

Research Article

# Determination of the Potential Employment of Young People and Women in Mali through the Stochastic Production Function of Type Cobb-Douglas

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## Abstract

Current employment policy programmes and instruments in Mali are not defined by economic sectors, regions, type of actor and nature of barriers. It is clear that unemployment does not affect women and young people to the same extent, depending on the economic sectors/branches of activity, regions, type of labour market player and nature of barriers. Identifying and taking into account these specificities in employment policy programmes and instruments can help to promote the occupational integration of young people and women in Mali.

**Keywords:** Employment, Policy, Sectors, Young, Women.

## Introduction

Unemployment is a major challenge in most African countries. In particular, in Mali, the phenomenon of unemployment is relatively more important among young people and women. According to INSTAT/EMOP, the unemployment rate for young people aged 15-35 was 20.2% [1]. Women (6.1%) were more affected than men (4.9%). The rate was twice as high in urban areas (8.7%) than in rural areas (4.3%). Similarly, women and young people are more likely to be in vulnerable or precarious jobs. The distribution of unemployment in Mali also shows regional disparities, with relatively higher rates in the regions of Gao (30.5%), Koulikoro (13.1%) and Kidal (10.7%) The rates were lower in Sikasso and Ségou (2.1%) and Timbuktu (1.2%). It should also be noted that the COVID-19 pandemic has contributed to exacerbating the phenomenon with a job loss estimated at 12% of previously available jobs [2]. To address the challenges related to youth and women's employment in Mali, the Government of Mali has implemented several projects and actions over the past two decades. For example, since 2004, the Youth Employment Promotion Agency (EJPA) has been implementing the Youth Employment Programme (YPEP) to address the issue of youth unemployment among graduates in Mali. This program helps create jobs for young people aged 15 to 40 in rural and urban areas, especially by facilitating their access to the formal labour market and credit. Under this programme, APEJ

implements the vocational training internship programme, previously called «APEJ Volunteering». This program cost 12 billion CFA francs and benefited 11 cohorts of young Malian graduates for a total of 43,162 trainees, 51% of whom were women.

### 1.1. Problematic

Notwithstanding the efforts of the Malian government to address the challenges related to youth and women's employment, the main problem is that unemployment remains relatively high among young people and women. Several structural and/or cyclical factors seem to explain this observation. Examples include the inadequacy of academic training in relation to labour market needs, the low level of skills and work experience among young people, the difficulties of young people's access to finance, and the low absorption capacity of the public service and the private sector. Moreover, the current employment policy programmes and instruments in Mali do not seem to be defined taking into account the specific economic sectors. The Commission's proposals for a European Community Framework Programme are based on the principles of regional policy, regional cooperation and the European Union. However, unemployment does not affect women and young people to the same extent according to sectors/branches of economic activity, the regions, and the type of

labour market actor and the nature of barriers. The study examines the sectors and branches of economic activity with the greatest potential for creating jobs for women and youth in Mali. To do this, the study is conducted following an approach based on econometric estimates of a stochastic production function of the Cobb-type. The Douglas-Louvain Survey was carried out for thirteen economic branches of activity in order to determine the production potential and the associated employment potential. The content analysis method is applied to data from literature and qualitative surveys conducted with nine categories of key informants.

## 1.2. Objectives

The main objective of this study is to examine the sectors and branches of activity of the Malian economy with the greatest potential for job creation for women and young people. More specifically, these are:

- Identify promising economic sectors and industries for the creation of jobs for young people and women in Mali;
- Determine specific conditions necessary for the local and foreign private sector to invest in these sectors and branches of activity in Mali;
- Identify specific actors needed to create these conditions that improve or reduce investment security in Mali;
- Explore ways to promote equal access and opportunities for young people and women to these new sources of work and income, addressing gender inequalities.

## 2. Methodology

The quantitative approach is based on descriptive analyses of central trends and dispersion and graphical analyses. In a second step, econometric estimates of a stochastic production function of the Cobb-Douglas type were made to determine the potential for production and employment associated with each branch of economic activity. Secondly, descriptive analyses of the structure of potential employment have identified those economic activities with the greatest potential for job creation for women and young people.

### 2.1. Estimation of Production Potential by Industry

The employment potential of a given sector is theoretically defined as the ratio between the (maximum) potential output volume of this sector and the labour productivity of the sector. The main objective here is to identify those branches of economic activity with the greatest potential for job creation, so our approach consists first of estimating the production potential by branch of economic activity. To do this, we adapt the specification of Battese et al and Wang et

al. for a stochastic frontier model for a structural production function of the Cobb-Douglas type. The empirical model is as follows [3, 4]:

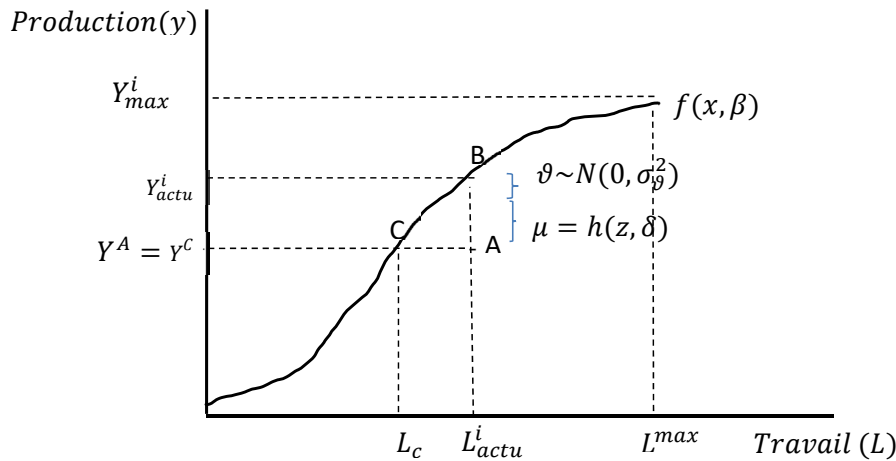
$$Y_t^i = f(x_t^i, \beta) + v_t^i - \mu(z_t^i, \delta) \quad (1)$$

Where  $Y_t^i$  is the value of output at factor prices,  $x_t^i$  means the factors of production including capital stock ( $K_t^i$ ) and total number of jobs ( $L_t^i$ ) in each branch of activity ( $i$ ) at time ( $t$ ).  $z_t^i$  Represents the set of factors explaining the technical inefficiency of economic activities ( $i$ ) over time ( $t$ ). It includes variables such as number of male employees, number of female employees, total number of urban employees, the total number of rural employees, the number of employees with no education level, the number of employees with primary level, the number of employees with secondary level and the number of employees with higher level.  $f(x_t^i, \beta)$  is the structural production function of Cobb-Douglas type.  $v_t^i$  is the standard error of zero averages and variance ( $\sigma_v^2$ ).  $\mu(\cdot)$  is the function of technical inefficiency of exogenous variables  $z_t^i$ . This function can be specified by various functional forms such as exponential, normal or semi-normal functions. In this study, we assumed the semi-normal form.  $\beta$  and  $\delta$  are parameters to be estimated.

The production potential or maximum production ( $Y_{\max,t}^i$ ) of a given branch is estimated using the parameters ( $\beta$  and  $\delta$ ) of equation (1) and allocating all potentially available work ( $L_{\max,t}^i$ ) to the branch. The potentially available work is the sum of current and unemployed jobs as well as the labour force available for employment among the inactive. These people may be said to be working, actively seeking employment or potentially available for work in the industry.

### 2.2. Estimation of Potential Employment by Industry

The estimated employment potential is illustrated by Figure 1, which represents the volume of production ( $y$ ) of each branch of economic activity ( $i$ ) in relation to labour  $L^i$ . The employment potential that each branch of activity is likely to create is conditional on its current level of production ( $Y_{actu}^i$ ), its current technical efficiency and the current productivity of labour in this branch ( $PM_L^i$ ).



**Figure 1 : Relationship between Production Volume and Work Volume**

The potential for employment is thus expressed by the following relation:

$$L_{pot,t}^i = \frac{Y_{max,t}^i}{PM_{L,t}^i} - \frac{Y_{actu,t}^i}{PM_{L,t}^i} = \frac{Y_{max,t}^i}{PM_{L,t}^i} - L_{actu,t}^i \quad (2)$$

Where  $PM_{L,t}^i$  is the productivity of labour in the industry ( $i$ ) at time ( $t$ ). For this study, we assumed the level of productivity at present. This assumption is relatively valid, as the level of productivity varies little in the short term.  $L_{actu,t}^i$  is the total current employment in the industry ( $i$ ). The condition that an industry ( $i$ ) is considered to have a potential for job creation is defined as  $Y_{max,t}^i - Y_{actu,t}^i > 0$ , where  $Y_{actu,t}^i$  is the current output of the industry ( $i$ ).

When the current output of a branch of economic activity is below its estimated (maximum) potential level, then the employment potential is positive. This means that this industry has a potential for job creation and probably for women and young people. On the other hand, when the current output volume of an industry is higher than the estimated potential level of output, then the employment potential will be negative in the short term for that industry. This means that the industry is technically efficient. However, in the medium and long term, the potential volume of employment in this branch of economic activity will simply be equal to the number of retirements that we will not assess as part of this study.

**2.3. Structure of Potential Employment by Branch of Activity**

The distribution of potential employment in each branch of economic activity according to sex and age group is determined by applying the average shares of each characteristic to the estimated volume of potential employment ( $L_{pot}^i$ ). These average shares are calculated from the historical employment structure of each industry for the period from 2013 to 2020. Data used is from EMOP/

INSTAT. Calculations are done using an Excel spreadsheet available on request.

**3. Results and Discussion**

The descriptive results indicate that the phenomenon of unemployment and the situation of vulnerable or precarious jobs affects more women, young people aged 15 to 35 years old, people with no education level and people living in urban areas. Inequalities in women’s access to jobs are present and persistent in all sectors of the Malian economy. On the other hand, these inequalities are more important in the industrial sector than in the other sectors. When we look at the branches of economic activity, we see that inequalities in access to jobs affect women strongly or very strongly in 14 out of 21 branches of economic activity in Mali. They affect young people in 7 of the 21 branches of activity to a large or even very large extent, and certainly more so among young women than young men.

The difficulties of young people and women in obtaining employment are linked to factors directly affecting labour supply (technical and economic barriers, social standards, political and institutional barriers) and indirectly demand (access to finance, political instability, informal sector practices and access to electricity). The facilities are mainly reflected in the existence of youth employment programmes and the willingness of partners to invest in training for women and young people in order to facilitate their socio-professional integration. For example, there are training and integration programmes for rural women, widows and girls who have dropped out of school. There is also a functional institutional framework and instruments such as the youth employment tax, and the vocational training tax.

There is a real potential for job creation for women and young people in nine of the thirteen economic branches examined. This potential is relatively higher in the agricultural, commercial, transport and storage sectors. However, it does not exist in the branches of financial and insurance activities, information and communication and public administration activities. Investment and the integration of young people

and women into the labour market in these sectors require the Malian authorities and their partners to reduce several structural and cyclical barriers directly affecting the supply of labour; and indirectly the demand.

#### 4. Conclusion

The study suggests that the effectiveness of youth and women's employment policies in Mali could be achieved through the implementation of programmes and instruments based on the specificities of economic sectors/branches of activity, regions, and types of actors and nature of barriers. Taking these specific features into account can help to promote the occupational integration of young people and women in Mali. More specifically:

- Public policies in Mali to combat inequalities of access to employment should target young people aged 15 to 35 and women, especially those with no education or living in urban areas;
- Policy interventions are needed in all sectors of the Malian economy to fully achieve equal access to jobs for women and youth. However, these public interventions could focus more on barriers to women's integration into the industrial sector;
- In the short term, interventions to promote equal access for women and youth to jobs could focus on reducing or eliminating barriers in nine of the thirteen economic sectors. These industries have the potential to create jobs for women and young people aged 15-35;
- In the medium to long term, training policies and internship programmes could facilitate the integration of women and young people into more productive sectors. These include the financial and insurance industries, information and communication and public administration activities.
- Measures to promote investment and job creation in the services sector could focus more on political stability, combating corruption and unfair competition practices of informal enterprises. On the other hand, they could effectively promote investment and job creation in the industrial sector by improving electricity supply. In addition, policies to facilitate access to finance could be very useful for both economic sectors.

Young people and women into the labour market in these sectors require the Malian authorities and their partners to reduce several structural and cyclical barriers directly affecting the supply of labour; and indirectly the demand.

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