Technology-Driven Employee Performance Appraisal System

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ABSTRACT

According to several studies, employee performance appraisal is the single most important management tool for any well-managed, sophisticated organization. However, developing an effective employee appraisal system remains to be accomplished in spite of several previous attempts to do so. This study focused on: identifying the various techniques used in appraisal process; identifying the types and sources of errors in the appraisal process; identifying all known metrics of performance appraisal measurement; identifying all the elements that should constitute an effective employee performance appraisal system and finally establishing the relationship between a technologically-driven employee performance appraisal system and employees' perception of justice with the appraisal process. We collected data from both primary and secondary sources in order to elicit information from stakeholders. It was unravelled that there is high level of perception of injustice with the present appraisal system by stakeholders. The study also revealed that an effective appraisal system should be technology-driven, it should have large span of control as data-capture is automated, it should be multi-rated, appraisal information should be multi-sourced, and it should be able to utilize all known metrics of performance measurement in the appraisal process.

Keywords: performance appraisal, performance measurement, appraisal data, appraisal outcome

1.0 INTRODUCTION

Performance appraisal can be described as the procedures adopted by an organization in order to improve an individual's performance through evaluation, feedback, merit increments, and promotions [1]. Performance appraisal is the system used by an organization to assign a score indicating the performance of an individual or a group [2]. Performance appraisal is the process of evaluating or judging the way in which someone is functioning [3]. The practice of performance appraisal is a mandated process in which, for a specific period of time, all or a group of employees' work performance, behaviour, or traits are individually rated, judged, or described by a person other than the rated employee and the results are kept by the organization [3]. The practice of giving employees annual ratings or performance evaluation is widely accepted as an essential and valuable tool throughout the business world [3]. Performance appraisal has two broad objectives: administrative objectives and developmental objectives. Administrative objectives are typical of performance assessment systems supporting decisions that may have organizational consequences on employees (such as a raise in salary, promotions, renewal of appointment, etc.). Developmental objectives refer to performance evaluation system focussing on career development (such as training, feedback, identification of strengths and weaknesses) [4], [5], [6].

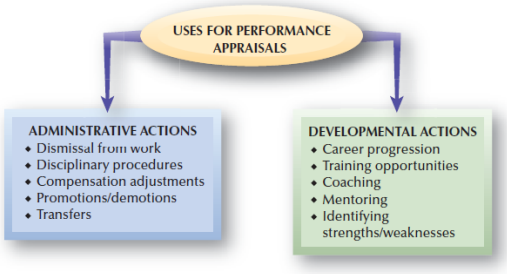

Figure 1: Uses for Performance Appraisals Source: [7]

The science of performance appraisal is directed towards two functional goals - to create a measure that accurately assesses the level of an individual job performance and to create an evaluation system that will advance one or more operational functions in an organization. Performance appraisal therefore suggests a system of measurement. Researchers and practitioners have been fascinated by how to measure and improve performance for decades; yet their overall inability to resolve definitely the knotty technical and interpersonal problems of performance appraisal and management has led one reviewer to term it the "Achilles heel" of human resource management. This statement still applies today [8]. Supervisors and subordinates alike are intensely aware of the political and practical implications of the ratings and in many cases, are acutely ill at ease during performance appraisal interviews. Despite these shortcomings, surveys of managers from both large and small organizations consistently show that they are unwilling to abandon performance management [8]. If we believe that appraising means measuring, then we will try to improve our appraisal of performance by measuring more precisely [9]. Human performance, except in such terms as things produced per hour, cannot be measured precisely. On the other hand, an excuse that some jobs cannot be described objectively is either ill-informed or deliberate. Although some job performance cannot be "counted" in numeric terms, whether or not performance achieves expectations can be assessed [9]. However, the question still remains 'what should be measured?' put differently, 'what should be the source of appraisal data?' and 'how should it be measured and processed?' In an attempt to answer these knotty questions, several scholars and practitioners alike have suggested and adopted the use of the following appraisal systems: ***Comparison or ranking methods*** (includes: straight ranking, alternation ranking, paired comparisons, forced distribution), ***standards-based reviews*** (includes: critical incidents, essays and narrative appraisals, checklists, forced choice, rating scales, behaviourally anchored rating scales (BARS), behavioural observation scales (BORS)), ***result-oriented reviews*** (management by objectives (MBO), and ***competency-based methods***. These systems are collectively called traditional systems of appraisal [10] and they are judgmental in nature and prone to psychometric errors - errors in measurement that occur because of the psychological predisposition or make-up of the assessor [11]. The unfortunate fact about psychometric errors is that most assessors are not aware that they are liable to such errors [11]. Psychometric errors include but are not limited to ***halo effect*** - the tendency for ratings and assessments to be influenced by one or two positive attributes of the individual, resulting in an overall favourable assessment that would not necessarily be supported by a careful consideration of all relevant factors; ***horns effect*** - an overall unfavourable assessment resulting from the undue influence of one or two negative

factors; ***central tendency error*** - caused by such assessors who avoid both ends of a rating scale in making their assessments; ***leniency error*** - ratings that are too high or too low in terms of employees' actual performance and will produce an inaccurate or skewed distribution of assessments; ***recency error*** - a tendency to judge people on the basis of a recent incident or performance that might not be typical of the whole review period, or on the basis of a single factor or impression; ***contrast error*** – where an assessor gives an employee an unjustifiably high or low rating in contrast to a very low or high rating given to the previous employee assessed; ***bias/prejudice*** - a conscious or an unconscious discrimination set off by age, race, sex, cultural origins, appearance, marital status, social position or personal habits and/or personal judgments about an employee that have no relevance to job performance; ***logical error*** - occurs when characteristics or factors that appear to be logically related are given similar ratings, even though they are not actually linked; ***attributional error*** – where an assessor attributes an employee's lack of goal achievement to personal deficiencies and pays insufficient attention to other factors [11]. As a result of the psychometric errors inherent with the traditional systems, several researchers came up with automated systems of appraisal. For instance [12] created an ***AHP-based*** (Analytic Hierarchy Process) evaluating process based on weighted criteria to combat such problems as favouritism and prejudice. This system remains partially manual and is heavily reliant on the Human Resource Department's willingness to cooperate. As a result of this anomaly [13] devised a system that was automatic and less dependent on human. This system makes use of Internet of Things (IoT) based systems to automatically gather accurate data that feeds into an evaluation algorithm. However, there was no way of measuring employee's daily task output and competency skills. The system merely calculates employees' performance based on data from clock in and clock out registers. Similarly, [14] in their work ***"A Game Theoretic Approach for an IoT-Based Automated Employee Performance Evaluation"*** proposes a game theoretic approach for an Internet of things (IoT) based performance evaluation of the employees in industry. IoT is a new paradigm that interconnects the various "objects" through sensor devices, Radio-frequency identification (RFID) scanners, actuators, and other wireless and mobile devices. This system has some flaws, firstly, assessments of employees are not based on competency skills and the system also fails to capture employees' daily tasks outputs as part of performance appraisal, secondly, there is no discrete ranking of employees' work output and organizational behaviours as to determine the highest scored employee and the lowest scored employee within a given assessment period. Other scholars suggested the application of **fuzzy based methods i**n the appraisal process. The fuzzy system has its own flaws which include but not limited to the fact that fussy systems are not based on measurable task outputs but on fuzzy or crisp qualitative employee appraisal skills and so do not measure a critical part of modern organizational performance criteria. In recent time several online appraisal systems have also emerged. These online systems include but not limited to:

Trakstar appraisal software, BambooHR software, Ultipro appraisal software and workday performance appraisal software. However, these online appraisal systems not only limited their performance measures to competencies only, they also used generic ratings for all workers irrespective of their roles or positions within their organizations. The online appraisal systems did not consider also the smart application of biometrics in securing appraisal data. This approach overlooked some important performance criteria that were relevant to particular jobs, and included other criteria that were irrelevant to others. ***In order to overcome the challenges faced by the existing appraisal systems, there is a need to develop a technology-driven appraisal system that can utilize an expanded range of performance tools to capture data from all know sources of appraisal information, and in quality time, in order to balance employees' quantitative-qualitative performance data or put differently in order to give validity to the instrument of performance measurement.***

2.0 METHODS

The study utilized survey research design to obtain relevant data. Three hypotheses were postulated to guide us in the work. The method of research involved administering of questionnaires and subsequent analysis of the results of the questionnaires using chi-squared goodness of fit tests. The results obtained from the chi-squared analysis were used to test the hypotheses.

2.1 Hypotheses

To guide our work in this study, the following hypotheses were posited.

i. There is significant relationship between use of traditional appraisal system and low level of employees' job satisfaction.

ii. Use of computer-based online appraisal system minimizes errors in the appraisal process.

iii. There is significant relationship between technology-driven appraisal system *with multi-sourced appraisal data* and high level of employees' job satisfaction.

2.2 Source of Data

We studied "Technology-driven Employee Performance Appraisal System" with data from two main sources thus:

Primary Source: Questionnaires were used to obtain relevant data from stakeholders in two public sector agencies of Nigeria. A total of 128 questionnaires covering 5 questions were delivered by hand to the stakeholders in these agencies. Out of this number, 120 questionnaires were completed and returned. The questions sought, among others, the views of the respondents on the relationship between the use of traditional appraisal system and employees' satisfaction.

Secondary Source: Relevant information was drawn from articles and books written by professionals in the Human Resource and IT industries.

3.0 RESULTS

3.1 Data Analysis and Result Presentation

Quantitative data obtained from primary source were analyzed using the chi-squared test. Table 3 and figure 3 both show the level categorizations of respondents. Table 1 shows the questions, responses and X^2 values from the chi-squared analysis of the questionnaires.

Table 1: Categorization of Respondents

S/n	Respondents' category	Number	Percentage
1	Junior staff	58	48.33%
2	Senior staff	50	41.67%
3	Management staff	12	10.00%
		Total:	**100.00%**

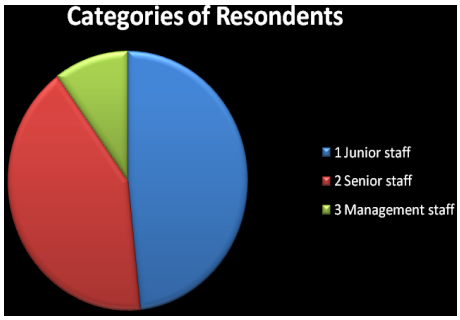

Figure 2: Pie Chart showing Level Categorization of Employees

Table 2: Questions, Responses and X^2 Values from the Chi-squared Analysis

S/n	Question	O_i	E_i	$(O_i-E_i)^2/E_i$	$X^2 = \sum[O_i-E_i)^2/E_i]$
1.	The use of traditional appraisal system with a single source of appraisal information leads to low level of employee job satisfaction				
	•SA	80	24	130.67	
	•A	22	24	0.17	
	•U	0	24	24	
	•D	12	24	6	
	•SD	6	24	13.5	**174.34**
2.	The use of online software for appraisal process reduces the number of appraisal errors				
	•SA	96	24	216	
	•A	18	24	1.5	
	•U	0	24	24	
	•D	4	24	16.67	
	•SD	2	24	20.17	**278.34**
3.	Employees consider appraisal outcome as fair when multi-source appraisal source data is used				
	•SA	92	24	192.67	
	•A	18	24	1.5	
	•U	0	24	24	
	•D	6	24	13.5	
	•SD	4	24	16.67	**248.34**
4.	Appraisal data is more secured and reliable with computer-based online appraisal process				
	•SA	98	24	228.17	
	•A	14	24	4.17	
	•U	2	24	20.17	
	•D	4	24	16.67	
	•SD	2	24	20.17	**289.35**
5.	An effective appraisal system should be technology-based, multi-sourced data, multi-rated, secured and reliable.				
	•SA	94	24	204.17	
	•A	22	24	0.17	
	•U	1	24	22.04	
	•D	2	24	20.17	
	•SD	1	24	22.04	**268.59**

3.2 Test of Hypotheses

3.2.1 Hypothesis One

H_0:*There is no significant relationship between use of traditional appraisal system and low level of employees' job satisfaction.*

H_1:*There is significant relationship between use of traditional appraisal system and low level of employees' job satisfaction.*

Relevant in testing hypothesis one is question 1 of the questionnaire.

From the chi-squared analysis in table 4, $X^2 = [(O_i - E_i)^2/E_i]$ for question 1 is **174.34**

Our degree of freedom (d.f.) = (n-1) = 4 and our level of significance (**α**) is 0.05

Decision

Tabulated value of X^2 (X^2_{Tab}) at 4 d.f. and 0.05 level of significance = **9.488**

The Calculated value of X^2 (X^2_{Cal}) = **174.34**

$X^2_{Cal} > X^2_{Tab}$

The decision rules states that if **X^2_{Cal}** is greater than **X^2_{Tab}**, we should reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

We therefore reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1)

3.2.2 Hypothesis Two

H_0:*Use of computer-based online appraisal system does not minimize errors in the appraisal process.*

H_1:*Use of computer-based online appraisal system minimizes errors in the appraisal process.*

Relevant in testing hypothesis two is question 2 of the questionnaire.

From the chi-squared analysis in table 4, $X^2 = [(O_i - E_i)^2/E_i]$ for question 2 is **278.34**
Our degree of freedom (d.f.) = (n-1) = 4 and our level of significance (**α**) is 0.05

Decision

Tabulated value of X^2 (X^2_{Tab}) at 4 d.f. and 0.05 level of significance = **9.488**
The Calculated value of X^2 (X^2_{Cal}) = **278.34**
$X^2_{Cal} > X^2_{Tab}$

The decision rules states that if **X^2_{Cal}** is greater than **X^2_{Tab}**, we should reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

We therefore reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

3.2.3 Hypothesis three

H_0:*There is no significant relationship between technology-driven appraisal system with multi-source appraisal data and high level of employees' job satisfaction.*

H_1:*There is significant relationship between technology-driven appraisal system with multi-source appraisal data and high level of employees' job satisfaction.*

Relevant in testing hypothesis three is question 5 of the questionnaire.

From the chi-squared analysis in table 4, $X^2 = [(O_i - E_i)^2/E_i]$ for question 2 is **268.59**

Our degree of freedom (d.f.) = (n-1) = 4 and our level of significance (**α**) is 0.05

Decision

Tabulated value of X^2 (X^2_{Tab}) at 4 d.f. and 0.05 level of significance = **9.488**
The Calculated value of X^2 (X^2_{Cal}) = **268.59**
$X^2_{Cal} > X^2_{Tab}$

The decision rules states that if **X^2_{Cal}** is greater than **X^2_{Tab}**, we should reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

We therefore reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1).

4.0 DISCUSSION

This study focused on the use of technology to drive employee performance appraisal system. Performance appraisal is as old as civilization. The United States Civil Service Commission's merit rating was in place in 1887 [15]. Many companies were influenced by Fedrick Taylor's "Scientific management" efforts of the early twentieth century and concocted performance appraisals [15]. Before World War II, however, very few organizations conducted any formal performance appraisals. A handful of companies and the military were the only ones using the procedure regularly. Most appraisals that were done concentrated more on an individual's personality and traits than on actual achievements against goals and formal analyses of the behaviours that produced those results. Then, in the 1950s Peter Drucker's novel idea of management by objectives (MBO) [16] and Douglas McGregor's book "The Human Side of Enterprise", which introduced his notions of Theory X and Theory Y, gained a lot of attention [15]. A few companies moved from a mere trait assessment to the development of a

procedure that concentrated on goal setting and made the appraisal process a shared responsibility between the individual and the manager [15]. From the work of Drucker and McGregor, the performance MBO process to replace trait appraisals and McGregor's integration of a ''Theory Y'' approach into the appraisal process produced a change in the way organizations went about assessing the contributions of their members.

Performance appraisal by its various definitions [3], [2], [1] suggests a system of measurement. ***The challenge of the appraisal process is in determining what exactly should be measured and how it should be measured in order to minimize error and increase employees' satisfaction with the outcome.*** Therefore, the creation of performance criteria is an important requirement towards performance appraisal. Although, it is a well known fact that there are no perfect appraisal systems, it is nonetheless important to emphasize that appraisal is a process, and like any other process, it has inputs, outputs, objectives, and owner(s). Therefore the appraisal process should be measurable and should be applied to bring results to its owner(s). Better appraisal process yields better appraisal outcome, and vice versa. The danger of not having an effective process is that the outcome leads to employees' job dissatisfaction, reduces employees' organizational commitments, lowers employees' moral and reduces organizational citizenship behaviours amongst employees. This is shown in figure 3 below.

appraisal procedure has grown to the point where a huge majority of companies now have a formal appraisal system. Drucker's initial proposal of an

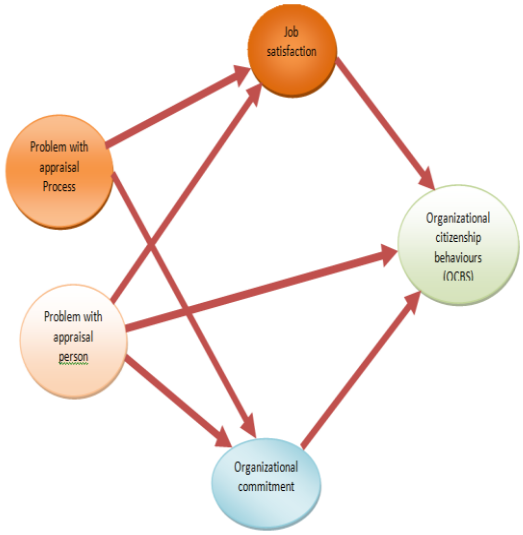

Figure 3: Relationship between Appraisal Outcome and OCB, and Job Commitment Source: [18]

To buttress the importance of performance measurement in organizations, [17] stated that rewards are indeed extremely powerful, and people will naturally tend to do the things for which they are rewarded, but *no matter how important and powerful rewards are, they are no better than the measurement system they are based on.* Organizations are conglomerations of many systems. Measurement is actually the most fundamental system of all. When the measurement system works well, management tends to manage (and reward) the right things- and the desired results will occur [17]. The wrong measures tend to trigger the wrong activities - because they represent what people see. Then these wrong activities generate the wrong results - no matter how well-executed the activities are. Most individuals and organizations do not get what they want because they do not measure what they really want [17].

4.1 Known Metrics of Performance Appraisal Process

Mathis and Jackson [7] stated that managers can use three different types of information about employee performance.

Trait-based information, which identifies a character trait of the employee - such as attitude, initiative, or creativity - and may or may not be job related. For example, a study by [19] concluded that conscientiousness was an important determinant of job performance. Because traits tend to be ambiguous, and favouritism of raters can affect how traits are viewed, court decisions generally have held that trait-based performance appraisals are too vague to use when making performance-based HR decisions such as promotions or terminations [7]. Also, fixating too much on characteristics such as "potential" can lead managers to ignore the important behaviours and outcomes that help organizations reach their objectives [20]. *Behaviour-based information* focuses on specific behaviours that lead to job success. Behavioural information clearly specifies the behaviours management wants to see. *Results-based information* considers employee accomplishments. For jobs in which measurement is easy and obvious, a results-based approach works well. However, ethical or even legal issues may arise when only results are emphasized, and how the results were achieved is not considered, so care should be taken to balance the different types of appraisal information [7].

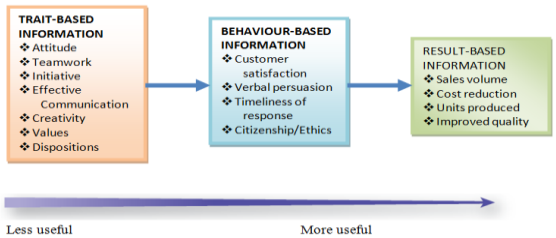

Figure 4: Types of Performance Information
Source: [7]

Performance measures can be viewed as objective or subjective. The objective measures can be observed - for example, the number of items sold or the number of invoices processed can be counted. Objective performance measures include production data (e.g. units produced, number of errors, etc) and employment data (e.g. number of incidents, absences, tardiness, etc). Objective measures are usually, but not always result-based. These variables directly define the goals of the organization and, therefore, sometimes are outside the employee's control. Objective measures of job performance involve counts of various work-related behaviours. Some common objective job performance measures include [55]:

- Absenteeism (number of days absent)
- Accidents (number of accidents)
- Incidents at work (number of incidents / assaults / altercations)
- Lateness (days late)
- Meeting deadlines.

Objective measures can be relatively quick and easy to obtain (given good organisational recordkeeping).

However, it can be unwise to place too much emphasis on these types of objective measures. An exclusive focus on results/outcomes may mask factors that impact on workers' performance that are beyond their control (e.g., client workload) [21]. Subjective measures require judgment on the part of the evaluator and are more difficult to determine. They are also prone to biases and errors. One example of a subjective measure is a supervisor's ratings of an employee's *"attitude*," which cannot be seen directly. Subjective measures rely on the judgment of an appraiser (self, co-workers, or supervisor). Subjective assessments are commonly used in performance appraisals and often involve the use of rating scales. Subjective assessments are more likely to provide accurate performance appraisals when: the behaviours and outcomes being assessed are stated in clear behavioural terms; the worker understands the measures (e.g., rating scales) being used to evaluate their performance, and agree that the measures are fair and accurate (i.e., measures what it is supposed to); and measurement is as brief as possible whilst addressing essential behaviours and

outcomes (frustration with long and unwieldy questionnaires may introduce error in responses)[21]. Consequently, both objective and subjective measures should be used carefully. Sources of performance appraisal data are shown in figure 5 below.

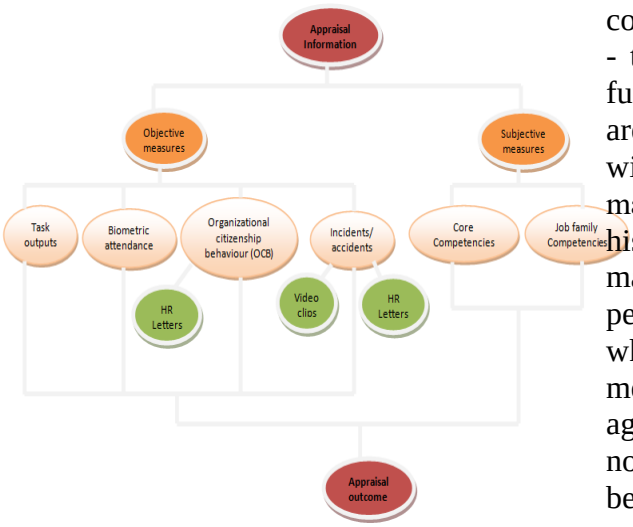

Figure 5: Sources of Appraisal Information

4.1.1 What should be measured?

Measurement provides the basis for providing and generating feedback, and thus can build the platform for further success or identify why things are going less well so that corrective actions can be taken. Therefore what gets measured in the appraisal process? Measure the wrong things perhaps because they are easy to measure, and an entire appraisal system can fall into disrepute. In making overall performance assessments, we should ensure that all aspects of performance are taken into account and not just those areas where targets for improvement or development were set [11] As Drucker [16] puts it the measurements which give us productivity for the manual worker, such as the number of pieces turned out per hour or per dollar of wage, are irrelevant if applied to the knowledge worker. Drucker [16] goes on to further state that a productivity measurement is the best yardstick for comparing managements of different units within an enterprise, and for comparing managements of different enterprises. This is because productivity includes all the efforts the enterprise contributes; it excludes everything it does not control. According to Drucker [16], productivity is the first test of management's competence. According to Drucker [16], measurement should be used to make self-control possible and should not be abused to control people from the outside and above - that is, to dominate them. Drucker [16] further stated that as long measurements are abused as a tool of control, measuring will remain the weakest area in the manager's performance. In furtherance to his argument, Drucker [16] stated that for a manager to be able to control his own performance, he needs to know more than what his goals are. He must be able to measure his performance and results against the goals. The measurements need not be rigidly quantitative; nor need they be exact, but they have to be clear, simple, rational, relevant and direct attention and efforts where they should go.

Performance measures that leave out some important job duties are considered deficient. For example, measurement of an employment interviewer's performance is likely to be deficient if it evaluates only the number of applicants hired and not the quality of those hired or how long those hired stay at the company. On the other hand, including irrelevant criteria in performance measures contaminates the measures. For example, appearance might be a contaminating criterion in measuring the performance of a telemarketing sales representative whom customers never see. Managers need to guard against using deficient or contaminated performance measures. Overemphasis on one or two criteria also can lead to problems as other important areas may be ignored. In addition, cheating can become an issue when goals are set to support such criteria because individuals might act unethically to reach objectives, especially when the objectives are linked to specific rewards [7]. As shown in figure 5 above, utilizing all know sources of appraisal data in measuring appraisal outcome is ideal. To

solve the problem of what should be measured; Rudman [11] suggested that organizations combine various methods and techniques in developing performance appraisal systems. For example, a system might usefully combine MBO, which is a way to determine *what* an employee is expected to do, with behavioural rating concerned with how an employee carries out job requirements or behave on the job [11]. Some scholars argue that perceived justice appears to be an essential mechanism through which appraisals affect employees' reactions (e.g., Erdogan [22] Greenberg [23]) and such argument has received considerable attention in the performance appraisal literature [24]. There are two types of justice described in the literature of justice and fairness that are involved in the performance appraisal process: distributive justice and procedural justice [24].

Levels of perceived procedural justice are positively related to important organizational outcomes such as organizational citizenship behaviour [25], [26], [27], [28], [29], [30]; trust in leadership [31], [32], [30]); organizational commitment; job satisfaction; and performance [33], [34]. Folger *et al.* [35] argue that a comprehensive model for a procedurally just performance appraisal systems should include fair hearing and judgment based on evidence among other variables. Support for this model has been found in other studies [36], [37], [38]. These studies found that characteristics of the ***due process appraisal*** (fair hearing and evidence-based criteria) were associated with perceived procedural justice. In addition, Poon [37] found that when employees perceived the performance appraisal process as manipulative and skewed by the political interests of the raters (as opposed to the due process), they demonstrated less satisfaction and higher intention to quit their jobs.

4.2 Sources of Errors in Subjective Performance Appraisal. According to Appelbaum, Roy, and Gilland [39], many researchers have published articles on the pitfalls and failures of performance appraisal. The researchers identified different results as to why performance appraisal fails. Psychometric errors are one of the main reasons why performance appraisals are done ineffectively within corporations. These errors include; leniency, halo effect, restriction of range, recency and contrast. These errors are attributed to the psychological predisposition of the appraiser during the appraisal process. Some researchers have suggested that one possible way of minimizing psychometric errors is by using a multi-rater system of evaluation [40].

A self-performance appraisal is another method that can support the multi-rater system to reduce the presence of psychometric errors as most of the studies done on self-evaluation indicated positive results relating to the appraisal process [41]. Donli [41] stated that self-evaluation can increase the effectiveness of the appraisal system and results show positive impact on employees' satisfaction with the evaluation and his perception of justice and fairness. Similar results were found by Jackson *et al.* [42]. Employees who have a chance to rate themselves became more involved and committed to their personal goals. Eldman and Arnold [43], in their research into cognitive process in performance appraisal stated that performance appraisal is the outcome of a dual process. Attention, categorization, recall and information gathering are carried out via either automatic or controlled process. In automatic process, aspects of an employee's behaviour are noted and the employee is categorized without conscious monitoring. This process is dominant except when decisions are problematic in which place a conscious categorization monitoring will take place. Subsequent recall of the employee is biased by the attributes of prototypes representing the categories to which the employee has been assigned.

4.3 Existing Appraisal Methods

Several appraisal systems have evolved over the years all in a bid to provide solution to the appraisal challenge. These systems are broadly classified into two: traditional systems and automated systems.

4.3.1 Traditional Systems

Traditional systems of appraisal include:

(a) Comparison or Ranking Method: Comparison or ranking methods require each person - or some characteristic of a person or a person's performance - to be compared with every other employee, with the results then being used to produce a rank order for all the employees. These methods are simple and easily understood, quick and inexpensive to implement and can achieve relatively high reliability, but they are not often used for performance planning and review.

There are some major problems with this method. Comparisons are usually made on the basis of a single behavioural dimension (e.g. 'reliability') or job-related characteristic (e.g. 'product knowledge') or some overall assessment (e.g. 'value to the organisation'). Unless these descriptors are given specific definitions, there is a risk that different reviewers will apply different standards in assessing relative worth, and the rank order will lack a defensible rationale. They are cumbersome when large numbers of employees are involved, or when more than one manager has to contribute to the ranking process, or when a number of characteristics need to be ranked. These methods are also subject to bias and discrimination on the part of those who decide the rankings. These would lead to employees' dissatisfaction and erode the intended gains of the appraisal process [11].

(b) Result-oriented Reviews or **Management By Objectives:** One way to approach measuring performance, popularized by management guru Peter Drucker, is Management by Objectives. Management by Objectives (MBO) is the best known of the results-oriented methods of performance planning and review and, in some form, probably the most frequently used approach to performance planning and review. MBO has been a feature of organisational life since it was popularised in the 1950s by Peter Drucker, John Humble and others as a replacement for the traditional bureaucratic or job-holding approach to employment [11]. In simple terms, MBO is a target-setting or results-oriented approach to performance management. It recognises that employees perform better when they have targets, and even better when they have participated in setting those targets [11]. While this approach is readily applied to jobs in, say, production or sales - where specifying targets and measuring performance in quantifiable terms is relatively straightforward - it can be more difficult in roles where quality is more important than quantity, or where the prime purpose is to provide support or service to others [11].

(c) Standards-based Reviews: Like comparison or ranking methods, standards-based review methods concentrate on an employee's characteristics or traits, rather than the person's actual performance or behaviour. These methods include application of critical incidents interviews, essays and narrative appraisals, use of checklist in performance reviews, application of forced choice reviews, use of rating scales, behaviourally anchored ratings scales (BARS), behavioural observed scales (BOS). The obvious problems with narrative methods are questions of comprehensiveness and difficulties of bias. Rater error is a problem, especially the halo effect where one attribute or incident dominates the overall rating. Managers seem to find it difficult to spread their ratings across the entire scale, leading to the central tendency problem where ratings are bunched around the middle of the scale, or a skewed distribution where all the ratings are too high or too low. The traditional systems of appraisal [10] are judgmental in nature and prone to psychometric errors - errors in measurement that occur because of the psychological predisposition or make-up of the assessor [11]. The unfortunate fact about psychometric errors is that most assessors are not aware that they are liable to such errors [11]. Psychometric errors include but are not limited to ***halo effect*** - the tendency for ratings and assessments to

be influenced by one or two positive attributes of the individual, resulting in an overall favourable assessment that would not necessarily be supported by a careful consideration of all relevant factors; ***horns effect*** - an overall unfavourable assessment resulting from the undue influence of one or two negative factors; ***central tendency error*** - caused by psychological bias against using extremes and as such assessors avoid both ends of a rating scale in making their assessments; ***leniency error*** - ratings that are too high or too low in terms of employees' actual performance and will produce an inaccurate or skewed distribution of assessments; ***recency error*** - a tendency to judge people on the basis of a recent incident or performance that might not be typical of the whole review period, or on the basis of a single factor or impression; ***contrast error*** – where an assessor gives an employee an unjustifiably high or low rating in contrast to a very low or high rating given to the previous employee assessed; ***bias/prejudice*** - a conscious or an unconscious discrimination set off by age, race, sex, cultural origins, appearance, marital status, social position or personal habits and/or personal judgments about an employee that have no relevance to job performance; ***logical error*** - occurs when characteristics or factors that appear to be logically related are given similar ratings, even though they are not actually linked; ***attributional error*** – where an assessor attributes an employee's lack of goal achievement to personal deficiencies and pays insufficient attention to other factors [11].

(d) Competency-based Reviews: Competency-based approaches to employee assessment have developed out of the growing use of competency-based approaches in many areas of human resources management, all of which are affected by the continuing lack of consensus over the 'competency' concept. If we accept that competency is 'the set of behaviour patterns that the incumbent needs to bring to a position in order to perform its tasks and functions with competence' [44], then it is clear that competency-based approaches to appraisal are concerned less with what employees achieve on the job than with what they have the capability or competency to do. In other words, these methods assess the individual's potential to perform rather than the actual performance [11]. Most competency based-reviews make use of general statements of competences which is applied across an occupation or an organization. Though less time and resources are needed to develop generic competences, this advantage is usually eroded if the descriptions are not sufficiently specific to a particular role or occupation. Competency statements can be used for the assessment of current performance but are better used to assess employees' abilities and development needs than the results they achieve. However, using competences to assess only the current situation seems to be a waste of significant amounts of analysis. Competency-based assessment, therefore, is most useful as a developmental tool - a kind of map that guides individuals from where they are at present to where they need to be in the future. But that map will need to change as individual employees make progress through their organisational and job careers [11].

4.3.2 Automated Systems

Automated systems of appraisal include all various efforts to use technology in carrying out the appraisal process. These include:

(a) Analytic Hierarchy Process (AHP): Several researches have been done to tailor the existing traditional or manual appraisal process to be more accurate and objective. Islama and Rasad 12] created an AHP-based evaluating process based on weighted criteria to combat such problems as favouritism and prejudice. The criteria were structured around quantity/quality of work, planning/organization, team work/cooperation and more weighted by importance by the Human Resource Managers. Each employee was given a

rating on their performance on each weighted criteria and an overall weighting score was calculated. The research suggested that guidelines to be followed in a revamped appraisal workflow to encourage a consistent and a fair review system. This system remains partially manual and is heavily reliant on the Human Resource Department's willingness to cooperate [12].

(b) Application of Time Card System and Internet of Things (IoT): To address the above anomaly, a system that is automatic and accurate was devised by Sharma and Hosein [13]. This was a time card system with a card reader that recorded employees' entries and exits. The difference in hours worked by an employee as well as their minutes was calculated and output as reports. Note that evaluations for employees were done solely on their data and compared to a company baseline figure. The system makes use of Internet of Things (IoT) based systems to automatically gather accurate data that feeds into an evaluation algorithm. The attendance dataset used in their research was derived from Radio-frequency identification (RFID) scanners for recording clock-in and clock-out times. While IoT and RFID devices do not eliminate all methods of data tampering, they discourage a variety of them. The use of this system created some challenges – the employee welfare challenges. For instance, it did not take into consideration days of approved absenteeism from work based on health or other human factor challenges. There was also no way of measuring employee daily task output and competency skills. The system merely calculates employees performance based on data from clock in and clock out registers [13].

(c) Application of Game Theory: Kaur and Sood [14]) in their work "A Game Theoretic Approach for an IoT-Based Automated Employee Performance Evaluation" propose a game theoretic approach for an Internet of things (IoT) based performance evaluation of the employees in industry. IoT is a new paradigm that interconnects the various "objects" through sensor devices, RFID, actuators, and other wireless and mobile devices. The ubiquity of the sensing capabilities of IoT devices enables continuous supervision of industrial employees due to which the proposed system is able to evaluate the performance of employees regularly. Moreover, the learning capabilities of the game model replace manual systems with an automated system. In their proposed system, the data collected by IoT devices are used to detect the actions of every employee in industry. Based upon the employee actions, their performance is evaluated. The game model is then used to take decisions for employees. Although the type of decision taken is industry dependent, the proposed system uses the pay-for-performance (PfP) system for decision making. PfP, also known as gain sharing, rewards the employees who perform better. On the other hand, a penalty is imposed on the employees who work against the industry's policies. Therefore, the decision is taken for selecting the employees for reward and penalty based on the employee performance. Various employee activities were detected from sensor measurements of IoT devices to form activity sets. The participation of each employee in each activity was determined using collocation mining which gives the performance of employees in industry. Game-based automated decisions were then taken by using performance information of the employees. This process has its shortcomings as assessments of employees are not based on competency skills and the system also fails to capture employees' daily tasks outputs as part of performance appraisal. There is also no discrete ranking of employees' work output and organizational behaviour as to determine the highest scored employee and the lowest scored employee within a given assessment period [14].

(d) Application of Fuzzy Based Methods: Several works were done on employee performance appraisal using Fuzzy set theory. Moon et al [45] proposed

a methodology utilizing fuzzy set theory and electronic nominal group technology for multi-criteria assessment in the group decision-making of promotion screening. The study suggested that the methodology is a good method for a transparent and fair multi-criteria performance evaluation in military organizations. Researchers have demonstrated that fuzzy set theory could be successfully used to solve multiple criteria problems. This is because in many circumstances, appraiser tends to use vaguely defined qualitative criteria in evaluating the performance of their subordinates. Therefore, it creates difficulty for appraiser to precisely quantify the score of each candidate. The fuzzy system of appraisal emphasizes on the mapping of uncertainty data in performance measurement system into fuzzy values which consists of labels and confidence values. The mapping process is essential since if erroneous membership function and rules were chosen, it yields a flawed output. Also researchers have demonstrated that fuzzy set theory could be successfully used to solve multiple criteria problems Jing *et al.* [46]. This is because, in many circumstances, appraiser tends to use vaguely defined qualitative criteria in evaluating the performance of their subordinates. Therefore, it creates difficulty for appraiser to precisely quantify the score of each candidate. Jing *et al.* [46] worked on applying fuzzy set theory on computer-based fuzzy group decision support system (FGDSS). Based on the findings of their work, the application of fuzzy set theory in FGDSS is said to be able to assist decision maker to make better decisions under different circumstances and alternatives [45]. The literatures that have been reviewed supported that the fuzzy set theory would be a good concept to be used in the development of the performance appraisal system. This is because fuzzy set theory allows the performance appraisal system to be developed by using some fuzzy variables and relationships. In the appraisal process using the fuzzy logic method, the performance of the appraisee usually involves the measurement of ability, competence, job behaviours, and skills, which are fuzzy concepts that may be captured during the performance appraisal process [56]. The fuzzy appraisal evaluation system is usually made of the following components: (a) The evaluation's criteria; (b) Existing performance evaluation tool; (c) Crisp input values; (d) Fuzzy values; and (e) Crisp output values. The crisp input values are observed from existing evaluation tool. The input values, which are in the form of crisp values, are processed through fuzzification phase, fuzzy inference phase, and defuzzification phase in order to convert fuzzy values into crisp output values for employees' performance assessment. The validity of the performance data and the rating scale used is not guaranteed by the fuzzy system. In fact the fuzzy system itself depends on the availability of the performance data and the rating scale which are fed as crisp inputs into the fuzzy system. The success of the fuzzy system of performance appraisal is heavily reliant on the experience of selecting what constitutes membership functions and rules. If erroneous membership function and rules were chosen, it yields a flawed output. Setting exact fuzzy rules and membership functions is a difficult task. Validation and verification of a fuzzy knowledge based system needs extensive testing with hardware. Fussy systems are not based on measurable task outputs but on fuzzy or crisp qualitative employee appraisal skills and so do not measure a critical part of modern organizational performance criteria [45].

(e) Online Performance Appraisal: Several recent software have also been developed to take care of employee performance appraisal processes. These software include the following: Trakstar performance appraisal software, BambooHR performance appraisal software, UltiPro performance appraisal, Darwinbox performance appraisal, etc. Clearly, gains made by this advancement in appraisal process can be pyrrhic if appraisal satisfaction does not improve as

well. Contemporary attention to psychological variables, such as appraisal satisfaction that underlie the appraisal process and user reactions to the performance management system have supplanted previous management occupation with appraisal instrument format and rater accuracy [47]. In view of the uniqueness and competitive advantage that human resources provide, it is appropriate that organizations pay greater attention to questions of employee satisfaction and with how firms evaluate their performance. It is believed that appraisal satisfaction will remain a relevant concern, even when technology is a primary mechanism for the feedback process. To this end, some of the existing online appraisal systems still have issues of appraisal satisfaction. This is because most of them based their assessments of employees on competencies only thereby neglecting other vital metrics of performance measurement. Yet others use generic rating across board when assessing employees irrespective of their roles within the organization. This approach overlooked some important performance criteria that were relevant to particular jobs, and included other criteria that were irrelevant to others.

4.5 Constituents of an Effective Appraisal System

Van and Schodl [24] states that if the main purpose of a performance appraisal process is to increase performance, then an effective performance appraisal system would be one that achieves this purpose. An effective appraisal system is dependent on a number of factors and these include: accuracy of ratings, source of appraisal data and perceived justice in the process. An effective appraisal system as described by Skinner *et al*. [21], involves among others: the appraisal instrument, the job analysis conducted to identify the appropriate criteria against which to establish standards for evaluating performance, and establishing the validity and reliability of the methods used. Regular monitoring of performance is another essential element of an effective appraisal process. Performance monitoring is a term applied to a variety of workplace practices that concern the collection of employee work performance data [48]. An effective performance appraisal should not be limited to a formal event occurring once or twice a year but should be a continuous process of day-to-day monitoring, feedback and review that provides first hand information to help identify performances shortfall so as to correct them promptly [49]. ***An effective appraisal system*** should be *technology-driven*. The use of technology in performance management has the potential to increase productivity, and enhance competitiveness. A performance appraisal system that uses technology to automate processes can provide many advantages to organizations, so human resource professionals should consider utilizing electronic methods to facilitate the manner in which appraisal procedures are administered and managed [7]. It is believed that appraisal satisfaction is a key concept that is central to any discussion of technology to be adopted in the appraisal process. Technology contributes to performance management and thus to appraisal satisfaction in two primary ways: technology facilitates measuring an individual's performance via computer monitoring activities and two, technology becomes a tool to facilitate the process of capturing appraisal data and generating performance feedback. ***An effective appraisal system*** should *utilize multi-source appraisal data* in rating employees' performance. To enhance perception of system fairness, practitioners should find a way to balance quantitative performance data with qualitative performance data. Key performance job criteria should be as outlined in the table 3 below [21].

Table 3: Key Performance Job Rriteria

Competencies	Knowledge, skills, and abilities relevant to performance
Behaviours	Related to individual productivity such as leadership styles, analytical skills, etc. Specific actions conducted/or tasks performed.
	Organizational citizenship behaviour (OCB) - actions that are over and above usual job responsibilities.
	Counterproductive work behaviours such as assaults, abuse of customers, etc.
Traits	Relating to individual's way of life such as "a good attitude", showing "confidence", being "dependable", etc.
Results / outcomes	Outputs, quantifiable results, measurable outcomes and achievements, objectives attained, incidents, absences, etc.

Source: [21]

Other scholars argue that: ***an effective appraisal system*** should ensure that the *appraisal data is highly secured* and that the source data is validly collected. These can be achieved through the use of password secured systems and the application of biometrics in capturing attendance data; a***n effective appraisal system*** should *permit greater span of control* by facilitating accurate collection of performance data without requiring managers to spend significant time observing each individual worker's actual job performance; a***n effective appraisal system*** should be *multi-rater based*. The 360-degree feedback system should be part of the appraisal system. There are several advantages to using this system compared to a single source of performance information [50]. First, 360-degree feedback systems result in improved reliability of performance information because it originates from multiple sources and not just one source. Second, they consider a broader range of performance information, which is particularly useful in terms of minimizing criterion deficiency. Third, they usually include information not only on task performance but also on contextual performance and counterproductive work behaviours, which are all important given the multidimensional nature of performance. Finally, because multiple sources and individuals are involved, 360-degree feedback systems have great potential to decrease biases - particularly compared to a system involving a single source of information.

5.0 Conclusion

Extant studies have revealed critical limitations in the implementation of the existing performance appraisal systems despite being widely adopted as necessary tools for enhancement of organizational effectiveness [16]. Such limitations include bias due to assessment errors, the reliability of the sources of information, and individual differences [51]. A commonly noted bias is represented by raters who are either too lenient or too strict [52], [53], [54]. Scholars have variously emphasized that the constituents of performance appraisal system determines its effectiveness and acceptability [16], [17]. To solve the problem of what should be measured; Rudman [11] suggested that organizations combine various methods and techniques in developing performance appraisal systems; Skinner *et al.* [21] outlined key

job performance criteria for an effective appraisal system as competencies, behaviours (actions conducted/or tasks performed, organizational citizenship behaviours - actions that are over and above usual job responsibilities, counterproductive work behaviours - actions such as assaults, abuse of customers, etc.), traits and results/outcomes of tasks. Further Skinner *et al.* [21] insisted that appraisal ratings should involve other entities like peers, customers or service providers, and self instead of the immediate supervisor alone. Finally, Van & Schodl [24] states that for an appraisal system to be effective, it has to achieve its main purpose, usually to increase the performance of individuals, teams, and the entire organization. At the centre of the operational success of an effective appraisal system is the deployment of technology to drive the entire process.

In a nutshell, this study was undertaken to: identify the various techniques used in appraisal process; identify the types and sources of errors in the appraisal process; identify all known metrics of performance appraisal measurement; identify all the elements that should constitute an effective employee performance appraisal system; and finally, establish the relationship between a technologically-driven employee performance appraisal system and employees' perception of justice with the appraisal process.

The study revealed that an effective performance appraisal system depends heavily on perceived organizational justice, the accuracy of the instruments of rating used, the sources of the appraisal data, the content of job performance criteria, and the type of technology that drives the process. Is there perception of distributive justice and procedural justice? Are the instruments of rating prone to psychometric errors or other errors? What constitutes the appraisal information? Is it single-source or multi-source appraisal information? Is it subjective or objective or a combination of both? What is the content of the job performance criteria? Do they contain all known metrics of performance measurement and how are they applied across the organization? Is the appraisal process manually-driven or technologically-driven? Answers to these questions point to the fact that an effective appraisal system should be technologically-driven, it should have large span of control as data-capture is automated, it should be multi-rated, appraisal information should be multi-sourced, it should be evidence-based, it should be accurate, reliable and promotes organizational justice and it should be able to utilize all known metrics of performance measurement in the appraisal process.

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