

Factorial Study of Youth Unemployment Problem Using Principal Component Analysis

O. Ongbali Samson, Mechanical Engineering Department, Covenant University, Nigeria.*

E-mail: samson.ongbali@covenantuniversity.edu.ng

A. Afolalu Sunday, Mechanical Engineering Department, Covenant University, Nigeria.

Y. Salawu Enesi, Mechanical Engineering Department, Covenant University, Nigeria.

Abstract-- Youth unemployment problem is a prevalent situation in developing economies especially in African and Asian countries. Amid myriad of variables constituting the problem, it is difficult to pinpoint the key variables causing the problem owing to lack of evidence and thus makes the situation complex for intervention by stakeholder. Consequently, this study seeks to establish mathematical prove of the primary variables causing youth unemployment problem to chart direction for intervention by stakeholders for sustainable economy. Over sixty variables causing youth unemployment problems were abstracted from literature and used to construct a structured questionnaires that were administered to respondents whose scores were collated into (n x m) data matrix that served as input variable to the Principal Component Analysis (PCA). Statisti XI software was employed to compute the data matrix and the variables with high factor loading where identified and extracted as the main cause for youth unemployment problems which include, Poor governance = 0.828, Rapid expansion of educational system = 0.827, Influencing available jobs by VIPs = -0.803, Concentration of social amenities in the urban centers = -0.784 and Infrastructural deficit to promote job creation = 0.780 among others. The pathway to intervention by stakeholder for sustainable society is charted by the finding of this paper to focus on addressing the primary variables while not neglecting the secondary factors.

Keywords-- Youth, Unemployment Problem, Factor Analysis, Direction and Intervention.

I. Introduction

Unemployment problem is a situation where people search for job and cannot get any within a period of time owing to myriad of variables. Youth unemployment problem is prominent in developing economies of the world especially in African and Asian countries. The problem is difficult and complex to solve because of lack of direction owing to copious variables that characterize the problem. The key variables constituting the problem cannot be pinpointed due to lack of evidence, thus authors based their argument for blaming a particular variable on educational guess and therefore does not provide reliable information for intervention to alleviate the problem. Consequently, this study seeks to establish mathematical prove of the primary and secondary variables causing youth unemployment problems to chart direction for intervention by stakeholders for sustainable economies. The youth are vital asset in nation building particularly in developing economies. However, if they are not meaningfully engaged, they become security, socioeconomic and political threat to the nation as we are witnessing today in some African countries. For instance, in Nigeria today, there are social and security crises attributable to youth unemployment problem such as kidnapping, militancy, Boko-Haram, Political hooliganism, agitation for secession among other vices. Hence, there is urgent need to determine and document with evidence the critical variables causing the problem for intervention by stakeholders.

Youth are persons between the age of 18 and 35 years [22]. International Labour Organisation defined unemployment as when people seek for job and they can't find any within a given period of time. According to [25], unemployment is a worldwide problem but it is acute in developing economies. Unemployment problem in Africa is growing geometrically while employment opportunity is growing arithmetically occasioned by many factors. Youth development and empowerment can curtail youth unemployment [12] asserted.

Multitude of variables constituting youth unemployment problem over the years have been identified and fragmentally documented in literature by researchers. For instance, [22] stated that gap between government policies and implementation cause unemployment problem; Rapid population growth [25, 28, 19, 22, 9, 35, 20, 27, 1, 26, 6, 13, 8]; Rural to urban migration [22, 25, 9, 29, 33, 5, 35, 34, 4, 27, 14, 1, 26, 6, 13, 8]; Lack of employable skills and

experience [22, 17, 14, 28, 15, 17, 32, 4, 27, 29, 33, 16]; Lack of entrepreneurial skill [22, 4, 20, 28, 13]; Supply of skilled youth is higher than demand [22, 15, 8]; Inappropriate public policies relating to employment [22, 20]; Lack of social infrastructures in the rural areas and concentration of social amenities in the urban centers [25]; Outdated school curricula [25, 9, 1, 26, 8, 19, 20]; Rapid expansion of the educational system [25, 9, 35, 34, 17, 27, 23, 14, 1, 26, 8]; Lack of vibrant manufacturing sector [25, 9, 27, 1, 26, 13, 8].

In addition, other variables causing youth unemployment problem identified in literature include, Poor business environment [15]; Corruption [25, 9, 35, 1, 28, 6, 13, 8, 19]; High wage demand by inexperienced youths [15, 17]; Excessive Labor market regulation and employment legislation [15, 29]; Poor levels of education among the youth [15, 17, 35]; Lack of recruitment channels and awareness [15, 13, 17]; Lack of job search skills [15], Lack of mobility [15]; Lack of career information and business potentials [15]; Lack of growth of labor demand [29]; Poor environment to encourages entrepreneurship [29, 33, 15, 14, 26, 2, 18]; Lack of vocational education and technical skills [33, 27, 14, 31]; Ethnic background [16, 17]; Lack of sustainable power supply [35, 28]; High and multiple taxes paid by companies [35], Poor human resources planning [34, 14]; Economic recession [34, 17, 10, 14, 26, 12, 2, 18, 11, 7, 33]; Sizeable proportion of expatriates in employment [34, 14]; The institution of NYSC in Nigeria [34, 14]; Collective bargaining process [34, 14].

Furthermore, other variables causing youth unemployment problems include, Graduates attitude to some types of jobs [34, 14], Behavior of employers and job seekers [34, 14]; Use of capital intensive technology [34,14]; Formal and informal sectors differentials [34, 14]; Bureaucracy in processing job applications [34]; Influencing available jobs by VIPs [34]; Gender discrimination by employer [17, 16]; High rate of geographical mobility [17, 14]; Marital status and early school leaving age [17]; Skill mismatch [17, 20]; Social status and family background, environmental factors, business cycle and inadequate credit facilities [17]; Neglects of the agricultural sector [17, 27, 14, 26, 2, 18]; Lack of foreign investment [17]; Poor governance [4, 22, 20, 14, 28]; Infrastructural deficit to promote job creation [20], Untimely economic policy measures [14, 28, 26, 2, 18, 19]; Unstable political environment [14, 17]; Long period of initial unemployment among graduate, Trade union wage increase demand, Non-involvement of youths in decision making process, Perception of youth about employment, and Labor market policies [14]; Wrong impression about Technical and Vocational Studies [26, 2, 18]; Cultural barriers and Failure of government policies to stimulate the private sector [13] and Emphasis on university certificate than entrepreneurial skills [19]

It appears from literature survey that there is lack of prove to substantiate blame for any of the 61 variables mentioned above as the key variable causing youth unemployment problem and thus makes it complex for the stakeholders to define where to start intervention program to solve the problem which is the gap this study seeks to bridge by establishing mathematical proves to pinpoint the principal variables causing youth unemployment problem and chart direction for intervention. Section one presents introduction, section two and three are methodology and results of the study respectively while section four and five present conclusion and recommendation.

II. Methodology

Sixty one variables causing youth unemployment problem were identified in literature and extracted. The variables were used to craft structured questionnaire using Rensis Likert's 5-point attitudinal scale whose dimensions include - strongly agree, agree, undecided, disagree, and strongly disagree. The respondents populations involved in the study were drawn randomly from the youth, adult and employer of labour. The sample size was determined at 95% confidence level and error margin of $\pm 8\%$ to arrive at a sample size of 150 respondents. The questionnaires were administered to the 150 respondents whose scores were collated and transformed into $(n \times m)$ data matrix that served as input variable to the Eigenvalues analysis embedded in PCA. Statistical software (StatistiXL) was employed to compute the (150×61) data matrix and variables with meritorious factor loading where extracted.

2.1 Brief Theoretical Background to Eigenvalues in PCA

In Principal Component Analysis (PCA), eigenvalues guide the extraction of factors and measures the variance of variable accounted for by a factor, whereupon it determines the number of factors to be selected in the analysis. In application of matrices to solving mathematical problems, equation (1) do occur as below,

$$Ax = \lambda x \quad (1)$$

$A = (a_{ij})$ is a given square $(n \times m)$ matrix, which in this context is the correlation matrix.

$x =$ unknown $(n \times 1)$ vector

$\lambda =$ unknown scalar.

Obviously, $x = 0$ is not a solution for any value of λ and it is of no interest because the factor contribute nothing to the explanation of variance of the variable. Our interest is the search for “non-trivial” solutions i.e, $x \neq 0$ for any value of λ called eigenvalue of matrix A. Whether trivial or non-trivial solutions exist depend on the values of λ . Equation (1), $Ax = \lambda x$ can be expressed as

$$Ax - \lambda x = 0 \tag{2}$$

We can only subtract a matrix from another matrix, hence, we introduce a unit matrix to equation (2) to yield,

$$(A - \lambda I)x = 0 \tag{3}$$

Where I is (n x m) identity matrix.

$$|A - \lambda I| = \begin{vmatrix} (a_{11} - \lambda) & a_{12} & \dots & a_{1n} \\ a_{21} & (a_{22} - \lambda) & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{1n} & a_{2n} & \dots & (a_{nn} - \lambda) \end{vmatrix} = 0 \tag{4}$$

$A - \lambda I$ is the characteristic determinant of A and $A - \lambda I = 0$ is the characteristic equation. Expanding the determinant gives a polynomial degree of n and the solution of the characteristic equation gives the eigenvalues of A. StatistiXL software is employed to solve equation (4) for characteristic roots and the determinant eigenvalues were used to select the factors that are relevant in the analysis. Thus the theory presented highlights the significance of eigenvalues in factor analysis as applicable in this study.

III. Results and Discussion

Twenty factors which loaded diverse variables with varying factor loadings were extracted from the Principal Component Analysis (PCA). However, variables with meritorious factor loading that explain high variance among the variables investigated were selected and classified as primary or secondary unemployment problem variable based on their respective factor loading. Noticeable evidence in the analysis was that, none of the variables investigated was loaded more than once among the factors extracted. The scree plot for the unemployment problem variables investigated generated by the analysis is presented in figure 1.

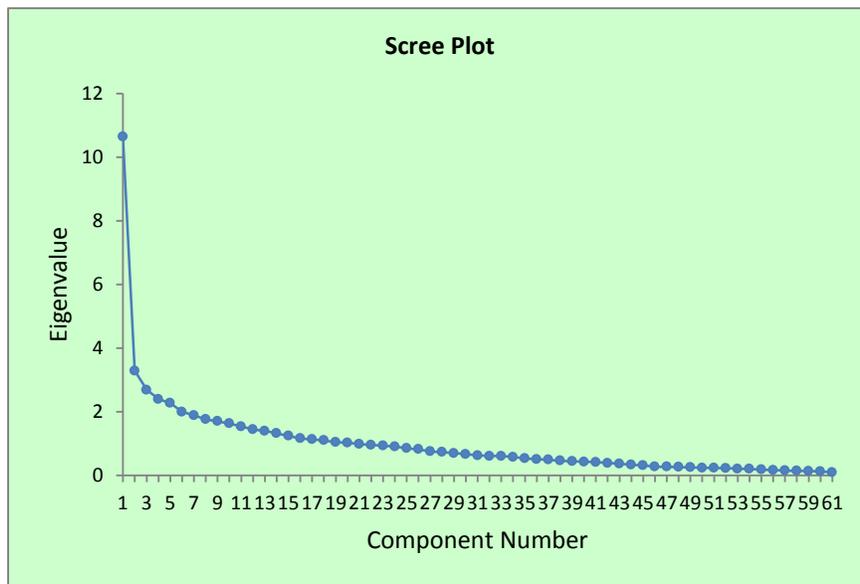


Figure 1: Scree Plot for Youth Unemployment Variables

The plot in figure 1 relates the eigenvalues to the factors where the elbow region indicates the number of useful factors generated by the analysis. From the analysis, variables with factor loading ranging from ± 0.7 to ± 1 were

classified as primary variables causing unemployment problem because they explain more variance among the variables analyzed. Similarly, variables with factor loadings ranging from ± 0.55 to ± 0.69 were classified as secondary variables causing unemployment problem because they explain less variance than does the primary variables. Table 1 depicts the primary variables causing unemployment problem and their corresponding factor loading.

Table 1: Primary Variables Causing Youth Unemployment Problem

S/N	Variables	Factor Loading
1	Poor governance	0.828
2	Rapid expansion of educational system	0.827

Table 2: Primary Variables Causing Youth Unemployment Problem (cont')

S/N	Variables	Factor Loading
3	Influencing available jobs by VIPs	-0.803
4	Concentration of social amenities in the urban centers	-0.784
5	Infrastructural deficit to promote job creation	0.780
6	Early school leaving age	-0.780
7	High wage demand by inexperienced youths	0.764
8	Business cycles (seasonal businesses)	0.764
9	Lack of vibrant manufacturing sector to absorb youth	-0.763
10	Gap between government policies and implementation	0.761
11	Lack of cordial relationship between employers and employees	-0.753
12	Low economic growth rate and recession	0.748
13	Supply of skilled graduates is higher than demand for them	0.727
14	Lack of vocational education and technical skills	-0.722
15	Lack of mobility to search for job	0.707

Negative factor loading suggest how negatively the variables contribute to unemployment problem. Among the primary variables, Poor governance, Rapid expansion of educational system, Influencing available jobs by VIPs, Concentration of social amenities in the urban centers and Infrastructural deficit to promote job creation characterize most of the variance in the variables investigated by wielding meritorious factor loadings of 0.828, 0.827, -0.803, -0.784 and 0.780 respectively. The later variables explain the degree to which they influence youth unemployment problem base on their respective factor loading.

Table 3: Secondary Variables Causing Youth Unemployment Problem

S/N	Variables	Factor Loading
1	Perception of youth about employment	-0.684
2	Trade union wage increase demand	-0.675
3	Ethnicity	-0.671
4	Rapid population growth	-0.671
5	Poor human resources planning	0.659
6	Corruption – doesn't allow vibrant economy for jobs creation	-0.652

Table 4: Secondary Variables Causing Youth Unemployment Problem (cont')

S/N	Variables	Factor Loading
7	Outdated school curricula lacking entrepreneurial content	-0.646
8	Sizeable proportion of expatriates in employment	0.644
9	Lack of job search skills	0.633
10	Non-involvement of youth in decision making process	-0.628
11	Lack of foreign direct investment	-0.623
12	Youths attitude to some jobs (high taste jobs without skill for it)	-0.619
13	Wrong impression about Technical and Vocational studies	-0.605
14	Emphasis on university certificate than entrepreneurial skill	-0.599
15	Inadequate credit facilities to help self-employment	0.597
16	Rural to urban migration	-0.584
17	Low level of education among the youth	0.55

Similarly, the secondary variables causing unemployment problem as demonstrated by the analysis include, Perception of youth about employment, Trade union wage increase demand, Ethnicity, Rapid population growth, Poor human resources planning and Corruption. These variables explain more variances among the secondary variables with corresponding factor loading -0.684, -0.675, -0.671, -0.671, 0.659, and -0.652 respectively. Other variables in this category contribute to unemployment problem by the degree of their respective factor loading. Variables with middling factor loading indicate the degree to which they contribute to unemployment base on their respective factor loading and should not be neglected. Furthermore, variables with less than average factor loadings are perceived to be inconsequential in the study but with caveat.

IV. Conclusion

The result of this study establishes that majority of the variables causing youth unemployment problem revolve around governance as pointed out in the analysis. For instance, Poor governance, influencing available jobs by VIPs, concentration of social amenities in the urban centers, infrastructural deficit to promote job creation, lack of vibrant manufacturing sector to absorb youth, low economic growth rate and recession, poor human resources planning, corruption and lack of foreign direct investment amid other variables. The study establishes mathematical prove of principal variables causing youth unemployment problem and shows the pathway to guide intervention by stakeholders and policy makers to alleviate the problem. Nevertheless, youth should develop entrepreneurial, vocational and technical skills to create jobs for themselves while it's expected of the stakeholders to create enabling environment for vibrant and sustainable economic activities.

The gap in knowledge in this work is that factors causing youth unemployment problem were previously blamed based on educated guesses by authors without evidence but this study fills the gap by establishing mathematical fact on the key variables causing youth unemployment problem using PCA tool

V. Recommendation

We suggest the forward aside from government system include but not limited to, (i) the youth should develop entrepreneurial skill, (ii) acquire vocational and technical skills to develop and grow their own businesses instead of waiting on Government to provide everything. Some vocational and technical skills available include, Auto-mechanics, Electrical/Electronic repairs, Welding and fabrications, Foundry technology, Plumbing works, Carpentry and Joinery, Leather works, Photography, Agriculture, Architectural draughtsman, Printing, Catering, Bakery and Confectionery, Hair-dressing and Barbing, Auxiliary nursing, Fashion designing, Car Wash, Vulcanizing, Tiling, Painting, Decoration, Aluminum Works and POP among others.

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