

**A case study on spanish electrical utilities.  
Sector specific indicators for measuring intellectual  
capital**

**Un estudio en empresas eléctricas españolas.  
Sector de indicadores específicos para medir el capital intelectual**

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| RESUMEN  | ABSTRACT   |
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| <p>Partiendo de las bases conceptuales existentes, en materia de identificación, y medición de capital Intelectual, la presente comunicación intenta definir un conjunto genérico de indicadores para medir el capital intelectual de las empresas pertenecientes a un sector específico, que sirva como herramienta para realización de estudios futuros de comparaciones y evaluaciones intrasectoriales.</p> <p>Las variables que definen el capital intelectual pueden variar de un sector a otro, lo cual supone la necesidad de realizar un análisis específico para cada sector. El modelo de referencia a aplicar se ha definido tomando como base las "Directrices Méritum", así como</p> | <p>Taking into consideration the existing conceptual bases to identify and to measure intellectual capital, this paper tries to define a generic set of indicators to measure intellectual capital of companies belonging to a specific industry. Those indicators could serve as a tool to develop future comparative intra-industry studies.</p> <p>Variables that define intellectual capital could vary from industry to industry, which means the necessity to develop different analysis for every sector. The model we are applying in this paper is based on MERITUM Guidelines, as well as on Danish Guidelines.</p> <p>The industry studied in this paper is the "Electrical Utilities". That industry was</p> |

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| <p>también las “Directrices Danesas”.</p> <p>El sector objeto de estudio, las “Utilities Eléctricas”, tradicionalmente se ha caracterizado por su estructura oligopólistica, y su carácter regulado. No obstante, a partir de la directiva europea 96/92/CE, cuyo objetivo general consiste en la introducción de la competencia en el sector y la creación de un mercado único europeo, las empresas eléctricas en el ámbito español, han experimentado e introducido cambios que han supuesto el aumento de la relevancia relativa de su capital intelectual.</p> <p>Los resultados obtenidos, permiten afirmar que resulta factible la elaboración de un Sistema de Indicadores del Capital Intelectual genérico, que permita el establecimiento de unos estándares mínimos para el sector, que sean generalmente aceptados, y que apoyen las comparaciones que puedan requerir los analistas financieros, los inversores y, en general, la sociedad en su conjunto.</p> <p>Por otra parte las diferencias fundamentales entre las empresas se encuentran sobre todo en el grado de consolidación de las prácticas de gestión que inciden en los intangibles críticos, por lo tanto el objetivo de cada empresa se debe orientar fundamentalmente hacia la mejora y el desarrollo de las capacidades de gestión de sus respectivos intangibles críticos.</p> | <p>traditionally characterized by an oligopolistic market structure and regulated by a governmental agency. After the European Directive 96/92/CE, to create a single competitive European market, the Spanish electrical utilities companies have introduced many changes, which increased, in relative terms, the relevance of their intellectual capital.</p> <p>As a result of our analysis, and based on different companies’ case studies, we develop a System of Generic Indicators of Intellectual Capital applicable for the whole industry. Such System would allow the comparative studies required by financial analysts, investors and other stakeholders.</p> <p>We found that main differences among companies of that industry are a consequence of diverse management practices in relation to key intangibles. For that reason company objectives must be basically oriented towards the improvement and development of management of key intangibles.</p> |
| <p><b>Palabras clave:</b> Intangibles críticos, Medición de Intangibles, Capital Intelectual, Indicadores.</p>  | <p><b>Keywords:</b> Key Intangibles, measurement of Intangibles, intellectual Capital, indicators.</p>   |

## 1. INTRODUCTION

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The importance of knowledge and information for businesses has been widely documented whether it is defined as “know-how”, intangible assets or intellectual capital. More recently, the key role that these factors play in maintaining competitive advantage has become increasingly clear particularly in those industries deemed to be “information or knowledge intensive”.

During the 1990’s, there was a proliferation of research and analysis regarding the identification, measurement, valuation and propagation of intellectual capital within corporate organizations. Many of these analyses gave rise to specific guidelines for identifying, measuring and documenting the knowledge and information available to firms.

This paper assumes that the indicators and variables used to measure intellectual capital within a company may vary across sectors making it necessary to define what intellectual capital means for each individual industry. Using existing frameworks, this study seeks to define a set of sector-appropriate variables and indicators for measuring intellectual capital within the firm, which will allow future comparisons across companies within the same industry as well as an evaluation of publicly-available reported by these companies.

The electrical utilities sector, which is the focus of this study, has historically been characterized by oligopoly and a high degree of government regulation. However, with the ratification of European Directive 96/92/CE which seeks to introduce competition in the power industry and the formation of a single European market for electricity, Spanish utilities have experimented and introduced several changes which have increased the relevance and value of their intellectual capital.

To this end, this study seeks to accomplish two objectives. The first is the application of a framework of analysis for identifying and measuring intellectual capital within a specific industry. The second is a general overview of the power industry in Spain. The results contained herein are the product of four case studies conducted between June 2003 and December 2004 involving specific companies within this industry.

## 2. MEASURING INTELLECTUAL CAPITAL: THEORETICAL FRAMEWORK

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### 2.1. The theoretical basis of intellectual capital within the firm

The conceptual basis of intellectual capital within firms is contained largely within the scope of the Theory of Resources and Capabilities (Resource Based View). This is the approach reflected in the most recent papers that seek to review the evaluation, identification, measurement and management of intellectual capital including those written by Cañibano and Sánchez (2004), Andriessen (2004), and Kaufmann and Schneider (2004).

Their theoretical perspective underscores the importance for business of managing not only tangible assets but intangibles as well. However, the importance of managing diverse sets of assets within the firm was also captured in many seminal papers of the 50's, 60's, and 70's. Penrose (1958) writes on the nature of physical and human resources within companies. Ansoff (1958) argues that capabilities and comparative advantage of businesses resides in their physical assets such as property, plant and equipment but also in their organizational and management skills. Andrews (1971) establishes a direct link between those types of organizational capabilities and the achievement of corporate objectives.

The structured management of intangible resources such as know-how and commercial relationships was presented by Wenerfelt (1984, 1995) using the term "Recourse-Based View" or "Resource-Based Theory". Other theoretical contributions such as the concept of "dynamic capabilities" (Teece et. Al., 1997) and their implications in the development of corporate strategy (Grant, 1991, 1997) continued to shape this theoretical approach. However, it was Prahalad and Hamel (1991) who introduced these ideas in the business world through the notion of "core competencies", the importance for companies of focusing their efforts in those areas where they have a distinctive advantage, a view much in line with Grant.

Concurrently and particularly over the last decade a new paradigm based on knowledge and information has emerged both within micro and macroeconomics. Within the context of business, ideas such as corporate strategy, customer satisfaction, product development and the know-how involved in each have come to be viewed as factors equally or more important than traditional tangible assets (capital and labour). Likewise, within economics, there is a recognition that growth and development is based and driven by new factors such as technology and innovation. This approach has finally given rise to the study, conceptualization and definition of new models which better explain these dynamics and which give significant importance to the production process and the spread and implementation of know-how as set forth by Foray and Lundvall (1996). This has led to the widespread use of the term "Knowledge Based Society" which refers metaphorically to the convergence of these new situations which characterize the current environment (Cowan, et al., 2000).

Knowledge is precisely at the core of the framework developed by Nonaka and Takeuchi (1995) who posit a theory of management based on knowledge and information. The authors start from the epistemology of knowledge and show its implications in the way processes are designed and how the firm's resources are configured.

Knowledge needs to be managed using different philosophical concepts (empirical and rational) with the objective of optimizing its transformation from tacit to explicit and creating new knowledge within the firm (Nonaka and Takeuchi, 1995). Various other contributions such as Dru (1997), Moore (1996) and Quinn (1996) add to this perspective, which is now known as "Learning Organization".

In summary, both the perspective of Resources and Capabilities as well as Learning Organization emphasize the growing importance of intangible resources and knowledge within business competitiveness, thereby providing theoretical

support to further studies of intellectual capital. Given that both approaches suggest tools for systematically managing these types of assets within the firm, recently there have also been attempts to create an integrated model. One example is the works by Bueno, et al., (2004).

The measurement of intellectual capital within the firm gains importance during the first part of the 1990's. During this period, several models arise which are later integrated and consolidated through the publication of general guidelines that can be applied to different types of businesses. The following sections examine these models as well as the latest thinking with respect to the identification and measurement of intellectual capital in order to place the model used in this study within a broader context.

## 2.2. Evolution of models for measuring intellectual capital

The increasing importance of knowledge and other intangible resources for the effective management of organizations requires that these same firms extend their management and internal monitoring systems to include all the resources available to them whether tangible or intangible given that value creation relies on both. Likewise, from the perspective of outside parties such as investors or financial analysts, traditional accounting systems and financial statements are inadequate for conducting company valuations and establishing the value of intangibles (Cañibano and others, 1999) which are key for businesses to operate effectively.

The need for information from inside and outside the firm coupled with a paradigm shift in company management based on know-how and intangible resources led many companies and research institutions to develop tools for management and communication based on new quantitative models.

The widespread search for an appropriate methodology for valuing and measuring intellectual capital gave rise in certain measure to a proliferation of models. On one hand, these endeavours enriched the field of intellectual capital, but on the other hand, fostered confusion within businesses, which delayed implementing any model at all given the absence of a single unified approach.

According to Roos, G. and Roos, J. (2002), the various models can generally be classified into four perspectives, specifically (a) models designed to value intellectual capital, (b) models for the capital markets, (c) models based on the return on assets and (d) models based on indicators.

The first category, models that seek to directly value intellectual capital, seek to quantify in monetary terms those intangible assets that are typically accounted for by businesses such as trademarks, patents, copyrights and others. In the methods relevant to capital markets, in which Tobin's work is often a starting point, the value of intangible assets are defined as the difference between market value and book value adjusting each according to the methodology employed. Models based on return on assets seek to measure intangible assets by comparing the return on assets achieved by a company in excess of a normalized return.

With respect to indicators, there are various propositions the most well-known of which include Balanced ScoreCard (Kaplan and Norton, 1996), the Skandia Navigator (Edvisson and Malone, 1997), the Intellectual Assets Monitor

(Svieby, 1997) and Technology Broker (Brooking, 1996). The various dimensions considered in these various models are summarized in Table 1 and are classified according the standard categories of intellectual capital: human capital, structural, and relational.

**TABLE 1**  
**COMPONENTS OF INTELLECTUAL CAPITAL IN VARIOUS MEASUREMENT MODELS**

| <b>MODEL</b>                              | <b>HUMAN CAPITAL</b>               | <b>STRUCTURAL CAPITAL</b>                                   | <b>RELATIONAL CAPITAL</b> |
|---|------------------------------------|---|---------------------------|
| <b><u>BALANCED SCORE CARD</u></b>         | <b>EDUCATION AND DEVELOPMENT</b>   | <b>INTERNAL PROCESSES</b>                                   | <b>CUSTOMERS</b>          |
| <b><u>SKANDIA NAVIGATOR</u></b>           | <b>HUMAN CAPITAL</b>               | <b>PROCESS AND INNOVATION CAPITAL</b>                       | <b>CUSTOMER CAPITAL</b>   |
| <b><u>TECHNOLOGY BROOKER</u></b>          | <b>INDIVIDUAL ORIENTED ASSETS</b>  | <b>INFRASTRUCTURE ASSETS – INTELLECTUAL PROPERTY ASSETS</b> | <b>MARKET ASSETS</b>      |
| <b><u>INTELLECTUAL ASSETS MONITOR</u></b> | <b>HUMAN RESOURCES COMPETENCES</b> | <b>INTERNAL COMPONENT</b>                                   | <b>EXTERNAL COMPONENT</b> |

Source: based on Kaplan and Norton (1996), Edvinsson y Malone (1997), Brooking (1996), Sveiby (1997)

Rather than develop tools applicable to specific companies or situations, investigative bodies and regulatory agencies focused on structuring generic tools and methods which could be implemented by different types of organizations irrespective of their activity. The priority was improving corporate performance through the optimal management of intangibles as well as adequate disclosure in order to finally achieve a more transparent capital market thereby improving the allocation of capital. This was the main impetus behind efforts by the OECD, among other institutions, to incentivize further research in this area starting in the mid-1990's with the objective of adequately structuring the methodologies for identifying and measuring intangibles (Cañibano et. al., 1999 p.45).

Within the European Context, two sets of guidelines have been developed since the end of the 1990's. First, "Intellectual Capital Statements – The New Guideline" was elaborated by a Danish research team (the "Danish Guidelines<sup>1</sup>")

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<sup>1</sup> The official name of this publication is "Intellectual Capital Statements – The New Guideline" but in this paper we refer to this study as "the Danish Guidelines". The first edition was published in November 2000 with the sponsorship of The Danish Agency for Trade and Industry (DATI). The second edition was published in February 2003 with the sponsorship of the Danish Ministry of Science, Technology and Innovation (DMSTI).

(DMSTI, 2003). Second, the Méritum Guidelines<sup>2</sup> (Cañibano et. al., 2002) focused on the management and reporting of intangible assets.

The various stages and components of both guidelines are set forth and compared in Figure 1. The Meritum Guidelines are based on the conceptual framework of resources and capabilities such that the key intangibles are defined on the basis of strategic objectives. The intangible assets correspond to the key competencies that the company should acquire, maintain or develop through all types of intangible activities. The guidelines comprise a stage of identification followed by a system of measurement whereby a system of indicators is defined and finally a phase of follow-up and action.

The “Danish Guidelines”, in contrast to the key intangibles of the “Méritum Guidelines”, apply the concept of “management objectives”, which are defined as a function of value creation for clients and customers. This framework also sets forth a set of initiatives for achieving these management objectives as well as a system of key indicators for monitoring progress.

Several analyses such as those carried out by Nordic Project (2001), Del Bello (2002) and Guimón (2002) among others have compared these methodologies identifying some areas of compatibility among them. While the classification of indicators set forth in the “Danish Guidelines” is much more detailed and easier to understand in practice, the “Méritum Guidelines” are conceptually stronger given that they establish a link with strategic objectives. Further, the “Danish Guidelines” are designed to provide external information through the development of the Intellectual Capital Report while the “Meritum Guidelines” address the need for both internal and external information.

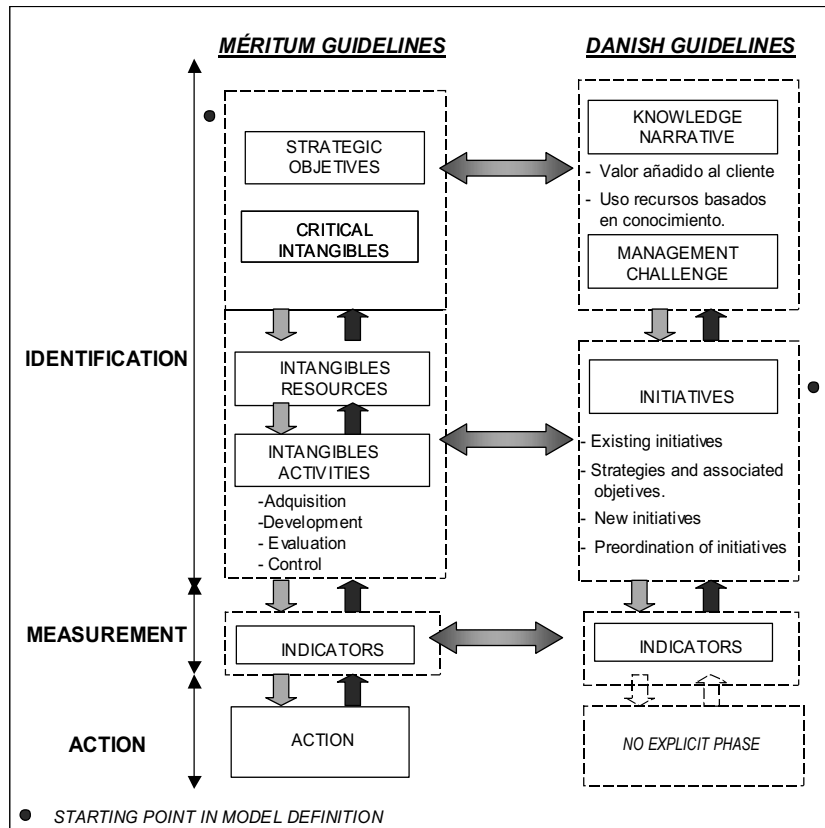
### **2.3. Recent studies on the measurement and reporting of intellectual capital**

Most recently, studies addressing the measurement and disclosure of intellectual capital have focused on three main topics: a) the validation of consolidated guidelines and models developed in previous years by applying them to different organizations; b) monitoring trends with respect to the disclosure of the intellectual capital of organizations as well as its use by third-parties; and c) the evaluation of intellectual capital indicators in order to detect the positioning of each in specific sectors.

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<sup>2</sup> These guidelines were not published as Meritum Guidelines, but given that they are one of the products from the Meritum project, they are often referred to as such in various articles, and we continue to do so in this paper. They were first published in November 2002 and constituted one of the principal products of the Meritum project, which was financed by the EU to address the issue of intangibles comprehensively. This project had the support and participation of researchers from various educational, governmental and research institutions within Europe including Denmark, Spain, Finland, France and Sweden.

**FIGURE 1**  
**ELEMENTS OF THE INTELLECTUAL CAPITAL MODELS UNDERLYING**  
**THE MERITUM AND DANISH GUIDELINES**



Source: source: developed on the basis of dmsti (2003b) y cañibano y otros (2002)

Many of these studies have revealed that the application and adaptation of guidelines and models depend on the individual characteristics of each company as well as their cultural and geographic context (Chaminade and Roberts, 2003).

The implementation of these models inside the firm, have also revealed that management should not only focus on the intangible assets of the company but that an integrated view of both intangible and tangible assets is needed (Bernad, 2004). In this regard, significant contributions have been made by researchers that have revived the Balanced Scorecard model, in whose fundamentals is the definition of the elements (both tangible and intangible) that allow reaching a company's strategic objectives. Within this perspective are included works by Mouristen et. al. (2005) and Anne Wu (2005).

With respect to trends in the disclosure of intellectual capital, various empirical studies have been conducted setting out the advances by companies in the reporting of information related to intellectual capital in different geographic contexts. Several countries have been studied including India and Spain (Ordóñez de Pablos, 2005); Holland, France and Germany (Vergauwem, 2005). Likewise, other studies have evaluated the use that financial analysts would have for these reports (Guimón, 2005). The conclusions indicate that because reporting is voluntary, very few companies disclose any information regarding their



intellectual capital and that there are limitations with respect to the verifiability of the data reported.

Thirdly, with respect to the evaluation of variables related to intellectual capital, several case studies have been conducted in sectors such as biotechnology and telecommunications (Palacios and Garrigós, 2003), hospitality (Engström et al., 2003) and services (Lim and Dallimore, 2003). In each case, the starting point has been a specific model comprising a host of predefined variables, and then taking selected portions of the model in function to their relevance to the sector in question.

Each of these studies, however, reveals the limited applicability of these guidelines for measuring and managing intangible assets within specific industries. Each case gives rise to the question of the appropriate variables that should be used for each type of evaluation. Utilizing a single set of variables does have the advantage of facilitating a future comparison of studies covering different sectors. However, it is also possible that key variables of particular importance to an industry are omitted.

This study attempts to define those variables that are most relevant to a particular industry by applying the existing guidelines. This is a first step toward a comparison and evaluation across various sectors.

### 3. DESCRIPTION OF THE MODEL TO BE APPLIED

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The conceptual bases of this paper are principally the “Méritum Guidelines” and the “Danish Guidelines”. From the Méritum Guidelines we have adopted the recommendations set out in the chapters entitled “Identification” and “Measurement”, which highlight Key Intangibles as the axis for designing a model for intellectual capital and the characteristics that a system of indicators should fulfil.

From the Danish Guidelines we have borrowed the methodologies designed therein for the gathering of information (Helping questions, Suggested tables for collection of information, etc.).

This paper does not start with any predetermined indicators of variables as its purpose is to identify those that should be defined and validated. However, given the need to begin from an initial point of reference, recent models are used including the Intellectus Model, the annexes to the “Danish Guidelines and specific documents from the electrical utilities sector.

We have modified the structure used for the system of indicators to facilitate the validation of the key variables. The purpose of these modifications has been to define a set of first order variables (general) for each key intangible, which are then defined as a function of other second order variables (specific variables). The primary objective of this approach is to facilitate the elaboration of the validation questionnaires and likewise a review of the set of indicators ultimately established.

These variables are related to two concepts set forth in the Méritum Guidelines, the intangible resources related to key intangibles as well as the

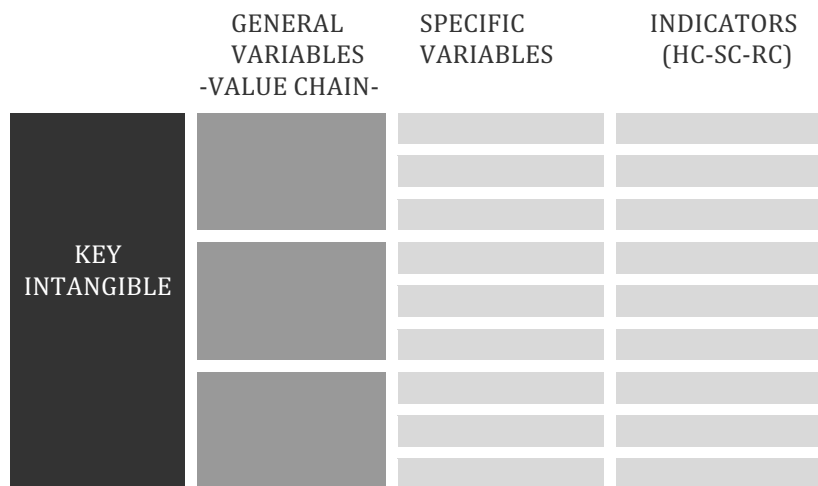
activities undertaken to develop each intangible. In order to facilitate the definition of key variables and relate them to the reality of business, the concept of “intangible value chain” has been incorporated as an ancillary tool in order to establish the basic sequence of activities or initiatives that the firm ought to undertake in order to develop the relevant key intangible.

Only at the end of this process are the different variables and indicators classified on the basis of their relationship to human capital, structural capital or relational capital. In other words, the definition of the key variables has focused on processes and takes into account the activities that the firm should undertake to manage its intangibles.

Taking into account these considerations, the structure of the model in which the variables and indicators are defined, features the following categories as set forth in Figure 2.

- a) **Key Intangibles** are defined as the core competencies that the firms in an industry need to develop maintain, develop or acquire in order to achieve their strategic objectives. In other words, these objectives comprise the challenges, in terms of intangibles, faced by electrical utilities in the current environment. These intangibles form the fundamental basis of the intellectual capital model for firms in this sector on which the model is designed and developed.
- b) The **Relevant General Variables** are defined as a function of the “intangible value chain”, in other words the overarching management processes that contribute to the acquisition, development and maintenance of the key intangibles.
- c) A subcategory of **Specific Variables** which comprise the general variable, related to the activities undertaken to manage each key intangible respectively. These variables are defined only at the firm level given that they lose relevance at the industry level.
- d) A series of **Indicators** are used to measure the corresponding variables; these indicators can, in turn, be classified in relation to Human Capital, Structural Capital and Relational Capital.

**FIGURE 2**  
**KEY ELEMENTS OF THE REFERENCE MODEL USED**



HC: Human Capital, SC: Structural Capital, RC: Relational Capital

## 4. METHODOLOGY

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The methodology used to analyze intellectual capital in the electrical utilities sector is based on the premise that measuring intellectual capital requires the definition of the best possible set of variables and that these variables and indicators may vary from one sector to another. Taking this into account, and following the recommendations in Yin (1984, 1993), case studies have been used as the key research method in order to ultimately develop an integrated analysis of these cases.

In order to collect data, we have used tools recommended by researchers such as Miles (1979) and Stake (1995) for developing case studies. In general, our approach begins with qualitative data derived from semi-structured interviews in order to define the key intangibles of the model and from there elaborate a first proposition of variables in each of the cases researched. For the final validation of variables and indicators, surveys have been used to collect opinions, which are subsequently quantified with the objective of arriving at a systematic analysis for the sector.

### 4.1. Purpose of the study

From a practical perspective, this study seeks to provide a set of indicators of intellectual capital common to companies within the electrical utilities sector, which can be used in future evaluations and which facilitate collaborative industry benchmarking.

### 4.2. Selection of cases

The electrical utilities sector in Spain is comprised of companies whose principal activities include the generation, transmission, distribution and marketing of electricity. Vertical integration is limited as a result of the policies implemented starting in 1997 in order to inject competition into the sector. The different segments of the value chain must be performed by independent legal entities (ME, 1997).

Statistical records indicate a total of 2139 companies in the electrical utilities sector (INE, 2004). However, only six companies control 99% of the market. UNESA<sup>3</sup> is the industry association that represents the common interests of these companies and it is through this collective perspective that this study has been applied to the industry.

The case studies treated in this study have been selected on the basis of the market share of each participant. Of the six corporate groups mentioned, this study deals with four, which have an aggregate market share of 46% in generation, 100% in transmission, and 60% in distribution and marketing.

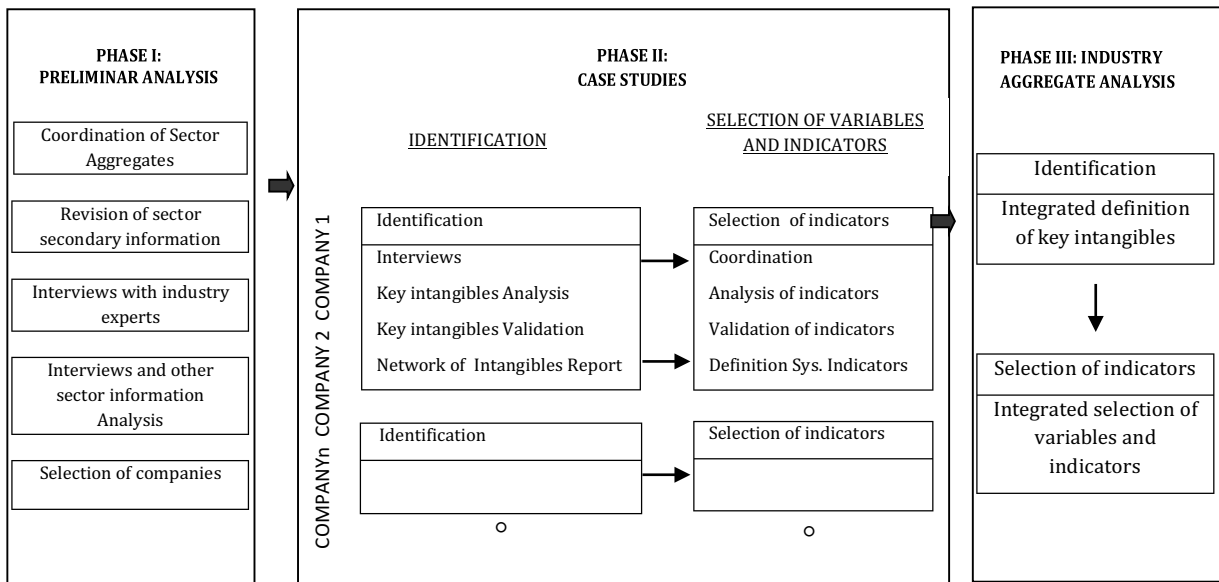
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<sup>3</sup> Electrical Utilities Industry Association of Spain

### 4.3. Stages of the methodology

The methodology employed to define the key indicators at the pectoral level was broken down in three stages: (a) preliminary analysis, (b) analysis of individual cases, (c) aggregate sectoral analysis. The stages are described in Figure 3 below.

**FIGURE 3<sup>4</sup>**  
**STAGES OF THE METHODOLOGY**



Source: Based on Chaminade (2005)

#### a) Stage 1: Preliminary Analysis

This stage involved understanding the overall issues facing the industry with the objective of putting the cases in their appropriate context, designing the semi-structured questionnaire, and preliminary general inquiries about the current relevance of intellectual capital for the industry. During this stage, nine semi-structured interviews were conducted with industry experts with different areas of focus including economics, management, legal and technical. Likewise, we consulted several secondary sources, principally publicly-available reports prepared by various industry institutions, in order to understand the recent developments in the industry, development policies, regulatory framework as well as short-term and medium-term technological trends.

#### b) Stage 2: Analysis of individual cases:

This stage consisted of applying the model to each of the individual companies under study. To this end, the Key Intangibles, Management Challenges, relevant variables for each key intangible and the other indicators for measuring each of these were defined sequentially. Table 2 sets out the various sources that were used as well as the procedures used to validate each of the elements of the

<sup>4</sup> A working paper is currently being prepared (Chaminade, 2005) which sets forth a Methodology for the Analysis of Intellectual Capital in a Given Sector, and which also details the study of individual companies.

model, all of which were subject to different conditions and availability depending on the company being analysed.

The viability of the proposed indicators in each of the case studies was evaluated by rating each according the following factors, Utility, Feasibility, Audit ability, Cost and Relevancy, in order to derive an index which was used to select the final indicators to be used for each Company.

**TABLE 2**  
**SOURCES AND VALIDATION MECHANISMS USED**

| ELEMENT OF THE MODEL                       | SOURCES USED TO DEFINE   | METHODS USED TO VALIDATE  |
|--|--|---|
| KEY INTANGIBLES                            | <ul style="list-style-type: none"> <li>• Semi-structured interviews with an average of 5 senior executives of each company.</li> <li>• Industry information consulted during the preparation stage.</li> <li>• Secondary data provided by the company in writing<sup>5</sup>.</li> </ul> | <ul style="list-style-type: none"> <li>• Focus groups with the executives within the divisions that were interviewed.</li> <li>• Review by the company executives of a report citing the key intangibles that were identified.</li> </ul> |
| RELEVANT VARIABLES FOR EACH KEY INTANGIBLE | <ul style="list-style-type: none"> <li>• Information provided in the interviews</li> <li>• Secondary information provided by the company</li> <li>• Variables used in existing intellectual capital models</li> <li>• New variables proposed during research.</li> </ul>                 | <ul style="list-style-type: none"> <li>• Focus groups with a working group formed by company employees.</li> <li>• Review of the proposed variables by the working group.</li> </ul>  |
| INDICATORS FOR EACH VARIABLE               | <ul style="list-style-type: none"> <li>• Indicators from existing models</li> <li>• New indicators proposed during research</li> <li>• Secondary information provided by the company in writing</li> </ul>   | <ul style="list-style-type: none"> <li>• Questionnaire submitted to an average of 10 executives in order evaluate the viability of each indicator</li> <li>• Focus groups with the working group of the company</li> </ul>                |

Based on Chaminade (2005)

### c) Aggregate Sector Analysis

The purpose of this third stage is to consolidate in an integrated manner the systems of individual indicators in order to develop a combination of generic and common indicators for all the companies within the sector being studied. The structure of this system of indicators to be used continues with the basic structure of Key Intangible, Generic Variables, Indicators.

Specific variables were omitted given that under the sector perspective these lose relevance and applicability. In order to select the indicators for each Key

<sup>5</sup> Secondary sources include: annual reports, environmental studies, reports on corporate responsibility, strategy summaries, human resource plans, and quality control reports.

Intangible, we used a selection criteria whereby their viability was confirmed in at least 50% of the companies analyzed subsequently consolidating the data as set forth in the Table.

In order to select indicators for each key intangible, we used a selection criterion whereby the indicator was viable for at least 50% of the companies analyzed. To this end, the combined evaluation tables were prepared as set forth below.

**TABLE 3**  
**FORMAT FOR THE INTEGRATED SELECTION OF INDICATORS**

| VARIABLES  | INDICATORS               | VIABILITY OF THE INDICATOR |           |    |           | % COMPANIES WHERE INDICATOR IS VIABLE |
|------------|--------------------------|----------------------------|-----------|----|-----------|---------------------------------------|
|            |                          | COMPANY 1                  | COMPANY 2 | .. | COMPANY N |                                       |
| VARIABLE 1 | INDICATOR 1a             |                            |           |    |           | % <sub>1a</sub>                       |
|            | INDICATOR 1b             |                            |           |    |           | % <sub>1b</sub>                       |
| VARIABLE 2 | INDICATOR 2a             |                            |           |    |           | % <sub>2a</sub>                       |
|            | INDICATOR 2b             |                            |           |    |           | % <sub>2b</sub>                       |
| .          | .                        | .                          | .         | .  | .         | .                                     |
| .          | .                        | .                          | .         | .  | .         | .                                     |
| VARIABLE N | INDICATOR N <sub>a</sub> |                            |           |    |           | % <sub>N<sup>a</sup></sub>            |
|            | INDICADOR N <sub>e</sub> |                            |           |    |           | % <sub>N<sup>e</sup></sub>            |

## 5. RESULTS

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### 5.1. Key intangibles identified

First, we studied the industry in the context of the fundamental changes and recent issues it faces using the results of the semi-structured interviews with industry experts and company executives as well as a review of the industry information and the documentation provided by the company in connection with the project (See Table 4).

From this review, we conclude that the industry has undergone significant changes in recent years due to privatization, introduction of competition, globalization, diversification and the increase of regulatory pressures in terms of the environment, taxation and in other areas specific to the industry.

These changes have brought a enhanced need to manage intangible assets as well as a transformation of companies in the industry particularly in the areas of marketing, followed by generation and distribution to a lesser extent. Companies have had to improve customer service, introduce new technological alternatives, adjust processes and procedures, design complementary processes, maintain levels of efficiency and quality control and improve communication with various third-parties. All these requirements have resulted in the need to develop other competencies in terms of human and organizational resources.

**TABLE 4**  
**RECENT ISSUES FACED BY THE ELECTRICAL UTILITIES SECTOR**

- Recent developments at all the companies within the sector have been characterized by industry **liberalization** starting with the ratification of the Spanish electrical utilities law<sup>6</sup> following the issuance of European directive 96/92 CE in 1997. The policies enacted in Spain focused on the gradual introduction of competition in the industry, the future configuration of the industry on the Iberian peninsula and the single European market.
- As a result of this Directive, companies have undergone a **internal transformation** governed by three factors: a) Shift from a focus on technology and production to a focus on the customer, which has become the key axis for operations going forward; b) reorganization of companies consisting not only of the segregation of activities (generation, distribution and marketing) into separate legal entities but also adapting the new structure to the marketplace; and c) efficiency, which becomes of key importance for operating in a competitive environment where the company is no longer remunerated as a function of “Reasonable Return” but now on the basis of “Reference Rates”.
- Environmental pressures on various sectors of the economy have increased particularly in the electrical utilities sector, with the objective of meeting the goals set forth in the Kyoto protocol and in the most recent summit in Johannesburg. All these changes have compelled companies to improve their management of environmental factors within generation, transmission and distribution with the objective of controlling emissions, managing waste products and reducing the environmental impact of their plants.
- Interested third-parties such as regulators, environmental agencies, shareholders, investors and employees increasingly demand more information thereby leading to a shift within the company toward **satisfying the stake-holder** and toward an improvement in communication and public relations management.
- In addition, companies have had to reassess previous efforts to expand internationally and to diversify. In the past, these initiatives often involved unrelated businesses but are now increasingly focused on developing the firm’s “core business” in order to enhance the return on its existing investments.

Key intangibles were identified for each individual company taking into account its strategic objectives and incorporating into the interviews specific questions designed to locate shortcomings with respect to achieving strategic objectives in terms of intellectual capital. To this end, the questionnaire dealt sequentially with subjects related to human resources, corporate culture, knowledge management, customers, processes, and public relations. These intangibles were confirmed by senior executives as established in the methodology.

In order to select the key intangibles at the sectoral level, company-specific key intangibles were associated with a set of factors which were a priority for the companies depending on their level of progress and relationship with strategic objectives. The results are set forth in Table 5 which lists the factors as well as the percentage of the companies for whom they were a priority.

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<sup>6</sup> Law 54 of 1997.

**TABLE 5**  
**EVALUATION OF FACTORS RELATED TO KEY INTANGIBLES**

| FACTORS ASSOCIATED WITH<br>KEY INTANGIBLES | % COMPANIES WHERE<br>THE FACTOR WAS A<br>PRIORITY |
|--|---|
| Human Resources                            | 100%  |
| Knowledge Development and Management       | 50%   |
| Internal Communication                     | 50%   |
| Corporate Culture                          | 50%   |
| Quality Control                            | 75%   |
| Clients & customers                        | 100%  |
| Communication with third-parties           | 50%   |
| Organizational flexibility                 | 50%   |
| Innovation                                 | 25%   |

Taking into account the previous table and the information obtained in the company-specific analyses, the key intangibles for the sector in Spain are summarized in Table 6.

**CUADRO 6**  
**KEY INTANGIBLES FOR THE SECTOR**

| KEY INTANGIBLES FOR THE SECTOR |  |
|--------------------------------|--|
| 1                              | Maintaining competent human resources.                   |
| 2                              | Strengthen internal communication and corporate culture. |
| 3                              | Quality control  |
| 4                              | Focus on clients and customers.                          |
| 5                              | Communication with third-parties.                        |
| 6                              | Strengthen organizational flexibility.                   |

## 5.2. Selected indicators applicable to electrical utilities

As in the case of the Key Intangibles, the selection of variables and indicators for measuring intellectual capital was conducted on a company-specific basis. The initial variables were derived from existing models and from the specific situation of each company. These variables were subsequently validated in work groups formed by an average of four participants each from different divisions of the company, with diverse backgrounds in control and measurement.

Once the variables were defined, a set of indicators for measurement were proposed and subsequently evaluated using different criteria as set forth in the methodology. Indicators with scores greater than 75% out of 100% were selected. Those variables with scores between 51% and 74% were reviewed by the team from each company subsequently re-evaluated.

Some existing models are limited in that they feature (a) variables whose significance is not clear, (b) indicators that are not expressed in relative terms making future comparisons difficult and (c) variables without possible indicators.



Further, the primary difficulty found in the definition of the generic variables and more so in the definition of the specific variables is that the selection process is only final once the measurement indicators have been defined thereby producing a cyclical iterative process, as cited in the “Méritum Guidelines” and the “Danish Guidelines”.

During the integrated analysis, it was clear that the generic variables were applicable across the different companies. However, the specific variables were excluded given that they are the product of specific initiatives and objectives being undertaken by each company and may not apply to their competitors. Consequently, the variables and indicators were reclassified in function of the key intangibles defined for the sector and were re-expressed in a generic fashion in order to insure that they could be applied to various companies.

To summarize, the structured indicators have a global quality given that their purpose is to provide simplified information relevant for facilitating the general management of key intangibles and to insure that they are stable over time. However, day-to-day management of a company’s intangibles requires the gathering and monitoring of second-order indicators and the development of measurement systems for each business unit (generation, distribution, and marketing).

The particular characteristics of the industry are evident in all those indicators related to production processes and it is these variables and indicators where the analysis of case studies becomes more relevant. On the other hand, the variables and indicators in the existing models such as those related to human resources, customers, and public relations can be applied directly.

Other areas such as internal communications and flexibility, which are included as variables in some existing models, have been used in this case study at the level of key intangibles. This reveals another unique characteristic of this industry: as certain competencies are more developed within certain electrical utilities, certain variables need to be further broken down and analyzed.

The results obtained during the aggregate analysis of each set of indicators for each of the companies analyzed in order to arrive at the general indicators for the sector, are set forth in Tables 7 through 12.

**TABLE 7**  
**VARIABLES AND INDICATOR FOR CRITICAL INTANGIBLE 1**

| CRITICAL INTANGIBLE                         | VARIABLES                      | MAIN INDICATORS   | %    | CH HC | CE EC | CR RC |
|---|--------------------------------|---|------|-------|-------|-------|
| <b>MANTEINING COMPETENT HUMAN RESOURCES</b> | Qualifications and Experience. | % Employees with university qualifications.                                   | 100% |       |       |       |
|   |                                | % Directors and managers with postgraduate studies (Masters, PHD, etc).       | 100% |       |       |       |
|   |                                | Average years of experience per employee (Internal and External Experience)   | 100% |       |       |       |
|   | Formation and development      | Annual average hours of formation per employee                                | 100% |       |       |       |
|   |                                | Annual investment in formation per employee.                                  | 100% |       |       |       |
|   |                                | % Employees with development plan.  | 100% |       |       |       |
|   |                                | % Key employees with a trained substitute.                                    | 75%  |       |       |       |
|   | Evaluation                     | % Employees that have performing management system.                           | 100% |       |       |       |
|   |                                | Average level of scope of the objectives during the last year (Per employee). | 100% |       |       |       |
|   |                                | % Employees with variable payment.  | 75%  |       |       |       |
|   | Satisfaction.                  | Average level of employees' satisfaction.                                     | 100% |       |       |       |
|   |                                | Frequency of satisfaction survey.   | 100% |       |       |       |
|   |                                | Annual hours of labour absenteeism per employee.                              | 75%  |       |       |       |
|   | Climate.                       | Average Level of organizational climate.                                      | 75%  |       |       |       |
|   |                                | Frequency of organizational climate surveys.                                  | 75%  |       |       |       |
|   |                                |   |      |       |       |       |

**TABLE 8**  
**VARIABLES AND INDICATORS FOR CRITICAL INTANGIBLE 2**

| CRITICAL INTANGIBLE   | VARIABLES                   | MAIN INDICATORS   | %    | HC | EC | RC |
|---|-----------------------------|---|------|----|----|----|
| <b>STRENGTHEN INTERNAL COMMUNICATION AND COMMON CULTURE</b> | Common culture and identity | % Employees that have received formation in corporate values.   |      |    |    |    |
|   |                             | % New employees that had welcome plan.  | 100% |    |    |    |
|   |                             | % Employees that have identification with the organization.   | 75%  |    |    |    |
|   | Corporate communication.    | % Employees that were in the strategic plan conferences.  | 75%  |    |    |    |
|   |                             | Nº Internal publications that were sent to the employees. (Journal, bulletins, etc.)                  | 75%  |    |    |    |
|   |                             | Nº access per month per employee to Intranet. (Specific webs with special information for employees). | 100% |    |    |    |
|   | Inter.-area Communication.  | Nº Transversal and Inter.-departmental teams and committees.  | 75%  |    |    |    |
|   |                             | % Employees with access to working group software. (group ware, lots, etc.).                          | 100% |    |    |    |
|   | Knowledge transfer.         | % Critical process with studies group or practical communities associated.                            | 75%  |    |    |    |
|   |                             | % Employees that belong to studies groups or practical communities.                                   | 75%  |    |    |    |
|   |                             | Nº reports per month put in the Intranet for studies groups and practical communities..               | 75%  |    |    |    |
|   | ICT for communication.      | Annual investment for employee in ICT.  | 75%  |    |    |    |
| Level of satisfaction with the ICT.                         |                             | 75%   |      |    |    |    |

**TABLE 9**  
**VARIABLES AND INDICATOR FOR CRITICAL INTANGIBLE 3**

| CRITICAL INTANGIBLE                                | VARIABLES   | MAIN INDICATORS  | %    | HC | EC | RC |
|--|---|--|------|----|----|----|
| <b>CONSOLIDATING CUSTOMER AND USER ORIENTATION</b> | Culture of orientation customer                     | % Employees with customer orientation formation.   | 75%  |    |    |    |
|  |   |  |      |    |    |    |
|  | Diversity and Innovation Offer                      | Frequency of reports with key information about customer and competitors.                              | 75%  |    |    |    |
|  |   | % Sales because of new products and services.  | 75%  |    |    |    |
|  |   | % Customers that have entered into an agreement for more of one service.                               | 75%  |    |    |    |
|  | Fidelity and extension of customer base.            | Annual investment in customers' fidelity campaigns and extension of commercial network / N° Customers. | 75%  |    |    |    |
|  |   | % Growth of customer base in the last year (Per market segment).                                       | 75%  |    |    |    |
|  |   | Customer distribution per market segment.  | 75%  |    |    |    |
|  |   | Share of market for business line.   | 75%  |    |    |    |
|  | Management and coverage of the commercial network.. | N° Commercial office / 100.000 customers.  | 75%  |    |    |    |
|  |   | N° Customers / N° Employees in customer attention.   | 75%  |    |    |    |
|  |   | % Industrial and commercial customers with access to extranet.   | 75%  |    |    |    |
|  | Quality in the commercial attention.                | Average time of waiting per channel. (Call canters, commercial offices).                               | 75%  |    |    |    |
|  |   | Average resolution time per type of request (Presuppose, installations, etc.).                         | 50%  |    |    |    |
|  |   | Average time between the first contact with the customer and the elaboration of the supply offers.     | 50%  |    |    |    |
|  | Quality in the claim attention                      | N° Claims/ N° Customers (Monthly).   | 50%  |    |    |    |
|  |   | % Claims solved on time.   | 75%  |    |    |    |
|  |   | % Claims because of causes which can be attributed to the company.                                     | 75%  |    |    |    |
|  | Satisfaction of customers and users.                | Average level of customer satisfaction (Per segment market).   | 100% |    |    |    |
|  |   | Frequency of customer satisfaction survey.   | 75%  |    |    |    |
| % Unsatisfied customer per cause.                  |   | 50%  |      |    |    |    |

**TABLE 10**  
**VARIABLES AND INDICATORS FOR CRITICAL INTANGIBLE 4**

| CRITICAL INTANGIBLE  | VARIABLES                                    | MAIN INDICATORS  | %    | HC | EC | RC |
|--|--|--|------|----|----|----|
| <b>MANTEINING<br/>CONTINUOUS<br/>IMPROVEMENT<br/>AND<br/>QUALITY<br/>ORIENTATION</b> | Continual improvement and innovation         | Nº Annual hours of formation per employee in quality and environment.              | 100% |    |    |    |
|  |  | % Initiatives in improvement that were implemented.                                | 75%  |    |    |    |
|  |  | Annual investment in buying of technology / Total Sales..                          | 75%  |    |    |    |
|  |  | Annual spending in I+D/ Total Sales.   | 100% |    |    |    |
|  |  | Nº New products, patents, registered marks, and usefulness models.                 | 50%  |    |    |    |
|  | Quality in the corporate process             | % Process with update manual and map.  | 75%  |    |    |    |
|  |  | % Process with measurement system defined.   | 50%  |    |    |    |
|  |  | % Buying to suppliers with quality certification.                                  |      |    |    |    |
|  |  | % Corporate and product process with quality certification ISO 9000.               | 75%  |    |    |    |
|  |  | % Fulfilment of strategic plan.  | 75%  |    |    |    |
|  | Environmental quality in the product process | % Installed power with environment certification ISO 14000.                        | 75%  |    |    |    |
|  |  | % Electrical generation without emissions (CO <sub>2</sub> ).                      | 50%  |    |    |    |
|  |  | % Underground electrical lines.  | 75%  |    |    |    |
|  |  | % Air transportation lines with sing for protection for bird life.                 | 25%  |    |    |    |
|  |  | % Fulfilment of maxim level of electromagnetic fields in the transportation lines. | 25%  |    |    |    |
|  | Quality and continuity supply                | % Fulfilment of average time of interruptions.                                     | 100% |    |    |    |
|  |  | % Fulfilment of average number of interruptions.                                   | 75%  |    |    |    |
|  |  | Average time of recover of incident s.   | 50%  |    |    |    |
|  |  | Cost of not fulfilment of the supply quality.                                      | 75%  |    |    |    |

**TABLE 11**  
**VARIABLES AND INDICATORS FOR CRITICAL INTANGIBLE 5**

| CRITICAL INTANGIBLE                            | VARIABLES  | MAIN INDICATORS   | %    | HC | EC | RC |
|--|--|---|------|----|----|----|
| <b>RELEVANT PUBLIC RELATIONS</b>               | Image in the media and events                                    | Spending in publicity/ Total spending   | 100% |    |    |    |
|  |  | % Communications in the main national written media that was positive.                | 75%  |    |    |    |
|  |  | Budget dedicated to sponsorship for cultural activities.                              | 100% |    |    |    |
|  | Relations with government and regulation authorities.            | Nº Equivalent full time employees in the regulation area.                             | 50%  |    |    |    |
|  |  | Nº Reports elaborated about regulation.   | 50%  |    |    |    |
|  |  | % Request to the regulation authorities that were solved positively.                  | 50%  |    |    |    |
|  | Relations with industry organizations and research institutions. | Nº Industry organizations and association in which the company normally to take part. | 50%  |    |    |    |
|  |  | Nº Conferences given for the company's employees in industry events.                  | 50%  |    |    |    |
|  |  | Budget dedicated to sponsorship for special industry projects.                        | 50%  |    |    |    |
|  |  | Nº Collaboration agreements with educational and research institutions.               | 75%  |    |    |    |
|  | Relations with finance community                                 | Nº Conferences and meetings with finance organizations..                              | 100% |    |    |    |
|  |  | Nº Requests that were solved in the finance attention office                          | 100% |    |    |    |
|  |  | Nº visits to the finance webs of the company  | 100% |    |    |    |
|  |  | % Reports of finance analysts that were positive.                                     | 75%  |    |    |    |
|  | Relations with trades unions.                                    | % Employees that belong to main trades unions.  | 50%  |    |    |    |
| Nº Meetings with representative trades unions. |  | 50%   |      |    |    |    |

**TABLE 12**  
**VARIABLES AND INDICATORS FOR CRITICAL INTANGIBLE 6**

| CRITICAL INTANGIBLE                   | VARIABLES                           | MAIN INDICATORS  | %    | HC | EC | RC |
|---------------------------------------|-------------------------------------|--|------|----|----|----|
| STRENGTHEN ORGANIZATIONAL FLEXIBILITY | Rotation and Diversity of employees | Distribution of employees per age, gender, hierarchy level, and business line.   | 75%  |    |    |    |
|                                       |                                     | Index of internal rotation.  | 75%  |    |    |    |
|                                       |                                     | % Directors and managers with experience in more than one unit line.             | 100% |    |    |    |
|                                       | Change orientation in employees     | % Voluntary internal rotation.   | 50%  |    |    |    |
|                                       |                                     | Annual Budget dedicated to incentives for ideas of improvement.                  | 50%  |    |    |    |
|                                       |                                     | % Employees that contributed with ideas of improvement.                          | 100% |    |    |    |
|                                       | Flexibility in the structure        | Nº Directors / Total Employees.  | 75%  |    |    |    |
|                                       |                                     | Nº Hierarchy level in the company.   | 50%  |    |    |    |
|                                       |                                     | % Outsourcing Spending/ Total personal spending.                                 |      |    |    |    |
|                                       |                                     | Frequency of revision of strategic plan.   | 50%  |    |    |    |
|                                       | Flexibility in the process          | Frequency of revisions of strategic plan and the actualization of process maps.. | 75%  |    |    |    |
|                                       |                                     | % product and operational process with software support                          | 100% |    |    |    |
|                                       |                                     | Product process supported in expert systems.                                     | 75%  |    |    |    |
|                                       |                                     | % Employees that can use tele-working software.                                  | 50%  |    |    |    |
|                                       |                                     | % Buying with management of risk.  | 50%  |    |    |    |

## 6. CONCLUSION

According to the previous paragraphs, it is possible to elaborate a System of Generic Indicators of Intellectual Capital for the companies within an industry, in spite of the own peculiarities of every one of such companies. Those indicators could be generally accepted standards for the sector, to support comparisons needed by financial analysts, investors and other stakeholders.

We found that the main differences among electrical utilities companies are related to management practices of key intangibles. According to that, company objectives may be basically oriented to improve and develop their management capabilities related to those key intangibles.

Two clear types of IC variables emerge from the case studies. Firstly, those are common to most companies. They can be easily used for comparisons. Further research should focus on greater des-aggregation and elaboration of indicators. This is the case, for example, of “Organizational Flexibility” and “Internal Communication”. Secondly, those are very specific for the companies. They are those linked to the productive process. In these cases the detailed analysis made in the case studies becomes most relevant.

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