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A 2014 Senegal Social Accounting Matrix: A Detailed Segmentation of the Skills Market

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Abstract : The purpose of this article is to carry out a descriptive analysis of the Senegalese economy, in particular the skills market.The SAM from the 2014 national accounts provides a consistent accounting framework for the analysis of strategic options for employment and economic growth in Senegal. The composite labor includes ten socio-professional categories, which are disaggregated into sixteen subcategories each. This results in a disaggregation of 160 types of labor according to the educational levels and training of individuals. The institutional unit is subdivided into four units: households, firms, government and the rest of the world. Households are distinguished according to ten deciles of consumption. The branches and products were aggregated according to the nomenclature to finally obtain 37 branches of production and 37 products. The SAM's results show that market services contribute 44% to the Gross Added Value (GVA) formation. Besides the capital factor that receives the largest share (61%), unskilled labour receives 25% of GVA and skilled labour receives only 14%. Therefore, future research is encouraged to use the CGE models. The paper includes implications on the nature and skills needs of the different sectors of the Senegalese economy.

Keywords:Social Accounting Matrix, Skills, Senegal

JEL classification : C82, E16, J24

I. INTRODUCTION

The Social Accounting Matrix (SAM) is part of the large family of economic tables (F. Quesnay's general economic table, inter-industry exchange table, input-output table, general economic table, financial transactions table). It has "retained its qualities while having its own virtues" (Grei, 1993). It provides an image of the interdependence of the economy through the circulation of flows that represent the identities of national accounts (Touré and Bélières, 1999). Generally, the construction of the SAM requires two main sources of information : the Resources and Employment Table (ERR) and the Integrated Economic Accounts Table (IEA). The first table provides information on economic flows according to the logic of economic activities and products, while the second table traces these flows according to the logic of institutional units. These two macroeconomic tables are complemented by microeconomic information from household surveys that allow a more detailed presentation of the SAM's accounts.The construction of an analytical model to study the implications of skills on the Senegalese labour market requires an accounting consistency framework. Senegal's Social Accounting Matrix (SAM) should reflect skills profiles in the labour market. Senegal is a middle-income country (US$1,010 per head). Human capital accumulation could be a key to boosting the country's growth. However, analysis of the data from the Senegal matrix in 2014 shows that the contribution of skilled labour to value added formation is low (14%).
The purpose of this article is to carry out a descriptive analysis of the Senegalese economy, in particular the skills market.

After presenting the methodology for the construction of the SAM (section I), we proceed through the SAM data to a descriptive analysis of the Senegalese economy, and in particular, the skills market (section II).

II.   METHODOLOGY

We start from the Senegal Social Accounting Matrix (SAM) (2014), developed by Cabral et al (2017). We have rebuilt it to adapt it to the qualification issue. This section first describes the overall representation of the accounts of the SAM (I), then the disaggregation process of the SAM (II).

II.1.   Overall representation of the SAM's accounts

The factors of production are composed of composite labour and composite capital. The composite labour includes ten socio-professional categories, which are then disaggregated into sixteen (16) subcategories each. This results in a disaggregation of 160 labour types according to the levels of education and training of individuals (see Table 1). Composite capital, on the other hand, is composed of private capital, public capital and the land factor. The institutional unit is subdivided into four units: households, companies, government and the rest of the world. The institutional household unit is distinguished according to the level of expenditure (consumption deciles). The branches and products were aggregated according to the nomenclature to finally obtain 37 branches of production and 37 products. Aggregation consists in grouping together in a single account sectors that operate in the same economic fields or that provide similar products.

II.2   Disaggregation process of the SAM

This section presents the procedure for disaggregating factor accounts and institutions of the standard SAM. The disaggregation of the SAM's accounts is guided by our needs and the availability of data.

Disaggregation of labour input

The disaggregation of labour input and households is done using additional information on individuals' economic activities, household income and expenditure. This information is provided by the second Senegal Poverty Monitoring Survey (*ESPS 2*) in 2011. The level of education and training of individuals has made it possible to classify workers into one hundred and sixty (160) categories corresponding to as many segments of the labour market (see Table 1). In other words, each socio-professional category is segmented according to the level of education and/or training. The distribution key for the labour factor in the SAM is also derived from information collected from the ESPS 2 database.

Table 1 shows the different categories of work by taking into account the ten (10) socio-professional categories and the sixteen levels of education/training of individuals, which makes it possible to obtain one hundred and sixty (160) segments of the labour factor.

Table 1. Typology of labour input

Socio-professional categories	Educational level
Senior Executives / Engineers (CSI)	Without instruction
Middle Managers / Supervisors (CMAM)	Primaryschool
Skilled Employees and Workers (EOQ)	Medium
Semi-skilled employees and workers (EOSQ)	Secondaryschool
Maneuvers	Superior
Employers	Certifying training
Independents	CAP
FamilyHelpers	BEP
Apprentices	BP
Others	BT

Note :

CSI: Senior executives and engineers; CMAM: Middle executives and supervisors; EOQ: Skilled employees and workers; EOSQ: Semi-skilled employees and workers; Man: Labourer; EMPLOY: Employers; INDEP: Self-employed; FA : Live-in caregivers; PRPA: Apprentices; AUT: Others ; CAP: Certificate of professional aptitude; BEP: Brevet d'étudesprofessionnelles; BP: Brevet professionnel; BT: Brevet de technicien; Bac Tec : Technical baccalaureate; DTS: Diploma of higher technician; BTS: Diploma of higher technician; DUT: Diploma of higher technician; DUT: Technical

university diploma; Primary: 1 to 7 years of primary education; Medium: 1 to 4 years of secondary education; Secondary: 5 to 7 years of secondary education or high school; Higher: 1 to 7 years of higher education.

Distribution of households by ten (10) consumption deciles

The household account is also broken down using information provided by ESPS 2. To achieve this objective, we considered ten of households typologies distinguished by level of expenditure (consumption deciles). For example, the CSIs (senior executives and engineers) are distinguished according to the ten consumer deciles (decile 1 to decile 10).

III.   RESULTS

Several lessons can be drawn from this 2014 SAM updated with survey data (ESPS, 2011; ENES[1], 2015).

III.1.   Structure of the Senegalese economy: lessons from the SAM

The value added created in the economy may differ from one sector to another. Income flows to each factor can also vary from one activity to another and from one household to another. The income of the different groups is allocated separately. Similarly, the various sub-sectors of agriculture contribute unevenly to the value added of the sector. Their links with other branches of the economy are of different magnitude. The contribution to indirect taxes paid by the agricultural sector fluctuates according to the branches.   In order to take a closer look at the Senegalese economy on the basis of a thorough disaggregation of the labour market, several lessons can be drawn. First, the distribution of value added between the various branches and factors of production. Then the activities of the production sectors but also Senegal's trade structure. Finally, the sources and uses of household income and other categories of institutions.

III. 1. 1. Skills structure of the Senegalese economy

Overall, the Senegalese economy is dominated by unskilled workers (64% are unskilled labour)in 2014.

Graph 1.Factor intensity in terms of labour type in the sectors (in %), 2014, Senegal (in %)
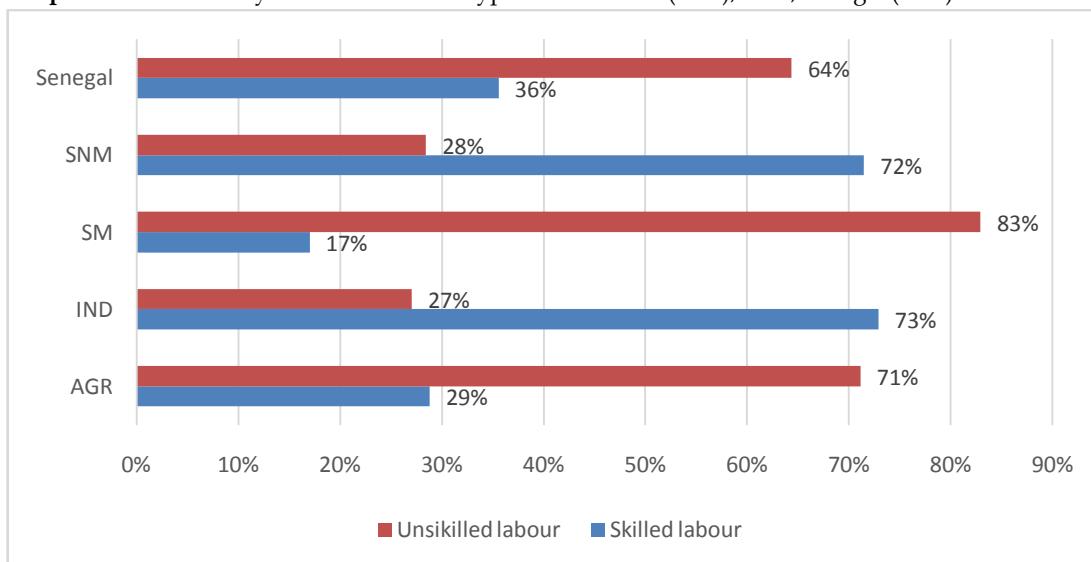
Source : Author's calculations based on 2014 SAM data.

Note :

AGRI = Agricultural sector

IND = Industrial sector

SM = Market services sector

SNM = Non-market services sector

LD = Labour

III. 1. 2.Distribution of value added between industries and factors of production

Table 1 shows the contribution of each branch to the formation of gross value added (GVA). Market services, which account for 44% of GVA, contribute more to its formation. The industrial sector (25%) also occupies a relatively

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[1]National Employment Survey in Senegal

prominent place in the formation of GVA. Agriculture in the broad sense and non-market services each contribute 16% of GVA.

Table2. Sectoral contribution to value added

	Value added/local production (VAi/Xi)	VAi/VA
AGRI	81%	16%
IND	35%	25%
SM	62%	44%
SNM	69%	16%
Ensemble	54%	100%

Source : Author's calculations based on 2014 SAM data.

The distribution of value added between the various factors of production shows that capital receives the largest share (61%) compared to labour (39%). The agricultural sector, which is naturally labour-intensive, has a relatively lower capital intensity (0.4). On the other hand, in the agricultural sector, work contributes more to the formation of value added (74%).

The contribution of labourers, CMAMs and self-employed workers to the formation of value added in the agricultural sector is relatively greater (35%, 12% and 4% respectively).

Moreover, in this sector, labourer-type labour receives the largest share (17% for uneducated workers, 12% for primary workers and 6% for labourers with certification training), followed by CMAMs (6% for CMAMs with a BTS), and self-employed workers (2% for self-employed workers without education and 1% for those with certification training). In non-agricultural sectors, capital intensity is relatively more significant in non-market industries and services where capital per capita is 3.3 and 2.2 respectively. On the other hand, agriculture is a more labour-intensive sector. With the exception of forestry branches where the capital/head ratio reaches 28.9, the latter is relatively equal to 0.3 in the other branches (Table 2).

Besides capital, which receives 61% of the value added of the market services sector, self-employed people with an average level of education and those without education receive 20% and 6% respectively. In parallel, in the industrial sector, the capital factor, which receives a 77% share of value added, the CSIs (senior executives and engineers) receive 6%. Apart from capital, which also receives the largest share of the value added of non-market services (69%), CSIs with CAPs, EOQs with certification training and CAPs each receive relatively 3%.

Table3. Contribution of skilled, unskilled and capital factors to value added formation, 2014, Senegal (in %)

	LDiskilled/VAi	LDiunskilled/VAi	KDi	KD/LD
AGRI	22%	52%	26%	0,4
IND	17%	6%	77%	3,3
SM	7%	32%	61%	1,6
SNM	22%	9%	69%	2,2
Whole	14%	25%	61%	1,5

Source :Author's calculations based on 2014 SAM data.

Note :

LDi = labour demand of sector i

KDi = capital demand of sector i

III. 1. 3. Sectors of activity

Several lessons can be drawn from the production activity of the various branches. The data are expressed in millions of CFAF.

Agriculture

The agriculture branch generates gross value added (GVA) at factor cost of 1,017,880. The labour and capital factors used by this branch are remunerated at 749,322 and 268,558 respectively. Its intermediate consumption is estimated at 244,251, i.e. production at factor cost of 1,262,131. This production is the subject of local sales (1,143,737) and exports, which are marginal (118,394). On the other hand, imports of agricultural products are estimated at 227,498. Indirect taxes net of subsidies collected on this product amounted to 21,909. The composite product consisting of local sales of agricultural products and CIF imports (including indirect taxes) is 1,393,144. These availabilities are used to satisfy

intermediate (540,451) and final domestic (1,143,737) demand for the product. The latter isdividedinto final consumption (859,032) and investments (-6,339).

Industry

The industry branch's production activity generates GVA at factor cost of 1,601,648. This is broken down into remuneration for labour (376,189) and capital (1,225,459). Its intermediate consumption is 3,020,042, representing a total production at factor cost of 4,621,690. Gross value added represents 35% of the branch's output, while intermediate consumption represents 65%. This production is the subject of local sales (3,499,788) and exports (1,121,902). On the other hand, imports of industrial products are estimated at 3,029,890. Indirect taxes net of subsidies collected on this product are 270,244. The composite product consisting of sales of local industrial products and CIF imports (including indirect taxes) is 6,799,922. These funds are used to satisfy intermediate (2,935,562) and final domestic (3,499,788) demand for the product. Final consumption and investment (including changes in stocks), which represent the components of these domestic end-uses, are 2,096,156 and 1,768,204 respectively.

Market services

This branch occupies a predominant place in the productive activity. It contributes more to the payments of factors of production with respective amounts of 1,097,797 and 1,729,939 paid into the labour and capital accounts. The value added at factor cost of the sector is estimated at 2,827,736. Its intermediate consumption is around 1,749,462 and its production is estimated at 4,577,198. The production is sold on the domestic (4,068,875) and foreign (508,323) markets. Imports of services reached 276,703. Indirect taxes collected on services are estimated at (188,175). The composite product is estimated at 4,533,753. The overall supply of services is used to satisfy final demand. This is composed of intermediate demand (1,996,901) and final consumption (1,379,322), while investment (including changes in stocks) is estimated at 1,045,018. The gross value added of market services accounts for 62% of the branch's output and intermediate consumption for 38%.

Non-market services

The gross value added of the non-market services branch is 1,026,724. Non-market services are defined as services produced by the State and financed by tax revenues. These are education, security, justice, representation abroad, etc. The production of these non-market services is equal to 1,485,883. It includes wages for 1,026,724 and intermediate consumption of goods and services for 459,159. The production of non-market services consists of administrative salaries and purchases of goods and services. Gross value added represents 69% of the branch's output and intermediate consumption 31%. Looking at the intermediate consumption table (Table 3),it can be seen that the most predominant products in inter-branch links are those of industry and market services. In the agricultural sector, industrial products are much more in demand as an intermediate product by other branches. Non-agricultural branches, except for non-market services, use their own products mainly as intermediaries. As intermediate consumption, non-market services demand much more from industrial products.

Table4.Intermediate flow input-output table, 2014, Senegal (in millions of CFAF))

	AGRI	IND	SM	SNM	Total
AGRI	51 564	445 336	32 077	11 474	540 451
IND	140 828	1 935 204	605 424	254 106	2 935 562
SM	51 859	639 502	1 111 961	193 579	1 996 901
SNM					
Whole	244 251	3 020 042	1 749 462	459 159	

Source :Author's calculations based on 2014 SAM data.

III. 1. 4. Foreign trade

The Senegalese economy is highly dependent on the foreign market for its sources of supply and sales abroad. These characteristics can be examined through the analysis of the structure of foreign trade and that of the composite product sold on the domestic market.

Structure of foreign trade

Imports represent nearly 51% of GDP and exports 25% (Table 4). This gap is at the root of Senegal's structural current account deficit, which reached 26% of GDP in the reference year. Imports are dominated by industrial products (86%) followed by services (8%) and agricultural products (6%). Exports of industrial products account for a relatively large

share of total exports (64%). They are followed by those of services (29%) and products of the agriculture branch, which occupy a relatively low weight (7%) (Table 4).

**Table 5.**Structure of foreign trade

	Exports	Imports	Exports/GDP	imports/GDP
Agriculture	7%	6%	11%	22%
Industry	64%	86%	60%	162%
Market services	29%	8%	17%	9%
Non-market services	0%	0%	0%	0%
Whole	**100%**	**100%**	**25%**	**51%**

Source : 2014 SAM.

Structure of the composite product supplied to the domestic market

On the domestic market, products come on average from external supplies, accounting for 26% of the total. The structure of the composite product on the domestic market differs according to the goods. Some products, sold on the local market, have a strong import component. External purchases of industrial and agricultural goods reach proportions of 46% and 17% respectively of the supplies supplied on the domestic market. As a result, these products are highly dependent on the international market. The service offers are essentially based on the local offer of 94%. Only 6% come from outside. This reflects the high weight of non-tradables in this sector (Figure 3).

Graph 2. Origin of composite product by goods, 2014, Senegal (%)

Origine du produit composite selon les biens, 2014, Sénégal (en %)
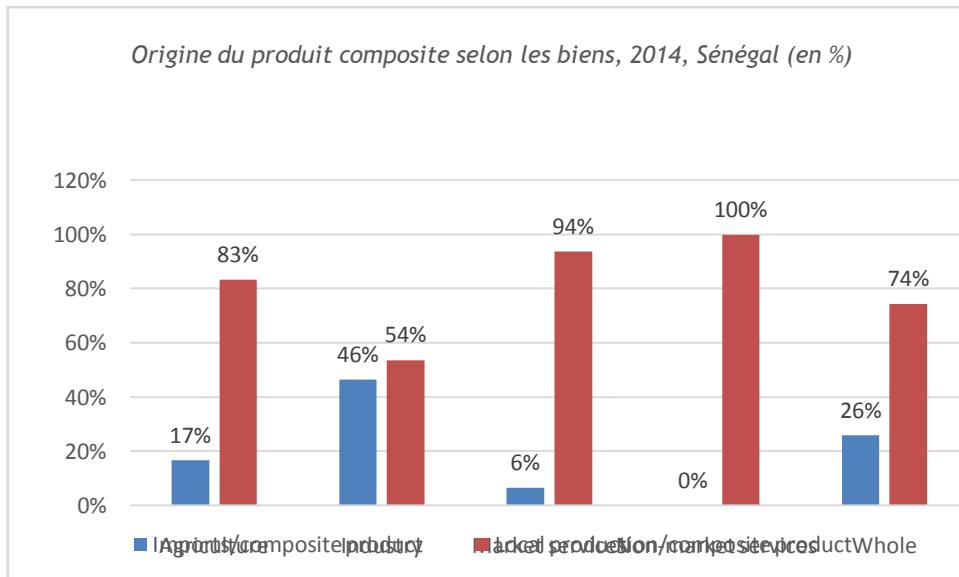
Source :2014 SAM.

The main source of indirect taxes is the industrial sector (56%), followed by services and agriculture, which contribute 39% and 5% respectively (Figure 4).

Graph 3. Relative contribution of different sectors to the indirect tax base, 2014, Senegal (%)
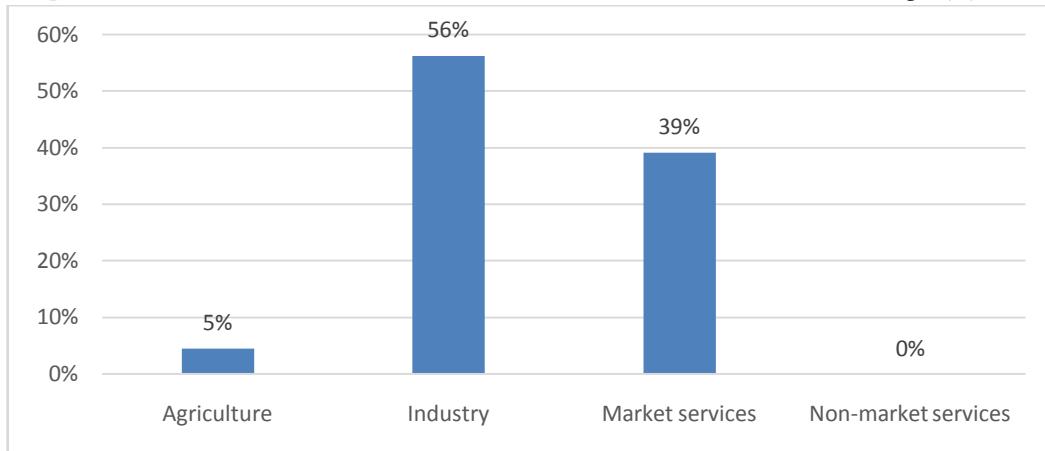
A lot of information on the origins and uses of income by households can be obtained from the SAM.

III. 1. 5. Sources and allocations of household income

Households derive their income from the factors they are endowed with, transfers and dividends. This income is subject to several types of assignments.

Sources of household income

Household income sources consist mainly of the remuneration of primary factors (labour, capital), transfers and dividends. All the wages allocated by the sectors to labour input are paid to households. The latter receive a significant part of the capital factor remuneration (49.6% of the gross operating surplus). The rest is allocated to firms (50.4%).

The different sources of household income are given in Table 5. It appears that most wages are allocated to households in the last two deciles (78%). The last and 9th decile receive 64% and 24% of labour input income respectively. The share of other deciles (D1 to D8) of households is 22%. Capital income is also largely allocated to households in the last two deciles (Table 5). The last and 9th decile receive respectively 71% and 10% of the capital factor remunerations paid to households. The share received by the other household deciles is 19%.

Table6. Distribution of primary factor income between the different categories of households, 2014, Senegal (in %)

	LD	KD
Decile 1	0%	0%
Decile 2	0%	0%
Decile 3	1%	1%
Decile 4	1%	1%
Decile 5	2%	2%
Decile 6	4%	3%
Decile 7	5%	5%
Decile 8	8%	7%
Decile 9	24%	10%
Decile 10	54%	71%
Total	100%	100%

On average, the primary factor incomes received by households are more composed of labour input incomes (56.56%). Apart from the 10th decile, whose primary factor income consists of labour (50%) and capital (50%), all the other household deciles consist mainly of labour (Table 6).

Table 7. Distribution of household income sources by different factors, 2014, Senegal (in %)

	LD	KD	Total
Decile 1	76,77%	23,23%	100%
Decile 2	59,51%	40,49%	100%
Decile 3	59,34%	40,66%	100%
Decile 4	57,88%	42,12%	100%
Decile 5	58,16%	41,84%	100%
Decile 6	61,94%	38,06%	100%
Decile 7	58,30%	41,70%	100%
Decile 8	60,48%	39,52%	100%
Decile 9	74,99%	25,01%	100%
Decile 10	50,01%	49,99%	100%
Senegal	**56,56%**	**43,44%**	**100%**

Source :2014 SAM.

Moreover, transfers contribute significantly to household income (Table 7). The latter derive 12.31% of their income from transfers.

Table 8. Household income by source, 2014, Senegal (in %)

	Factors	Transfers	Total
Decile 1	93,04%	6,96%	100,00%
Decile 2	88,43%	11,57%	100,00%
Decile 3	88,39%	11,61%	100,00%
Decile 4	88,02%	11,98%	100,00%
Decile 5	88,08%	11,92%	100,00%
Decile 6	89,05%	10,95%	100,00%
Decile 7	88,12%	11,88%	100,00%
Decile 8	88,67%	11,33%	100,00%
Decile 9	92,52%	7,48%	100,00%
Decile 10	86,09%	13,91%	100,00%
Senegal	87,69%	12,31%	100,00%

Source :2014 SAM.

Use of income

Overall, net income from household transfers is used for final consumption, direct tax payments and savings (Table 8).The share of final consumption in income is higher (85%). In particular, 41% of income is used for the consumption of agricultural goods, 27% for services and 17% for agricultural goods. Households save 11% and pay the state 5% of their income.

Table 9. Household income use, 2014, Senegal (in %)

	Companies	**Households**	Gouvernement	Rest of the world
Companies	0%	**0%**	60%	23%
Households	20%	**0%**	15%	0%
Gouvernement	5%	**5%**	0%	1%
Reste of the world	28%	**0%**	6%	0%
Investment-Savings	48%	**11%**	19%	75%
Consumption				
AGRI	0%	**17%**	0%	0%
IND	0%	**41%**	0%	0%
SM	0%	**27%**	0%	0%
SNM	0%	**0%**	49%	0%
Total	100%	**100%**	100%	100%

Source :2014 SAM.

III. 1. 6. OtherSAM institutions

Other institutions exist outside households; they are firms, the state and the rest of the world.

The firms

Firms receive a portion of the remuneration paid by the capital factor to institutions in the form of a gross operating surplus (1,981,688). This income is allocated to direct tax payments (134,700) and dividend payments (1,358,714) to resident and non-resident households. A portion of business income is earmarked for their savings (1,368,560) (Table 9).

The State

The State's sources of income are direct taxes on personal income (15%), taxes on corporate income (60%), indirect taxes (49%) and transfers from the rest of the world (6%). The balance constitutes the State's savings in relation to its resources (19%) (Table 9).

Table10. Use of agents' income, 2014, Senegal (in %)

	Companies	Households	Gouvernement	ROW	Companies	Household	Gouvernement	ROW
Companies			273 505	606 781	0%	0%	30%	23%
Households	559 514		71 122		20%	0%	8%	0%
Gouvernement	134 700	247 512		37 700	5%	5%	0%	1%
Row	799 200		29 400		28%	0%	3%	0%
I-S				1 969 591				
I-S	1 368 560	540 914	85 348		48%	11%	9%	75%
Consumption								
AGRI		859 032			0%	17%	0%	0%
IND		2 096 156			0%	41%	0%	0%
SM		1 379 322			0%	27%	0%	0%
SNM			440 865		0%	0%	49%	0%
Total	2 861 974	5 122 936	900 240	2 614 072	100%	100%	100%	100%

Source : 2014 SAM.

The Rest of the world (Row)

Its revenues consist of imports in CIF value, dividends received from firms and current transfers from the State. Imports amounted to 4,014,419. The dividends paid by firms in the rest of the world and the transfers they receive from the State are 799,200 and 29,400 respectively. The rest of the world's expenditures consist of exports at FOB price and current transfers to the government. Exports are estimated at 1,748,619 while transfers received by the government from the rest of the world are 37,700. The difference between total imports, dividends and transfers received and total exports and transfers paid is, by definition, the net import of foreign capital. It represents the current account balance of the economy's external balance of payments and is equal to 2,576,372 (Table 10). The latter is a revenue from the accumulation account. Since foreign capital is added to domestic savings to finance the nation's gross investment, this revenue is also referred to as foreign savings.

Table 11. Current balance

Current account	Expenditure	Revenue
Exports	1 748 619	
Transfers to households		
Transfers to government	37 700	
Imports		3 534 091
Transfersreceived		828 600
Balance	2 576 372	

Source : 2014 SAM.

IV.   CONCLUSION AND RECOMMENDATIONS

This paper focused on a thorough segmentation of the skills market and the analysis of the 2014 Social Accounting Matrix for Senegal. The SAM's lessons on the Senegalese skills market are many:

- The distribution of value added between the various production factors shows that capital receives the largest share (61%) followed by labour (39%), including unskilled labour, which receives 25% of GVA, and skilled labour, which receives 14%.
- Apart from capital, which receives 61% of the value added of the market services sector, self-employed people with an average level of education and non-educated people receive 20% and 6% respectively.
- The Senegalese economy, which is more capital-intensive, has a per capita capital of 1.5 in 2014. However, the latter leavesdisparitiesbetweensectors.
- The agricultural sector is more labour intensive while the non-agricultural sectors are more capital intensive.

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