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Economic Factors that Impede Women's Participation in Engineering Workplaces in Selected Organizations in Nakuru County of Kenya

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Abstract: The study sought to examine Economic factors that impede women's participation in engineering workplaces in selected organizations in Nakuru County. The study was anchored on social feminism and rational choice theory to provide a theoretical framework. The study was guided by cross sectional survey research design. A census and snowball sampling methods was used to select the study sample where all female engineers in all the selecting organization were the sampled respondents. The study also conducted focused group discussions in 3 groups composed of both women engineers and non-engineers women. The study administered questionnaires to all women engineers in all the selected organizations as key informants. Data gathered was summarized, then analysed and presented using SPSS. The study found that Economic factors is a significant ($r=0.264$ $p<0.05$). Recommendations from the study was that the principal secretary, ministry of planning and Education should allocate funds to conduct community sensitization programmes and ensure that the necessary gender mainstreaming strategies is put in place. Further, these findings can inform policy makers on the pertinent issues affecting women in their bid to engage in male dominated fields such as engineering and to find out how to strengthen and improve women participation in not only the field of engineering but also other areas where women's participation remains low.
Keywords: Economic factors. Women's Participation, Engineering Workplaces.

INTRODUCTION

Research findings have demonstrated that engineering and technology have been pointed out as being key to a country's competitiveness in the global economy. For instance, Europe's biggest Economies-Germany, United Kingdom, France, and Denmark among others have the highest numbers of professional engineers and technologists [1]. The sound engineering capabilities have placed and maintained countries such as the USA, Japan, China and others at the forefront of economic and social development [2]. It is also increasingly being recognized that a robust engineering base is what underpins the rapid economic growth in India, South Africa, Brazil and other rapidly developing economies [3]. Although other factors such as political stability and good governance may have contributed to the expansion of these economies, there is no doubt that a sound engineering and technology capability has played a significant role in the overall economic growth and development of these countries.

Women account for about 43% of the world's population. Precisely there are approximately 57 million more men compared to women in the world, yet in most countries, there are more women as compared to men. However, women's participation in the wage labour remains far much below that of men. For instance, globally the average women's wage labour participation is just about 30% compared to over 80% for men [4]. About 68% of women in the United States are active participants in the wage labour, with Europe having an average 65% of women's wage labour participation. Women's participation in wage labour is lowest in Latin America at 45% and highest in East Asia and Pacific at 72%, with their participation in wage labour in Africa standing at about 60% [5]. About 60% of women in Kenya are participating in labour compared to about 85% for men.

Engineering and technology are critical to a country's development. Despite their importance to a country's economic growth, a significant shortage of engineers is experienced the world over and especially of the female gender. Governments around the world have advocated for the expansion of engineering, largely perceived as male oriented, to include women as a way of addressing manpower shortage and moderate the stereotypes of this career. In Kenya, concerted efforts through policies such as affirmative action and gender mainstreaming strategies are aimed at among others, enhancing women's interest in engineering related fields. However, a notable low representation

still exists. Recent trends in Nakuru County indicate that prevalence of women in engineering fields is remarkably low. This implies that there is need to retain and boost the number of women who venture into this field. The impediments to their involvement in engineering fields have not been investigated, hence was the need for the study to fill this gap.

Economic impediment to women participation in engineering fields

The corporate sector is one of the areas that offer opportunities for gainful engagement to many people including women. It is, thus, important to examine the level of women's participation in the corporate sector given its economic significance to women. Analysis of corporate leadership of leading 500 global corporate organizations showed that only 5% or 25 corporate organizations have women chief executive officers [6]. Engineering organizations in the areas of telecommunication, construction, automotive among others are some of the organizations with multi-national presence. While the survey did not reveal the sector of the 500 leading global organizations cited above, it is possible that some of these organizations are engineering based. This status therefore suggests that very few (if any) engineering organizations, which may have been part of that survey has a woman chief executive officer. Despite these worldwide trends, women's situations differ significantly from nation to nation thus the study found out whether the absence or presence of women leadership in engineering organization impedes their participation.

Joakes [7] acknowledged that a very small proportion of women hold influential positions in the corporate sector However, it is equally clear that women are still even marginalized in the middle positions in the corporate sector. Yet another survey of medium size corporate organizations in the United States reported that women held only 22% of the middle level positions [8]. Although there is no comprehensive data on the level of women's participation in the corporate sector in Kenya, Nzomo [9] observed that most of the women in Kenya were concentrated in low-paying, low social status jobs in the public service in terms of income and decision making powers. The author further noted that the concentration of women decreases with the increase of the level of the job group. From the foregoing, it is clear that women's labour participation in general has remained substantially concentrated in the lower cadre, thus necessitating the need for an examination of the impediments to women's participation in engineering fields.

The fact that most women's participation in labour is largely at peripheral level implies that, men are still the dominant participants at policy levels. This further confirms the fears that were expressed by several scholars including Cha [10] and Frome and others [11] who charged that organisations are still structurally constrained and function in ways that do not support women's career growth. Although the assertion by Cha [12] and Frome and others [13] were not directly linked to engineering based organizations, the ideas are still relevant to the proposed study. As it has been pointed earlier, engineering fields has on overage about 20% women's participation worldwide [14]. While it is plausible that organizations may have been structured in ways that limit women's upward mobility in the organizations, the scholars have not highlighted the specific organizational practices that tend to impede women's upward mobility in traditionally male dominated professions such as engineering. The study provided some insight into organizational based structures or practices that impede women's occupational progress in the engineering organizations based in Nakuru County.

According to England [15] there are powerful economic incentives for women to move into historically male-dominated occupations, yet women who work in male-dominated occupations are confronted with numerous impediments to their stay and career progression in these work places. The study observed that male dominated work places are some of the most rewarding careers. As pointed out earlier, a survey on graduate pay revealed that law, medicine and engineering are some of the most paying professions in the world, yet majority of these professionals are male. The fact that women account for only 20% of engineers in the world Manpower Group [16] is an illustrative of the impediments women face in their attempt to participate in engineering and other male dominated fields.

Inadequate resources have been cited as one of the greatest impediments to women's participation in male dominated engineering fields. For example, an examination of women's experiences in the construction industry reported a lack of available funding that target improving the status and qualifications of female construction entrepreneurs to win big construction businesses [17]. Lack of collateral for credit has even limited women's ability to access credit. For a long time, land has been one of the most used collateral in Kenya. However, land among many African societies in owned by men. Although several African countries have developed policies and laws to improve women's access to land, such policies have been impeded by traditional customs [18].

Although the government has over the years introduced funds such as Women Enterprise Fund, Youth Enterprise Fund and recently Uwezo Fund, the funds disbursed as loans by these financial kitties is so inadequate to efficiently power businesses such as those in the engineering sector. Engineering fields are capital-

intensive sectors that require heavy investment that cannot be adequately financed by funds such as the ones highlighted here. The proposed study had established elsewhere that women accounts for only 2.8% of the consulting engineers in Kenya. [19]. While there is no doubt that this number is indeed very low, it is not clear whether inadequate resources has contributed to the low participation of women engineers in Kenya. There is therefore need to examine whether inadequate resources have played any role in impeding participation of women in the engineering fields.

Elite capture or control of economic activities has been cited yet another impediment to women's participation in various sectors of development. Dahl-Ostergaad and others [20] cites the tendency of elites to control local development as one of the major problems frequently encountered in society. The authors observe that leaders never easily concede decision-making roles to other people especially in different development project situations. Some leaders feel that they could perform effectively in all situations and institutions thereby arrogating the roles of initiators, legitimizers, planners and executors to themselves alone for all projects. While the above observations are broad based, the study specifically addressed variables that impede women participation in engineering fields.

Indeed, the study concedes that local elites such as members of parliament, members of County Assembly, senior civil servants and professionals are very critical in local development initiatives. However, the overbearing role of the governor of the county on county resources, and Member of Parliament on Constituency Development Fund where they appoint managers of these resources and serve as patrons in most of the resource allocation boards may pose a great impediment to women's participation in local development. Many elites use such overbearing role to manipulate rather than facilitate the role of certain entities in local development. There are huge engineering and technology opportunities in the county ranging from road construction, building construction, setting up of industrial plants among others that if well managed can offer a lot of opportunities to women engineers.

From the literature, it is clear that the impediments women face in attempting to participate successfully and persevere in historically male-dominated fields such as engineering emanate from outright gender discrimination, traditional gender hierarchies and norms that prevail in the society and places of work. The traditional stereotyped role expectations appear to spill over to organisational policies and practices, which impedes women's participation in labour generally but more so in traditionally male dominated fields of engineering.

It is, however, clear from much of the literature that impediments women face has not been contextualized to particular professional fields. Much of the attention has been on unskilled and semi-skilled labour within the manufacturing industry, with no specific and comprehensive coverage of skilled and well-paying fields such as in engineering. Although attempts have been made to document women's experiences in the male dominated fields, the documentations have been largely generalized yet the experiences of women in the male dominated work places may not be the same. For instance, medicine, law and engineering have generally been categorized as male dominated fields. However, these fields though male dominated appear to have unique impediments of his own. Therefore, the assumption that women's experiences in these fields are the same may not provide a holistic picture about women's experiences. The study filled this knowledge gap on the unique impediments women encounter in the field of engineering.

RESULTS

Frequencies on Economic Impediments on Women's Participation in engineering workplaces

Table-1: Frequency on Promotion

PROMOTION/ECON(EC)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NEUTRAL	3	10.0	10.0	10.0
	DISAGREE	13	43.3	43.3	53.3
	STRONGLY DISAGREE	14	46.7	46.7	100.0
	Total	30	100.0	100.0	

From the findings, a larger segment of the respondents did strongly disagree (46.7%) and closely followed by those who disagree (43.3%) and (10%) women were neutral in their view that women engineers were given opportunities to promotion compared to their male counterparts.

This confirms the view of Babcock and Laschever [21] women are not expected to be

aggressive or to ask for things; this means that women often lose out in situations where men would negotiate higher salary, start-up packages, bonuses, or resources. Treatment on promotion of female engineers has been a thorny issue. While this fosters wage disparities among men and women, it also establishes groundwork for limited access to career pathway.

Table-2: Responses to items making the Economic aspects of Impediments in engineering workplaces

Item	Frequency	Percentage	Cumulative Percentage
Treatment of women engineers performances and career	30	29.6	29.6
Trustworthiness of female engineers in demanding projects	30	30.9	60.5
Challenges faced by women engineers in starting projects	30	39.5	100
Total	**30**	**100**	

The positive responses to the survey item show that among the items highly considered are challenges faced by women engineers in starting projects (74.7%), trustworthiness of female engineers in demanding projects (58.5%) and treatment of women engineer's performance and career in the work place (56.1%).

From the focused group discussions, some participants summarized the whole situation as stated below**:**

> *"Women find it hard to break through the barriers. One must really work hard to be felt and to be considered. There seem to be unseen challenges that a woman must navigate through in order to be promoted. Women seem to be restricted to certain positions and made to stick there". "Women are always placed in operational levels. Hardly will you find them at managerial level. Likewise, hardly will you find women engineers heading a department, they are always the deputy. Women tend to be placed in positions largely associated with women's roles. Such positions also make them earn less than men". "From the interview schedule, it is comes out clearly that female engineers tend to shy away off from working harder because no promotion is forthcoming, women struggles to catch up with men but with little success, they feel their work is devalued, no equal chances come on their way and hence they get discouraged".*

One the aspect of trust one woman said:

> *"Women are not trusted at all simply because a woman is considered to be too honest and cannot keep secrets, her virtues are a stumbling block towards progress, they say." "We live in a man society where men will always haggle their way out to manage a project because of what he will get out of it".*

Economic Factors Impeding Women Participation in engineering workplaces

From Table 4.2, the results reveal that there is a weak positive relationship between economic factors and women participation in engineering at work place ($r = 0.264$, $p < 0.05$). From the research question, it can be deduced that it is an impediment on women participation in engineering work place. This is evident where women account for about 70% of incidences of poverty around the world UNDP [22]. The weak positive relationship indicates the existence of invisible social economic structures that limit women aspirations. This can include from a family level how ownership, access and control of resources are determined.

Poverty level among women globally is about 70% compared to their male counterparts, which stand at 40% [23]. Coincidentally, Africa and Latin America have the least cases of women's participation in labour, thus confirming that high incidences of poverty among women has more to do with low labour participation.

Table-3: Regression Model on Impediments influencing Women Participation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.575[a]	.330	.326	.46139	.330	82.369	1	167	.000	1.233

The results in table 3 shows that there is a relationship between impediments influencing women participation t (R=0.575). Coefficient of determination (R^2) is 0.330. This shows that 33.0% variation on factors impeding on women participation in engineering field. This is also shown in table below.

Table-4: Regression Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17.535	1	17.535	82.369	.000[b]
	Residual	35.551	167	.213		
	Total	53.086	168			

a. Dependent Variable: Women Participation
b. b. Predictors: (Constant), Impediments

Table-5: Multiple regression models

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	4.452	.732		4.248	.000		
	Cultural Aspects	.266	.058	.369	1.921	.000	.990	1.000
	Social Aspects	.125	.068	.322	4.708	.000	.990	1.000
	Economic Aspect	.112	.058	.207	1.821	.000	.990	1.000

a. Dependent Variable: Women participation

As shown in table 5, elements of impediments namely; cultural aspects (β=0.266, p=0.000), Social aspects (β=0.125, p=0.000) and economic aspects (β=0.112, p=0.000) were found to significantly influence women participation in engineering field. This means that the three factors variables do contribute significantly to the women participation in engineering field. The results show that cultural aspect (β=0.266) has greater effect followed by social aspect (β=0.125) and lastly economic aspect (β=0.112) on women participation in engineering workplaces.

CONCLUSIONS

The study was to determine the economic factors impeding women's participation in engineering workplaces in selected organization in Nakuru County. From the analysis, the results reveal that there is a relatively weak positive relationship between economic factors and women participation in engineering at work place ($r = 0.264$, $p < 0.05$). It is noted that the concentration of women decreases with the increase of the level of the job group. Although there are powerful economic incentives for women to move into historically male-dominated occupations, majority of women engineers sampled in the study did not seek any financial assistance. Women who work in male-dominated occupations are still confronted with numerous impediments in their stay and career progression in these work places. Engineering courses require enormous funds during training and requires heavy investment that cannot be adequately financed by funds such as the ones highlighted in the study.

On economic factors impeding women's participation, the study concludes that while there is no doubt that the number of women engineers are indeed very low, it is not clear whether inadequate resources has contributed to the low participation of women engineers in Kenya (β=0.112, p=0.000). Although there are powerful economic and political incentives for women to move into historically male-dominated occupations, few who attempt to work in male-dominated occupations are confronted with numerous impediments to their stay and career progression. This is true, as previous studies have indicated that apart from the opportunities provided such as the gender mainstreaming policy, third gender rule in employment and affirmative action policy, the number of women in engineering still fall short in these work places. There are huge engineering and technology opportunities in the county ranging from road constructions, building constructions, setting up of industrial plants among others that if women are visibly and professionally engaged, then it will offer a platform for marketing women ability in male dominated fields.

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