Appraisal of Independent and Interdependent Problem-Solving Skills on Role-Based Performance of University Non-Academic Staff.

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Abstract

Organisational researches are now considering roles or competences as alternative to concept of job. This study therefore investigated independent and interdependent problem-solving skills as predictors of role-based performance. A survey research method utilizing an ex-post factor design was adopted for the study. Participants were 210 non-academic staff selected through purposive sampling in a private university in the South-West. Data was collected using the Independent and Interdependent Problem-Solving Scale and the Role-Based Performance Questionnaire. Both instruments were validated using Nigerian samples. Item validity was also run on each item and all items showed to be valid. Results of the hypotheses analysis at p<.05 showed that independent problem solving skill reported significantly higher role-based performance than interdependent problem solving skill. Independent and interdependent problem-solving skills significantly predicted role-based performance. Age was also found to predict role-based performance. Despite reports on the effectiveness of team work, it is recommended that independent problem-solving skills receive more focus in terms of training and development efforts.

Keywords: Independent and Interdependent Relationships, Problem-Solving Style, Job Performance, Role Theory, University Staff.

Introduction

Role-Based Performance concept relates to how successfully an individual plays one's prescribed role and is measured in terms of one's relative success or failure in that role. In contrast, job performance can be viewed as an activity in which an individual is able to accomplish the task assigned to him/her successfully (Laiba, Anum, Mohammed and Kashif, 2011). Not surprisingly, the concept of job performance has been a construct of empirical research through the history of empirical study in industrial psychology. Researchers such as Higgin, Duxbury and Lee (1992) & Campbell (1993) have all carried out research on this concept, however one of the setbacks in these studies is that their findings lack generalization to the population other

than which sample were selected, in other words the findings of majority of study lack extrapolation. According to Bommer, Johnson, Rich, Podsakoff, and MacKenzie (1995), "job performance is the most widely studied criterion variable in the organizational behavior and human resource management literatures" pp: 587. However, most performance measurement systems are limited in that they ignore dimensions of work behavior that lie beyond what has been traditionally included in the scope of a specific job itself (Welbourne, Johnson and Erez, 1997). Thus, performance measurement has since been modified from being person oriented to being behaviorally oriented, with the emphasis being on those tasks or behaviors that were associated with the job (Welbourne et. al., 1997).

In their opinion, Milkovich and Boudreau (1997), state that "organizations are replacing the notion of 'jobs' with considering what 'roles' or 'competencies' will be required for the 21st century." This trend, in Welbourne et. al.'s postulation, has led to a renewed interest in the 'person.' Specifically, organizations have begun to develop appraisal systems based on competency models, which focus on the skills needed to be effective in one's current and future job (Lawler, 1994). Even though the emphasis is returning to the person (vs. the job), competency models continue to be defined by job attributes like the ability to solve problems, in particular, the ability to solve problems independently or interdependently. Mansfield (1996) defines a competency model as "a detailed, behaviorally specific description of the skills and traits that employees need to be effective in a job."

According to an online encyclopedia (n.d.), problem-solving requires two distinct types of mental skill which are analytical and creative. The first problem-solving skill is analytical or logical thinking which includes skills such as ordering, comparing, contrasting, evaluating and selecting. It provides a logical framework for problem-solving and helps to select the best alternative from those available by narrowing down the range of possibilities (a convergent process). Analytical thinking often predominates in solving closed problems, where the many possible causes have to be identified and analysed to find the real cause. The second problem-solving skill is creative thinking which is a divergent process, using the imagination to create a large range of ideas for solutions. It requires us to look beyond the obvious, creating ideas which may, at first, seem unrealistic or have no logical connection with the problem. There is a large element of creative thinking in solving open problems (Online encyclopedia, n.d.).The creative thinking skills can be divided into several key elements such as: fluency for producing many ideas, flexibility for producing a broad range of ideas, originality, producing uncommon ideas and elaboration for developing ideas. Effective problem solving requires a controlled mixture of analytical and creative thinking (Online encyclopedia, n.d.).

Independent problem-solving therefore focuses on the creative and analytical thinking that an individual is able to initiate, sustain and bring to a logical and productive end with little or no assistance from other individuals. Interdependent problem-solving entail creative and analytical thinking that an individual is able to initiate, sustain and bring to a logical and productive end, with a lot of dependence on other individuals throughout the process. Solutions to problems that emerge at work are of no little importance to the successful progress of completing work tasks, roles and responsibilities.

The non-academic staffs of university structures are no doubt very critical, as regards building sustainable ivory towers. Ivory towers, as citadels of academic learning and effective result oriented research institutes are fondly referred as, are also paramount to the national development and sustenance of any nation. These ivory towers are made up mostly of academic and non-academic staffs that play significant roles in the success of educational pursuit of these institutions. Non-Academic staffs provide services to both the student body and academic staff in general, thereby by invariably helping to drive the success of nation building through academic learning and research. In the researcher's opinion, the psychological job attributes, specifically problem-solving skills, of administrative or non-academic staff is necessary to achieve this function. Understanding the type of problem-solving skill that is most effective towards performance on the job is evidently important to university training policy directives.

Researchers Rubin,Watt and Ramelli (2012) found that employees who are independent problem-solvers perform better than interdependent problem-solvers in the workplace. Previous researchers found association between consideration of independence and interdependence on group-member performance (Shaw, Duffy & Stark, 2000), solitary and collective task (Magid, Sarkol & Mesoudi, 2017), consumer decision making task (Vieira, 2013) and clinical performance (Sebok-Syer, Chahine, Watling, Goldszmidt,Cristancho & Lingard, 2018).

Multiple researchers from these various fields have opined that roles play an important part in social structure (Mead, 1934; Turner, 1978), and roles have been recognized as central to understanding employee behavior in organizations (Katz & Kahn, 1978). In the strictest sense, roles are positions within a social framework (Oeser & Harary, 1964); however, they also are defined by the individuals who occupy them (Callero, Howard, & Piliavin, 1987; Oeser & Harary, 1964). According to role theory, individuals' role expectations are influenced by both their personal attributes and the context in which they exist. Thus, role theory suggests that employee performance will be a function of both the individual and the organization. Role theory represents a major advancement in explanations for performance since it combines both a psychological (individual contributions) as well as sociological (organizational framework) perspective.

Moreover, according to identity theorists, it is not the existence of roles, but their saliency, which affects behavior (Burke, 1991; Thoits, 1992). Identity theory suggests a process by which people use an internal control system to filter information. The likelihood that an event or information will trigger behaviuor, is associated with the saliency of a particular role (Thoits, 1991; 1992). According to Thoits "the more salient the role identity, the more meaning, purpose and behavioral guidance the individual should derive from its enactment (1991: 106)." In other words, those roles which are most salient to us provide us with the strongest meaning or purpose. In turn, the more meaning we derive from a role, the greater the behavioral guidance that ultimately leads to the enactment of behaviors associated with that role. Thus, organizations can affect behavior of staff at work by influencing the saliency of work-related roles. Management influence work-related role saliency in many different ways including rewarding behaviors, requiring behaviors, formal and informal recognition, and even punishment when behaviors are not enacted. Since different organizations have different expectations of their staff, role saliency is most likely to be different across organizations; it is of significance to study the different job attributes that define these different roles.

Developing countries such as Nigeria have been faced with the challenge of nation building which involves the development of human capital and building institutional capacities (Ijide, 2015). While the business of nation building is a continuous endeavor (Gambari, 2008), proper direction through effective policy making is necessary. These policies are guiding factors that facilitate the efforts of the individuals who are corner stones of the building blocks of sustainable national development. As the academic staff of ivory towers increase efforts to churn out building blocks of the future of national development, non-academic staff play a key role in the smooth process of providing and establishing education and training. Personal competencies of the individuals who facilitate the administrative running of ivory towers are areas of noteworthiness. As alluded to severally, the role based performance of these non-academic staff of ivory towers is an area of interest, considering its role in measuring competencies that enhance the ability of the person or individual employee to do their job effectively.

Job performance focuses on the task while role-based performance focuses on the person. While job performance has been studied widely, there is a dearth of literature on role-based performance among Nigerian samples and specifically among non-academic staff of universities. The competency of problem solving, be it independently of interdependently, is no doubt one which will enhance the person or individual skills that will determine how effective a person will be in their assigned roles. Independent and interdependent problem-solving skills is also an area that has not received satisfactory empirically researched results and discussion in literature surrounding employee competencies. The present study is therefore focused on understanding the influence of problem-solving, both independent and interdependent, on the reported role-based performance of non-academic staff among a sample of private university non-

academic employees. The main goal of the study is to establish a relationship between independent and interdependent problem-solving and role-based performance, with a view to recommending appropriate policy interventions.

From the ongoing therefore the following hypotheses were tested:

1. Independent and interdependent problem-solving will be a significant predictor of role-based performance among the non-academic staff.
2. There will be a significant difference in the role-based performance of the non-academic staff based on independent and interdependent problem-solving skills.
3. Age will be a significant predictor of role-based performance among the non-academic staff.
4. Male staff will report a significantly higher role-based performance than females.

Materials and Methods

The study adopted a survey research method utilizing an ex-post factor design involving administration of questionnaire in which independent and interdependent problem-solving serve as independent variables, while role-based performance was the dependent variable.

Participants

Participants were 210 non-academic staff from a private university in South-West, Nigeria. The mean age of the participants was 39.68 (SD= 7.571). The gender distribution shows that 117(505.7%) of the participants are male and 93(44.3%) are female. The marital status distribution shows that 154(73.3%) of the participants are married while 48 (22.9%) are single. 5 (2.4%) are separated and 3 (1.4%) are widowed. The highest educational qualification distribution shows that 28 (13.3%) of the participants have an Ordinary National Diploma/National Certificate Examination; 24 (11.4%) of them have a Higher National Diploma; 67 (31.9%) have a Bachelor's degree; 60 (28.6%) have a Masters degree and 22 (10.5%) of them are with a Doctorate degree, while 9 (4.3%) are classified under "Others".

Procedure

A two-stage sampling technique was adopted for collection of data. This comprised the simple random sampling and purposive sampling techniques. Simple random sampling was used to select departments from the various units that served as the population setting. Purposive sampling was subsequently used to administer questionnaire to the participants.

Instruments

The Independent-Interdependent Problem-Solving Scale (Rubin, Watt, & Ramelli, 2011).

The Independent-Interdependent Problem-Solving Scale is a general purpose measure of dispositional preferences for independent and interdependent problem-solving. The scale consists of 10 items. Participants respond using a 7-point Likert-type response scale anchored "Strongly Agree" and "Strongly Disagree". Five of the items measure the preference for independent problem-solving, and five measure the preference for interdependent problem-solving. Rubin et al. (2012) reported evidence of the reliability and validity of Version 1 of the Independent-Interdependent Problem-Solving Scale. In summary, the scale has good reliability, with a single factor structure (eigenvalue = 3.96) and good internal consistency (αs = .77 & .80).

Role-Based Performance Questionnaire (Welbourne, Johnson and Erez, 1998).

Role-Based Performance Questionnaire was developed by Welbourne, Johnson and Erez (1998). It comprises of 20 items with five dimensions namely job, career, innovation, team and organization. The response technique utilises the 1 to 5 Likert scale type whereby 1 signifies "need much improvement" and 5 signifies "Excellent". For the entire 20 items scale, alpha ranges from 0.86 to 0.96. The reliability estimates suggests a high homogeneity among the scale items. The reliability of the score of role-base performance is 0.87.

Both instruments were validated using Nigerian samples. Independent-Interdependent Problem-Solving Scale reliability is reported (Cronbach alpha, .772, Spearman-Brown, .801 and Guttman Split-half, .785), while Item Correlation Analysis showed validity at .949. In Table 1, Item Validity was ran on each item and all items showed to be valid.

Role-Based Performance Questionnaire reliability is reported (Cronbach alpha, .949, Spearman-Brown, .844 and Guttman Split-half, .831), while Item Correlation Analysis showed validity at .949 also. In Table 2, Item Validity was also ran on each item and all items showed to be valid.

Item Validity of Instruments

Table 1: showing inter-item analysis for the validation of the Independent Interdependent Problem Solving Scale

ITEMS	N	SIG (2 Tailed)	Correlation
II1	210	.000	.426
II2	210	.000	.539
II3	210	.000	.670
II4	210	.000	.716
II5	210	.000	.622
II6	210	.000	.694
II7	210	.000	.668
II8	210	.000	.692
II9	210	.000	.499
II10	210	.000	.533

Table 2: showing inter-item analysis for the validation of the Role Based Performance Questionnaire

ITEMS	N	SIG (2 Tailed)	Correlation
RB1	210	.000	.822
RB2	210	.000	.872
RB3	210	.000	.837
RB4	210	.000	.783
RB5	210	.000	.746
RB6	210	.000	.748
RB7	210	.000	.768
RB8	210	.000	.771
RB9	210	.000	.810
RB10	210	.000	.769
RB11	210	.000	.706
RB12	210	.000	.761
RB13	210	.000	.754
RB14	210	.000	.751
RB15	210	.000	.770

RB16	210	.000	.664
RB17	210	.000	.685
RB18	210	.000	.669
RB19	210	.000	.693
RB20	210	.000	.642

All the items on the two instruments Independent Interdependent Problem Solving Scale and Role Based Performance Questionnaire showed to be valid. The two instruments are therefore valid for use, when considering Nigerian Samples**.**

Results

Hypothesis One

Independent and interdependent problem-solving will be a significant predictor of role-based performance among the non-academic staff.

The result presented in Table 3 indicated an R value = .187 and R square value =.030. The R^2 of (0.030) indicated that problem-solving skills accounts for 3.0% of the total variation in role-based performance. The result indicated that problem-solving significantly predicts role-based performance among the non-academic staff F $(1,208)$ = 7.524, P<.05 = .030. Hypothesis 1, which states that independent and interdependent problem-solving will significantly predict role-based performance, is therefore accepted.

Hypothesis Two

There will be a significant difference in the role-based performance of the non-academic staff based on independent and interdependent problem-solving skills.

The result presented in Table 4 indicated t-Test scores that 98 of the non-academic staff were independent problem-solvers while 112 were interdependent problem-solvers while their mean role-based performance scores were 73.30 and 68.16 respectively. The P value associated with this test was .023. The t-Test succeeded in revealing a statistically significantly reliable difference between the mean of the role-based performance scores that the independent problem-solving staff have (M = 73.30, SD = 14.912) and that of the interdependent problem-solving staff (M = 68.15, SD = 17.183), $t(208)$ = 2.297, p = .023, α = .05. It can be therefore concluded that the role-based performance levels of non-academic staff who use independent problem-solving skill was higher than that of non-academic staff who use interdependent problem-solving skill. The hypothesis was therefore accepted.

Table 3: Linear regression showing problem-solving use as a predictor of role-based performance

MODEL	SS	DF	Mean Square	F	P Value	R	R^2
Regression	1945.171	1	1945.171	7.524	.007	.187	.030
Residual	53774.643	208	258.532				
Total	55719.814	209					

Table 4: showing independent t-Test analysis for the role-based performance scores of independent and interdependent problem-solvers.

PROBLEM SOLVING	N	$\overline{X}$	SD	t	P
INDEPENDENT	98	73.30	14.912	2.297	<.05
INTERDEPENDENT	112	68.16	17.183		

Table 5 Linear regression analysis showing age as a predictor of role-based performance

MODEL	SS	DF	Mean Square	F	P Value	R	R²
Regression	2598.929	1	2598.929	10.176	.002	.216	.047
Residual	53120.885	208	255.389				
Total	55719.814	209					

Hypothesis Three

Age will be a significant predictor of role-based performance among the non-academic staff. The result presented in Table 5 indicated an R value = .216 and R square =.047. The R^2 of (0.047) indicates that age accounts for 4.7% of the total variation in role-based performance. The result indicates that age significantly predicts role-based performance among the non-academic university staff. Hypothesis 3, which states that age will significantly predict role-based performance, is therefore accepted.

Hypothesis Four

Male staff will report a significantly higher role-based performance mean score than females. In Table 6, the t-Test scores showed that 117 of the non-academic staff were male and 93 were female while their mean role-based performance scores were 70.15 and 71.08 respectively. The P value associated with this test was .683. The t-Test failed to reveal a statistically significantly reliable difference between the mean of the role-based performance scores that the male non-academic staff have (M = 70.15, SD = 15.296) and that of the female non-academic staff (M = 71.08, SD = 17.611), $t(208) = 2.293$, $p = .683$, $α = .05$. It can be therefore concluded that the role-based performance levels of the male staff is not significantly higher than that of the female staff. The hypothesis was therefore rejected.

Table 6: showing independent *t*-Test analysis for the role-based performance scores of male and female staff

GENDER	N	$\overline{X}$	SD	t	P
MALE	117	70.15	15.296	2.293	>.05
FEMALE	93	71.08	17.611		

Discussion

The analysis of the result shows that independent and interdependent problem-solving skills will predict role-based performance among a sample of non-academic university staff. The finding reveals that 3.0% of the variation in role-based performance can be accounted for by the effect of independent and interdependent problem-solving while the balance of 97% is attributable to other factors. Another important finding from the analysis is that age will predict role-based performance among a sample of non-academic university staff. The finding reveals that 4.7% of the variation in role-based performance can be accounted for by the effect of age as an independent variable while the balance of 95.3% is attributable to other factors. Of great importance also is the finding that shows that staff who exhibit independent problem-solving attributes manifest a significantly higher level of role-based performance than workers who exhibit interdependent problem-solving skills; supporting Rubin et al. (2012). Due to a dearth of literature studying the interacting influence of these variables, it is challenging to establish prior findings that may or may not be consistent with the findings from this study.

From previous studies carried out on age and job performance, it was concluded that although individual studies differ, averaging across available studies reveals virtually no relationship between age and job performance (McEvoy and Cascio, 1989). There is potential for age discrimination in dealing with performance-relevant training and development of staff (Maurer and Rafuse, 2001). There could be a

tendency to give preference to younger staff over older ones in assigning or encouraging training and development opportunities. The focus of this study however is on role-based performance and an apparent relationship exists between age and role-based performance. The findings of this study will add information focusing on these variables to enriching literature for future studies on these variables.

While the independent variable, independent and interdependent problem-solving skills are key areas that have not been given much attention in terms of research, the results of this study provides a perspective that requires more attention. For instance, there is a lot of emphasis in organizational behavior on teams, team work and team results. It is arguable that team work will result in higher levels of job performance; it is also beneficial to note that role-based performance is based on competency models, which focus on the skills needed to be effective in one's current and future job (Lawler, 1994).

One of such competencies is the focus of this study which borders on problem-solving. Interdependent problem-solving skill connotes the input of efforts coming from several individuals, howbeit minute. This approach also alludes to team effort or team work in providing solution to work related issues. The findings from this study point to a close but significant difference in the two problem-solving approaches as it concerns role-based performance. The independent problem-solving approach reported a significantly higher mean in role-based performance than the interdependent problem-solving approach.

Conclusion and Recommendations

The present study focused on establishing a relationship between independent and interdependent problem-solving skills and role-based performance, with a view to recommending appropriate policy interventions. The general finding was that independent and interdependent problem-solving and age separately and significantly predict role-based performance among non-academic staff at a private university in South-West Nigeria. The independent problem-solving skill was found to be more efficient as a competency, based on role-based performance, than the interdependent problem-solving skill. There is a need for the university administration sector in Nigeria, to pay adequate attention to issues of independent problem solving skills, as it affects their staff's role based performance level.

It is recommended therefore, that the university administration sector should give due attention to the findings of the present study by exploring ways to ensure a more dynamic strategy of emphasizing and ensuring a focus on the training and use of independent problem-solving and role-based performance among their staff. The university administration sector should in particular, evolve organizational policies aimed at ensuring training and development programs among non-academic staff that focuses primarily on sponsored research to establish the role-based performance level of the work force in relation to problem-solving skills covered in this study.

Researchers interested in the study of psychological competencies that individual staff requires to succeed in their organizational roles should consider role-based performance as an important criterion. Future investigations should consider using non-academic university administrators and government administrative staff in other parts of Nigeria not covered by the present study. A comparative study is also suggested on problem-solving skills of non-academic staff and academic staff of universities.
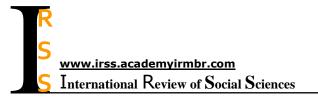
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