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Measuring Federal Employee Leadership Potentials Based on Sex and Educational Attainment.

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Abstract

The purpose of this study is to find whether there is a significant difference in the agreement as to whether the federal agency supervisor provides an employee with opportunities to demonstrate his or her leadership skills based on sex and educational level, using data from the 2018 Federal Employee Viewpoint Survey. The study applies a Mann-Whitney U test and Kruskal-Wallis H Test of independent samples of 515,223 federal employees to find a significant difference in the leadership skills and potentials of federal employees based on sex and educational level. Both sex and level of education of federal employees are significant determinants of differences in the leadership skills and potentials of federal employees. This paper further suggests that irrespective of the gender of the employee, the level of education of the employee determines the level of opportunities, leadership skills and potentials.

Key words: Leadership skills, Mann-Whitney U-test, Kruskal Wallis H-test, Federal Employment Viewpoint Survey

Introduction

Leadership skills and potentials of employees are important assets required to direct the affairs of an organization and have unequivocally drawn the attention of scholars (Lee, Robertson & Kim 2020). Leadership could be examined from different perspectives, based on the style adopted. Charismatic leaders are sensitive to their employees' needs and monitor their potential for development and advancement, and thus are likely to know which developmental activity is helpful and appropriate for a certain employee (Rowold & Laukamp, 2009, Bermann 1999). Charismatic leaders take personal risks in order to motivate followers in training and development activity (Rowold & Laukamp, 2009). All of these qualities create a stronger bond between the charismatic leader and followers, and thereby eventually impact attributional processes, which can be measured using data from the Federal Employee Viewpoint Survey (Fernandez, Resh, Moldogaziev & Oberfield 2015). Based on the social role theory, men are perceived as being achievement oriented and acting in an aggressive or instrumental way, a phenomenon often referred to as agency or being agentic, whereas women are more often seen as social and service oriented or communal (Eagly et al., 1992, De Cremer 2006)).

On the other hand, education is a strong determinant of leadership skills and potentials (Den Hartog, & De Hoogh 2009). The charismatic leader is one who has confidence in his performance and carries others along with him (Eagly 2012). Over the past 50 years the United States public workforce has become increasingly diverse following legislation and changing social norms (Choi 2010; Fernandez *et al.* 2015; Riccucci 2002). The role of women and ethnic minorities in public agencies has drawn the attention of scholars in a bid to promote an inclusive organizational culture. According to Fernandez *et. al* (2015) supervisors seek to consciously empower employees from two different perspectives; the psychological perspective in which the employee feels very confident about his ability to perform a particular task and on the other hand some researchers consider employee empowerment as a factor, which relates to leadership style and skills aimed at sharing resources with lower-level employees. This later approach seems to be more commonly adopted in public management. No doubt, there is a direct

relationship between employee empowerment practices and performance (Fernandez and Moldogaziev 2011). However, job satisfaction, and organizational commitment have been found to negatively affect turnover (Grissom 2012, Moynihan and Landuyt 2008). Federal agency supervisors are tasked with the responsibility of ensuring that employees are adequately empowered in order to demonstrate their leadership skills irrespective of any social or psychological constraints. Ethnic and racial factors are also identified constraints in the workplace that inhibit optimum employee performance (King 2007). When diversity is well managed in an organization the agency is most likely to experience improved employee satisfaction and job quality (Oberfield 2014). This study draws on data extracted from the Federal Employee Viewpoint Survey of 2018, which reflects the advantage of reproducibility and ensuring that researchers easily merge information from different federal agencies (Fernandez *et. al* 2015)

There is an observed gap in the literature that warrants this study. This study therefore examines the following research questions;

RQ 1: Is there a significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills (Q43) based on the sex of the employee (DSEX)?

RQ 2: Is there a significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills (Q43) based on the education level of the employee (DEDUC)?

The study reveals a significant difference and a rejection of the null hypothesis for both research questions, indicating that sex and educational attainment are major determinants of leadership skills and potentials of federal employees. The study is presented in six sections, the next is a review of relevant literature and theory, the third is a statement of the method of analysis, the fourth is the result of the empirical analysis, the fifth discusses the results and the sixth concludes the paper.

Literature Review/Theory

Lopez & Ensari (2014) points to the role incongruity theory and its implications for attributional biases for leaders. The prediction is that when organizational outcome is negative, there will be more negative attributions directed at the female than male. Another argument is given by Dovidio and Gaertner (2004) on the notion of aversive sexism as a prejudicial attitude toward women, in a bid to justify some discriminatory tendency.

On the relationship between educational attainment and leadership skills, Richardson & Norgate (2015) finds a high degree of correlation between job performance in terms of leadership and employees' educational attainment.

This study seeks to test the hypothesis whether there is a significant difference in the agreement that federal agency supervisors provide the employee the opportunity to demonstrate his or her leadership skills based on the sex of the employee and secondly, based on the educational attainment. There are no known studies that have discussed this issue to a large extent, but this study intends to fill this gap.

Methods

The data for this study is obtained from the 2018 Federal Employee Survey. The entire analytical framework is nonparametric because the variables are in ordinal or nominal values. This study employs the Mann-Whitney U test of mean differences in order to ascertain whether there is a significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills based on the sex of the employee.

In order to test the second hypothesis of whether there is a significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills based on the education level of the employee, the study employs a Kruskal-Wallis H Test statistic.

Results

Mann-Whitney U Test conducted to test the following hypothesis;

- H₀1: There is no statistically significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills (Q43) based on the sex of the employee (DSEX).
- H_a1: There is a statistically significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills (Q43) based on the sex of the employee (DSEX).

Table 1: Hypothesis Test Summary

	Null Hypothesis	Test	Sig. ^{a,b}	Decision
1	The medians of my supervisor provides me with opportunities to demonstrate my leadership skills are the same across categories of Sex:.	Independent-Samples Median Test	.000 ^c	Reject the null hypothesis.
2	The distribution of my supervisor provides me with opportunities to demonstrate my leadership skills is the same across categories of Sex:.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

c. Yates's Continuity Corrected Asymptotic Sig.

From Table 1, we find that both the median and the distribution of the samples test show a significant difference in leadership skills based on the sex of the employees.

Table 2: Independent-Samples Median Test Summary

Total N		515223
Median		4.000
Test Statistic		39.913 ^a
Degree Of Freedom		1
Asymptotic Sig.(2-sided test)		.000
Yates's Continuity Correction	Chi-Square	39.876
	Degree Of Freedom	1
	Asymptotic Sig.(2-sided test)	.000

a. Multiple comparisons are not performed because there are less than three test fields.

The results in Table 2 further corroborates the result in Table 1 and shows a significant difference in the median outcomes of the variable.

Table 3: Independent-Samples Mann-Whitney U Test Summary

Total N	515223
Mann-Whitney U	31782956500.000
Wilcoxon W	56897731640.000
Test Statistic	31782956500.000
Standard Error	50333328.235
Standardized Test Statistic	-16.649
Asymptotic Sig.(2-sided test)	.000

A significant Mann-Whitney U result from Table 1 through 3 indicates that the samples of Male and Female categories are different in terms of opportunities given by supervisors to demonstrate their leadership skills. From the tables above, examining whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills based on the sex of the employee. We find that the mean rank for male is greater than that of female, therefore reject the null hypothesis that there is no significant difference.

Kruskal-Wallis Test is used to Test the following hypothesis;

- H_0 : There is no statistically significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills (Q43) based on the education level of the employee (DEDUC).
- H_a : There is a statistically significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills(Q43) based on the education level of the employee (DEDUC).

Table 4: Hypothesis Test Summary

	Null Hypothesis	Test	Sig. ^{a,b}	Decision
1	The medians of 43. My supervisor provides me with opportunities to demonstrate my leadership skills. are the same across categories of level of education completed?.	Independent-Samples Median Test	.000	Reject the null hypothesis.
2	The distribution of 43. My supervisor provides me with opportunities to demonstrate my leadership skills. is the same across categories of level of education completed?.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

a. The significance level is .050.

b. Asymptotic significance is displayed.

From Table 4, we find a significant difference in the median and distribution of leadership skills based on the level of education of federal employees.

Based on the result in Table 5, a pairwise comparison of the groups of independent variable are tested to ascertain the relative group differences.

Table 5: Pairwise Comparisons of What is the highest degree or level of education you have completed?

Sample 1-Sample 2	Test		
	Statistic	Sig.	Adj. Sig. ^a
Less than a Bachelor's Degree-Bachelor's Degree	1053.052	.000	.000
Less than a Bachelor's Degree-Beyond a Bachelor's Degree	3486.877	.000	.000
Bachelor's Degree-Beyond a Bachelor's Degree	790.646	.000	.000

Table 6: Independent-Samples Kruskal-Wallis

Test Summary	
Total N	516928
Test Statistic	3942.980 ^a
Degree Of Freedom	2
Asymptotic Sig.(2-sided test)	.000

a. The test statistic is adjusted for ties.

Table 7: Pairwise Comparisons of What is the highest degree or level of education you have completed?

Sample 1-Sample 2	Test		Std. Test		
	Statistic	Std. Error	Statistic	Sig.	Adj. Sig. ^a
Less than a Bachelor's Degree-Bachelor's Degree	-19768.633	496.947	-39.780	.000	.000
Less than a Bachelor's Degree-Beyond a Bachelor's Degree	-30844.818	493.583	-62.492	.000	.000
Bachelor's Degree-Beyond a Bachelor's Degree	-11076.185	467.374	-23.699	.000	.000

The Kruskal-Wallis Test assumes that the groups are equal (Cronk 2018). Thus, a significant result indicates that at least one of the groups is different from at least one other group. The test

assumes an ordinal level of measurement for the dependent variable and the independent variable should be nominal or ordinal. A Kruskal-Wallis test was conducted comparing the outcome of the highest level of education attained by federal employees. A significant result was found [$H(2) = 3942.98, p < 0.05$], indicating that the groups differed from each other.

From Pairwise comparison Table 7; $p < 0.05$ for all groups shows that all the groups are significantly different from the other.

Discussion

The results of the Mann-Whitney U Test indicate that there is a significant difference in leadership skills and potentials of employees based on whether the employee is a male or female. This finding supports the result found in Lopez and Ensari (2014) on the distributional effects of leadership styles based on gender. The significance of the test statistic implies that the leadership possessed by the male and employees are different or the perception of the employee changes about the leadership depending on whether the employee is a male or female.

In the same vein, using the Kruskal-Wallis H Test we find a significant difference on the leadership skills and potentials of employees based on the educational level. This shows that education is a significant variable in determining the leadership potentials of employees in the federal service. This finding corroborates the result in Richardson & Norgate (2015) on job performance based on IQ of employees.

Conclusion

In this study we find a significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills based on the sex of the employee by applying the Mann-Whitney U Test for independent samples. This shows that

the sex of employees determines how they apply their leadership skills and opportunities given to them by their supervisors. In the second analysis we also found a significant difference in the agreement as to whether the federal agency supervisor provides the employee with opportunities to demonstrate his or her leadership skills based on the education level of the employee using a Kruskal-Wallis H Test for independent samples. This finding also indicates that educational attainment is very significant in determining the potential of the federal employee to demonstrate his or her leadership skills.

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