Target Event: Women's Summit

Theme: Diversity Agenda: Why and how to bring women on board

A SURVEY ON WOMEN REPRESENTATION IN THE BUILT ENVIRONMENT

Adeline Cheptoo Nyole[1],

[1]Women in Real Estate (Advocacy Committee), P.O Box 9378-00200 Nairobi, Kenya,

Abstract

According to the *UN Women* website, all the sustainable development goals depend on the achievement of the fifth SDG, "Achieve gender equality and empower all women and girls". With only nine years left to the achievement of the UN SDGs and Kenya's Vision 2030 goals, women are still largely underrepresented in the construction industry in Kenya.

The 2021 survey undertaken by the Women in Real Estate revealed that, out of the 1,974 Registered Engineers registered to the Engineering Board of Kenya only 155 are women translating into 7%. There are 132 local consulting firms in the country and only 2 are women owned, representing only 1.5%. The survey also revealed that the trend is the same for other professionals across the Built Environment the Architects, Quantity Surveyors, Planners and Construction Managers.

The aim of this survey was to bring to light the demographic of women professionals within the construction industry in Kenya. While acquiring information on the level of participation of women in the construction industry, and bring to light the opportunities present for them in the industry.
The survey seeks to establish issues and constraints affecting women participation in the construction industry and their views on how to increase women participation in the industry.

Keywords: Women in Engineering, Built Environment, Gender Equality, Sustainable Development Goals.

1 Introduction

The United Nations adopted Agenda 2030 for Sustainable development and detailed 17 goals and 169 targets that are to be achieved. Goal number 9 champions building resilient infrastructure, promote sustainable industrialization and foster innovation. Innovation and technological progress are key to finding lasting solutions to both economic and environmental challenges especially in Sub-Sahara Africa. However, this cannot be done when the world is not utilizing half its work force who are women. Development can only be termed as sustainable when it is all inclusive and women play major role in unlocking Africa's technological revolution.

This paper aims to show how women are severely underrepresented in the construction field. Studies have shown a steady rise in the enrollment of women in the Science, Technology, Engineering and Mathematics (STEM). This has been reflected in many fields like Health Sciences, Environment Management, Agriculture, Biological Sciences and Information Communication Technology (ICT) but the same cannot be said for engineering fields like construction, transportation and energy which are all key in actualizing the development goals.

According to United Nations Education, Scientific and Cultural Organization (UNESCO) and STEM and Gender Advancement (SAGA), there is not enough data and statistics on women in the STEM field in Africa. In order to make informed decisions policy makers require reliable data bring about relevant changes. This paper is an attempt at capturing the demographic of women who graduate from the school of engineering and built environment and the transition into the professional status.

2 Methodology

The paper was prepared through the desk review of national data, focus group discussion, peer-reviewed literature, results of standardised cross-national surveys and other sources. It also draws on published articles, newspapers and written papers on the topic.

Following a similar approach to the WIRE 2020 Survey, sampling was employed in the data acquisition process. A questionnaire was presented to the organizations. The organizations were in divided in the following manner:

i) Academic institutions namely; Jomo Kenyatta University of Agriculture and Technology, Kenyatta University and University of Nairobi.
ii) Regulatory bodies for the professionals involved. They are; The National Construction Authority, Board of Registration of Architects and Quantity Surveyors and Engineers Board of Kenya)
iii) Professional Associations that represent the professions being surveyed that include; Town and County Planners Association of Kenya, Architectural Association of Kenya and Institute of Quantity Surveyors of Kenya and Institute of Engineers of Kenya.

3 Results

Results

Survey Data of Women Graduating from Built Environment Courses

The first step of the survey started in the university level. Graduates in the field over the past 20 years were sampled. This was in order to show the trend of women graduating in the engineering and built environment degrees. University of Nairobi being the oldest institution and the pioneer in offering the courses being surveyed was used as a sample institution. Three years were sampled. Graduating classes of 1999, 2009 and 2019.

Table 1: University of Nairobi Graduating Class of 1999 Construction related degree courses

UNIVERSITY OF NAIROBI GRADUATING CLASS OF 1999						
	DEGREE	**FEMALE**	**% FEMALE**	**MALE**	**%MALE**	**TOTAL**
1	Agricultural Engineering	4	13.33%	26	86.67%	30
2	Civil Engineering	5	9.26%	48	88.89%	54
3	Electrical And Electronic Engineering	4	8.33%	44	91.67%	48
4	Mechanical Engineering	0	0.00%	28	100.00%	28
5	Architecture	3	12.00%	22	88.00%	25
6	Land Economics	12	42.86%	16	57.14%	28
7	Building Economics	6	24.00%	19	76.00%	25

Table 2. University of Nairobi Graduating class of 2009 Construction related degree courses

	UNIVERSITY OF NAIROBI GRADUATING CLASS OF 2009					
	DEGREE	**FEMALE**	**% FEMALE**	**MALE**	**%MALE**	**TOTAL**
1	Environmental And Bio-systems Engineering	2	3.77%	51	96.23%	53
2	Civil Engineering	6	10.71%	50	89.29%	56
3	Electrical and Electronic Engineering	7	8.64%	74	91.36%	81
4	Mechanical Engineering	5	9.80%	46	90.20%	51
5	Geospatial Engineering	2	8.70%	21	91.30%	23
6	Architecture	7	18.92%	30	81.08%	37
7	Architectural Studies	5	18.52%	22	81.48%	27
8	Land Economics	4	12.50%	28	87.50%	32
9	Building Economics	2	6.90%	27	93.10%	29
10	Planning	4	12.50%	28	87.50%	32

Table 3. University of Nairobi Graduating class of 2019 Construction related degree courses

	UNIVERSITY OF NAIROBI GRADUATING CLASS OF 2019					
	DEGREE	**FEMALE**	**% FEMALE**	**MALE**	**%MALE**	**TOTAL**
1	Environmental and Bio-systems Engineering	5	13.89%	26	72.22%	**36**
2	Civil Engineering	26	26.26%	63	63.64%	**99**
3	Electrical and Electronic Engineering	22	27.85%	57	72.15%	**79**
4	Mechanical Engineering	5	9.26%	40	74.07%	**54**
5	Geospatial Engineering	5	18.52%	22	81.48%	**27**
6	Architecture	14	31.82%	30	68.18%	**44**
7	Architectural Studies	31	35.23%	57	64.77%	**88**
8	Quantity Surveying	23	23.00%	77	77.00%	**100**
9	Construction Management	11	23.40%	36	76.60%	**47**
10	Real Estate	38	44.71%	43	50.59%	**85**
11	Planning	27	32.93%	55	67.07%	**82**

Table 4. The trend of female graduates over the 20 years.

	DEGREE	1999	2009	2019
1	Environmental and Bio-systems Engineering	13.33%	3.77%	13.89%
2	Civil Engineering	9.26%	10.71%	26.26%
3	Electrical and Electronic Engineering	8.33%	8.64%	27.85%
4	Mechanical Engineering	0.00%	9.80%	9.26%
5	Geospatial Engineering	N/A	8.70%	18.52%
6	Architecture	12.00%	18.92%	31.82%
7	Architectural Studies	N/A	18.52%	35.23%
8	Quantity Surveying	24.00%	12.50%	23.00%
9	Construction Management	N/A	6.90%	23.40%
10	Real Estate	N/A	N/A	44.71%
11	Planning	N/A	12.50%	32.93%

Survey Data of Women working in the profession

The second phase of the survey was looking for the demographic of women who are in the profession practicing. The data that was available was from the Engineer's Board of Kenya the body that governs the Engineering profession in Kenya and Board of Registration of Architects and Quantity Surveyors that regulates the two professions.

Table 5. Percentage of Female Graduate, Professional, Consulting Engineers and Female owned Consulting firms.

CATEGORY	FEMALE	% FEMALE	MALE	% MALE	TOTAL
Graduate Engineers	2,124	11.98%	15,607	88.02%	**17,731**
Professional Engineers	155	7.28%	1,974	92.72%	**2,129**
Consulting Engineers	12	2.64%	443	97.36%	**455**
Engineering Consulting Firms	2	1.49%	132	98.51%	**134**
TOTAL	**2,293**	**11.21%**	**18,156**	**88.79%**	**20,449**

Table 6. Percentage of Professional Architects and Female owned Consulting firms.

CATEGORY	FEMALE	% FEMALE	MALE	% MALE	TOTAL
Professional Architects	105	7.59%	1279	92.41%	1384
Architectural Consulting Firms	14	3.34%	405	96.66%	419

Table 7 Percentage of Professional Architects and Female owned Consulting firms.

CATEGORY	FEMALE	% FEMALE	MALE	% MALE	TOTAL
Professional Quantity Surveyors	84	10.21%	739	89.79%	823
Quantity Surveying Consulting Firms	6	2.33%	251	97.67%	257

4 Discussion

The survey has clearly brought out the underrepresentation of women in the field. There is a significant improvement over the twenty years that have been surveyed especially in the Architecture but the same has not translated in engineering with an average of 12% increment from 1999 to 2009 even as the enrollment of the total number of students has increased by an average of 90%. The same trend can be seen at the professional level where women make up less than 10% of the professionals practicing. There are several factors that can be attributed to the very low numbers. These issues need to addressed and measures put in place.

The STEM field has a societal connotation of being a man's field therefore girls are not encouraged to pursue the sciences. It is too late to encourage girls to enroll in the field at the university level. The training should start from primary school. However, the belief and values that there are careers are traditionally meant for girls and others for boys is a deterrent. The stereotype and societal expectation of women has led to the low uptake of women in the built environment degree courses.

Even within the built environment industry there are some of the courses that are perceived as 'hard' or technically demanding and like Engineering, while some of them are soft like the Real Estate and Architecture. The survey shades light on this because of the increased percentage of women graduating from those fields. This is a fallacy as they are all equally demanding and if one has the capability to do one they can all be encouraged the other.

The survey has also shown that the transition of women who graduate to those who practice is also low. According to The African Academy of Science (The African STEM Report 2020), work inclusivity is the main factor women leave the field. Many women feel like they are intruding into a space that was built for a man. There is little to no effort made in most working environments to accommodate women. The construction site is already a harsh and stakeholders are not willing to invest because there are very few women and therefore, the cycle is perpetuated. Work inclusivity is also important as women especially in Sub-Sahara Africa are also expected to be the primary domestic partner and caregiver and require more flexibility when it comes to work.

Women in the industry face the very real threat of sexual harassment. According to a survey done by Women in Built Environment Kenya (WIRE) 64.7% of the respondents reported to have faced a form of sexual harassment in an academic institution, a construction site or at their place of work. This may make a person feel offended, humiliated and/or intimidated. Sexual Harassment can be; Physical: Any unwelcome physical contact including patting, pinching, stroking, kissing, hugging, fondling, or inappropriate touching.

Verbal: Unwanted sexual comments, repeated and unwelcome sexual advances, flirting use of job-related threats or rewards to solicit sexual favors. Non-Verbal: Unwelcome gestures of a sexual nature. Unwelcome display and/or sharing of sexually explicit pictures and objects. This demotivates them from fully participating in their work.

5 Conclusions

According to the United Nations, Africa will require an additional 2.5 Million Engineers to achieve Sustainable Development Goal (SDG) 6, Clean water and sanitation. There are so many opportunities present in the engineering field that can be taken up by women. In order to achieve this, we must first bridge the gender gap in the industry.

Girls should be set on the path to the science career very early on, right from the lower primary school. Before preconceived biases against the sciences are developed. The curriculum should be hands on learning and real life problem solving skills can be practiced early on. This will be able to give the students a true picture of what their future careers will look like. It will also help them think of relevant innovations that can easily be applied to problems facing the world. Other ways in which they can be encouraged is through; after school STEM clubs and activities, Career guidance and counselling with mentors, interactive contests and competitions and heavy investments in scholarships and research grants for girls and women pursuing STEM related fields.

Work inclusivity and gender mainstreaming needs to be part of our work environment. Women should get the support they need in order to function optimally in their work place. This may be as little as making sure there are clean accessible washrooms to flexible working hours especially after maternity leave. There should protection for women in their work places against sexual harassment.

There is need for data to be collected and made readily available. What gets measured gets done. Progress needs to be measured and quantified for it to be quantified. There are many professional organizations all of whom represent women in the built environment. They should work together to provide data and statistics on women in the built environment. Availability of data provides a reliable and complete picture of the situation. It will also help the governments, policy-makers and other stakeholders the tools to help them address the gender gap.

Finally, policies need to be put in place and adopted to ensure the increased participation of women. The policies should touch on the following areas; ensuring school curriculums are all inclusive, gender equity in support of affirmative action for increase in women and girls in STEM, security and protection of women against sexual harassment and proper training of graduates to ensure smooth transition into the professional field.

The impact of increase of women launching into the construction industry needs to be felt through the entire supply chain, that is, from managerial positions to the site level. This is the only way we can truly achieve gender equality in an industry largely seen as male dominated.

Acknowledgement

We would like to acknowledge the Women in real Estate (WIRE) institution for the taking on this important survey and Institutions that so kindly provided us with all the data.

References

1. UNESCO, The SAGA Survey of Drivers and Barriers to Careers in Science and Engineering, SAGA Working Paper 4, Paris, 2018.
2. The AAS (2020). Mukhwana A.M., Abuya T., Matanda D., Omumbo J., Mabuka J. Factors which Contribute to or Inhibit Women in Science, Technology, Engineering, and Mathematics in Africa. Nairobi).
3. AFRICAN UNION, Agenda 2063, The Africa we want, Addis Ababa 2015.
4. Global Partnership, Alice Mukashyake 12/08/2020 https://www.globalpartnership.org/blog/women-stem-key-unlock-africas-socioeconomic-potential last accessed 29/09/2021
5. Engineering Board of Kenya, Members Page, https://ebk.go.ke/ Last accessed 29/09/2021
6. Board of Registration of Architects and Quantity Surveyors https://boraqs.or.ke/ Members page Last accessed 29/09/2021
7. University of Nairobi, Graduation booklets 2019,2009,1999 https://www.uonbi.ac.ke/ Last accessed 29/09/2021
8. United Nations Website, Sustainable Development Goals https://www.un.org/sustainabledevelopment/ last accessed 30/09/2021