b) seasonal fluctuations; (c) catastrophic (abnormal) movement; and (d) residual (chance movement).

Results

The questionnaire was distributed to 385 top, middle and lower levels staff of the five selected organisations but only 349 completed and returned the questionnaire yielding an overall response rate of 92%. We set out to provide the necessary lead for empirical examination of the degree to which demand forecasting leads to the determination of employee requirements in organisations. For this reason, hypothesis one was formulated thus:

H₁: Demand forecasting positively affect the determination of employee requirements. Table

1 shows that 57.54% of the respondents agreed that scientific calculation of the quality and quantity of staff before recruitment leads to proper estimations while 42.46% responded to the contrary; 62% of the respondents agreed that job analysis is made before a 'fit' person is employed and that it leads to accurate estimation of employee needs but 38% disagreed.

Also, 66% of the respondents affirmed that the total number and quality of workers in their organisations is estimated based on their organisation's policies and objectives which leads to accurate manpower needs

determination, while 34% disagreed; 64% affirmed that the total number and quality of workers is estimated based on their organisation's workload/sales or production targets

Table 1: Opinion of Respondents on the Impact of Demand Forecasting on the Estimation of Employee Requirements

S/no	Description	Response	Frequency %
1	Scientific calculation and evaluation of staff before recruitment leads to proper estimation	Agreement category 145 Disagreement category 107	57.54% 42.46
2	A clear analysis of the needs, experience and expectations of a particular job before recruitment leads to proper estimation	Agreement category 166 Disagreement category 100	62.41 37.59
3	Number and quality of workers is estimated based on my organization's policies and objectives	Agreement category 177 Disagreement category 91	66.05 33.95
4	Total number and quality of workers is estimated based on my organization's workload/sales or production targets an	Agreement category 185 Disagreement category 106	63.57 36.43
5	Subvention from Government and /or internally generated income determines the right number and quality of workers employed	Agreement category 204 Disagreement category 95	68.23 31.77

Source: Field Survey, 2012

Which leads to the accurate estimation of personnel needs while 36% disagreed. Lastly, 68% of the respondents agreed that subvention from government and internally generated revenue determines the right number and quality of workers employed but 34% of the respondents disagreed.

The Chi-square (χ^2) test statistic was used to test the hypothesis (H_1). The theoretical frequency for each cell in Table 1 was computed using the formula: n_{Rn_c} / n as shown in Table 2. The $\chi^2_{t, 4}$ under 0.05 = 9.49 while the calculated $\chi^2_c = 7.29$.

Table 2 - Chi-square (X^2) Table for Testing Hypothesis H_1

Cell	f_o	f_t	$f_o - f_t$	$\frac{(f_o - f_t)^2}{f_t}$
1	145	161	-16	1.60
2	107	91	16	2.40
3	166	170	-4	0.09
4	100	96	4	0.17
5	177	171	6	0.20
6	91	97	-6	0.37
7	185	185	0	0
8	106	106	0	0
9	204	191	13	0.89
10	95	108	-13	1.57
Total	1376	1376	0	7.29

Source: Field survey, 2012

$$d.f. = (r - 1)(c - 1) = (5 - 1)(2 - 1) = (4)(1) = 4$$

$$X^2_{t,4} \text{ under } 0.05 = 9.49. \text{ But calculated Chi-square } (X^2_c) = 7.29$$

Statistical Decision

Level of significance = 0.05, Sample size (n) = 349; Test statistic = x^2 . **Decision rule:** Accept H_0 if calculated value (X^2_c) \leq Chi-square (X^2_t), if otherwise, reject the H_0 and accept H_1 . Since the calculated Chi-square (x^2_c) value falls within the acceptance region (i.e. $x^2_c = 7.29 < x^2_t = 9.49$), we accepted the null hypothesis and rejected the alternate and we thus concluded that demand forecasting is not a potent tool in the estimation of employee requirements in Nigeria public organisations.

Discussion and Implications of Findings

Result of the test of the hypothesis indicate that demand forecasting does not significantly affect the estimation of employee needs in Nigerian public organisations ($\alpha = 0.05$, $x^2_c = 7.29 < x^2_t = 9.49$), we thus conclude that the two variables are not associated: The result is contrary to Karen Legge theory which states that demand forecasting is a very potent tool in human capital forecasting that yields accurate or precise estimation of employee requirement in terms of number and quality (Legge 1989: 36).

The result is also contrary to the findings of a survey of 115 large organisations conducted jointly by the American Management Association and Creasp, McCormick and Paget – which indicated that some firms particularly, in stable businesses like utilities or insurance, simply perfected requirements on the basis of past growth or sales forecasts or company budgets. The result is precision in the estimation of employee requirements (Sen, 1987:20).

The weakness in the relationship between human capital forecasting and employee requirements as witnessed in the Nigerian Public Sector Organisations could be as a result of the lack of proper knowledge and expertise. Bartholomew (1976: 67) asserts that human capital forecasting requires the combined technical skills of statisticians, economists and behavioral scientist, managers and planners.

It is also possible that the inability of public organisations in Nigeria to forecast with precision its employee requirements could be as a result of forecasting in isolation from other sectors or departments of the organisation.

Bramham (1982: 22 – 23) strongly believe that human capital forecasting cannot be done in isolation from forecasting in other domains. To him, having established a fund of knowledge on all aspects of the firm's business, it is possible to move at attempts to indicate in which direction human capital is going and the direction it should take to meet organisational objectives.

Also, the finding is unlike results from a research conducted on some selected Indian Public Sector organisations where human capital forecasting gave precise estimation of employee need requirements (Sen, 2005: 129 – 163). However, Sen goes on to conclude that forecasting could be right or wrong.

Conclusion

Widely varying approaches to forecasting the employee needs of an organization exist and effective forecasting requires a combination of quantitative methods and subjective judgement. Where demand forecasting is conscientiously pursued, imbalances in surpluses or deficits of employees can be detected and handled before they become unmanageable leading to decrease in personnel costs.

Also, demand forecasting is an interdisciplinary activity which requires the combined technical skills of statisticians, economists, behavioural scientists, together with the practical knowledge of human capital managers. Lastly, forecasting cannot tell what will happen, but only what might happen under given conditions and circumstances.

Recommendation

In view of the findings and conclusion above, the following recommendations are hereby submitted:

1. Human capital managers should adopt a strategy of combining both quantitative methods and subjective judgement in forecasting the employee needs of organization.
2. Chief executive officers of public organisations should make it mandatory for human capital planners to employ scientific methods in forecasting. This is with a view to reducing personnel cost, accurate estimation of employee requirements and the achievement of organisational effectiveness and employee productivity.
3. Since forecasting is an interdisciplinary activity, there should be a combination of the technical skills of statisticians, economists, behavioural scientists and human capital managers in planning the human capital in public organisations.

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