



## The impact of intangibles on value creation: Comparative analysis of the Gu and Lev methodology for the United States software and hardware sector<sup>☆</sup>



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### ABSTRACT

The aim of this paper was to analyze the contribution of intangible assets in the value creation of companies, using the methodology proposed by Gu and Lev (2003, 2011). The database used was collected in Datastream with information covering the period from 2001 to 2010. The main results indicate that: (i) the variables RD and SGA and RD, SGA and CAPEX represent intangibility proxies for the software and hardware sector, respectively; (ii) comprehensive value explains the market value for the two sectors; and (iii) the intangibility indices ICBV and RI and MtCV, ICM and RI present a positive and significant relationship with shareholder return for the software and hardware sector, respectively. The principal implication of the paper is having found a positive and significant relationship between comprehensive value and market value. Accordingly, if this variable really explains the market value, it is a solution to a problem that afflicts accountants, which is how to account for intangibles in the balance sheet.

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## Impacto de los intangibles sobre la creación de valor: análisis comparativo de la metodología de Gu y Lev en el sector de software y hardware de Estados Unidos

### RESUMEN

El objetivo de este trabajo fue analizar la contribución de los activos intangibles en la creación de valor de las empresas utilizando la metodología propuesta por Gu y Lev (2003, 2011). La base de datos utilizada fue recogida en Datastream con información que abarca el período de 2001-2010. Los principales resultados indican que: (i) las variables RD y SGA y RD, SGA y CAPEX representan proxies de intangibilidad para el sector del software y hardware, respectivamente; (ii) el comprehensive value explica el valor de mercado para los dos sectores, y (iii) los índices de intangibilidad ICBV y RI y MtCV, ICM y RI presentan una relación positiva y significativa con el rendimiento para los accionistas en el sector del software y hardware, respectivamente. La principal consecuencia de este artículo fue obtener una relación positiva y significativa entre el comprehensive value y su valor de mercado. Si esta variable realmente explica el valor de mercado, se trata de una solución a un problema que afecta a los contables, que es cómo contabilizar los activos intangibles en el balance general.

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## 1. Introduction

Intangibles are being studied by various areas of knowledge. Many scholars believe that knowledge has played an important role in the value creation of companies and represents a source of sustainable competitive advantage for them. Bontis (2002) observed that concern about the topic is present in economics, sociology, and psychology, administration (information technology, human resource administration, and management research). For this reason, according to Barney (1991), to understand the sources of sustainable competitive advantage it is necessary to build a model based on the statement that the resources of the company are immobile and heterogeneous. Thus, Barney (1991, 2008) proposes the model known as VRIO (Value, Rarity, Imitability and Organization). The author assures readers that for a company to have a potential sustainable competitive advantage, its resources must be: valuable, in the sense that it exploits opportunities and/or neutralizes threats; rare among the current companies and potential competitors; imperfectly imitable; and there cannot be any strategically equivalent substitutes for these resources.

Several studies provide empirical evidence for the hypothesis of the potentiality of intangibles in the generation of future economic benefits for companies (value creation and economic performance). Hall et al. (2001) found positive relationships between the quantity of patents and the market value of the company. Villalonga (2004), in turn, investigated the influence of intangible resources on the superior performance of North American companies and found in his research that intangibles play an effective role in sustainable competitive advantage, thus generating superior economic performance, as foreseen by the resource-based view (RBV). Lee and Chen (2009) observed that research and development expenditures lead to two types of effect on the company's value creation. In their study they observed that low or moderate levels of R&D expenditure lead to negative returns from shares while on the other hand, high levels of R&D expenditures lead to positive returns. According to Miller and Mathisen (2008), advertising expenses should be considered capital investments as they generate future economic benefits, thus increasing the company's market value. Indeed, in the study conducted by Yeung and Ramasamy (2008), the results revealed that companies with strong brands are more profitable and also present sufficient evidence in the significant relationship between brand and company performance in the stock market.

Andriessen (2004), supported by the work of Bontis (2002) and Bontis, Dragonetti, Jacobsen, and Ross (1999), selected five important schools of thought for the study of intangibles. The intellectual capital community is interested in the definition and measurement of intellectual capital, one of the forms of intangibles.

Andriessen (2004) brought up 12 methodologies that seek to provide a response to the problems of definition and measurement (Bounfour, 2002; Brooking, 1996; Edvinsson & Malone, 1997; M'Pherson & Pike, 2011; Mouritsen, Larsen, Bukh, & Johansen, 2001; Pike & Roos, 2000; Pulic, 2000a, 2000b; Roos, Roos, Dragonetti, & Edvinsson, 1997; Sullivan, 1998a, 1998b, 1998c; Sveiby, 1997; Viedma, 2001). The accounting community is interested in the accounting of intangibles in the financial statements, on the basis that traditional financial accounting does not present a satisfactory response for the market value of companies that is very different from the value expressed in traditional financial statements (Gu & Lev, 2003; Hall et al., 2001; Lev, 2001; Standfield, 2001; Stewart, 1997). Andriessen (2004) brought up seven methodologies that develop studies along this line of research. The performance measurement community incorporated the concept of intangibles to lend greater credibility to the focal points of performance measurement and according to Andriessen there are 2 methodologies that work with this concern (Kaplan & Norton, 1992, 1996a, 1996b, 2001; Stewart III, 1994). The valuation community,

arising from financial studies, seeks to improve measurements (from the perspectives of the discounted cash flow and real options) of the highly uncertain values that originate from intangibles. Andriessen (2004) verified three methodological focuses that work along this line of research (Dixit and Pindyck, 1998; Khoury, 1998; Reilly & Schweih, 1999). The human resources community, with a representative in the survey conducted by Andriessen (2004), seeks to reactivate human resources accounting techniques that developed in the 1960s and 1970s (Sackman, Flamholz, & Bullen, 1989).

Gu and Lev are representatives of the accounting area, as they are interested in approximating the book values of a company to the market value. From this point of view they are close to the line of thought of normative accounting, which is concerned about establishing rules for the accounting of intangibles (Córcoles, 2010; Epstein and Jermakowicz, 2009).

The theoretical line of thought, arising from economics, which sustains the arguments of Gu and Lev (2003, 2011), is the neoclassical theory. They base their theories on the empirical observation that the traditional production function, where only capital and labor are responsible for value creation, is unable to explain production, introducing a third factor, intangible assets. In the original version, the value generated by a company could be explained by a Cobb-Douglas production function in the form:  $Q = AL^{\alpha}C^{\beta}$ , where  $Q$  represents the value added,  $L$  the labor,  $C$  the capital,  $A$  is the total productivity of the production factors,  $\alpha$  and  $\beta$  represent the elasticities of value added in relation to labor and to capital, respectively. As the traditional production function was unable to explain the value added using just two production factors, it was enlarged to take into account a third production factor. The importance of this third factor for the explanation of shareholder will be evaluated in this paper.

Gu and Lev seek to provide an answer for a gap that exists in the area of research on intangibles: which is the best way of conceptualizing and measuring intangibles? It is emphasized that there are numerous proposals in the various areas dedicated to the study of intangibles, as highlighted above, but there is no consensus on a hegemonic methodology accepted by the majority of researchers dedicated to the topic.

In the next sections we present the methodology proposed by Gu and Lev (2003, 2011) to calculate intangibles, followed by the methodology used in the article with information about the data and research hypotheses, then the analysis of results of the models studied here, and finally the closing comments in the conclusion section.

## 2. Theoretical benchmark

According to Gu and Lev (2003, 2011), intangible capital is driven by several factors including innovation, human capital, organizational process, relations between customers and suppliers, etc. As there is no public information available for all these drivers, the authors limit the analyses of intangibles to those variables that are available by companies. In the authors' opinion, the drivers of intangibles are: R&D expenditures (creation of patents, business knowledge), advertising expenses (brand creation), general and administrative expenses including information technology and consulting services, and investments in intangibles (goodwill and other intangibles).

Gu and Lev (2011) assert that the literature on the valuation of intangibles features three categories that measure these assets: market value approach, accounting valuation approach and component valuation approach. According to the authors, the market value approach measures the value of intangibles through the difference between the company's market value based on the share price and on the book value or the value of Tobin's  $Q$ . Although easy

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