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# MICROECONOMICS OF KNOWLEDGE. AFRICAN CASE

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## ABSTRACT

Since the process of globalization era, we can always lived in economics of knowledge. The cycle of economics founded on knowledge are composed by three components: the investment in knowledge; the production and the diffusion of information technology and communication (ITC) and the institutional mechanisms that favor the access to knowledge (Foray, 2004).

By fact the economics are divided in **Micro** and **Macroeconomics**, this work has as objective to approach theme “**Microeconomics of Knowledge**” based on African case.

We concluded that, in general analysis, South Africa and Tunisia are the countries of the selected with better performance in microeconomics of knowledge, and Angola, Chad and Ethiopia are poor countries in this area of knowledge.

High rates of adult alphabetization can stimulate companies and firms to employ skilled personal according to their necessities and this personal can and it is ready to work with advanced technology and to effect R&D for development of their activities.

**Keywords:** Economic of Knowledge, Macroeconomics, Microeconomics, Microeconomics of Knowledge

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## **1. INTRODUCTION**

Since process of globalization era, we can always lived in economics of knowledge.

The cycle of economics founded on knowledge are composed by three components: the investment in knowledge; the production and the diffusion of information technology and communication (ITC) and the institutional mechanisms that favor the access to knowledge (Foray, 2004).

**Economics of knowledge** is a science that study the interaction between firms, companies, people, etc, at level of acquisition, absorption, change, dissemination of knowledge on time and space.

By fact the economics are divided in **Micro** and **Macroeconomics**, this work has as objective to approach theme “**Microeconomics of Knowledge**” based on African case.

It is begun to give a definition of microeconomics of knowledge doing first the distinction between microeconomics and macroeconomics. And below I show the state of microeconomics of knowledge in African countries that got considered for this work.

## **2. METHODOLOGY**

The methodology adopted is based on method scientific of Thomas Khun, that permit us through statistical dates see state of a paradigm that in this case are intellectual property, technology (Manuel, 2006).

The methodology is based in dates of World Forum Economic .

### 3. MICROECONOMICS OF KNOWLEDGE. DEFINITION

Robbins stating that: “**Economics** is the science which studies human behavior as a relationship between ends and scarce means which have alternative uses” (Granstrand, 1994).

And as we saw on introduction, the economics are divided in **Micro** and **Macroeconomics**.

**Microeconomics** studies the behavior of economics agents such as consumers, firms, workers, markets, industries on the local determined and time, or according to Samuelson and Nordhaus (1992), microeconomics analyses the behavior of individual components like industries, firms and household.

Microeconomics study of the economics decisions the people and enterprises, as well as good markets, services, and productive factors where those decisions of confront.

Study too of the processes of affectation the resources to possible alternatives and the paper of the prices and markets in this processes (Mateus and Mateus, 2001).

Already **Macroeconomics** studies the functioning of the economy as whole, or according to Stiglitz (1997), macroeconomics looks at the behavior of such aggregate measures as overall rates of unemployment, inflation, economic growth and the balance of trade.

So, the **Microeconomics of Knowledge** will be the science that analyse different behaviors of the firms and working of markets in the activities of absorption, use, creation, diffusion, search, define, expander, and maintain their knowledge.

On table below, we can see some examples of factors commonly related and studied in Economics of Knowledge also considered by Granstrand (1994)<sup>2</sup>, and we can see that on **level micro** we have much technology factors, variables, activities,

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<sup>2</sup> Granstrand (1994) had used this factors for evaluation of countries, markets, industries, firms, etc in **Economics of Technology**.

This author define **Economics of Technology** as the field of inquiry that focuses on the causal nature of the interactions between changes in various technologies and natural sciences on one hand and economic changes of various kinds on the other. Economics of Technology encompasses the economic analysis of technological change as well as the analysis of economic change, focusing on technology.

processes, and phenomena that can be considered for evaluation the state of markets, industries, firms, products, technologies in economics of knowledge, that we can name of microeconomics of knowledge (see table 1).

TABLE 1

**Examples of factors commonly related and studied in Economics of Knowledge**

Level of observations/analysis	Economic factors/variables/activities/processes/phenomena	Technology factors/variables/activities/phenomena
<b>A) Macro (national, international)</b>	Welfare; Growth; Employment; Investment; Income distribution; Business cycles; Trade; Inflation; Interest rate; Productivity; Competitiveness; Development; etc.	Rate of Adult Alphabetization; S&T institutions; Patent System; National Systems of Innovation; Technology System; Innovation clusters; Innovativeness; etc.
<b>B) Micro (markets, industries, firms, products, technologies, etc)</b>	Market structure; Concentration, Size of firm; Growth; Profitability, rate of return; Productivity; Competitiveness; Investments; Organization; etc.	Creativity; Discovery; Invention; R&D; Innovation; Imitation; Adoption; Diffusion; Patenting; Licensing; Technology diversification; etc.

#### **4. STATE OF MICROECONOMICS OF KNOWLEDGE IN AFRICAN COUNTRIES**

For evaluation the state of microeconomics of knowledge in Africa got selected 23 countries, and used the follows indicators:

- 1) Business Investment in R&D;**
- 2) Firm-level Technology absorption;**
- 3) Subsidies for firms-level research and development;**
- 4) Company Spending on Research and Development.**

## **1) BUSINESS INVESTMENT IN R&D**

According to informations available by World Economic Forum (2005), South Africa is the country where had existed most business investment in R&D in 2004, and it was in 24<sup>th</sup> on world ranking, to follow Kenya (32<sup>nd</sup>) and Tunisia (37<sup>th</sup>). (See annex - table 1).

Ethiopia (104<sup>th</sup>), Chad (103<sup>rd</sup>) and Angola (102<sup>nd</sup>) where had existed less business investment in R&D in 2004 and are poor countries of the World in this subject.

## **2) FIRM-LEVEL TECHNOLOGY ABSORPTION**

Tunisia is the country of the selected where firms absorbed most technology in 2004, and it was in 24<sup>th</sup> on world ranking, to follow South Africa (28<sup>th</sup>) and Egypt (37<sup>th</sup>).

Angola (103<sup>rd</sup>), Chad (99<sup>th</sup>) and Ethiopia (96<sup>th</sup>) are poor countries of the selected in absorption of technology by firms in 2004, and according to World Economic Forum, these countries was poor at world level (See annex – table 1).

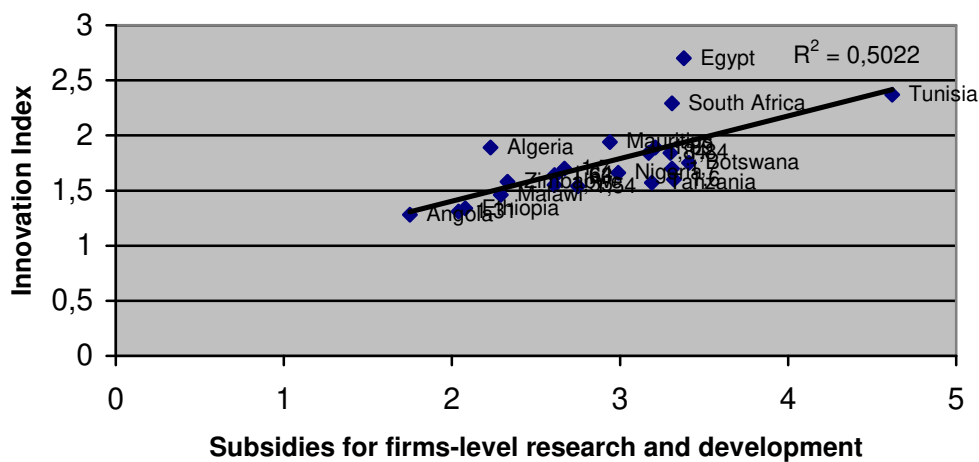
## **3) SUBSIDIES FOR FIRMS-LEVEL RESEARCH AND DEVELOPMENT**

According to informations of World Economic Forum (2005), we can see that Tunisia is the country where the government had conceded most subsidies for firms for research and development that others countries, and it is on 13<sup>th</sup> on world ranking, to follow we have Botswana (34<sup>th</sup>) and Egypt (35<sup>th</sup>).

Angola (94<sup>th</sup>), Chad (89<sup>th</sup>) and Ethiopia (87<sup>th</sup>) are the countries where government had conceded less subsidies for firms for research and development. These countries are on poor position on world ranking elaborated by World Economic Forum (2005). (See annex - table 2).

The graphic 4.1 show us a relation between one of variables that we saw above for divers countries with their innovation index. And we can see that countries where subsidies for firms for research and development are high it has high innovation index (we have, for example, Tunisia, Egypt and South Africa case), contrast with countries that it has low levels of subsidies for firms for research and development (we have, for example, Angola, Ethiopia case).

**GRAPHIC 4.1** – Subsidies for firms-level research and development in Africa Vs Innovation Index for African countries



#### 4) COMPANY SPENDING ON RESEARCH AND DEVELOPMENT

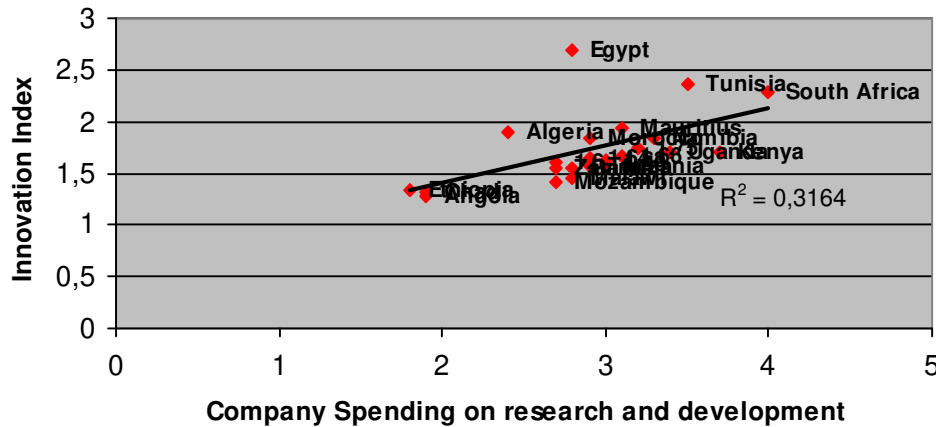
According to table 2 (see annex), we can see that South Africa is the country where company spending more on research and development, and it is in 24<sup>th</sup> on world ranking, to follow we have Kenya (32<sup>nd</sup>) and Tunisia (37<sup>th</sup>).

Angola (102<sup>nd</sup>), Chad (103<sup>rd</sup>) and Ethiopia (104<sup>th</sup>) are poor countries of the selected where company spending less on research and development.

The graphic 4.2 show us that countries where company spending more on research and development are those that are high innovation index, and we have, for example, Tunisia, Egypt and South Africa case, and countries where company spending

less on research and development have low innovation index, and we have, for example, as happen above, Angola, and Ethiopia case, and exist others.

**GRAPHIC 4.2 – Company spending on research and development on different countries Vs Innovation Index**



## 5. CONCLUSION

We saw the definition of microeconomics of knowledge and their state in African countries that had been selected for this work.

We concluded that, in general analysis, South Africa and Tunisia are the countries of the selected with better performance in microeconomics of knowledge, and Angola, Chad and Ethiopia are poor countries in this area of knowledge.

Angola, Chad and Ethiopia as well as other countries with poor performance, such as Mozambique and Algeria, for example, they should promote absorption of technology by firms and reinforce subsidies for firms for R&D, because as we saw, there exists a positive relation between innovation index and those variables. So, these countries can promote their innovation and consequently their competitiveness.

Companies should spend more on R&D for the same reasons referred to above. The governments should also promote adult alphabetization and protection of intellectual property by law in these countries as we can see in tables 3 and 4 (see



annex), they have low rates of adult alphabetization (% 15 years and over) and low protection of intellectual property.

High rates of adult alphabetization can stimulate companies and firms to employ skilled personal according to their necessities and this personal can and it is ready to work with advanced technology and to effect R&D for development of their activities.

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**ANNEXES**

TABLE 1

**Business Investment in R&D and Firm-level Technology absorption**

<b>Business Investment in R&amp;D, 2004</b>			<b>Firm-level Technology absorption, 2004</b>	
<b>(1)</b>			<b>(2)</b>	
<b>Country</b>	<b>Ranking</b>	<b>Score</b>	<b>Ranking</b>	<b>Score</b>
Tunisia	37	3.46	24	5.31
South Africa	24	4.03	28	5.22
Kenya	32	3.66	71	4.21
Uganda	38	3.42	66	4.27
Namibia	42	3.29	45	4.77
Botswana	44	3.21	70	4.22
Nigeria	47	3.15	75	4.05
Mauritius	50	3.12	55	4.47
Madagascar	55	3.03	48	4.70
Zimbabwe	62	2.97	90	3.57
Morocco	66	2.94	74	4.11
Ghana	67	2.92	60	4.40
Tanzania	69	2.90	69	4.22
Egypt	72	2.85	37	5.05
Gambia	73	2.85	86	3.81
Malawi	77	2.81	88	3.64
Zambia	80	2.73	64	4.29
Mozambique	81	2.72	97	3.16
Mali	82	2.68	72	4.17
Algeria	94	2.42	57	4.47
Angola	102	1.93	103	2.78
Chad	103	1.91	99	3.13
Ethiopia	104	1.85	96	3.26

Source: World Economic Forum, 2005

TABLE 2

Subsidies for firms-level research and development and Company spending on research and development

Subsidies for firms-level research and development, 2004 (1)			Company spending on research and development (2)	
Country	Ranking	Score	Ranking	Score
Tunisia	13	4.62	37	3.5
Kenya	67	2.67	32	3.7
Gambia	61	2.75	73	2.8
Botswana	34	3.41	44	3.2
Morocco	42	3.30	66	2.9
Ghana	69	2.61	67	2.9
Mauritius	54	2.94	50	3.1
Namibia	47	3.17	42	3.3
Uganda	41	3.31	38	3.4
Zimbabwe	79	2.33	62	3.0
Nigeria	52	2.99	47	3.1
Zambia	72	2.61	80	2.7
South Africa	39	3.31	24	4.0
Malawi	81	2.29	77	2.8
Algeria	45	3.21	94	2.4
Egypt	35	3.38	72	2.8
Ethiopia	87	2.08	104	1.8
Tanzania	46	3.19	69	2.9
Mozambique	84	2.23	81	2.7
Mali	38	3.32	82	2.7
Madagascar	69	2.61	55	3.0
Chad	89	2.04	103	1.9
Angola	94	1.75	102	1.9

Source: World Economic Forum, 2004 and 2005

TABLE 3  
**Rate of adult alphabetization**  
**(15 year and over)**

Countries	Rate of adult alphabetization (15 year and over)	
	1990	2003
Angola	42%	66,8%
Mozambique	33%	46,5%
Botswana	68,1%	78,9%
Democratic Republic of Congo	47,5%	65,3%
Lesotho	78,0%	81,4%
Malawi	51,8%	64,1%
Mauritius	79,8%	84,3%
Namibia	74,9%	85,0%
Seychelles	89,0%	91,9%
South Africa	81,2%	82,4%
Swaziland	71,6%	79,2%
Republic of Tanzania	62,9%	69,4%
Zambia	68,2%	67,9%
Zimbabwe	80,7%	90,0%

Source: Human Development Report 1993 and 2005

TABLE 4

**Protection of Intellectual Property on different countries of the World**

Countries	Protection of intellectual property	
	Ranking	Score
Sweden	1	6.3
Denmark	2	6.3
United States	3	6.2
Germany	4	6.2
Finland	5	6.1
United Kingdom	6	6.1
Netherlands	10	6.0
Singapore	13	5.7
France	14	5.7
Austria	15	5.7
Canada	16	5.7
Luxembourg	17	5.6
Belgium	18	5.5
Ireland	21	5.2
South Africa	22	5.0
Malaysia	25	4.8
Tunisia	26	4.8
Estonia	29	4.7
Portugal	30	4.6
Spain	31	4.5
Slovenia	32	4.5
Namibia	33	4.5
Hungary	37	4.2
Egypt	38	4.1
Thailand	39	4.0
Czech Republic	43	3.9
Ghana	44	3.9
Italy	45	3.9
Indonesia	47	3.9

Source: WORLD ECONOMIC FORUM, 2004



TABLE 4

(Continuation)

Countries	Protection of Intellectual Property	
	Ranking	Score
Malta	50	3.7
Brazil	51	3.7
Uruguay	53	3.6
Mauritius	55	3.5
Malawi	57	3.5
Botswana	58	3.5
Lithuanian	61	3.4
Mexico	62	3.3
Mali	66	3.3
Gambia	67	3.2
Madagascar	69	3.1
Zimbabwe	70	3.1
Kenya	71	3.1
Latvia	72	3.1
Nigeria	73	3.0
Tanzania	74	3.0
Zambia	75	3.0
Algeria	77	2.9
Poland	79	2.8
Philippines	82	2.7
Uganda	85	2.7
Argentina	88	2.5
Mozambique	89	2.5
Peru	90	2.4
Vietnam	93	2.4
Ecuador	95	2.3
Paraguay	97	2.2
Ethiopia	99	2.2
Chad	102	2.0
Angola	104	1.8

Source: WORLD ECONOMIC FORUM, 2004

