academicJournals

Vol. 7(17), pp. 898-1008, 8 May, 2013
DOI 10.5897/AJPP11.789
ISSN 1996-0816 © 2013 Academic Journals
http://www.academicjournals.org/AJPP

African Journal of Pharmacy and Pharmacology

Full Length Research Paper

Towards a new economic model on biopharmaceutical companies

E. Fidalgo*, A. Rodríguez and A. Monroy Antón

Universidad Complutense de Madrid, Campus de Somosaguas, 28223-Madrid, Spain.

Accepted 30 December, 2011

Intangible assets are one of the most important issues in biopharmaceutical companies today, due to the idiosyncrasies of this business. In such an innovative sector, companies have been investing heavily in research, development and innovation and the book value often does not accurately reflect the real value of the companies. It was necessary, therefore, a new accounting model that meets the needs of this sector. This work main contribution is the design of an intellectual capital report, particularly suited to the biopharmaceutical companies, a model that has been called 3C 2P 2R. The two main conclusions of the study have to do with the growing importance of intangibles as a new way to create value and new way of organizing economic activities in biopharmaceutical companies, and the need for new forms and quality of information provided, since no proper assessment of this asset has high costs. The proposal made here may become a fundamental tool to improve the valuation ofbiopharmaceutical companies.

Key words: Drug industry, pharmaceutical economics, economic value, economic models, healthcare market.

INTRODUCTION

The birth of the biopharmaceutical industry comes along with the discovery of recombinant DNA and monoclonal antibody technologies, 40 years ago (Walsh, 2007). Biopharmaceuticals are complex macromolecules created recombining DNA, using cell fusion or genetic manipulation. One of the main differences with traditional pharmaceutical industry is that biopharmaceuticals are usually administered by subcutaneous, intravenous or intramuscular injection, instead of orally.

From the appearance of human insulin, the first drug produced via genetic engineering; in 1982, more than 100 biopharmaceuticals have been marketed (Roche, 2006). Sales have grown enormously and the sector has little to do with that of the 1970s. During these years, the world has seen the discovery of the first recombinant vaccine (against hepatitis B) in 1986, the first therapeutic monoclonal antibody (against kidney transplant rejection), also in 1986, and the first and only oligonucleotide in 1998 (against cytomegalovirus retinitis in AIDS patients), among others (Alexander et al., 2011; Rydzewsky, 2008). Nowadays, cost of medicines is growing constantly as new medicines are marketed (Kulkarni et al., 2010).

One of the most important issues for the industry today is to reach a fair valuation of the intangible assets. In such an innovative sector, in which companies invest heavily in research, development and innovation, the book value often does not reflect the real value. Since the main purpose of accounting should be to help in making efficient and more successful decisions, this objective can be hindered in the case of technology-based innovating companies (EIBTs), as the accounting information provided by traditional financial statements does not constitute itself a useful tool to achieve that goal.

Only a few companies in the world produce

*Corresponding author. E-mail: fidalgo@ccee.ucm.es. Tel.: 91 394 2356.

biopharmaceuticals. This makes it impossible to assess industry performance using traditional measures, such as output, market share, export growth or productivity gains. In this situation, the use of measures, such as R&D and revenue gets more importance for these companies.

It seems clear that the main drivers of value creation in these companies are intangible (Holland, 2004). They are not directly observable, so their identification and measurement, which are crucial, is really difficult. Although, these assets may generate competitive advantages, there is little information about them. The result of all this is that in technology-based companies (EIBTs) in general and in biopharmaceutical companies in particular, financial statements do not reflect properly the financial situation. As a result, "*the informative capacity of financial statements on the current and future financial situation of companies is clearly decreasing*" (Cañibano et al., 1999). Both the European Union and the primary regulators of corporate accounting, the International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB), have been active in recent years in projects regarding the disclosure on intangibles. In this sense, the European Union issued the "Guidelines for the Management and Dissemination of Information on Intangibles" (Project published by the Airtel-Vodafone Foundation in 2002).

The empirical studies conducted in the past two decades have revealed the progressive deterioration of the relationship between the market price of a company and other financial variables, such as earnings, book value or cash flows. One consequence is that the role of accounting information in investment decisions is declining. This concern about the usefulness of the accounting model has led various United State agencies like the Securities and Exchange Commission (SEC) and FASB to set up working groups to identify the inadequacy of the financial statements, suggesting ways to improve them. It is necessary, therefore, for a new model that meets the needs of companies operating in sectors like high technology, life sciences or the internet. They are committed to innovation, a process that generally can be divided into three stages, discovery/learning, implementation and marketing. The traditional accounting models do not provide relevant information about these processes of innovation, which are crucial for the survival and success of these companies (Gutiérrez de Mesa, 2004).

The objective of this work is to design a new model for biopharmaceutical companies, which improves the valuation possibilities for this industry. The aim of the model includes:

1. To increase financial support for the industry
2. To strengthen long term investment in biopharmaceuticals
3. To encourage forecasting initiatives in companies in the sector
4. To optimize financial situation of the firms
5. To reduce risks and enhance the viability of the industry.

METHODOLOGY

In order to develop the model, the first step will be to discuss how the R&D process works in biopharmaceutical companies. This will help to create the base from which the second step will be started. In a second phase, a deep analysis of the currently existing models of accounting information in the biotech sector will be done. This will include a review of major national and international contributions in terms of intellectual capital models in the sector. Once it has been done, we will make our own model from the most useful parts of those analyzed, creating the biopharmaceutical companies model.

RESULTS

The R+D+I process in biopharmaceutical industry

After analyzing all the material and sources available, it was found that the R+D+I process, in the case of biopharmaceutical companies, was substantially different to innovation processes in other areas. The role of innovation activities is to reach the economic realization of a process or product (Gutiérrez de Mesa, 2004). Some examples in the case of the biopharmaceutical industry are the new drugs placed into the market, meaning not only absolutely novel drugs (absolute innovation), but also better medicines, for example, with less contraindications, fewer side effects, reductions in the dailies, etc., (relative innovation).

However, the discovery of a new substance is the first part of this process of scientific research and technological development. Then, a series of tests and trials have to be carried out, in order to ensure the effectiveness and safety of the drug to be marketed. In this sense, we found a set of stages that the new drug passes from the initial discovery (Lobato et al., 1997):

1. Preclinical phase: where the substance is subjected to a complex battery of *in vitro* tests and animal testing in order to identify possible toxic effects and establish its pharmacological characteristics.
2. Clinical phase: after passing the aforementioned tests, promising products are brought to a second process, generally called clinical trials.

a. Phase I: trials in healthy people (volunteers). If the drug is tolerated and produces the desired effect, it enters the second phase.
b. Phase II: the product is supplied to a number of patients suffering from the disease, which is expected to deal with the drug subject of the experiment (between 3.000 and 4.000 patients). If the product is still promising, it would go to the next stage.
c. Phase III: the product is supplied to a large number of patients. Large-scale tests are used to determine the ideal dosage and refine the levels of safety and efficacy estimates.

In view of this, it can be concluded that innovation in drugs is a process characterized by uncertainty, resource

consumption and time consumption. The complexity of this process is clear in the early stages of obtaining a chemical compound that will form the basis for the subsequent drug.

The subsequent testing phases leading to the production of a new drug from discovery of a new active substance (NPA) are extended over several years. It is common, a length of 12/13 years from the moment the new active substance is obtained until the new drug appears into the market. Obviously, for the company, the economically significant moment is the marketing of the product.

This research process requires a lot of resources, both financial and human, which have increased considerably in the past twenty years. In 1999, for example, the cost of research and development of a new chemical or biological entity was estimated at 560 million euros (around U.S. $ 460 million, considering an exchange rate of 1.20 € per U.S. $) and in 2001 this cost was estimated around 900 million euros, about U.S. $ 750 million (EFPIA, 2003).

Non-financial proposals for the identification and measurement of intangible assets

There have been several previous proposals to complete the information provided in traditional financial statements on intangible assets, but none of them has been shown to be suitable for this type of business. Among the existing international proposals, the most famous are those of Kaplan and Norton (1992) with their balanced scorecard; Edvinsson (1997) with his Skandia navigator, Lev (2000, 2001) with the value chain score board and Sveiby (1997) with the intangible monitor assets. Among the Spanish proposals, the view held by the group of experts who drafted the White Paper on Reform of Accounting in Spain (ICAC, 2002), the Intelec Model (Euroforum, 1998) and the Intellectus Documents Center for the Knowledge Society of Madrid (UAM).

In 1992, Kaplan and Norton questioned whether the measures provided by accounting, based in short-term financial indicators, enabled managers to evaluate new strategies and innovation processes. Deficiencies in traditional accounting have been widely discussed in recent years of the twentieth century and early twenty-first century, as the need for more information about intangible assets has become a highly important and decisive factor for the future of a company. Financial statements, in their traditional conception, do not take intangibles into account. Kaplan and Norton believe that new valuation methods that reflect the new organizational goals and processes are needed. The “balanced scorecard” is a new architecture valuation based in the company's strategy (Roos et al., 2001). It is an assessment accounting system rather than as a specific instrument, as it is based on the company's organizational strategy. It requires a company that has its own rational system of creation and intellectual capital flow. To be effective as a decision tool, it is necessary that the company meets its own objectives, the context in which it operates and is dynamic enough to reflect the temporal dimension (Bontis, 2000).

Sveiby (1997) stated that the book value must equal the value of tangible assets minus debt. He considered that the prevailing traditional accounting system for over 500 years had to make way for a new system which takes into account non-financial flows of knowledge. He proposed a new conceptual framework based on three types of intangible assets:

1. Intangible assets arising from the external structure, such as branding, customer or supplier relationships;
2. Intangible assets arising from the internal structure, this is the organization, management systems, legal structure, operating systems, attitudes, R&D and software;
3. Intangible assets derived from individual skills such as training and experience.

He recommended, first of all, to replace the frame of traditional accounting by a new framework which takes into account knowledge. Within this new framework, the pooling of financial and nonfinancial indicators provides a more complete economic and financial situation and value creation for shareholders.

According to Sveiby, the purpose of identifying and measuring these three groups of intangible assets is to implement better management control. To achieve this aim, the first step is to determine who will be interested in the results. In an external display, the company needs to describe quality of management as accurately as possible to shareholders, customers, creditors and other social. Outsiders are generally interested in knowing the position of the company, as external accounting occurs only after long intervals of time. He therefore recommends including information about intangible assets that the company owns, including certain key indicators as well as necessary explanation about them, in the information given to external agents.

On the other hand, it is also necessary that an internal valuation of such intangible assets for the company managers, as they need to assess progress and take corrective measures. Ultimately, it results in creating an information system for management. That system focuses on the flows, trends and changes of the different variables under control. Sveiby believes that the measurement of intangible assets should include at least three cycles of measurement to assess the results and repeat them annually. He identifies three indicators for each of the three types of intangibles: growth and renewal, efficiency and stability, recommending the directors, that is, the selection of one or two variables for each indicator.

In essence, the “Intangible Assets Monitor” showed in a simple way a series of indicators relevant to each category (Sveiby, 1997). Obviously, the choice of these depends on the strategy of the company. Edvinsson, meanwhile, proposed the famous Skandia Navigator (1997). Skandia is considered the first company that has made real efforts to measure their intellectual capital. This company developed in 1985 an “Intellectual Capital Report” and became the first one to complement their traditional financial reports submitted to its shareholders in 1994 with a report on their intellectual capital. Other companies like Dow Chemical have developed several initiatives to valuate their R&D and patent development process based on the multidimensional concept of value creation for Skandia (Bontis, 2000).

Leif Edvinsson was the “architect” and Skandia executive who developed the report model called Navigator (Skandia Navigator), which focused on five areas, such as, financial, customers, processes, renewal and development and human capital. This new taxonomy of accounting tried to identify the roots of value creation in a company measuring and valuating a set of dynamic and hidden factors that underlie the “visible” part of the company (Edvinsson and Malone, 1997). According to Skandia's model, the basis of intellectual capital is the union of two hidden factors, human capital and structural capital (Bontis, 2000):

1. Human capital is defined as the combination of knowledge, skills and innovative capabilities of the employees of a company, including the values, culture and philosophy prevailing in the organization;
2. Structural capital refers to the hardware, software, databases, organizational structure, patents, trademarks and all other organizational capabilities that underpin the productivity of human resources, including the so called “client capital”, this is the relationships developed with key customers of the organization. Unlike human capital, structural capital does belong to the company and may be subjected to “transaction”;
3. Intellectual capital is defined as the sum of human capital and structural capital. According to Edvinsson and Malone (1997, 1999), intellectual capital includes the applied experience, organizational technology, customer relationships and professional skills that enable the company to achieve a competitive advantage in the market.

The Skandia “CI Report” for the measurement of the five core areas of the Navigator model, used up to 91 new indicators of intellectual capital in addition to traditional 73. Of all these new indicators, Edvinsson and Malone suggested 112 to create what they call a “Universal Intellectual Capital Report”.

Lev (2000) proposed a new accounting paradigm based on three axes (financial assets, nonfinancial assets and accounting improvement), integrated under control loops into a coherent information structure. This author considers that the traditional financial reporting system does not articulate links between capabilities and results, and these are the determinants of success in the new economy. The information system proposed focuses on four innovative capabilities:

a. Ability to innovate/marketing
b. Human resources
c. Customers
d. Networks

His new accounting proposal is a really ambitious system that means expanding the traditional accounting to nonfinancial and nontransactions derivative domains, providing necessary information for decision makers and investors in today's changing global economic environment. The proposed system incorporates better information on certain elements (intangible investments) and a system of “balanced scorecard” focusing on non-financial indicators. It also adds coherence and structure to the information provided.

As regards the existing Spanish main proposals, that take into account the contributions previously analyzed (Edvinsson, 1997; Kaplan and Norton, 1992; Lev, 2000; Sveiby, 1997), it is necessary to mention the view held by the group of experts who drafted the white book on reform of accounting in Spain (ICAC, 2002), the Intelec model (Euroforum, 1998) and the Intellectus Documents of the Center for Knowledge Society of Madrid (UAM).

Intelec model responded to the need to collect in an easily understandable system all the intangible elements that create value in organizations, providing managers with relevant information to decision-making. The model aimed to bring the explicit value of the company to its market value, and report on the organization's ability to generate sustainable results, continuous improvement and long-term growth. The model was structured, following major international contributions, establishing a tripartite classification of intellectual capital.

The Intelec model incorporated present and future dimensions when structuring and measuring intangibles based on its potential and the efforts being made in its development. In addition, it also incorporated the internal and external dimensions, identifying the intangible elements that create value from the consideration of the organization as an open system. It is also important to highlight the dynamic nature of the model, which not only provided the intellectual capital at a particular point in time but also close to the flow of conversion between the different blocks of intellectual capital. Finally, the model did not only consider the explicit (transmittable) knowledge, but also contemplated the more personal, subjective and difficult to share knowledge (Gutiérrez de Mesa, 2004).

Subsequently, the Centre for Research on the Knowledge Society of Madrid (CIC) developed the Intellectus model (2002) based on the Euroforum group

model in 1998. This model also builds on the model of Kaplan and Norton, Edvinsson, Sveiby and Brooking. The objectives were to identify and assess the elements that define the human capital and select the most appropriate indicators for each of them. The model made a restatement of the elements of human capital, establishing a total of five items to be included in the measurement of human capital of an organization. These elements were motivation, satisfaction and commitment of staff, skills, learning ability and capacity to integrate new people. The

"*elements identified gather the essentials of what is meant by valuable human capital or talent [...] one that is motivated and prepared, with adequate diversity of people and can be managed over time, through the incorporation of new people and development of their capacities*" (CIC, 2002).

In addition to the Intelec and Intellectus models, outlined earlier, the "report on the state of accounting in Spain and basic guidelines for its reform" (ICAC, 2002) also refers, in Chapter 7, the financial information that is still relevant. That is why it made a series of recommendations at the time of incorporating this type of voluntary information in the report. The practices followed by companies in Spain are far from providing relevant management reports to users of the information, and the disparity manifests itself in the preparation and submission of the report. Therefore and in order to standardize the information, the white book proposed the information to be included, although its position is that such standardization was considered as a recommendation and not a coercive measure.

There are three factors that should guide the choice of indicators in a company:

1. The strategy
2. The characteristics of the company itself
3. The characteristics of the industry in which it operates.

Proposed report of intellectual capital for biopharmaceutical companies: Model 3C 2P 2R

After the review of the most prominent national and international literature on intellectual capital, and after analyzing the main intangible asset of these businesses, our model proposal supplements the traditional annual financial statements with an intellectual capital report, especially appropriate to this biopharmaceutical sector. The aim is that analysts, investors and managers of these companies have additional evidence to assess more successful at these businesses. It also aims to create a common tool for all which allows, over time, inter-company comparability.

The proposed model is structured graphically as shown in Figure 2. To define the different kinds of indicators, targets must be defined. While in the traditional balance sheet, objectives are implicitly defined. Developing an intellectual capital report (ICR) requires the explicit formulation of organizational objectives. The discussion of goals and strategies forces the organization to focus on the essential process of value creation, which can then be measured, documented and communicated. The ICR is structured on the basis of three pillars:

1. The potential added value of the company.
2. The company's key processes.
3. The results obtained by the company.

Regarding the study of the potential of this added value, it will be conditioned by human, structural and relational capital of the company (3C). The key processes of these companies rely on R&D, distinguishing research projects of development projects (2P). Finally, the results of the company shall be measured from two different perspectives, on one hand the financial and on the other hand the nonfinancial results (2R).

After defining the organization's strategic objectives, once the pillars of ICR have been set, and taking into account the existing data at company level, indicators are formulated for each of the proposed categories. One of the biggest risks in the development of an intellectual capital report is the definition of too many goals or too many indicators; that is why the actual strategic thinking of the company is clarifying priorities (Gutiérrez de Mesa, 2004). When selecting indicators, the priority should be to define them in the most clear and transparent as possible way.

This intellectual capital report, especially suitable for biopharmaceutical companies, is built on the tripartite classification of intellectual capital (3C), generally accepted, by which it is divided into human capital, structural capital and relational capital. Adding to it the R+D+I (2P) of the company and the results (2R), not only financial statements are also scientific, proposing a set of indicators within each of the categories of intellectual capital.

In each years´ ICR shall appear as the indicators of the year for which it is being done, as well as at least indicators of last year, in order to facilitate annual intracompany comparison and to have a tool that allows seeing the company's intellectual capital evolution. The model 3C 2P 2R of ICR is reflected in Figure 3.

DISCUSSION

The balanced scorecard of Kaplan and Norton, through the analysis of the four main perspectives of the business (financial perspective, customer perspective, internal perspective and growth perspective) is a useful tool to demonstrate to the investors the true value of the company.

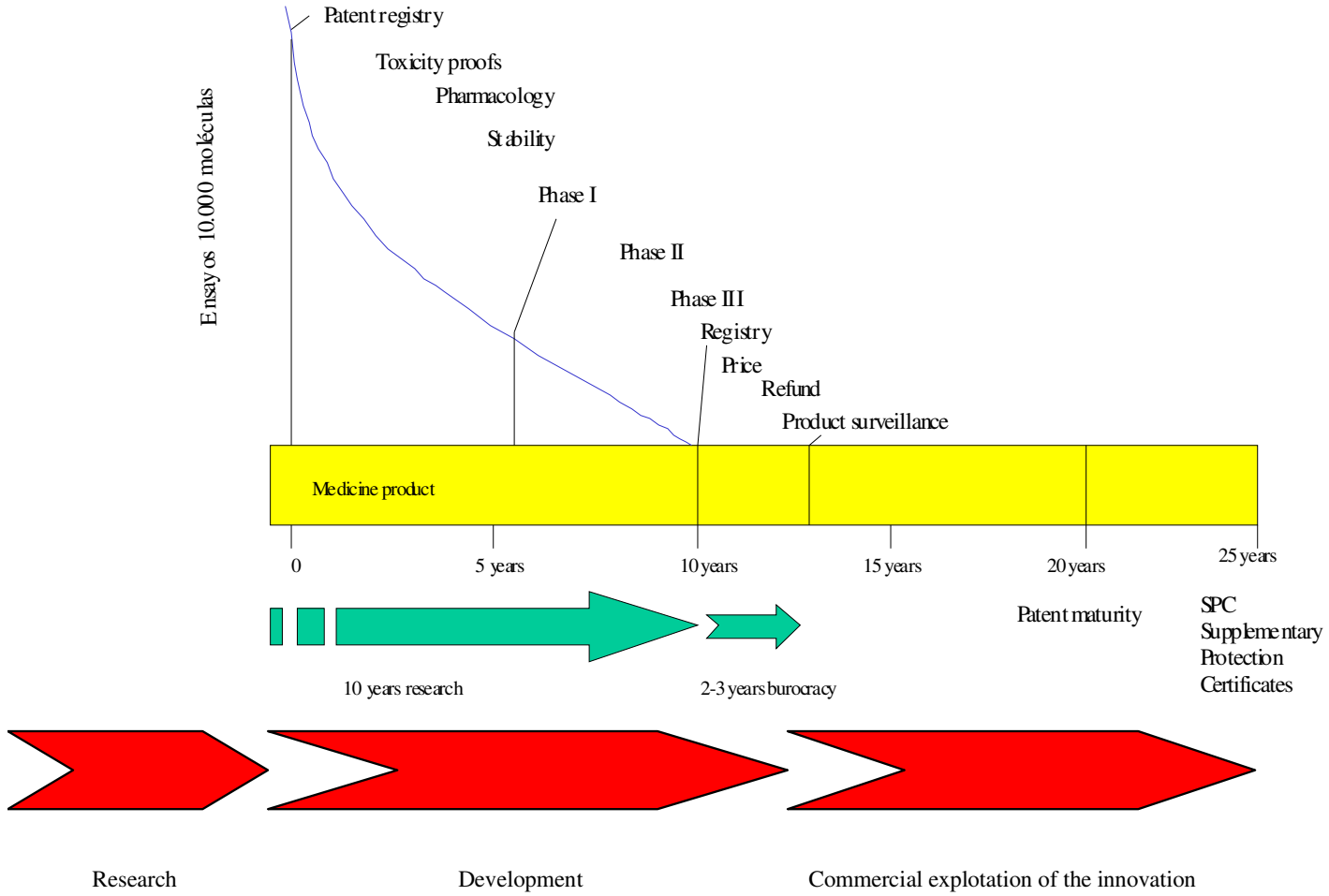

Figure 1. R&D process phases.
Source: AGIM, Recherche et Vie in EFPIA (2003) and authors.

However, some authors, such as Roos et al. (2001) consider that the scorecard presented by Kaplan and Norton reveals too much information about the company's strategy.

The scorecard has another clear disadvantage: its relative stiffness in the identification of key success factors in each of the perspectives. Almost certainly, one of the key factors has an impact on several dimensions of the intangible assets considered by Kaplan and Norton.

The Skandia value scenario included both financial and nonfinancial aspects, allow the estimation of the market value of the company. Edvinsson and Malone (1997; 1999) consider that the intellectual capital represents a new way of seeing the value of the organization, and that the identification and valuation of these intangible assets is possible thanks to accounting.

Many authors acknowledge the considerable efforts made by Skandia for the identification and measurement of intangible assets that served as a basis to encourage academics, researchers, analysts and managers to continue studying the process of value creation in companies. Skandia's model has been particularly important because it acknowledges the crucial role customer relations play in creating value for the organization.

But among the weaknesses of the model, Lynn (1998) stated that Skandia navigator provides only an approximation of what the intellectual capital may be. As it assigns no monetary value, its usefulness is limited. Other authors, such as Johan et al. (2001) argue that because the base model is basically the company's balance sheet, the measure it makes of the intangible is only a static X-ray in time, as it does not capture the dynamic flows of the organization.

The variety of methods to measure intellectual capital means the practical impossibility of carrying out comparisons in the values of the intellectual capital of firms operating in different industries. Even firms that operate in the same industry may have substantially different results when using different methods (Gutiérrez de Mesa,

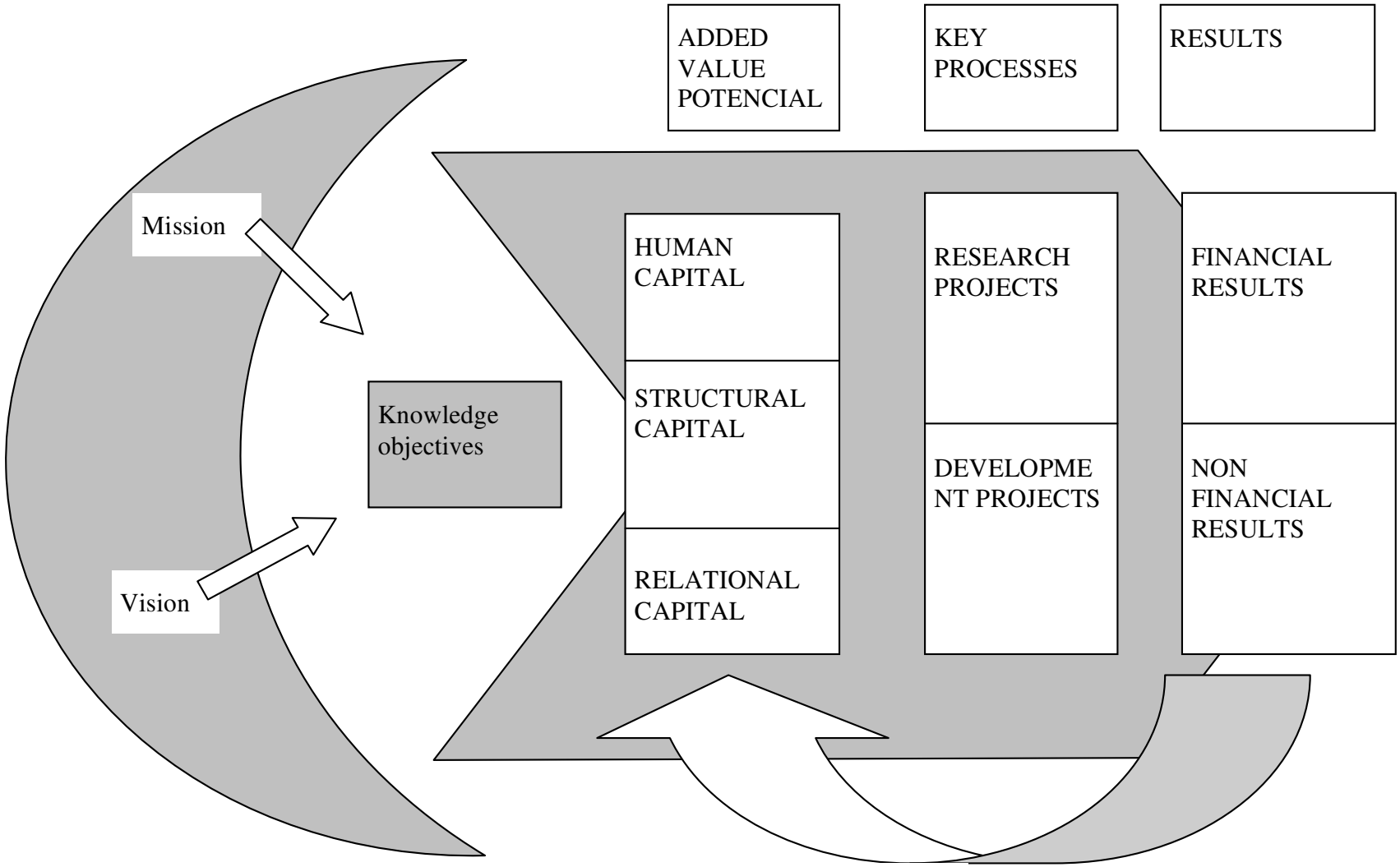

Figure 2. Proposed model 2P 3C 2R.
Source: Gutierrez de Mesa Vazquez, E. (2004). Adapted from Koch, Leitner and Bornemann (2000).

1. HUMAN CAPITAL:

1.1 HUMAN RESOURCES

- ▶Total new hires
- ▶Total new research staff on new additions
- ▶Staff Turnover rate
- ▶Total Staff Departures
- ▶Total Retirements and early retirements
- ▶Average Age Staff
- ▶Average Age of researchers
- ▶Percentage of research staff on total Staff
- ▶Percentage of staff with university training on total staff
- ▶Percentage of PhD researchers on total researchers

1.2 TRAINING

- ▶Total training days per employee
- ▶Total technology training days per employee
- ▶Total R+D training days per researcher
- ▶Total training expenses on wage cost per employee
- ▶Total training expenses on total administrative expenses

2. STRUCTURAL CAPITAL:

2.1 ICT

- ▶Computer rate per employee
- ▶ICT expenses per employee

2.2 KNOWLEDGE BASED INFRASTRUCTURES

- ▶Total data bases the company uses

3. RELATIONAL CAPITAL:

3.1 PROJECTS IN COLLABORATION

- ▶Total new national projects in collaboration with other institutions over new projects
- ▶Total new European projects over new projects
- ▶International research activities
- ▶Total international researchers on the total company's researchers
- ▶Total formalizad strategic alliances
- ▶Total exploitation strategic alliances on total strategic alliances formalized
- ▶ Total exploration strategic alliances on total strategic alliances formalized

3.2 KNOWLEDGE DIFUSSION

- ▶Total conferences and seminars attended by research staff per researcher
- ▶Total lectures given by each researcher
- ▶Total papers published in refereed scientific journals per researcher

3.3 CLIENTS, IMAGE AND STAKEHOLDERS

- ▶Total expenditure on corporate advertising on total expenditure on advertising and promotion
- ▶Total new clients
- ▶Total news stakeholders of the company

4. R+D+I+T PROJECTS:

4.1 RESEARCH PROJECTS

- ▶Total new research projects initiated
- ▶Total new research projects externally financed on new projects total
- ▶Total new international projects on new projects

4.2 DEVELOPMENT PROJECTS

- ▶Total new active substances discovered
- ▶Total projects in preclinical research phase on total development projects
- ▶Total products in clinical research phase I on total development products
- ▶Total products in clinical research phase II on total development products
- ▶Total products in clinical research phase III on total development products
- ▶Total products pending approval by the competent authorities on total development products
- ▶Total outstanding products on total development products
- ▶Total news products on total development products

4.3 INNOVATION EXPENSES (I.E.)

- ▶Total Internal expenses in R+D+I+T over Total I.E.
- ▶Total External expenses in R+D+I+T over Total I.E.
- ▶Total machinery and equipment acquisition on total I.E.
- ▶Total intangible technologies acquisition on total I.E.
- ▶Total Design for production and distribution on total I.E.
- ▶Total Marketing expenditure on Total I.E.
- ▶Total Training expenditure on Total I.E.

5. RESULTS:

5.1 FINANCIAL

- ▶Total Net income (N.I.)
- ▶N.I. increase over previous year
- ▶Total product sales N.I. /Total N.I.
- ▶Servicing N.I./ Total N.I.
- ▶Grants N.I./Total N.I.
- ▶Royalties income/ Total N.I.
- ▶Other income/ Total N.I.
- ▶Total external financial resources on equity
- ▶RONA = Net Profit/Total Net Assets
- ▶Profitability variation over previous year

5.2 SCIENTIFIC

- ▶Total New active substances (N.A.S.) discovered
- ▶New index A* = NAS Type A* / Total NAS
- ▶New index A = NAS Type A / Total NAS
- ▶New index B = NAS Type B/ Total NAS
- ▶New index C = NAS Type C/ Total NAS
- ▶Total bio-pharmaceutical patents registered
- ▶Total Co-Inventions
- ▶Scientific production index = Total bio-pharmaceutical scientific publications/ Nº researchers
- ▶Total licences issued on the company's product to third-party
- ▶Total licences achieved on third-party products
- ▶Average duration of the R+D+I+T processes = Average number of years since the NAS is discovered until the new product is launched
- ▶Scientific success = Number of products launched / Number of Projects in R+D phase

Figure 3. Intellectual capital report for bio-pharmaceutical companies: model 2P 3C 2R.

2004). In addition, for creating intellectual capital, financial capital must be consumed, and in this regard it is essential to determine the profitability of investments in intellectual and financial capital (increased or decreased shareholder value).

These arguments highlight the need for a measure that is generally accepted of the effectiveness of intellectual capital. Furthermore, this measure should be able to "connect" the intellectual capital with financial capital to measure the effectiveness of the company in transforming intellectual capital into financial capital and vice versa. All these factors lead to the development of "second generation" models for measuring intellectual capital, consolidating the various methods into a single index, or at least a small amount of them. The information of the R&D process provided by traditional financial statements is clearly not enough to make a proper valuation of these companies (Gutiérrez de Mesa, 2004).

The proposal made here may become a fundamental tool to improve the assessment of these, especially as from January 1, 2005, some companies in this sector (large pharmaceutical companies listed on certain markets European equity) must submit their accounts in accordance with International Financial Reporting Standards while others (small new biotech companies oriented to pharmaceutical activities) continue presenting its financial information in accordance with the rules laid by the Spanish general accounting plan, so that comparability between the two groups is impossible. Through this report, which orders and standardizes the information provided on this type of intangible assets consistently and systematically, a truer picture of the economic and financial reality of such companies can be achieved (Gutiérrez de Mesa, 2004).

Conclusions

Intangible assets have become a key factor for growth at both the micro (enterprise) and macro (country) level. The change that has occurred in the production process shows, in addition to their growing importance, the inadequacy of traditional economic, financial and management concepts in the reality of the new economy. The problem that arises is the identification and measurement of intangible assets for managers, researchers and analysts. In this regard, intellectual capital report proposals based on nonfinancial aspects have proliferated, in addition to traditional financial statements. It is necessary to highlight two key outcomes of the study:

1. The growing importance of intangibles as a new way to create value and new way of organizing economic activities.
2. The need for new forms and quality of information provided since no proper assessment of this asset has high costs.

Therefore, we must stress the need to improve the process of identifying and measuring intangible assets at both micro and macro level, since a better valuation on a company allows a better measurement at the country level.

This need, in the case of technology-based innovating companies in general and in biopharmaceutical business, in particular, is determinant. It is clear that the main drivers of value creation in these companies are intangible and therefore not directly observable, so their identification and measurement are crucial. It is also a fact that although these assets may generate competitive advantages, information about them and spread abroad is scarce. The result is that in technology-based innovating companies in general and in biopharmaceutical companies, in particular, financial statements do not properly reflect the economic and financial situation of it. Investors, analysts and managers defend that traditional financial statements should include non financial information relevant to a best valuation of those companies.

The proposal made may become a fundamental tool to improve the valuation of these kind of companies, especially as from 2005, some companies in this sector (large pharmaceutical companies listed on certain markets European equity) submit their accounts in accordance with International Financial Reporting Standards while others (small new biotech companies oriented pharmaceuticals) continue presenting its financial information in accordance with the rules laid by the Spanish general accounting plan, so that comparability between the two groups will be impossible. This report, which orders and standardizes the information provided on this type of intangible assets consistently and systematically, allows getting a truer picture of the economic and financial situation of biopharmaceutical companies.

ACKNOWLEDGEMENT

In memoriam of Emma Gutiérrez de Mesa Vázquez, who passed away during the elaboration of this work.

REFERENCES

Alexander D, Pucci A, Smith M, Bloomfield K (2011). Life Science Trends 2011. Carlyle Conlan, Morrisville, NC.

Bontis N (2000). Assessing Knowledge Assets: A Review of the Models Used to measure Intellectual Capital. Framework Paper, Queen's University, Kingston.

Cañibano L, García AM, Sánchez P (1999). The Relevance of Intangibles for the Assessment and Management of Enterprises: Spanish Literatura. Rev. Finan. Account 100:17-88.

CIC (2002). Identificación y Medición del Capital Humano. Taller de Trabajo sobre Capital Humano, Documento Intellectus, Madrid.

DTIDC (1996). Capital and Growth, Danish Trade and Industry Development Council. In www.ll-a.fr/intangibles/denmark.

Edvinsson L, Malone MS (1997). Intellectual Capital: Realizing your Company's True Value by Finding its Hidden Brainpower. Harper Business, New York.

Edvinsson L, Malone MS (1999). Cómo identificar y calcular el valor de los recursos intangibles de su empresa. Ediciones Gestión 2000, 1999. Barcelona.
Edvinsson L (2000). Some Perspectives on Intangible and Intellectual Capital. UNIC, Stockholm.
EFPIA (2003). The Pharmaceutical Industry in Figures. European Federation of Pharmaceutical Industries Associations. Brussels.
Euroforum (1998). Modelo de Medición del Capital Intelectual. Madrid: I.U. Euroforum.
European Commission (2003). Study on the Measurement of Intangible Assets and Associated Reporting Practices. DG Entreprise Workshop on “Intangible Economy”. Brussels.
FASB (1985). Statement of Financial Accounting Concepts No. 6, “Elements of Financial Statements”. Stamford, Connecticut.
FASB (2001a). Business Combinations. FASB Statement No. 141. Stamford, Connecticut.
FASB (2001b). Goodwill and other Intangibles Assets. FASB Statement No. 142. Stamford, Connecticut.
Fidalgo Cerviño E (2003). Financial Information in the Future II: New accounting information and new scenarios. In: Moreno-Luque Abogados, Present and Future of Financial Information. Gestión, Barcelona.
Gutiérrez de mesa Vázquez E (2004). From creative destruction to creative cooperation in biopharmaceutical industry: an economic and accounting analysis, Doctoral Thesis. Universidad Complutense de Madrid.
Holland J (2004). Corporate intangibles, value relevante and disclosure content. The Institute of Chartered Accountants of Scotland, Edinburgh.
ICAC (2002). Report on the current situation of accounting in Spain and Basic Lines for its reform. Instituto de Contabilidad y Auditoría de Cuentas, Madrid.
Kaplan RS, Norton DP (1992). The Balanced Scorecard Measures that Drive Performance. Harv. Bus. Rev. 70(1):71-9.
Koch GR, Leitner KH, Bornemann M (2000). Measuring and Reporting Intangible Assets and Results in a European Contract Research Organization. Paper prepared for the Joint German-OECD Conference Benchmarking Industry-Science Relationship. Berlin, Germany.
Kulkarni U, Deshmukh YA, Moghe VV, Rege N, Madhuri K (2010). Introducing pharmaeconomics (PE) in medical undergraduate curriculum. Afr. J. Pharm. Pharmacol. 4(1):27-30.
Lev B (2000). New Accounting for the New Economy. pp. 1-28.
Lev B (2001). Management, Measurement and Reporting. Brookings Institution Press, Washington.
Lev B, Gu F (2001). Intangible Assets: Measurement, Drivers, Usefulness.
Lobato P, Lobo F, Rovira J (1997). La Industria Farmacéutica en España tras la Unificación del Mercado Europeo. Política Industrial y Estrategia Empresarial. Farmaindustria, Madrid. pp. 49-51.
Lynn LE (1998). The Management of Intellectual Capital: The Issues and the Practice. Management Accounting Issues, Management Accounting Practices Handbook. Society of Management Accountants of Canada, Hamilton. P 16.
Moreno-Luque A (2003). Present and Future of Financial Reporting. Ediciones2000.com Management. EC Regulation No 1725/2003 of 29 September, by adopting certain international accounting standards, OJ October 13, 2003. Barcelona:
Rydzewsky RM (2008). Real World Drug Discovery. A Chemist´s Guide to Biotechnology and Pharmaceutical Research. Elsevier, Amsterdam.
Roche (2006). Biotechnology-new directions in medicine. Hoffman-La Roche Ltd., Basel, Switzerland.
Roos J, Roos G, Dragonetti NC, Edvinsson L (2001). Intellectual Capital: The intangible value of the company. Piados Empresa, Barcelona.
Sveiby KE (1997). The New Organizational Wealth: Managing and Measuring Knowledge-Based Assets. Barret-Kohler Publishers, Inc., San Francisco.
Walsh G (2007). Pharmaceutical biotechnology. Concepts and applications. John Wiley & Sons, Hoboken, USA.