INFLUENCE OF WOMEN EMPOWERMENT ON PROFESIONAL DEVELOPMENT OF FEMALE ENGINEERS

(ARE FEMALE ENGINEERS EMPOWERED ENOUGH?)

Elizabeth Nabwire Ekakoro
Assistant Highway Engineer, Egis Kenya Ltd., Kakamega, Kenya
ekakoroliz@gmail.com

Abstract

Women Empowerment continues to be a relevant global subject and the essentiality of women in national development cannot be ignored. This has seen the rise of women in various fields, including engineering. Not only have they challenged the stereotype that engineering is male-oriented, but also deliver successfully. Thus organizations with female engineers on board record significant satisfaction on the achieved results. However, the female engineers that climb the ladder to the top are a handful, which begs the question of whether empowerment is enough to keep the lady engineers on track and ensure their professional growth. This study investigated the influence of women empowerment on the professional growth of female engineers. Descriptive research was used to examine how recognition, inclusion, continuous professional development, and promotion influence the professional growth of female engineers. Analysis was done using statistical package for social sciences software, correlation and regression analyses applied. The study revealed a strong influence of inclusion on the professional growth of female engineers. It further indicated that continuous professional development was paramount to their professional growth. To keep more women on board, the study recommends the inclusion of female engineers in technical matters, mentorship, and mandatory training to ensure professional growth.

Keywords: Female engineers, Empowerment, Recognition, Inclusion, Continuous professional development, Promotion.

1 Introduction

1.1 Background

Women empowerment is integral to the achievement of the UN Sustainable Development Goals(SDGs). The fifth SDG advocates for equality and empowerment of women and girls. The stereotype that engineering is masculine is gradually becoming water under the bridge as more women are rising in Science, Technology, Engineering, and Math (STEM) (Dutta, 2015). However, despite the impetus that women empowerment has on development it is reported that no country has fully achieved the empowerment of women and girls (M. Kaltenborn et al., 2020). Though notable progress has been made, women are still underrepresented in STEM areas and especially in engineering (Alfred & Rice, 2014). The subject of empowerment therefore cannot be overlooked as far as having more female engineers on board is concerned.

The representation of women in engineering is a global concern. The engineering workforce in the United States comprises only 11% of women, whereas statics indicate that over 25% of women are engineering graduates (Fouad, et al, 2011). Only 9% of the United Kingdom's engineering workforce is female and the shortage is considered an imminent threat to businesses in the UK (Maskey, 2018). Although Thailand is experiencing a rise in the number of female engineering graduates, licensed female engineers are not likely to be promoted unlike their male counterparts (Kaewsri & Tongthong, 2013). It is further reported that while 3.3% of male engineers get promoted in Thai, only 0.3% of female engineers get a promotion.

Advancing gender equality and women empowerment is a major target of the AUs African Women's Decade. One of the themes focuses on parity at the workplace, promotion, and equal opportunities for women in all sectors of engineering inclusive (African Union, 2013). Though the declared decade of 2010-2020 has seen several steps towards the realization of gender equality and women empowerment, it is not yet a done deal. The incessant gender divide in Sub-Saharan Africa undermines the empowerment agenda of the SDGs (Ogechi,

2020). According to the Engineering Council of South Africa, only 361 out of 2085 women registered in various engineering categories are professional engineers(17%) while less than 10% of the profession in Kenya is female.

1.2 Problem Statement

The Kenyan 2010 constitution has a legislative framework on gender equality in place, and it is debatable whether or not there's successful enforcement. The gender rule dictates that no more than two-thirds of appointive or elective positions shall be of the same gender (Constitution of Kenya, 2010). Although some studies indicate that work-life balance and bias are the major causes of women quitting engineering (Bryce & Far, 2019), there would still be a challenge implementing the gender rule in the Kenyan construction sector owing to the number of female engineers in the field. Aiming at why and how to bring more women on board, this study seeks to explore how women's empowerment influences the professional growth of female engineers.

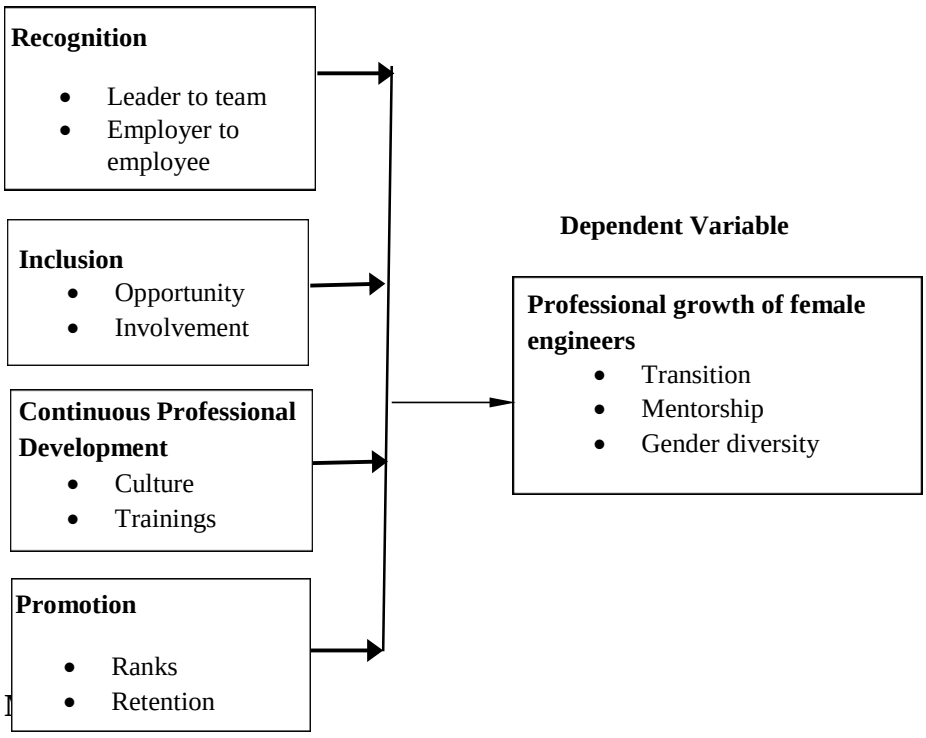
1.3 Research Objective

To examine the influence of recognition, inclusion, continuous professional development and promotion on the professional growth of female engineers.

2 Conceptual Framework

Below is an illustration of the interrelationship between (recognition, inclusion, continuous professional development and promotion) and professional development of female engineers.

Independent variables



3 M

Descriptive research design was employed in this study. An online questionnaire was used on a target population of 30 female engineers of all cadres. With a confidence level of 95% and a 5% margin error, Yamane's formula was used to determine the sample size as follows:- $\mathbf{n} = \frac{\mathbf{N}}{\mathbf{1+N}(e^2)}$

Where;
n = Sample size
N = Population under study
e = 5% error
1 = Constant
The sample size was calculated as;

$$\mathbf{n} = \frac{\mathbf{30}}{\mathbf{1 + 30}(\mathbf{0.05^2})}$$

n=27.91 ~ 28

The study adopted a 5-point Likert scale type of questionnaire as pursues: - 1- Strongly disagree, 2- Disagree, 3-Neutral, 4-Agree, 5- Strongly agree. The collected data was analyzed using statistical package for social sciences software (SPSS). A frequency distribution table was used for tabulating the calculated statistic for each variable. The researcher used correlation and regression analyses to test the significance of the used model and variables. The regression equation was adopted as follows:

$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$:-

Where: Y = Professional growth of female engineers; $\beta 0$ = Constant term $\beta 1$, $\beta 2$, $\beta 3$ and $\beta 4$, = Beta coefficients;

X1 = Recognition; X2 = Inclusion; X3 = Continous professional development; X4 = Promotion

ε = Stochastic disturbance error. The study was tested at 95% confidence level and 5% significance levels.

4 Results

The study received responses from 25 (83.3%) out of the targeted 30 respondents. The response rate of 83.3% was achieved through the support of google forms. Mugenda and Mugenda (2003) posit that a response rate of 50% is adequate, 60% is good and above 70% is very good. Going by this, the response rate in this study was adequate for carrying out study analysis.

Table 4.1: Descriptive Statistics for dependent variable

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
There's smooth transition of female engineers from GE>PE>CE	7	28.0%	5	20.0%	11	44.0%	2	8.0%	0	0.0%
There are effective mentorship programs for female graduate engineers	6	24.0%	8	32.0%	7	28.0%	1	4.0%	3	12.0%
Engineering organizations are committed to embracing the gender diversity	3	12.0%	4	16.0%	9	36.0%	6	24.0%	3	12.0%

From the above table, majority 44.0% of the respondents were neutral that there's smooth transition of female engineers from GE>PE>CE. Another 32.0% disagreed that there are effective mentorship programs for female graduate engineers while another 36.0% were neutral that engineering organizations are committed to embracing gender diversity.

Table 4.2 Correlations between the Dependent and Independent Variables

		Professional Growth of Female Engineers	Recognition	Inclusion	Continuous Professional Development	Promotion
Professional Growth of Female Engineers	Pearson Correlation	1	.897**	.939**	.935**	.922**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	25	25	25	25	25

**. Correlation is significant at the 0.01 level (2-tailed).

As observed above, all the independent variables had a strong positive association with the dependent variable.

Table 4.3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.972[a]	.944	.933	.27506

a. Predictors: (Constant), Promotion, Continuous professional development, Inclusion, Recognition

The R value at .972 shows that there exists a strong influence of independent variables on professional growth of female engineers. R^2 shows .944 on variation of professional growth of female engineers caused by the independent variables.

Table 4.4: ANOVA of dependent and independent variables

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.447	4	6.362	84.083	.000[b]

	Residual	1.513	20	.076
	Total	26.960	24	

a. Dependent Variable: Professional Growth of Female Engineers
b. Predictors: (Constant), Promotion, Continuous Professional Development, Inclusion, Recognition

From Table 4.4 where [F (4, 20) = 84.083, P<.05] it is evident that the independent variables influence professional growth of female engineers and thus a significant predictor.

This study employed a multivariate regression model in order to determine the importance of the independent variables with regard to the dependent variable which is professional growth of female engineers. This is helpful in determining the statistical significance of the predictor variables used in this study. The study investigated how well the predictor variables will predict professional growth of female engineers. The coefficients of the regression model were as shown in Table 4.5

Table 4.5: Coefficients of the regression equation

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.396	.675		.587	.564
	Recognition	-.169	.262	-.101	-.643	.527
	Inclusion	.492	.130	.549	3.776	.001
	Continuous Professional Development	.398	.107	.520	3.703	.001
	Promotion	.042	.209	.035	.199	.845

a. Dependent Variable: Professional Growth of Female Engineers

Multiple regression was used in order to determine the relationship between professional growth of female engineers and the other variables which were Recognition, Inclusion, Continuous professional growth and Promotion. The multiple linear regression equation model that was fit for this study is,
$Y= 0.396+0.549X_2+0.520X_3$.

5 Discussion

The results show that an increase in a unit of inclusion results in 0.549 increase in professional growth of female engineers and an increase in a unit of continuous professional development results in an increase of 0.520 in professional growth of female engineers. Recognition and Promotion were not statistically significant hence were not used in model fitting. Thus, inclusion and continuous professional development highly determine professional growth of female engineers.

6 Conclusions

Inclusion was found to be the most significant determinant of professional growth of female engineers. Not only do female engineers need to get involved in all technical aspects, but there should be equal opportunities for all; and equal pay for equal work. Continuous professional development is also paramount to the professional growth of female engineers. Organizations and employers need to promote periodic training cultures. Female engineers need to embrace lifelong learning and proactively take part in the activities of the institution. Embracing diversity will enhance team performance, while effective mentorship programs will attract and keep more women on board.

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