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Fatma Braham and Sami Mensi

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Send correspondence to:
Sami Mensi
University of Manouba & ECOFI Laboratory
Sami.Mensi@fsegt.rnu.tn

Abstract

In this paper we are interested in the phenomenon of internalization and/or globalization of firms. More precisely we examine a sample of 34 corporations operating in the telecommunications sector and rank them according to different indicators of internationalization. We propose a new indicator and compare it essentially with the Generalized Herfindhal one. In our point of view, this new indicator fits itself very well the global nature of the firm, the data and robustness.

ملخص

نهتم في هذه الورقة بظاهرة استيعاب أو عولمة الشركات . ولنكون أكثر دقة فقد فحصنا عينة من 34 شركة تعمل في قطاع الاتصالات السلكية واللاسلكية وصنفناها وفقا لمؤشرات مختلفة من التدويل. نقترح مؤشر جديد ونقارنها مع مؤشر Herfindhal المعمم . في وجهة نظرنا، هذا مؤشر جديد يتلائم بشكل جيد جدا مع الطبيعة العالمية للشركة، والبيانات والمتانة.

1. Introduction

The emergence of a new international trade concept at the beginning of the 1980s reveals an important gap between standard theories based on exchange between countries (nations) characterized by different factorial endowments and new international trade theories where mobility of the new factor of production and Foreign Direct Investments (FDIs) are very much involved. Indeed, productive systems are being more and more dynamic and so they generate more situations of imperfect competition which need new models and tools from industrial and geographical economics.

Many authors studied these questions, in particular those concerned with the internationalization of production systems. Coase (1937) In his famous book "The Nature of Firm" has distinguished between firm borders and market borders in the sense that a firm substitutes its borders for market borders when the cost of internal transactions is lower than market utilization costs (Horstman and Markusen 1992) It is to Dunning (1979, 1988a, 1988b) that we owe the most convincing synthesis on this topic. To overcome the shortcomings of its approach named Ownership Location Internalization (OLI), he proposed a comprehensive explanation for the emergence of multinational firms. Thus, a firm decides to internationalize its production if: (a) it possesses a certain power on the market coming from ownership of part of production or of the process, (b) there is a real gain to delocalize a part of its abroad activities (Location), and (c) there are some advantages for the firm to keep the control of production entities delocalized rather than to externalize these activities (internationalization).

Nevertheless, these new approaches of international trade analysis are far from being unified in a coherent theoretical framework leading to many questions regarding the phenomenon of firms' internationalization. In 1995, the United Nations Conference on Trade and Development (UNCTAD) published its annual world investment report. In this report, we find a list of the top 100 transnational corporations for the developed countries and the top 50 transnational corporation for the developing countries. These rankings are made using a Transnationality Index (TI). This index is the main UNCTAD tool for measuring the internationalization phenomenon.

Other indicators are used by other international organizations and economists in order to rank multinational firms operating in the same sector or to distinguish the most internationalized among them known as global firms. Nevertheless, these rankings are far from being similar and they are inadequate to describe the degree of internationalization of such firms. In this paper, we review the main internationalization indicators and set up a new one in order to get answers to these research questions: How we can rank firms on the basis of their degrees of globalization? What is a good firm globalization strategy? And what is a global firm?

The paper is organized as follows: Section 2 gives an overview of common criteria used to classify multinational firms. Section 3 examines two pivotal notions: internationalization and globalization. Section 4 is devoted to the quantification of the globalization strategy by setting up our new indicator after a brief discussion of existing indicators. In Section 5 we are concerned with statistical analysis and empirical validation, where we present a concrete use of the new indicator to rank a sample of multinational firms operating in the telecommunications sector and compare with the generalized Herfindhal indicator. Section 6 concludes the paper.

2. The Common Classification Criteria for Multinational Firms

Before starting on the question of measurement or quantification of firms' internationalization phenomenon, we must specify some important definitions and key concepts. More precisely, we present in this section the main criteria for classifying multinational firms into homogeneous groups. In this respect we distinguish between the

international firm, the multinational and the transnational one. We mention thereafter other criteria used to classify these firms. Finally we will show that the choice of an optimal criterion of the degree of firms' internationalization strongly depends on the retained definition.

2.1 Criteria of restraining definitions of multinational firms

Many economists, like Vernon (1966), were earlier to think that if we considered multinational every firm that had at least one subsidiary, a branch or an abroad involvement, we risk to include a large range of firms without taking account of the specific features of the new firm behavior, known as global, for instance General Motors, IBM....Thus many economists propose to limit the Multi-National firm expression (MN) to big-sized firms for which an important part of their production activities is assured by premises situated in a country other than their home country. This definition excludes distribution networks that are increasingly taking ground in the world. Otherwise, several classifications of internationalized firms have been suggested since the 1960s. Indeed, Perlmutter (1969) distinguished three categories of internationalized firms: ethnocentric multinational firms, for which production remains centered in the country of origin; polycentric multinational firms, that are implanted in several countries considered as different markets; and geocentric multinational firms, for which production processes are shared through the whole international market but are managed in a unique way.

Many recent works on multinational firms define the global firm according to the last category, mainly the works of Porter (1979, 1980, 1986a), where he insists on the high level of coordination and hierarchy between their subsidiaries. In this regard, Porter distinguishes between global firms and what he called "multidomestic" firms. The latter group is characterized by a weakness of coordination between their subsidiaries due to their extreme dispersion throughout the world.

2.2 International, multinational and transnational firms

Hugonnier (1984), explains the distinction between the "multi-", "inter-" or "trans-" national firms, by advancing the following definitions : (1) a firm is international if we can suppose that its activities have reciprocal impacts of the same nature on at least two countries; (2) a multinational firm is one that has several nationalities and whose property and control are spread over people having different nationalities, and (3) a transnational firm is an enterprise that operates from its headquarters through the national borders of other countries. The author adds that the multinational term often refers to firms that have beneficial effects on both the home country and the host countries. Concerning the transnational term, he adds that "the transnational term recalls to ideas of exploitation, domination in business... transnational firms are the international modern vector of capitalism in developing countries."

The international term was left out because it looks unrealistic. Few firms are owned and controlled by moral or physical people from different countries, and thus satisfy the definition mentioned above. Nowadays, this distinction is left out, since the emergence of South Asian and South American transnational corporations had it that the "multinational" and "transnational" terms lost their ideological appeal.

2.3 Classification of multinational firms

Because multinational firms don't generally have the same features, Hood and Young (1982) have regrouped them in four categories: their outside engagement, their organizational structure, their original countries or their host countries. In the first case, we are interested in the degree of internationalization that depends on size, presence in various regions across the world and on the abroad engagement in terms of the firm's activities in its original country. In the second case, they highlight the shape of the firm's organization. They distinguish

between firms having accidentally abroad activities and those having a global strategy of engagement throughout the world under the following conditions: (1) they act on the goal to achieve a global objective through the coordination of activities of all their entities, and (2) they consider that their general operation zone is not limited to their country of origin but concerns all the countries where they operate. In the third case, a firm would not be multinational if it acts solely for the interests of the parent company and/or the country of origin. Otherwise, the multinational firm must exceed nationalistic considerations and focus on optimizing the interests of all its entities (parent company, subsidiaries, branches, etc.), to be either geocentric or polycentric.

Other classifications have been established, among them one that takes into account activity type. Three sectors are generally considered: The primary sector (extraction, mining, and exploitation of raw materials), the secondary sector (manufacturing industries) and the tertiary sector (services including banking, insurance, tourism, transport, consulting, etc...). The activity undertaken in each sector determines to a large extent the firm's internationalization behavior. In fact, it is argued that in the primary sector, minority subsidiaries and firms are the most dominating. In the secondary sector, it is the majority subsidiaries, and in the tertiary sector, it is the branches that are the center of decision. A last distinction is made on the basis of either the multinational firm's country of origin or on the host country. Regarding country of origin, we further distinguish four global models of international engagement:

- The American-European model: It started in the 1950s and is characterized by a preponderance of orientation towards developed countries and the secondary sector as the abroad implantation sector of choice. According to this model, full ownership is the most common engagement type.
- The Japanese model: It is characterized by the fact that FDIs are mostly made by small and medium firms whose activities are not the production of goods but rather services and trading (notably sales). Indeed, their objective is to find worldwide outlets for products of other Japanese firms.
- The Eastern countries model: It is characterized by the fact that activities of firms are done within the Organization of Economic and Commercial Development OECD zone, or in other industrialized countries. The key sectors are mentioned as follows in a decreasing order of importance: the tertiary sector (essentially merchandizing of products imported from Eastern countries, banking services, transport and technical support), the industrial sector (essentially extraction and transformation of raw materials). As for the shape of engagement in the industrialized countries, implantations in eastern countries are especially oriented towards tertiary sector and are completely owned by parent companies (100% involvement). On the other hand, involvements in developing countries are very small in percentage.
- The developing country model: It is characterized by the fact that FDIs are generally streamed towards other developing countries and mainly target the oil sector. These investments are made by big firms. Co-firms are the most common type in this model. This kind of engagement is noticed as well for the first wave of FDIs coming from Hong Kong, Brazil, Singapore, India, South Korea, Taiwan, Mexico, Argentina and Venezuela, as well as for the second wave originating from Colombia, Indonesia, Philippines and Thailand.

3. Internationalization - Globalization and Strategies of Firm Internationalization

According to some authors, internationalization is a strategic decision where the firm opts for a foreign market. Thus, an understanding of this phenomenon requires a specification of an internationalization strategy. This specification rests on criteria that can be clear but are

vaguely expressed. One of these is the exclusive reference to internationalization or the maintenance of a distinction between globalization and internationalization. Indeed, Ohmae (1985) is one of the first authors who promoted the idea of internationalization. He exposed his vision of the world economy as well as he provided advice concerning strategy for firms that are concerned by internationalization. The world strategy, according to him, takes into consideration the three poles of the "Triad", the United States, Japan and Europe and voices a global vision.

Porter (1979) takes an approach to globalization that is founded on the nature of the firm's strategy. He affirms that the global sector is the one in which "the competitive position of a firm in a country is affected meaningfully by its position in other countries and vice-versa." In other words, a firm's previous engagements determine its globalization pace and content. Indeed, in setting a global strategy, a firm sells its product in several countries and uses a ready-made approach to its internationalization. To be a multinational doesn't necessarily imply a global strategy if the multinational has subsidiaries that operate independently in every country (Porter 1980).

Nevertheless, many publications of the OECD use the term globalization instead of internationalization because globalization means "the internationalization of the productive system" (Tanaka and Vickery 1993). Veltz (1996) is among the authors who insist on a clear cut difference between internationalization and globalization. While referring to internationalization, he focuses on economic openness process. However, he believes that openness does not imply the creation of a homogeneous international market. Hence, we may argue that a strategy is a global concept that concerns all aspects of the firm's behavior in terms of "product-market" positioning. This strategy is first national then international by exporting and creating subsidiaries abroad. Consequently, there is a group of several subsidiaries composed of different nationalities, i.e. the draft of a multinational. The group occupies an international space by intervening in several markets. However, the success of the competitive game depends on features of the product and production costs to which transportation costs are added. The production out of the firm's original country can serve to supply the original country as well as countries of its trade network. The firm sets up a production/sales network that spreads through several countries. At this stage, the firm is qualified as transactional. This stage of development rests on FDIs, a transfer of capital and risk. The firm contributes to the international market by making worldwide exchanges. Its strategy is then mainly founded on spatial and on competitive conditions. The firm can adopt a regional, continental or a global integration strategy.

4. Setting Up the New Indicator

In this section we propose a new indicator of internationalization, to quantify the degree of internationalization of transnational firms. This indicator then allows for a new ranking of such firms taking into account their global strategy. Before defining our new indicator, a brief discussion of the main indicators used in the literature is of an order. The OECD's indicator is defined on a scale of 1 to 10. (OECD, 1997). For instance a firm, whose investments that are coming from outside are less than 10% of total investments, has an indicator between 2 and 3. Because of its qualitative nature, it is difficult to use this indicator to rank internationalization of firms. Since 1995, the UNCTAD has begun to rank top transnational corporations based on their foreign assets, (UNCTAD, 1995). For instance, the annual world investment report gives the ranking for the top 100 firms of the developed countries.

For a given firm i, this indicator is defined as

$$\frac{\sum_{j=1}^{3} R_{i,j}}{3}$$

Where

$R_{i,1}$ denotes the abroad sale rate.

$R_{i,2}$ denotes the abroad labor rate.

$R_{i,3}$ denotes the abroad asset rate.

We think that the major weakness of this indicator comes from the fact that it translates both supply (labor and capital) and demand factors (sales). This indicator is somehow unstable in the sense that the rank obtained changes considerably with time. Defined as an average, this indicator is sensitive to outliers. Actually this indicator gives no idea about how global a firm is. For instance some American corporations focus most of their activities on home regions, nevertheless they are well ranked.

The Herfindhal's indicator, denotes by X_i (resp. $X_{i;j}$) the amount of a quantified activity of a firm i (resp. in a region or a country j). X_i could, for instance, be the global assets, sales, number of employees or subscribers etc.... The simple Herfindhal's indicator is defined, for a given firm i, by using the formula

$$\sum_{j=1}^{n} \left(\frac{X_{i,j}}{X_i} \right)^2$$

Where n denotes the number of countries of possible establishments. This indicator is not satisfactory because it supposes that all markets have the same importance. Actually it doesn't distinguish between firms established in one country and others established in the international market. Still using the same notations as before, the Generalized Herfindal's indicator is defined as:

$$\frac{n}{\sum_{j=1}^{n} \frac{\left(\frac{X_{i,j}}{X_i} \right)^2}{\left(\frac{GDP_j}{GDP} \right)}} \tag{1}$$

Where GDP (resp. GDP_j) denotes world's Gross Domestic Product (resp. the country j). We notice that the range of the generalized Herfindhal indicator could be very large without any reference values (see figure 7). Even though the generalized Herfindhal indicator takes into account proportionality between foreign activity rate of the firm i, $\frac{X_{i,j}}{X_i}$, and the economic weight of the host country $\frac{GDP_J}{GDP}$, it does not consider the distribution of the sector throughout the world.

Concerning the new indicator that we propose, we assume that the world is divided into 7 regions as follows: region 1: Western Europe, region 2: Eastern Europe, region 3: North America, region 4: Central and South America, region 5: Asia, Region 6: Africa, region 7: Middle East. We recall that X_i^k denotes the total amount of a quantified activity of a firm in a region k,

$$X_i^k = \sum_j X_{i,j}^k$$

Where $X_{i,j}^k$ is the total amount of the quantified activity of a subsidiary in a country j of the region k. By X^k we denote the total amount of the quantified activity of all firms in region k.

$$X^k = \sum_i X_i^k$$

X denotes the total amount of the quantified activity of all firms with the same activity in the world.

$$X = \sum_{k=1}^{7} X^k = \sum_{k=1}^{7} \sum_i \sum_j X_{i,j}^k$$

Finally we define $r_{k,i} = \dfrac{X_i^k}{X_k}$ as the weight of the firm i activity in region k and $\tau_k = \dfrac{X^k}{X}$ as the sector activity weight of region k in the world. We obtain the following two series:

τ_k	τ_1	τ_2	$\cdots$	τ_7
$\tau_{k,i}$	$\tau_{1,i}$	$\tau_{2,i}$	$\cdots$	$\tau_{7,i}$

For a given firm i, the new indicator is defined as the absolute value of the correlation coefficient of the two last series, defined by the following standard formula:

$$\rho_i = \left| \frac{\sum_{k=1}^{7} (\tau_k - \bar{\tau})(\tau_{k,i} - \bar{\tau}_i)}{\sqrt{\sum_{k=1}^{7} (\tau_k - \bar{\tau})^2} \sqrt{\sum_{k=1}^{7} (\tau_{k,i} - \bar{\tau}_i)^2}} \right| \tag{2}$$

where $\bar{r}$ (resp. $\bar{r}_i$) is the average of the series {r$_1$, ...r$_7$} (resp. {r$_{1,i}$, ...r$_{7,i}$}).

This indicator measures how much the dispersion of the activities of a given firm throughout the world is linearly correlated with the sector activity dispersion throughout the world. This indicator gives an idea about the globalization strategy of a given firm and could allow for a more realistic ranking of firms operating in the same sector or even in different sectors.

5. Empirical Study

As mentioned in the introduction, this section is devoted to an empirical validation of the new indicator. We examine a sample of 34 corporations operating in the telecommunications sector. Table 1 below reports the distribution of the number of subscribers by millions for 34 corporations located in different regions. The world is divided into 7 regions as follows: Western Europe: W.E.; Eastern Europe: E.E.; Middle East: M.E.; Asia: A.; Central and South America: C.S.A; North America: N.A.; Africa: Af.

We compute the new indicator (N.I.) for the 34 corporations using equation (2) and the generalized Herfindhal indicator (H.I.) using equation (1). The next table shows the firms' ranking based on each indicator:

Note that in most cases the rank given by the new indicator (N.I.) is close to the one given by Herfindhal indicator (H.I.). However, some of them, denoted by ←) are very different, like America Movil, Etisalat, Mobile Telesystems and Vodafone. Next, we treat these examples separately. First, we plot the diagram of the distribution of subscribers of all firms throughout the world (Figure 1), where regions are mentioned in the same order as in table 1 (1, 2… 7). We use this diagram as a reference. In fact, we compare this diagram to those of mentioned firms to get a visual idea of how much each distribution of subscribers of such firms is correlated with the world distribution.

The next figure (Figure 2) describes how Vodafone's subscribers are distributed throughout the world. We notice good correlation with the world distribution of subscribers (figure 1). This justifies the top position given to this firm according to the new indicator, while it is ranked 10th under the Herfindhal indicator.

Moreover, if we consider the Mobile-Telesystems firm, it is ranked 31st according to the new indicator and 15th according to the Herfindhal one. It is clear that the distribution of the subscribers of this firm (Figure 3) is far from the subscribers' distribution throughout the world (Figure 1). And so, we can consider that Mobile -Telesystems has a regional strategy rather than a global one.

Figure 4 describes the subscribers' distribution of America -Movil where it is clear that most of its activity is located in Central and South America (region 5 in the figure). Therefore America- Movil has no global strategy which justifies its last position according to the new indicator while it is ranked 24th by the Herfindhal indicator.

In the next figure (Figure 5) we consider Etisalat Corporation ranked 15th by the new indicator and 25th by the Herfindhal indicator. This medium position with respect to the new indicator is justified by the fact that this corporation adopts an internationalization strategy consisting in investing more in regions where the level of competition is not high.

5.1 Robustness of indicators

In this paragraph we aim at proving that the new indicator (N.I.) is more stable than the Herfindhal indicator (H.I.). We begin by ranking firms according to the new indicator, by using subsidiaries data and then compare it with the ranking already obtained by using subscribers data (see Table 4). Subsidiaries data are reported in Table 3.

We consider the two rankings as two series for which the linear correlation coefficient is $\rho= 0.66$. We interpret this good correlation as a good stability of the new indicator when changing the data. This confirms the fact that the number of subscribers of a firm is naturally correlated with its number of subsidiaries. Next we make the same test of stability for the generalized Herfindhal indicator. We collect Herfindhal ranking of firms, by using both subsidiaries data and subscribers' data, in Table 5.

The linear correlation coefficient of the last two series is $\rho = 0.24$. Compared to what we get when using the new indicator ($\rho = 0.66$), we claim that it is more stable than the generalized Herfindhal indicator. In addition, if we consider the statistical distribution of the generalized Herfindhal indicator of firms, we note that its range is too large which makes its statistical analysis difficult. (see Figure 7). In contrast, the new indicator distribution has the interval [0, 1] as a smaller and fixed range for all data (see Figure 6). This confirms further our claim about the stability of the new indicator.

6. Conclusion

This paper attempts to theoretically and empirically contribute to the problem of measuring internationalization of firms. Regarding the original country, we kept four global models of international engagement: The American-European model, the Japanese model, the Eastern countries model, and the developing country model.

A new indicator is proposed. This indicator measures how much the dispersion of the activities of a given firm throughout the world is linearly correlated with the sector activity dispersion throughout the world. This indicator gives an idea about the globalization strategy of a given firm and could allow for a more realistic ranking of firms operating in the same sector or even in different sectors. We focus our analyses on the telecommunications sector. We examine a sample of 34 firms that are installed in the 7 regions of Western Europe, Eastern Europe, Middle East, Asia, Central and South America, North America and Africa.

Firms are ranked according to different indicators of internationalization. Our empirical estimations point to the superiority of our index with regards to the nature of the firm itself, data and robustness.

According to UNCTAD estimations, the rate of internationalization of major transnational corporations drastically decreased in 2008, while international benefits decreased by 27 percent. The financial and economic crisis had important repercussions on sectors as much as on firms, with shrinking benefits, increasing unemployment figures and forced restructuring plans as evidence. However, the production output of the first 100 transnational corporations often represents a large proportion of the total transnational corporations' international production. During the three years 2006, 2007 and 2008, these 100 transnational corporations represented in average a 9 percent of foreign assets, 16 percent of sales and 11 percent of employment of the total transnational corporations. As for their combined added value, it increases the international GDP by 4 percent, a relatively stable rate since 2008.

If we consider the sectorial repartition of the first 100 transnational corporations in 2007, it is the manufacturing sector which remains better represented, with General Electric, Toyota Motor Corporation and Ford Motor Company at the top. Nevertheless, service-providing transnational corporations continued to progress; they became 26 in 2008, compared to 14 in 1993, with Vodafone Group and Electricité de France considered among the biggest. Primary-sector transnational corporations, among which Royal Dutch/Shell Group, British Petroleum Company and ExxonMobil Corporation, are well ranked due to an increase in their external revenues. As for developing countries' transnational corporations, there were seven highly diversified firms on the list, such as Hutchinson Whampoa and CITIC Group, and important electrical parts manufacturers, such as LG Corporation and Samsung Electronics.

Internationalization strategy of firms has been profoundly affected by the recent crisis and a new ranking of the most internationalized firms is expected. We expect this new index to provide new rankings. Its robustness has been proven in relation to the telecommunications sector. Its use to revise the rankings of other sectors should be encouraged.

In addition, the new classification, introduced by the new indicator, is likely to provide immediate guidelines in terms of governments' economic policies to stimulate competition and efficiency, to deal with the harmful effects of market power and to maintain social welfare.

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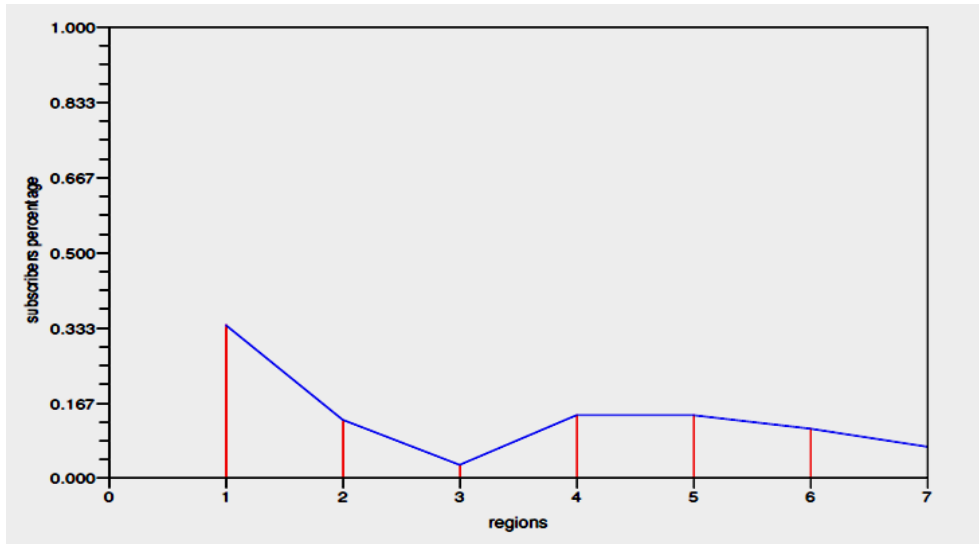**Figure 1: Distribution of Subscribers of all Firms throughout the World**

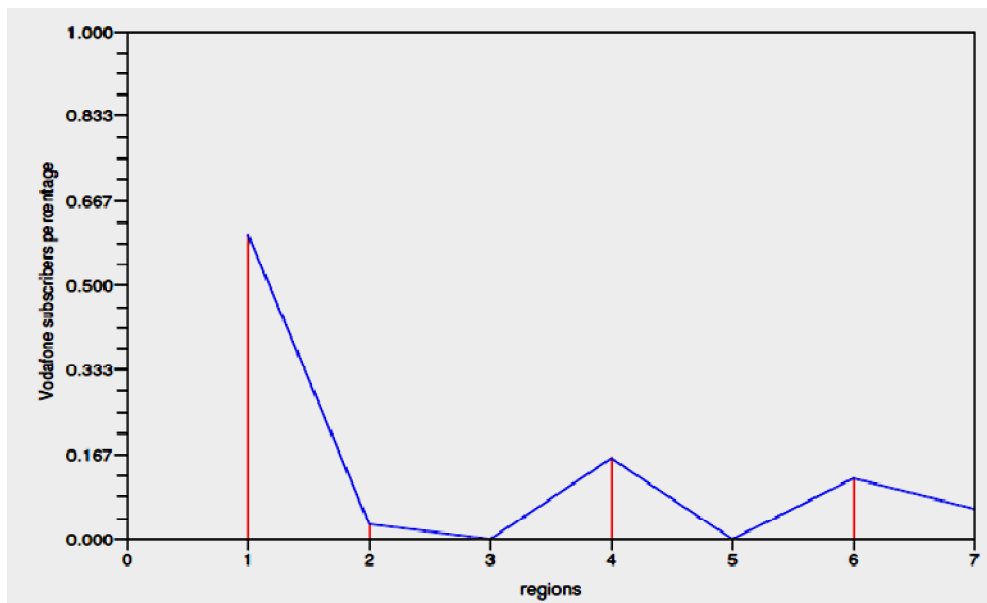**Figure 2: Distribution of Vodafone's subscribers**

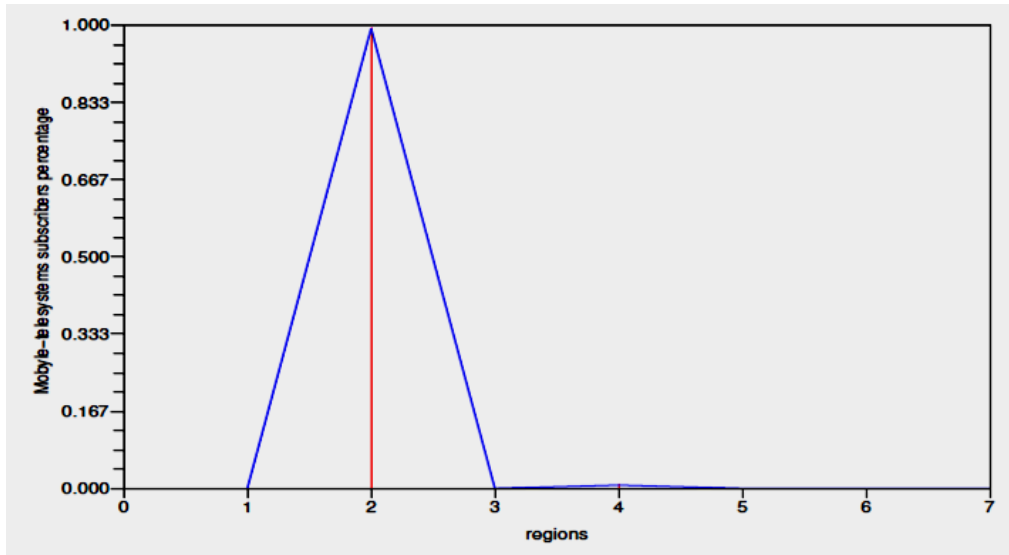**Figure 3: Distribution of Subscribers in Mobile-Telesystems**

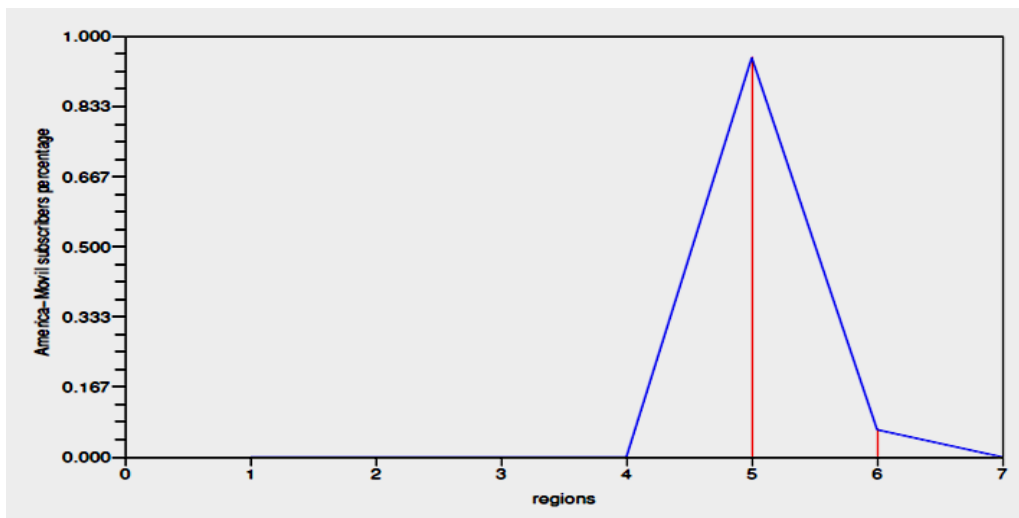**Figure 4: Distribution of Subcribers in America -Movil**
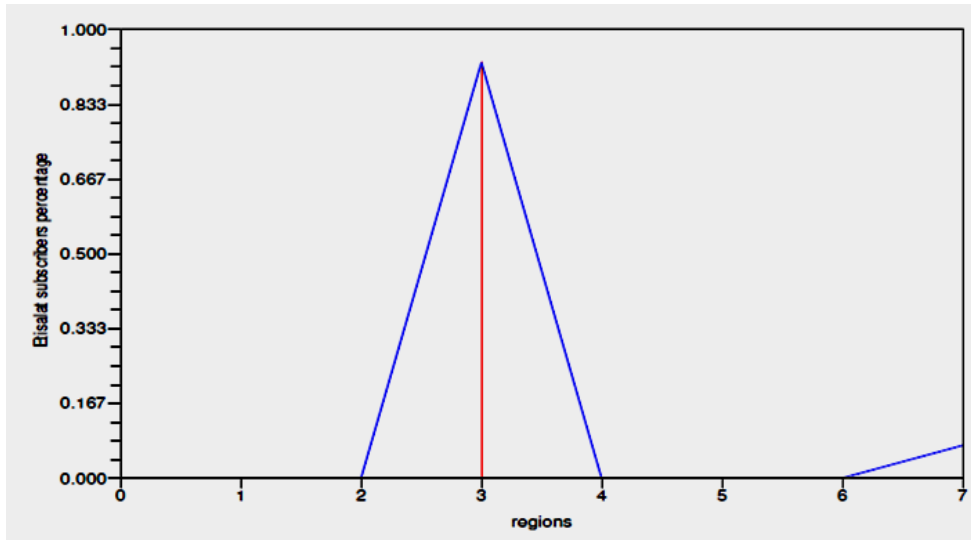
Figure 5: Distribution in Etisalat Corporation
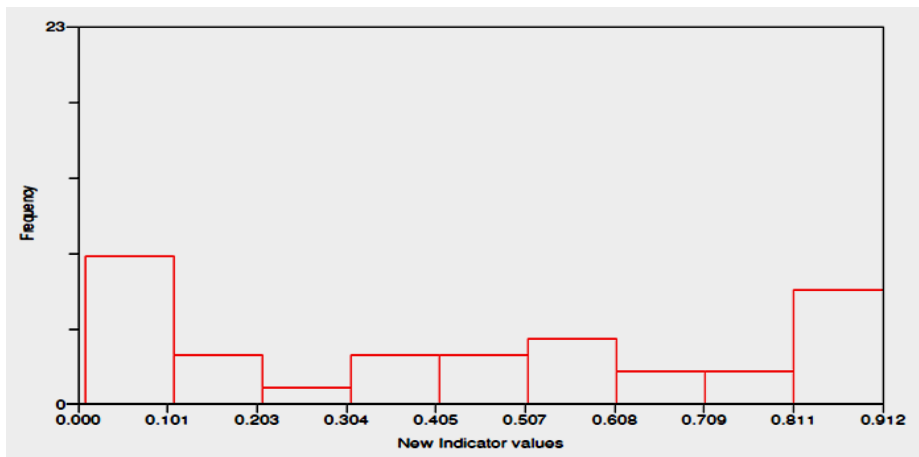

Figure 6: New indicator distribution

Figure 7: Herfindahl Indicator Distribution
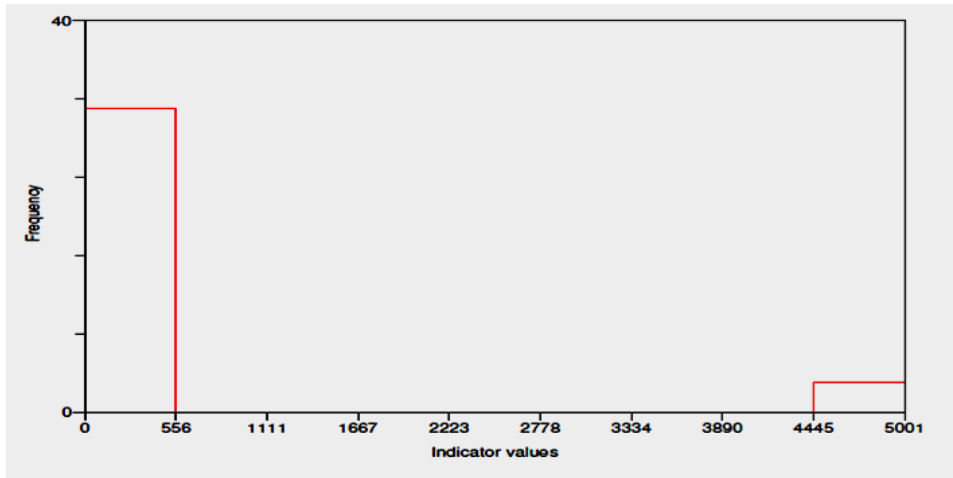
Table 1: Proportionate Subscribers by Region (31 December 2005)

Firms	W.E.	E.E.	M.E.	A.	C.S.A.	N.A.	Af.
Vodafone	108.534	6.880	-	29.785	-	22.785	11.332
America Movil	-	-	-	-	86.611	0.024	-
Deutshe Telekom	62.262	1.366	-	-	-	21.690	0.100
France Télécom	57.627	6.966	0.264	0.01	1.522	-	5.555
Telefonica	23.239	-	-	0.006	46.829	-	1.199
Mobile TeleSystems	-	58.579	-	0.495	-	-	-
Telecom Italia	-	2.179	-	18.790	-	-	
Sprint Nextel	-	-	-	-	0.493	44.287	-
VimpelCom	-	43.355	-	0.950	-	-	-
Telenor	7.293	21.064	-	14.242	-	-	-
Verizon Comms	5.470	-	-	-	3.251	28.482	-
TeliaSonera	12.370	10.353	11.498	1.262	-	-	0.295
NTT	-	-	-	33.975	-	-	-
Singapore Telecom	-	-	-	30.698	-	-	-
O2	27.417	-	-	-	-	-	-
Orascom	-	-	0.894	14.218	-	-	9.512
KPN	20.821	-	-	-	-	-	-
Vodacom	-	-	-	-	-	-	20.123
SK Telecom	-	-	-	19.423	-	-	-
MTN	-	-	-	-	-	-	18.294
Hutchison Whampoa	9.789	-	0.652	6.735	-	-	0.034
Portugal Telecom	5.312	-	-	0.082	9.299	-	1.634
Turkcell Holding	-	0.749	14.515	0.220	-	-	
Vivendi Universal	9.300	-	-	-	-	-	5.051
Telekom Malysia	-	-	-	13.704	-	-	0.141
Alltel	1.024	-	-	-	0.245	10.662	-
Tele2	8.413	2.648	-	-	-	-	-
TDC	9.987	-	0.039	-	-	-	-
MTC (incl. Celtel)	-	-	-	4.010	-	-	5.330
Telekom Austria	3.680	5.210	-	-	-	-	-
Millicom International	-	-	-	2.330	3.022	-	1.640
OTE	2.988	2.861	0.289	-	-	-	-
Etisalat	-	-	5.315	-	-	-	0.418
Investcom	0.065	-	1.452	-	-	-	2.234

Table 2: New and Herfindhal Indicator

Firms	N.I. rank	H.I. rank	N.I.	H.I.	
Alltelb	27	23	0,033766603	1,283074027	
America Movil	34	24	0,007875853	1,18224875	←
Deutsche Telekom	7	6	0,862220045	15,85008814	
Etisalat	15	25	0,517393257	1,115330094	←
France Telecom	6	4	0,897474958	85,09780241	←
Hutchison	9	21	0,80627349	1,460664139	
Investcom	13	18	0,554334103	1,684604964	
KPN	3	2	0,902699711	5001,146332	
Millicom	25	22	0,118919567	1,345350505	
Mobile Telesystems	31	15	0,02173751	2,471634413	
MTC	12	17	0,593422794	1,686079048	
MTNc	21	29	0,314019157	0,810082898	
NTT	29	33	0,023995968	0,223818373	
O2	2	1	0,902699711	5001,146332	
Orascom	23	30	0,19850149	0,597471624	
OTE	11	7	0,67197653	10,94218386	
Portugal Telecom	17	13	0,460314653	3,074085445	
Singapore Telecom	30	34	0,023995968	0,223818373	
SK-Tlecom	28	32	0,023995968	0,223818373	
Sprint-Nextel	24	27	0,119485321	1,048862531	
TDC	4	3	0,901338306	4652,696828	
Telcom Italia	8	9	0,806882594	7,086980381	
Tele2	5	5	0,898551075	42,47959916	
Telecom Malysia	33	31	0,020858136	0,228356355	
Telefonica	18	20	0,441771055	1,594377621	
Telekom Austria	14	8	0,547865645	7,099322158	
Telenor	22	19	0,284914007	1,662526162	
TeliaSoneraf	19	11	0,334075662	6,762135625	
Turkcell Holding	16	26	0,493030847	1,095187806	
Verizon Comms	26	16	0,058793526	1,731108297	←
Vimpel-Comp	32	14	0,021438761	2,53151639	
Vivendi-Universal	10	12	0,693648005	6,534401273	
Vodacom	20	28	0,314019157	0,810082898	
Vodafone	1	10	0,912160429	6,925090218	←

Table3: Number of Subsidiaries by Region

Firms	W.E.	E.E.	M.E.	A.	C.S.A.	N.A.	Af.
Vodafone	16	2	0	6	0	1	7
France Télécom	11	2	1	1	2	0	10
Telefonica	2	1	0	4	14	0	4
MTC	0	0	4	0	0	0	14
Telia sonera	7	3	4	2	0	0	1
Millicom Itern	0	0	0	4	5	0	7
Hutch-Whampoa	6	0	1	7	0	0	1
Telenor	5	3	0	7	0	0	0
Tele2J	13	2	0	0	0	0	0
America Movil	0	0	0	0	13	1	0
Deutshe Telekom	8	4	0	0	0	1	1
Orascom	0	0	2	7	0	0	5
Etisalat	0	0	3	0	0	0	8
MTN	0	0	0	0	0	0	10
TDC	9	0	1	0	0	0	0
Investcom	1	0	2	0	0	0	5
Portugal Telecom	1	0	0	2	1	0	4
Telekom Malysia	0	0	0	6	0	0	2
NTT	0	0	0	7	0	0	0
OTE	1	5	1	0	0	0	0
Singapore Telecom	0	0	0	7	0	0	0
Sprint Nextel	0	0	0	0	5	2	0
Telecom Italia	1	0	1	0	5	0	0
Turkcell Holding	0	2	4	1	0	0	0
Mobile TeleSystems	0	3	0	3	0	0	0
Alltel	2	0	0	0	2	1	0
Telekom Austria	3	2	0	0	0	0	0
Verizon Comms	1	0	0	0	2	2	0
Vivendi Universal	1	0	0	0	0	0	4
Vodacom	0	0	0	0	0	0	5
O2	4	0	0	0	0	0	0
VimpleCom	0	2	0	2	0	0	0
KPN	3	0	0	0	0	0	0
SK Telecom	0	0	0	3	0	0	0

Table 4: New Indicator Ranking Based on Subscribers and on Subsidiaries

Firms	Rank by subsidiaries	Rank by subscribers
Alltel	3	27
America Movil	0	34
Deutsche Telekom	3	7
Etisalat	1	15
France tel	1	6
Hutch-Whampoa	7	9
Investcom	2	13
KPN	2	3
Milicom Itern	1	25
Mobile TeleSystems	4	31
MTC	1	12
MTN	5	21
NTT	7	29
O2	1	2
Orascom	0	23
OTE	3	11
Portugal Telecom	2	17
Singapore Telecom	2	30
SK Telecom	0	28
Sprint Nextel	1	24
TDC	1	4
Tele2J	2	8
Telecom Italia	7	5
Tlfonica	6	33
Telekom Austria	1	18
Telekom Malaysia	6	14
Telenor	2	22
Telia Sonera	5	19
Turkcell Holding	3	16
Verizon Comms	2	26
VimpleCom	8	32
Vivendi Universal	2	10
Vodacom	9	20
Vodafone	2	1

Table 5: Herfindhal Indicator Ranking Based on Subscribers and on Subsidiaries

Firms	Rank by subsidiaries	Rank by subscribers
Alltel	19	23
America Movil	32	24
Deutsche Telekom	10	6
Etisalat	18	25
France tel	1	4
Hutch-Whampoa	6	21
Investcom	11	18
KPN	21	2
Milicom Itern	5	22
Mobile TeleSystems	25	15
MTC	15	17
MTN	22	29
NTT	27	33
O2	20	1
Orascom	9	30
OTE	31	7
Portugal Telecom	4	13
Singapore Telecom	28	34
SK Telecom	29	32
Sprint Nextel	33	27
TDC	16	3
Tele2J	13	9
Telecom Italia	24	5
Tlfonica	2	31
Telekom Austria	17	20
Telekom Malysia	14	8
Telenor	8	19
Telia Sonera	7	11
Turkcell Holding	30	26
Verizon Comms	34	16
VimpleCom	26	14
Vivendi Universal	12	12
Vodacom	23	28
Vodafone	3	10