The New Business Models in the Knowledge Economy: the Strategic Way to Value Creation

Ilídio Lopes[1] and Maria do Rosário Martins[2]
[1]School of Management, Polytechnic Institute of Santarém, Portugal
[2]New University of Lisbon, Portugal
ilidio.lopes@esgs.pt
mrfom@isegi.unl.pt

Abstract: Over the last decade we have seen the emergence of an economy in which the digital component has become a constant presence in all areas of knowledge. In the digital world, characterised and dominated by a complex connectivity, value assumes a complex meaning, which is strongly distinct from that used in the traditional economy. There are new business concepts, new strategies based on innovation, new mechanisms to create value, and a new need – to build methodologies and metrics that can measure and reflect it.

Keywords: Digital economy, knowledge economy, intellectual capital, business models, and value networks

1. Introduction

In the present day, information represents a new raw material. Determining extensive alterations in the behaviour of individuals and organisations, it seeks to reach sustainable standards of development. The emergence of a new economic order has resulted from the management of this new raw material, in which intangible assets, while supporting the main source of value creation, have assumed a preponderant role. In accountancy it is known as *intangibles*, in economic theory as *knowledge assets* and in management literature, as *intellectual capital*. Its essence represents an asset without physical existence, providing potential future returns. Those assets are generally very expensive. They are extremely difficult to manage and, even today, their associated property rights are confused. This assertion raises the need to rethink accounting and financial principles and, also, protection and management models, with a view toward creating a more appropriate match between accounting and market values.

2. Aims and objectives

Intangible assets are the main source of value creation and evidence has already been obtained that the impact of knowledge capital investment (KCI) on gross domestic product (GDP) surpassed, for the period 1991-2000, that of fixed capital investment (FCI) (Lopes *et al.,* 2004). This has provoked the need to make those assets explicit and questions the rules that support them at an accounting level. Independently of the approach followed - using models centred on knowledge classifications, those based on intellectual capital or socially constructed models (McAdam and McCreedy, 1999) - our intrinsic objectives are primarily concerned with their classification. Broadly speaking, consistent and workable accounting rules are required in order to fairly and truly reflect the economic and financial reality. This linkage certainly supports organisations in their decision-making and helps them to implement strategies in volatile and complex environments that are gradually being dominated by new business models (electronically constructed) and are strongly supported by dynamic innovation processes.

3. Intangible asset: the concept

The search for a broadly acceptable definition of an "intangible asset" is not an easy task, since any approach lacks certification and precision. Baruch Lev (2001:5) affirms: "*An intangible asset is a claim to future benefits that does not have a physical or financial (a stock or a bond) embodiment*". Hence, any assets that can provide costs economies can, essentially, also constitute, an intangible asset.

Broadly, Brockington (1996:5) refers to the expected returns when he affirms that:

> *"…. The value of intangible assets is created and maintained almost entirely by expectations about the future and the value that this places on a current situation. It is the business of management to maximize those aspects of a business situation which are invariably given expression by the existence of intangibles".*

From an economic theory perspective, Reilly and Schweihs (1998:5), enumerate a set of characteristics as the basic requirements in the classification of asset. Intangible assets should be subject to specific identification, have a recognizable description, have legal existence and legal protection and be subject to private

ISSN 1479-4411

Reference this paper as:
Lopes I and do Rosário Martins M (2006) "The New Business Models in the Knowledge Economy: the Strategic Way to Value Creation" *The Electronic Journal of Knowledge Management* Volume 4 Issue 2, pp 159 - 168, available online at www.ejkm.com

property rights. Their private rights should be promptly and legally transferable, they should be required to bear some tangible manifestation of their existence, they should have been created or come into existence at an identifiable time or as the result of an intangible event and, finally, they should be subject to destruction or to termination of their existence at an identifiable time or as a result of an identifiable phenomenon. The intrinsic pragmatism of those approaches contrasts is of a generalist and subjective nature. It creates increased difficulties for a measurement and analysis approach. Broadly speaking, economic phenomena do not qualify as intangible assets, which rely on the importance and use of financial reports at a secondary level.

International Accounting Standard (IAS) 38 establishes that an intangible is an asset without a monetary nature; it is identifiable, controllable and without physical substance and it can generate a future economic benefit. It is retained in the organisation for use in the production or distribution of goods and services, to be rented or for administrative purposes. Phillips and Phillips (2002:4) mention that those assets are the key to competitive advantage in the knowledge economy environment. They are characterized by their invisibility, by the difficulty in quantifying, acquiring or imitating them, by the permeability of the accounting rules and procedures involver and, by their indefinite lifetime. According to Brockington (1996), their value can fluctuate unexpectedly. Immediate evidence of their existence can sometimes be impossible to obtain. This is only given expression when definitive advantages coming from the development and result of certain businesses are surveyed.

4. Categories of intangible assets

There are several approaches to the classification of intangible assets. They depend upon the accounting boundaries and the economic theory. Hence, we present the main intangible asset categories, as expressed in literature as a whole, focussing to a very great degree on the microeconomic level.

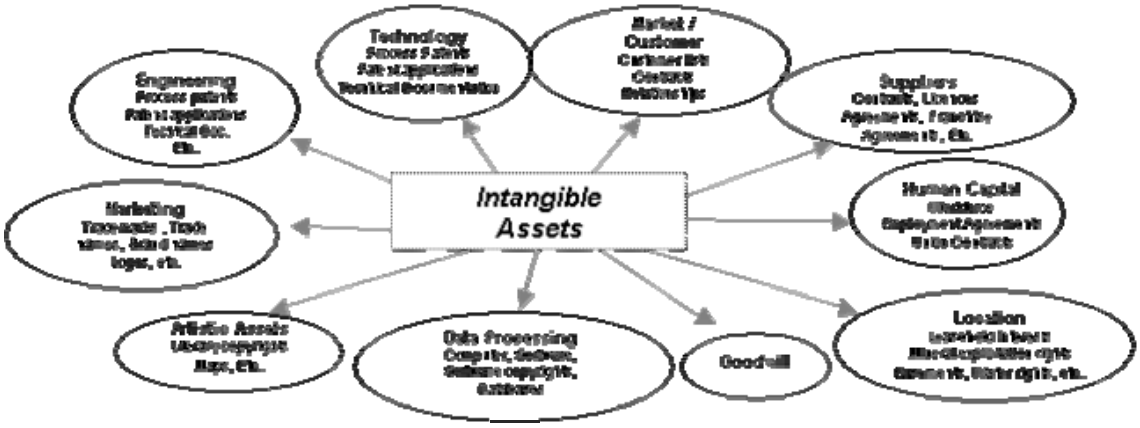


Figure 1: Intangible asset categories I (adapted from Reilly and Schweihs, 1998)

This economically constructed classification whose boundaries are difficult to identify, allows the inclusion of a specific asset in a certain category, as the result of the criteria used in its measurement or in accordance with the analyst's sensitivity. From a management point of view, in contrast to tangible assets and financial capital, intellectual capital (Edvinsson *et al.*, 1997) emerges as an alternative in intangible asset analysis. Strongly focused on and oriented towards the management of a firm – in particular knowledge management - this approach has recently received, great credit and wide application. We note in particular the developments at the Swedish company *Skandia*. In Figure 2, we show four categories of capital and the scope of intellectual capital scope, as an important source of value creation
.

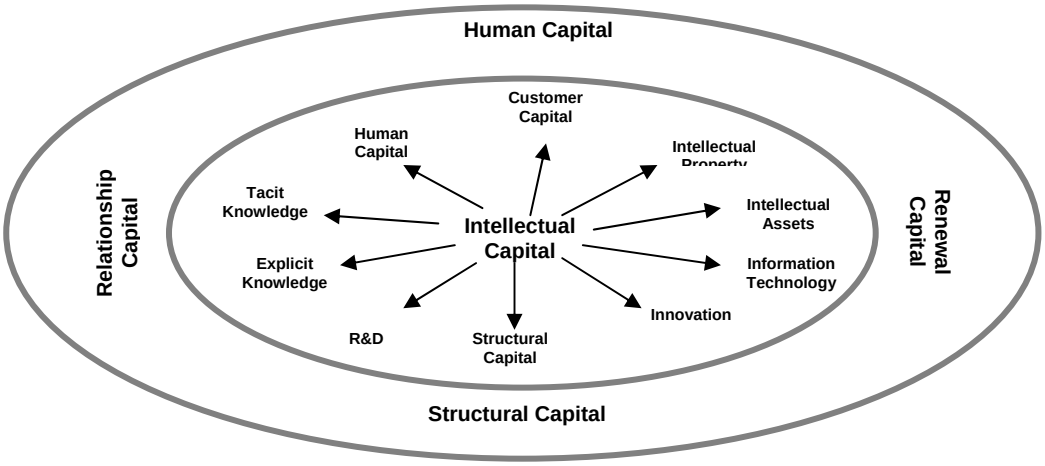


Figure 2: Intangible asset categories II (adapted from Phillips and Phillips, 2002:5)

As in the previous classification, the panoply of elements enclosed in intellectual capital offers extensive latitude and shaky objectivity. This must express itself in increased subjectivity in the methods and criteria required to translate the information into financial statements. Human capital, which is essentially linked to implicit or tacit knowledge (Nonaka and Takeushi, 1995), is the one that is most difficult to manage, capture and develop. It represents, from our point of view, the most difficult structural block to be reflected in and incorporated into the financial statements. In fact, the four structural blocks shown in the diagram, representing capital, cannot be dealt with nor analysed in isolation. Regenerative capital basically appears to be associated with capacity to innovate, reflected in the intensity and quality of patents registrations in particular. Research and development investment becomes the operational source for the technology, product or process patenting activity. Structural capital is in its essence, related to the internal processes and explicit knowledge. Finally, the company's relational reflects its influence at an external level, translating what, in classic Balanced Scorecard terminology (Kaplan and Norton, 1996), is assigned as the market or customer perspective.

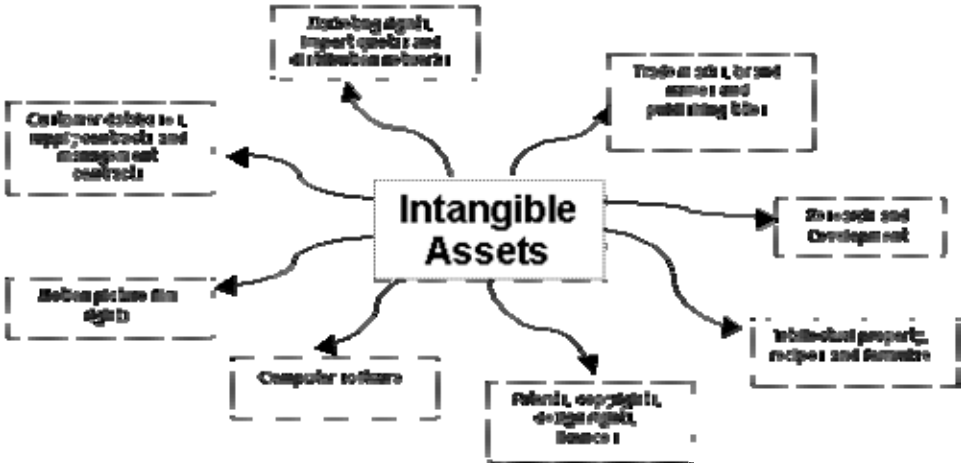


Figure 3: Intangible assets: examples as per IAS 38

The categories presented in this section allow us to better understand specific types of intangibles (with or without a physical element) and the consequent ambiguities in their measurement and analysis. Nevertheless, those assets should be aggregated or disaggregated as necessary to provide relevant information to users of the financial statements as a whole.

5. The accounting approach

To translate, into financial terms, the costs occurring in the knowledge capturing process, is not an easy task or a transparent one from an ethical point of view. But their recognition as costs in a specific accounting period does not match their potential return. This means that traditional

accounting methods (cost based methods) are not properly adjusted to suitably reflect the transformation in the business processes. New principles and methods are required (using economic criteria, market valuation or hybrid methods) that recognise intangibles assets as a powerful source of value when they reflect an existing use, a market value and a liquidation valuation. Financial reporting, a merger or acquisition, fund raising, taxation, brand management and license agreements are the main reasons supporting the intangible assets valuation (Brockington, 1996:176).

Primarily, those assets should be initially recognised according to their cost, depending, however, on two basic conditions: the probability that future economic benefits will flow to the enterprise and the fact that the cost can be measured reliably. After initial recognition, the assets should be entered either according to their historical cost minus any accumulated amortisation and impairment (the amount by which the carrying amount of an asset exceeds its recoverable amount) losses (based on a benchmark approach and annually tested as per IAS 36) or by means of a revalued amount minus any subsequent amortisation and impairment losses (based on fair value viewed as the amount for which an asset could be exchanged between knowledgeable, willing parties in an arm's length transaction). This alternative treatment of impairment is allowed throughout for all the bottom up and top down tests on goodwill. Broadly speaking, "an intangible asset should be derecognised (eliminated from the balance sheet) on disposal or when no future economic benefits are expected from its use and subsequent disposal" (IAS38). Gains or losses should be determined as the difference between the net disposal proceeds and the carrying amount of the asset. They should be recognised as income or expense in the income statement.

Let us remember what is expressed in IAS 38. Marks, headings, publication headings, lists of customers and other elements that, in substance, are generated internally, do not have recognized as an intangible asset. This norm follows the point of view that these assets cannot be distinguished from the costs required to develop the company as a whole. Therefore, such items cannot be recognized as intangible assets since they were not internally generated (e.g. expenditure on internally generated brands). Generally, brands are, in fact, an important example of intangible assets: thought without any physical element, many are very valuable for the companies according to the impact on their businesses. In fact, as stated by Brockington (1996:134), a brand is not a single identifiable asset but a complex combination of names, market positions and other skills that allow companies to retain or obtain a greater competitive advantage than could otherwise be generated. As shown in Schwartz (1999:32), "a brand is a set of differentiating promises that link a product or a service to its customers". Since brands have the same nature as internally generated goodwill and they are not bought or sold, they should not be recognised in the financial statements if self-generated (IAS 38). In the particular case of their acquisition, they should be deemed to have a useful life and then amortised over the established period. The same applies for structural and renewal capital, in particular mastheads, publishing titles, customer lists, corporate reputation and other similar items.

In this paper, we stress the fact that Research activities (original and planned investigation undertaken with the prospect of gaining new scientific or technological knowledge and understanding) and development activities (application of research findings or other knowledge to a plan or design for the production of new or improved sustainable materials, devices, etc, prior to the commencement of commercial production or use) are the source of important intangible assets and support the new business models that explored in detail in the following section.

6. The new business models: an integrated approach

A business system is defined as the way a company defines and differentiates its offers, defines the activities that properly match its strategy, selects its processes, configures and allocates its resources, enters the market, creates utility for its actual and potential customers and obtains a positive return from those activities (Slywotzky, 1996).

Traditionally, as business systems evolved they observed an innovation phase strongly focused on vertical integration. They evolved processes of innovation in their structures and processes. New activities emerged as the result of disaggregation and reaggregation processes in the traditional value chains. In general, these activities are developed by means of electronics contexts, in which networks drive the interlinked phenomena of increasing returns and network effects. In the new economy Kelly, 1998), web economy (Schwartz, 1999) or network economy (Shapiro and Varian, 1999), Tapscott *et al.* (2000) identify a new system of doing business (the business web), which, on the economic plane, has brought new proposals for value, new competition rules and

procedures, new resources, capabilities and competences, new strategies and new, more sophisticated market approaches. These strongly internetworked business systems represent a new source of value for customers and wealth for shareholders. The core competences of each participant become the key factor of success in this business approach. As stated by Tapscott *et al.* (2000:17), a b-web can be defined as:

> *"A distinct system of suppliers, distributors, commerce service providers, infrastructure providers, and customers that use the Internet for their primary business communications and transactions".*

Innovation offers a new proposition that renders the old way of doing business obsolete: the electronic infrastructure now represents the principal way of sharing data, information and knowledge. Innovation management can capture broad application ideas and optimise the licensing value of the patented invention (Willigan, 2001:27). Firms become increasingly virtual and volatile on account of the innovation processes. The differences between various organisations' competitive agreements (multinational, global, international or transnational) and their consequent value networks (Shapiro and Varian, 1999) remind us that the research and development process (as a process that allows the creation of new intellectual property, potentially protected by patent registration) should be kept as an internal activity - the source par excellence of true and sustainable competitive advantage.

As mentioned above, in b-web structures a new proposal for value emerges: the Internet becomes a primary structure. Value is created and managed, sometimes, through complex innovation chains. These models, with their intrinsic forces, apply and require multiple participation: the competitive advantages in terms of costs, capacities, innovation, competence and future returns are dependent on the core capabilities of the various companies who integrate the business system.

The performance of these business systems is not exactly linear. Its complexity results from the multiplicity of agents (contributing to global value of the system) that, on the basis of a synergistic interdependence, should provide and guarantee a solid and dynamic competitive advantage. This interlinked manner of doing business requires a new breed of pioneers, strongly supported by information and communication technologies, to drive the companies. New cost categories arise such as those for search, contracting and coordination costs. Tapscott *et al.* (2000) classified the participants in five distinct categories, as illustrated in Figure 4, below.

From our point of view, the most innovative and revolutionary dimension relates to how participants should do business. We are in a still fluid process, in uncharted territory, where customers are gaining more power than ever before. *Coopetition* has arisen as a phenomenon in the b-web process. All participants simultaneously compete and cooperate among themselves on the b-web, emerging as a universal platform for creating value and wealth. A b-web is, in truth, highly focused on the end customer. Its members try to satisfy the customers' requirements and needs on an ongoing basis.

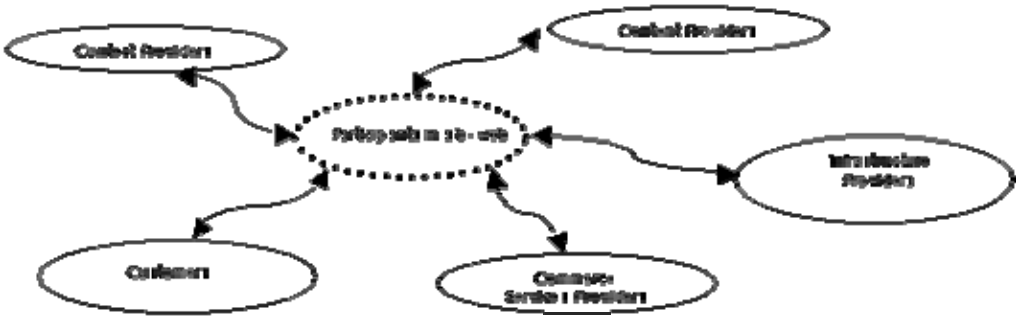


Figure 4: Participants in a b-web (adapted from Tapscott *et al.,* 2000:20)

We are, in fact, in an unsettled and highly volatile field: its functional desegregation is moving towards a new form of intermediation (Szabó, 1999; Tapscott *et al.*, 2000). The elimination and substitution of the physical space (where traditional intermediate agents developed their businesses) have gradually led to a new form of intermediation. Multiple participants, requiring new coordination rules and procedures of engagement, apply, also for a new structural capital approach (Shapiro and Varian, 1999). Thus, these new business models are built, in the entire value system, on the basis of two structural dimensions: their control (hierarchical or self-organized) and their value integration. According to the authors, the success of this type of

business depends on its intrinsic innovation strategies, in particular its policies of intense research and development.

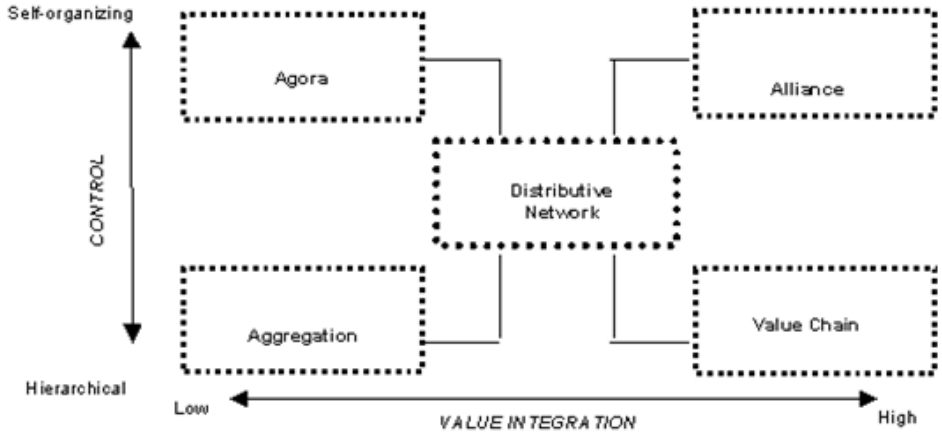


Figure 5: B-web typology (Tapscott *et al.,* 2000:28)

In the digital economy, whose boundaries are highly flexible, the success of the business platforms depends on the participants' capacity and intelligence. The structural combination of physical and intangible assets results in an important competitive advantage (what Tapscott *et al.*, 2000 called the *marketface*). Some of them represent authentic free and neutral markets where an ample assortment of products and information is offered to purchasers through personal negotiation (the agoras).

In particular, in the alliances, whose nature is not hierarchical, participation is in accordance with established rules and standards, based on a philosophy of creative contributions. As we have repeatedly affirmed, the customer assumes a preponderant role value creation. Alliances normally display increasing returns and strong network effects (driven by demand side economies of scale), as they link individuals and organisations in their own self-interest.

The aggregator model is led by companies that act as intermediaries. They focus their activity on the selection and organisation of goods; prices setting and customer help in finding goods and services that on a fulfilment basis match their needs. Although, capturing specific markets and segments is their basic aim, they do not add value to the goods. Nonetheless, they improve and increase value through the exchange process.

The market integrator approach has a distinct aim: its responsibility is the restructuring and management of the value chain. It provides an alternative that more successfully responds to a specific segment, with an integrated and specifically oriented customer approach. Based on high technology and focused on value-added design and relationship management, this model is strongly linked to the innovation process.

In contrast to traditional business models, the b-web requires a reduced investment in fixed capital, low fixed costs and offers higher operational edges. It is therefore to be expected that this type of business bring high returns. On the other hand, customers have acquired more power in contributing information and knowledge to the system. They normally raise their expectations, acquire flexibility and, thus, gain in terms of cost and quality. Intangible elements (information, control, relationships and knowledge) are enhanced. As mentioned by Kelly (1998:2) "This new economy has three distinguishing characteristics: It is global. It favours intangible things – ideas, information, and relationships. And it is intensely interlinked. These three attributes produce a new type of marketplace and society, one the is rooted in ubiquitous electronic networks". New metrics are required that, on a fair and true basis, can capture and measure the competitive advantages that emerge from those new business models. As already mentioned, "The b-web is to emerge as a generic and universal platform of creation of value and wealth" (Tapscott et al., 2000:25).

7. Innovation as the core activity for business webs

Intellectual property (patents, trademarks and copyrights, among others), have been seen by some economic agents as mere legal instruments and by others as basic tools for business. Many companies have explored this type of asset, regarding it as a potential competitive weapon and

source of unexpected returns (Shapiro and Varian, 1999; Rivette and Kline, 2000). Intellectual property management has been reflected in many cases, in the way added value has been created. We refer to registered intellectual property, codified or un-codified organisational and human capital (Contractor, 2001).

To identify some of the competitive advantages emerging from intellectual property, it is necessary to identify certain key drivers (presented in Figure 6). They allow companies to gain a competitive advantage in market and financial terms.

Intellectual property constitutes an important driver with which to gain competitive advantage from a financial or market point of view. This assertion, which is now irrefutable is gradually being assumed as a generic strategic principle, draws our attention to innovation activities and processes. Measuring it, however, is neither an easy task nor on which the scientific and academic communities are united. The expected returns remain the most important corollary, enabling companies to enter those assets in their financial statements, unless, as sometimes, they are used, for internal purposes.

We shall now describe, by means of a simplistic and possibly incipient and twisted approach, an alternative that can be used in the valuation of a financial patents portfolio. In the first place, all patents should be audited and segregated into "not essential patents" and “essential patents" for the business (in accordance with business growth and the intensity of patent use in the business). In the second phase, companies should identify their real commercial contribution for business. This contribution should be monetarily quantified for those patents, percentage of net value added. Finally, “not essential patents” should be assigned a residual value, unless the company obtains high returns from their application by third parties.

At a macroeconomic level, the intensity of research and development investment also represents an important driver that genera competitive advantages between nations or regions. In the last nine years, in Europe, moderate increases have been seen, particularly in the business enterprise sector (Graph 1). However, among those states above the European average, the Nordic countries (namely, Finland and Sweden) have been the leaders with regard to the intensity of R&D both in the business enterprise and higher education sectors. As regards, the poor levels observed in the other countries, in particular the ones that recently joined the European Union, new macroeconomics politics are required, that, in the medium and long run, can support the new business models development and generate increased competitive advantage.

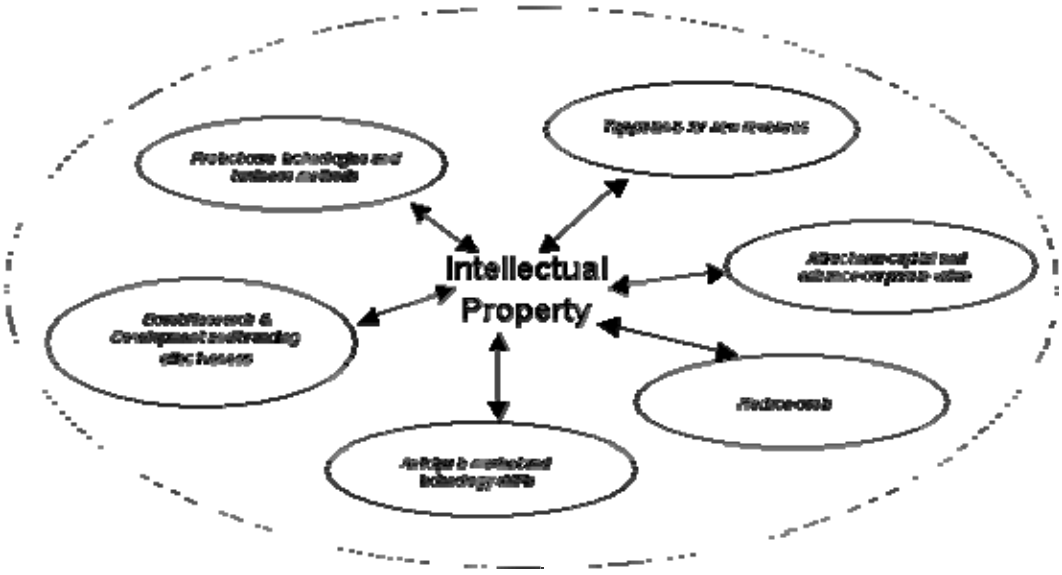
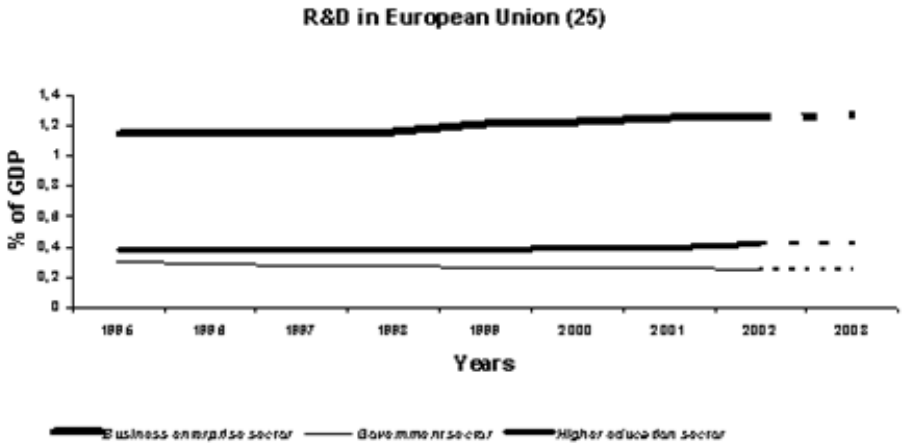


Figure 6: Translating intellectual property into competitive advantage (adapted from Rivette and Kline, 2000:58-60)

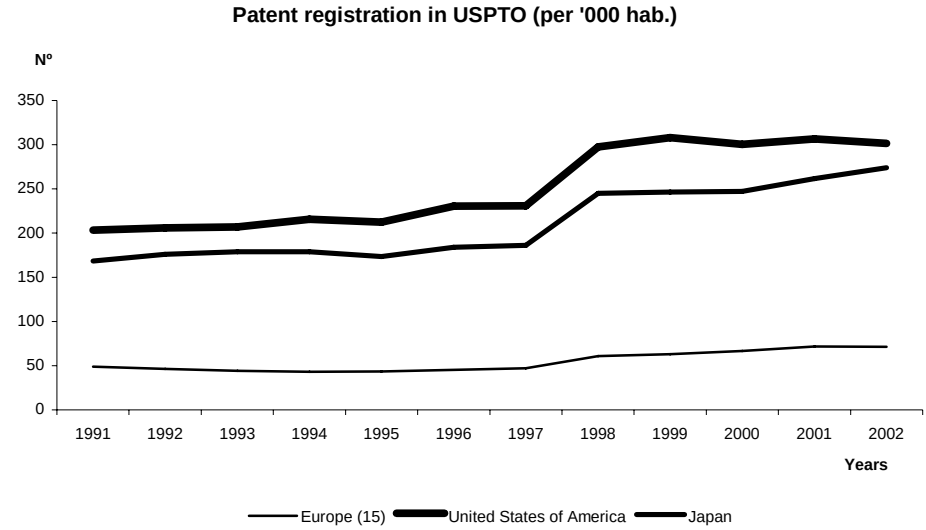


Graph 1: Research and development in Europe (Eurostat, 2003)

Patent registration is, probably, the most obvious indicator of innovation management. According to Willigan (2001:35):

> *"Companies wishing to exploit their intellectual assets may wish to establish an incentive program for scientists and engineers to direct and motivate their invention activity. The objectives of such an incentive program are to channel invention activity into areas where the current patent portfolio needs improvement, and to identify areas of future technology that companies need to "play in" in order to be successful in the "knowledge-based" world of the future".*

The data available from the EPO (European Patent Office) relates to the annual requests received. In contrast, the data available from the USPTO (United States Patent and Trademark Office) relates to the registrations actually granted are. Given the problems of comparability between the data available, we have considered that of USPTO. In spite of the assertions and potential restrictions derived from the registration process, our evidence and conclusions should be carefully analysed.



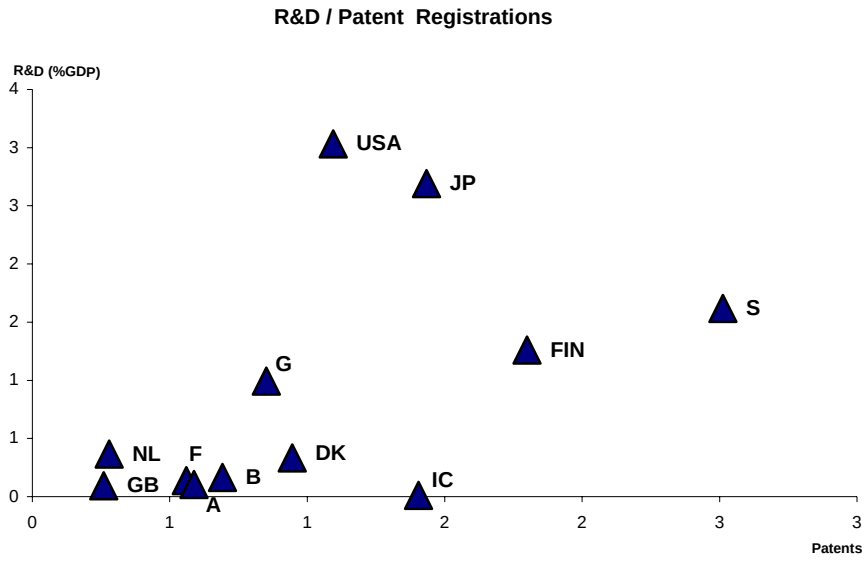
Graph 2: Patent registrations in the USPTO (Eurostat, 2003)

Patents registrations are allocated to the country of the inventor except in the case where more than one country is involved. A fractional method of counting is used in this particular case. The United States of America (USA) and Japan (JP) lead the patent registrations in the USPTO, as shown in Graph 2. Sweden and Finland led the European scenario as they submitted, per million inhabitants, approximately 187 and 158 requests, respectively, in 2002). We note the same trend if we refer to the requests submitted to the EPO by country.

On the basis of the European average for two structural drivers – R&D investment intensity and patent registration in the USPTO - the countries identified in Graph 3 are those whose position lies above that average. The supremacy of the USA, the Nordic countries (FIN and S) and Japan becomes clear and evident. Other European countries, in particular the ones that recently joined the European Union, present weaknesses that require technological innovation policies and procedures if they are to achieve a fair and sustainable alignment in comparison with the rest. Without these developments, we shall continue to face the difficulties arising from a Europe developing at different speeds. Moreover, potential competitive advantage may be gradually and permanently lost in the digital and global economy.

8. Conclusions

The intangible asset concept is associated with expected future returns. It is viewed as an identifiable non-monetary asset without physical substance, controlled and is the source of future returns for the enterprise. In this respect, one of the most visible sources of intangible assets is patent registration, supported by the intensity of research and development. This evidence is consolidated at a later date by the number of patents actually registered and granted by the international agencies. Innovation management is, therefore, a source of competitive advantage for national economies in general and the business sector in particular. However, especially in Europe, we have a lack of innovative ideas that will lead to broad application-based patents that can maximize a company's investment in research and development. The European evidence in those domains clearly indicates a need for urgent reflection and action.



Graph 3: R&D intensity *and* patent registrations in the USPTO (Eurostat, 2003)

Based on sophisticated innovation processes, new business models have emerged, that have transformed the traditional value propositions. Innovation capacity seems to be the key to achieve competitive advantage in a more virtual and complex way of doing business.

The capitalisation of intangible assets and their consequent amortisation over an estimated and proven period of useful life positively affect the usefulness of financial information in the eyes of investors. However, if internally generated, they cannot be recognised as intangible assets because in many cases they are a mixture of several items such as names, competitive positions, customer lists and other similar items. The recognition of intangibles as immediate costs has the inverse effect in disclosing the incapacity of present accounting systems to reflect the reality of a national economy, which is more volatile and less supported by physicals assets than a decade ago.

References

Brockington, Raymond (1996) Accounting for Intangible Assets: A new Perspective on the True and Fair View, England: Addison-Wesley Publishing Company.
Contractor, Farok J. (2001) "Intangible Assets and Principles for Their Valuation", Valuation of Intangible Assets in Global Operations, Farok J. Contractor (Editor), London: Quorum Books.
Edvinsson, Leif; Johan Roos; Göran Roos and Nicola Carlo Dragonetti (1997) Intellectual Capital – Navigating the New Business Landscape, London: MacMillan Press.
Healy, P.; S. Myers and C. Howe (2002) "R&D accounting and the relevance-objectivity trade-off", Journal of Accounting Research, 40 (3), pp. 677-710.
Kaplan, R. S. and David P.Norton (1996) The Balanced Scorecard: translating strategy into action, Boston: Harvard Business School Press.
Kelly, Kevin (1998) New Rules for the New Economy: 10 Radical Strategies for a Connected World, New York: Viking.
Lev, Baruch and T. Sougiannis (1996) "The capitalization, amortization, and value-relevance of R&D", Journal of Accounting and Economics, Nº21, pp.107-138.
Lev, Baruch (2001) Intangibles: Management, Measurement, and Reporting, Washington: Brooking Institution Press.
Lopes, I.; Maria Rosário F. O. Martins and Luís Alfredo do Amaral (2004) "Economia do Conhecimento: A era dos intangíveis", Simpósio Internacional "Ciência, Conhecimento e Mercado", Actas do Simpósio.
McAdam, Rodney and Sandra McCreedy (1999) "A critical review of knowledge management models", The Learning Organization, Bradford, Vol. 6, Iss. 3, pp. 91-100.
Nonaka, Ikujiro and Hirotaka Takeuchi (1995) "The knowledge creating company – how Japanese companies create a dynamics of innovation, New York: Oxford University Press.
Phillips, Jack J. and Patrícia Pulliam Phillips (2002) "Measuring and Monitoring Intellectual Capital: Progress and Future Challenges", Measuring Intellectual Capital, Jack J. Phillips and P. Pulliam Phillips (Ed.), Alexandria: ASTD.
Reilly, Robert F. and Robert P. Schweihs (1998) Valuing Intangible Assets, New York: McGraw-Hill.
Rivette, Kevin and G. Kline (2000) "Discovering new value in intellectual property", Harvard Business Review, January – February, pp.18-19.
Schwartz, Evan I. (1999) Digital Darwinism: 7 Breakthrough Business Strategies for Surviving in the Cutthroat Web Economy, New York: Broadway Books.
Shapiro, Carl and Hal R. Varian (1999) Information Rules: A Strategic Guide to the Network Economy, Boston: Harvard Business School Press.
Slywotzky, Adrian J. (1996) Value Migration: How to Think Several Moves Ahead of the Competition, Boston: Corporate Decisions.
Smith, Kim E.; Robert T. Tully and Ian Charles (2000) International Accounting Standards Overview and Application - IAS 38 Intangible Assets, Teddington: Accountancy Tuition Centre Limited.
Szábo, Katalin (1999) "Networks in Hyper-Competition - Decomposition of Companies into Molecular Units and their Re-Integration into Networks", Journal of European Business Education, Issue 9, No.º 1, December, pp.80-92.
Tapscott, Don; David Ticoll and Alex Lowy (2000) Digital Capital: Harnessing the Power of Business Webs, Boston: Harvard Business School Press.
Teece, D. J. (1986) "Profiting from technological innovation: implications for integration, collaboration, licensing and public policy", Competitive Challenge, Cambridge: Ballinger Publishers.
Willigan, Walter L. (2001) "Leveraging your Intellectual Property: A Proven Path to Value Extraction", Valuation of Intangible Assets in Global Operations, Farok J. Contractor (Editor), London: Quorum Books.

