PERFORMANCE ASSESSMENT OF AFRICAN COUNTRIES IN RELATION TO WOMEN'S DEVELOPMENT

Hayriye ATİK[*]

Masreka KHAN[**]

ABSTRACT

In This article, relative women development in Africa has been explored. Article has two aims. The first aim is to determine the factors which effect gender equality in Africa. The second aim of this article is to show relative development of the African countries in terms of women's development indicators by ranking them. Through this aim, we also test whether Sub-Saharan Africa has lower development level than North African countries as raised by International institutions.

By using 16 variables for 54 African countries, principal components analysis was applied. The results have indicated that Sub-Saharan Africa has not in a lower development level.

Keywords: Economic Development, Women Development, Principal Components Analysis.

AFRİKA ÜLKELERİNİN KADIN KALKINMASI KONUSUNDAKİ PERFORMANSLARININ DEĞERLENDİRİLMESİ

ÖZ

Bu makalede, Afrika'daki kadınların göreli kalkınması araştırılmıştır. Makalenin iki amacı bulunmaktadır. Bunlardan birincisi, Afrika'da cinsiyet eşitliğini etkileyen faktörlerin belirlenmesidir. İkinci amaç, kadın kalkınması ile ilgili değişkenler yardımıyla, Afrika ülkelerini sıralayarak onların göreli kalkınma düzeylerini ortaya koymaktır. Bu amaç doğrultusunda uluslararası kuruluşlar tarafından ortaya atılan ve Sahra- altı Afrikası'nın daha az gelişmiş olduğu şeklindeki düşünce de test edilmiştir.

54 Afrika ülkesi için 16 değişken kullanılarak temel bileşenler analizi uygulanmıştır. Sonuçlar, Sahra-altı Afrikası'nın daha düşük bir gelişme düzeyi sergilemediğini ortaya koymuştur.

Anahtar Kavramlar: Ekonomik Kalkınma, Kadın Kalkınması, Temel Bileşenler Analizi.

[*] Prof. Dr., Erciyes Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü.
[**] Öğr. Gör., Erciyes Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü.
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INTRODUCTION

In the wake of Sustainable Development Goals (SDGs), once again gender equality and rights of women and girls are in policy makers development agenda. Many of the new goals targeted to achieve by 2030 in fact overlap with key features of Common African Position (CAP). To comprehend women's situation in relation to development and empowerment, policy makers and development practitioners require a better understanding of women's situation. Present article offers that fresh perspective, by determining the factors effecting women development in African countries and by ranking the countries through gender specific development indicators.

This article has two aims. The first aim is to determine the factors which effect gender equality in Africa. So, the policy makers can support the development of these factors in African countries. The second aim of this article is to show relative development of the African countries in terms of women's development indicators by ranking them. Through this aim, we also test whether Sub-Saharan Africa has lower development level than North African countries as raised by International Monetary Bank, World Bank and other institutions.

By using 16 variables for 54 African countries, multivariate technique of principal components analysis was applied. As a result of the analysis, the factors which have role on women's development have been determined. However, the results related with country rankings did not supported the idea that women in Sub-Saharan Africa are in lower development levels.

This article is divided into five sections. The first section explains the indicators used to measure the development in the literature. The second section elaborates the indicators used in empirical analysis. Section three discusses the methodologies used in this article and gives the countries included in empirical work. Section four presents empirical results. The last section concludes the paper.

I. LITERATURE ON THE MEASUREMENT OF DEVELOPMENT

Different variables have been used to measure development by the authors. The purpose of this section is to review these studies so that we can explain the rationale of using variables in this paper.

Adelman and Morris (1967) used 37 indicators which can be classified into three categories: economic, political and socio-cultural. Ahluwalia (1976) used a small set of variables. These variables were:

Tax revenues/GDP, primary school enrolment, secondary school enrolment, total population and growth rate of population.

Hicks and Streeten (1979) used two groups of indicators: Social and economic. These indicators can be observed from Table 1.

Table 1: Economic and Social Indicators of Development

Economic Indicators	**Social Indicators**
Newsprint consumption	Expectation of life at birth
Automobiles	Calorie consumption (as % of required)
Radio receivers	Infant mortality
Electricity consumption	Primary enrolment
Energy consumption	Literacy rate
	Average persons per room
	Housing units without piped water (%)

In addition to these variables, some institutions developed some indices to measure development. In 1960, the U.N. Research Institute for Social Development created an indicator called "Level of Living Index" (Hicks, Streeten, 1979). The U.N. Research Institute for Social development also created a Development Index based on 18 indicators. The Overseas Development Council constructed a measure called the Physical Quality of Life Index for 150 countries. The United Nations Development Program publishes a "Human Development Index" since 1990s to champion people oriented policies. Felipe and Resende (1994) used 39 variables classified into four categories (economic, demographic, educational and health) to measure development for Asia and Latin America.

Similar to Felipe and Resende (1994), Some studies used multivariate statistical techniques (such as principal components and cluster analysis) to measure the relative development of the countries and regions by using different group of variables (Gidengil, 1978; Jacquemin, Sapir1995; Artis, Zang 2002; Seyfullahoğulları 2003; Atik 2015).

II. INDICATORS USED IN EMPRICAL ANALYSIS

The literature review conducted has been useful in determining the choice of the development indicators that will be utilized in the empirical analysis. Following The Global Gender Gap Report by The World Economic Forum, the indicators are conveniently grouped under eight dimensions: i) economic participation and opportunity indicators, ii) employment and leadership indicators, iii) educational attainment indicators, iv) health and survival indicators, v) rights and norms related indicators, vi) childbearing indicators, vii) childcare indicator, viii) political empowerment indicator (See Table 2).

Table 2: Women Development Indicators Used in Empirical Analysis

Economic participation and opportunity indicators	
1Female labor force participation	(%)
2.Wage equality for similar work	(Female to male ratio)
3.Employment share of women in non-agricultural sector	(% of total non-agricultural employment)
4.Unemployment rate of women labor force	(as % of female)
Leadership indicators	
5. Ability of women to rise to positions of enterprise leadership	Data on a 1 to 7 scale (1=worst score, 7=best score)
Educational attainment indicators	
6.Female adult illiteracy rate	(%)
7.Enrolment in secondary education	(Female to male ratio)
Health and survival indicators	
8. Population Percentage of women	(%)
9. Number of women(15+) living with HIV	('000)
Rights and norms related indicators	
10. Women's access to credit	Data on a 0-to 1 scale (1=worst score, 0= best score)
11.Women's Access to land ownership	Data on a 0-to 1 scale (1=worst score, 0= best score)
Childbearing indicators	
12.Maternal mortality ratio	per 100,000 live births
13. Contraceptive prevalence rate of women ages (15-49)	(%)
14. Total fertility rate	Children per women
Childcare indicator	
15. Maternity leave	Number of weeks
Political empowerment indicator	
16. Women in Parliament	(Female to male ratio)

The data for these indicators are generally for the year 2014. If the date for 2014 is not available, then the data for 2013 is used for some countries. Statistical data is collected from two publications. These are: *Global Gender Gap Report 2014* and 2015 and *OECD Dataset on Gender, Institutions and Development 2012*.

III. METHODOLOGY AND SAMPLE

The methodology employed to find out the countries relative performance in Africa involves the use of the multivariate technique of principal components analysis. This multivariate technique has been applied in a number of studies (Gidengil 1978; Jacquemin, Sapir 1995; Artis, Zang, 2002; Seyfullahoğulları, 2003; Ersungur vd., 2007; Atik, 2015) to find out the relative development of the countries and regions as we mentioned earlier. The difference between these studies is the variables used in empirical analysis. This paper differs from the earlier studies as the women development indicators, which were given in the previous section, are used for the first time in this work.

A. PRINCIPAL COMPONENTS ANALYSIS

Principal components analysis is used in order to reduce the number of variables down to a smaller number of new variables (principal components). Hence the purpose of principal components analysis is to take *n* variables X1, X2, X3…,Xn and find the combinations of these to produce uncorrelated indices like Z1, Z2,Z3…Zn. If there is not any correlation, it means that the calculated indices measure different dimensions in the data. The "Zi" values are called the principal components.

B. SAMPLE COUNTRIES

The methodology described in the previous section is used here to determine the relative development of countries in Africa in terms of women development and women empowerment indicators. 54 African countries were included in empirical analysis (See Table 3).

Table 3: The List of Countries Included in This Analysis

1.Algeria	12.Congo	23.Guinea	34.Morocco
2.Angola	13.Congo (Democratic Republic of the)	24.Guinea-Bissau	35.Mozambique
3.Benin	14.Côte d'Ivoire	25.Kenya	36.Namibia
4.Botswana	15.Djibouti	26.Lesotho	37.Niger
5.Burkina Faso	16.Egypt	27.Liberia	38.Nigeria
6.Burundi	17.Equatorial Guinea	28.Libya	39.Rwanda
7.Cameroon	18.Eritrea	29.Madagascar	40.Sao Tome and Principe
8.Cape Verde	19.Ethiopia	30.Malawi	41.Senegal
9.Central African Republic	20.Gabon	31.Mali	42.Seychelles
10.Chad	21.Gambia	32.Mauritania	43.Sierra Leone
11.Comoros	22.Ghana	33.Mauritius	44.Somalia
45.South Africa	46.South Sudan	47.Sudan	48.Swaziland
49.Tanzania (United Republic of)	50.Togo	51.Tunisia	52.Uganda
53.Zambia	54.Zimbabwe		

IV. EMPIRICAL RESULTS

In the first place of the analysis, we performed Kaiser-Meyer-Olkin (KMO) and Bartlett's tests. The reason of applying these tests is to decide whether our data is suitable for principal components analysis. KMO statistics should be greater than 0.60 and Bartlett's test should be significant (e.g. $p<0.05$). According to results in Table 4, we can apply principal components analysis as KMO statistics is 0,664 and Bartlett's test is ((0,000 < 0,05) significant.

Table 4: KMO and Bartlett's Tests

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,664
Bartlett's Test of Sphericity	Approx. Chi-Square	505,147
	Df	120
	Sig.	,000

In the second stage of the analysis, the principal components analysis has been performed to decide the number of the principal components that should be retained for further analysis. Examination of the values suggests that the first five principal components and the resultant principal component scores should be used in the assessment of the countries (See Table5). Because, principal components which eigenvalues are more than "1" is accepted for further analysis. The analysis suggest that the first five principal components scores for each country might act as an adequate summary of the original 16 scores in any further analysis of the data, these five components account for nearly %68,926 of the total variation of the original variables.

Table 5: Principal Components Results

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative
1	4,342	27,138	27,138
2	2,327	14,542	41,680
3	1,780	11,123	52,803
4	1,412	8,827	61,630
5	1,167	7,296	68,926

Table 6: Component Matrix

	Component				
	1	2	3	4	5
SMEAN(fertility)	-,843	,189			
SMEAN(contraceptive)	,809	,157		,126	,137
SMEAN(femadultilliterac)	-,805	,172	-,280	-,214	,101
SMEAN(unemploy)	,744		-,119		,249
SMEAN(secondary)	,674	-,325	,252	,179	
SMEAN(matermorta)	-,634	,241	-,107		
SMEAN(accesstocredit)	-,477	,209	,402	,300	,452
SMEAN(abilityoftorise)	,365	,870	-,168		
SMEAN(wageequality)	,360	,868	-,186		
SMEAN(womenhıv)	,136	-,550	,463		,143
SMEAN(enmpnonagri)	,291	-,167	,638	-,463	,157
SMEAN(femlabforce)	-,416	,181	,625	,118	-,241
SMEAN(numberofweeks)	-,104		,166	-,781	,356
SMEAN(accessland)	-,294	-,114	,221	,588	,211
SMEAN(setinparl)	,216	,231	,536		-,562
SMEAN(populaperc)		,286		,182	,513

The first component, explaining 27.1 % of the total variance, is highly correlated with fertility rate (-0,843), contraceptive prevalence rate of women ages (0,809), female adult illiteracy rate (-0.805), unemployment rate of women (0.744), enrolment rate of women in secondary education (0.674) and maternal mortality rate (-0.634) (See Table 6).These correlations also give idea about the factors which effect women's development in Africa. For example, women's development is highly and negatively correlated fertility rate in Africa. This finding is consistent with development theory which stresses that the fertility rate is high in developing countries.

The second principal component, explaining 14.5 % of total variance, is mainly determined by ability of the rise to positions of enterprise leadership (0,870), wage equality (0,868) and the number of women with HIV (-0,550).

The third principal component, explaining %11.1 of total variance, is mainly determined by employment rate of women in non-agricultural sector (0,638), female labor force (0,625) and female to male ratio in parliament (0,536).

The fourth principal component, explaining 8.8 % of total variance, is mainly determined by number of weeks which represents maternity leave (-0.781) and women's access to land (0,588).

The fifth component, explaining 7.2 % of total variance, is mainly determined by the number of women set in parliament and the population percentage of women.

Table 7: Principal Components' Table

Countries	PCA1	PCA2	PCA3	PCA4	PCA5
Algeria	-,83595	1,45487	-1,75341	-1,77024	,45890
Angola	,44623	-,05072	,89168	-,13116	-,35815
Benin	,87308	-1,15863	-,58249	1,65106	,35020
Botswana	-1,33014	,64038	-,12743	,58812	,32776
Burkina	1,33852	,67843	-,30719	-,10149	,68610
Burundi	,63970	,99065	1,33297	-,18151	-1,61573
Cameroon	-,09612	-1,27606	-,11141	,89345	,09738
Cape Ver	-,73363	,85823	-,17656	-,77229	-2,52298
Central	,61435	-,90878	-,13378	,33085	1,29268
Chad	2,21645	,99189	-,70981	-,23993	-,42094
Comoros	-,21792	-,84827	-1,44360	-,57587	,07659
Congo	,02135	-,91681	-,38986	,42410	,67779
Congo (D)	1,00854	-,85979	-,43667	1,00196	,65246
Côte d'Ivoire	,84099	,61086	-,72611	-,10417	,32763
Djibouti	-,34181	-,98784	-,92853	-,66690	,52861
Egypt	-1,32609	1,01794	-2,41807	-,31361	-,18869
Equatorial Guinea	-1,18934	-1,50211	,49236	,19123	,27542
Eritrea	-,05440	-1,17772	,59366	,08773	-,74893

Table 7: (Continued)

Ethiopia	,65676	,80283	,39654	,88841	,90440
Gabon	-1,55610	-1,38740	,05000	,67916	,64550
Gambia	,44190	-1,26780	-,24458	1,06022	-,18262
Ghana	-,07547	,08556	,12818	,95274	-,42500
Guinea	1,39007	,48201	-,51758	-,17054	,21616
Guinea-B	,78374	-,83567	-,17093	,03887	-1,64368
Kenya	-,29595	,90255	,47218	,60762	,58201
Lesotho	-1,13930	,52797	,68541	-1,09655	,94329
Liberia	1,29659	-,54918	-,37149	-1,62807	,42796
Libya	-2,38456	-,96476	-1,29079	,61090	-2,03840
Madagascar	-,24014	,27600	,28312	-,56198	,69175
Malawi	,51414	1,21057	,46332	,19888	-1,99669
Mali	1,22369	,55503	-,92047	-,80690	,90567
Mauritania	,35300	,75320	-1,18264	-,12813	,90295
Mauritius	-1,55550	,84595	-,39505	-1,27941	,57625
Morocco	-,52765	,79645	-1,65455	-,72122	,22879
Mozambique	1,14226	1,13771	1,42957	-,12035	-1,53819
Namibia	-1,26813	,41187	,37479	,48131	,37095
Niger	1,00835	-1,04775	-,96792	,12255	1,08727
Nigeria	,84016	1,29535	,07640	1,74090	,12408
Rwanda	-,36367	-,81954	2,62492	-,41095	-,13331
Sao Tome	-,65589	-1,03535	-,28858	-,54954	-,74444
Senegal	,87816	1,08073	,85565	-1,28855	,87871
Seychelles	-1,22683	-1,54612	1,86531	-1,15874	1,29850
Sierra L	1,11905	-1,11231	-,02451	,75500	-,57812
Somalia	,86299	-,81903	-,86739	,92894	,23906
South Africa	-1,78309	1,68150	1,72707	1,68740	2,53773
South Sudan	,63344	-1,74301	1,59497	-3,74128	-,50222
Sudan	-,15799	-1,13405	-,42415	,64148	-2,10269
Swaziland	-1,52471	,40536	-,19829	1,24171	-,65922
Tanzania	,32347	,89102	1,49420	,15158	,08558
Togo	,46697	-1,01817	,09355	,18820	1,27760
Tunisia	-1,21185	,86519	-,61671	-,89448	-1,10818
Uganda	,07671	,62574	1,70708	1,74347	-1,12084
Zambia	,40796	1,20987	-,32978	,45697	-,27988
Zimbabwe	-,32638	,88115	1,07740	-,93096	,23315

After the determination of the factors which effect women's development in Africa, we will show the country rankings according to the first principal components scores of the countries. Table 8 shows that Chad is the most developed African country in terms of women development indicators, while Libya is the least developed country. If we use general development indicators

and measure the relative development of the countries, the overall development of the countries would be different. The first important result from the rankings is that North African countries are in lower development level than the others.

Table 8: Country Rankings

1.Chad	19.Central	37.Dijibuti
2. Guinea	20.South Sudan	38.Ruanda
3.Burkina	21.Togo	39.Madagaskar
4.Liberia	22.Guinea	40. Sao Tome
5.Mali	23.Gambia	41. Cape Verde
6.Mozambiq	24.Zambia	42. Algeria
7.Sierra L	25.Mauritiania	43. Lesotho
8.Congo (D)	26.Tanzania	44.Equatorial Guinea
9.Niger	27.Uganda	45. Tunisia
10.Senegal	28.Congo	46. Seychelles
11.Burkina	29.Eritre	47. Namibia
12.Somalia	30.Ghana	48. Egypt
13.Cote devoire	31.Cameron	49. Botswana
14.Nigeria	32.Sudan	50. Swaziland
15.Guine-B	33. Comoros	51. Mauritius
16.Ethiopa	34.Madagaskar	52. Gabon
17.Mozambiq	35. Kenya	53. South Africa
18. South Su	36.Zimwavbe	54. Libya

CONCLUSION

This article has dealt with the measurement of development for women in Africa. It has sought to establish country rankings in Africa, by applying principal components analysis to a set of selected development and empowerment indicators, classified as economic participation and opportunity, leadership, educational attainment, health and survival, rights and norms related indicators, childbearing, childcare, and political empowerment. The first reason of applying this methodology was to determine the factors which effect women development in Africa. The second reason was to determine the relative development of the countries by ranking them.

The results of principal components analysis indicated that five principal components were to be used for further analysis.

The first component, explaining 27.1 % of the total variance, is highly correlated with fertility rate, contraceptive prevalence rate of women, female adult illiteracy rate, unemployment rate of women, enrolment rate of women in secondary education and maternal mortality rate. These correlations also give idea about the factors which contribute to gender based inequalities in Africa. For example, women's development is highly and negatively correlated fertility rate in Africa. This finding is consistent with development theory which stresses that the fertility rate is high in developing countries.

The second principal component, explaining 14.5 % of total variance, is mainly determined by ability of the rise to positions of enterprise leadership, wage equality and the number of women with HIV. This results mean that restrictions on the ability of rising high positions and the absence of wage equality badly effects women development.

The third principal component, explaining %11.1 of total variance, is mainly determined by employment rate of women in non-agricultural sector (0,638), female labor force (0,625) and female to male ratio in parliament (0,536). So, the increase in female labor force participation rate and in women employment in non-agricultural sectors will support women development in Africa.

According to the fourth principal component, explaining 8.8 % of total variance and to fifth principal component, explaining 7.2 % of total variance, the factors which effect positively women development in Africa are women access to land and women set in parliament.

After the determination of the factors which effect women development in Arica, we showed the country rankings according to the first principal components scores of the countries. According to these rankings, Chad is the most developed African country in terms of women development indicators, while Libya is the least developed country. The first important result from the rankings is that Sub-Saharan African countries are not in lower development level than the others as North African countries are generally have lower ranking scores.

To achieve lasting change in Africa, it is important to enact legislation and development policies. These policies should address discrimination against women, promote gender equality, support women and try to change cultural norms.

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