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# MASTER THESIS

# Intangible assets analysis for company valuation: a Project Management approach

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## **INTRODUCTION**

The continuous evolution of technologies and business models has added several levels of complexity to companies' valuation in the last decades. The digital transformation of our world has changed the competitive factors, giving much more relevance to what was almost unknown before the dot com revolution: intangible assets. While in the past the major production factors, and consequently the elements on which financial analysis was grounded in, were mainly tangible assets like property, plant and equipment, nowadays the generation of wealth is increasingly based on the development, exploitation and exchange of invisible or intangible values. The biggest companies in the world by market capitalization have founded their strength on knowledge-based technology, software, human capital and other intangible elements.

To highlight this relevance Nakamura<sup>1</sup> in his paper shows that firms in the US have spent one trillion of US dollars in intangibles in the year 2000 (marked as the beginning of the internet era). The most relevant sign of this tendency towards intangible economy is given by the price-to-book ratios of the biggest companies present on global financial markets. This indicator is calculated by diving the company's stock price per share by its book value per share and shows how the market assesses the value of a company with respect to which are the assets presented on the balance sheet<sup>2</sup>. Big figures of this ratio indicate that market participants are willing to pay a substantial premium in excess of the book value of a company's intangibles.



Figure 1 - P/B Ratio Biggest US companies by market capitalization

<sup>&</sup>lt;sup>1</sup> Nakamura, L., (2003), *"A Trillion Dollars A Year in Intangible Investment and the New Economy"*, Oxford et al., pp. 19-47

<sup>&</sup>lt;sup>2</sup> Henry, E., Robinson, R., (2019), "CFA Program Curriculum Level I", Volume 3, CFA Institute, p. 32

As the chart in *Figure 1* shows, the P/B ratio of the world's biggest listed companies has values ranging between 5 and 15, much higher than the average value of 3 used as reference level by the community of financial analysts.

This difference between market and book values can be seen as a proxy for the decreasing significance of reporting and financial accounting: IFRS (International Financial Reporting Standards) allows the recognition of certain intangible assets only, omitting several of the invisible resources companies have and exploit to create value. The reason why IFRS limits the recognition of such assets is linked to the issues and obstacles related with the classical accounting models and also to the features inherent in intangible assets.

The purpose of IFRS is to provide as much precise and useful information as possible to their primary users in order to allow them to make fully aware decisions about allocating resources to a company. The IFRS in its Conceptual Framework<sup>3</sup> distinguishes between two fundamental and four enhancing qualitative characteristics that financial statements should have, presented in *Figure 2*:

Useful Financial Information			
<ul> <li>Fundamental Qualitative Characteristics</li> <li>Relevance</li> <li>Faithful Representation</li> </ul>	Enhancing Qualitative Characteristics <ul> <li>Comparability</li> <li>Verifiability</li> <li>Timeliness</li> <li>Understandability</li> </ul>		

Figure 2 - Qualitative characteristics of useful financial information

In failing to recognize a big chunk of a firm's intangibles, IFRSs do not present a faithful picture of a company's financial situation. Consequently, financial statements are considered to be less relevant for their users.

Over the past few years, there has been an ongoing discussion about the improvement of international accounting standards, yet without a final outcome capable of catching up with the new needs of financial statements users.

The present thesis tries to look at this issue under a new aspect, bringing into the debate the discipline of project management and its valuation practices. Hence the research question of this paper is:

Can the valuation of a company's project portfolio fill the gap between its book and market value?

<sup>&</sup>lt;sup>3</sup> Conceptual Framework for Financial Reporting, (2018), www.ifrs.org

In simple words, this thesis tries to clarify if the issue remains only attached to accounting or if project management standards and practices can help to resolve this problematic subject. To do this in the first chapter the characteristics and attributes of intangibles will be described and analyzed while in the second chapter the accounting treatment of intangible assets will be discussed in its several typologies. In chapter three the concepts of project portfolio will be introduced describing the financial methods used to evaluate companies' projects. In the last chapter possible proposals for the improvement of the standards will be discussed evaluating potential pros and cons for their implementation.

## **CHAPTER 1**

# **INTANGIBLE ASSETS**

As stated in the introduction of this work, in the last decades certain categories of intangibles, mainly customer relations and technological competencies, have assumed an increasingly relevant role in the determination of the source of value. Consequently, intangible assets have started to come up beside tangible ones as value drivers for companies and financial analysts. It is important to notice that this trend involves not only tech giants, but also consumer product companies and other industries that have always been linked to tangible capital. As Gu and Lev underline "corporate value and growth are increasingly driven by intangible assets, whereas physical capital (like factories, machines, or inventory) is just an enabler—a commodity—equally available to all competitors and hence a marginal creator of value and competitive advantage".<sup>4</sup>

The relevance of this trend towards a more "intangible economy" is confirmed by the Intangible Asset Market Value Study conducted by Ocean Tomo LLC in 2017. The study examines the intangible components of market value for the companies included in the S&P500 and CSI 300<sup>5</sup>. As it can be seen from *Figure 3* and *Figure 4* the value of intangibles has continuously increased since 1975 in the United States while in China the growth has slowed down in the mid-2000s before growing again catching up with the US level. In both cases the market value of companies is mostly composed by intangibles assets.



COMPONENTS of S&P 500 MARKET VALUE

Figure 3 - S&P 500 companies market value split by type of asset

<sup>&</sup>lt;sup>4</sup> Lev, B., Gu, F., (2016), "The End of Accounting and The Path Forward for Investors and Managers", Wiley, p. 82 <sup>5</sup> S&P 500 is a stock market index that measures the stock performance of 500 large companies listed on stock exchanges in the United States; CSI 300 is a capitalization-weighted stock market index designed to replicate the performance of the top 300 stocks traded on the Shanghai Stock Exchange and the Shenzhen Stock Exchange.



COMPONENTS of CSI 300 MARKET VALUE

Figure 4 -CSI 300 companies market value by type of asset

During this evolution, traditional accounting systems have not been able to keep faith to their main goal which is to portray all the firms' value sources to both external and internal stakeholders. Actually, traditional reporting systems have been built primarily to display the value of tangible assets, trying to adapt their standards to the newcomer intangibles. In doing so, the majority of companies' intangible assets are still not shown in financial statements. But as Monga pointed out: *"How do you attach a price tag to something you can't see or touch?*".<sup>6</sup>

For this reason, before starting the analysis and discussion on intangible assets reporting standards, in this section the main features and attributes of intangibles will be defined, distinguishing them from tangible items and providing a description of possible categorization framework.

<sup>&</sup>lt;sup>6</sup> Monga, V., 21 March 2016, "Accounting's 21st Century Challenge: How to Value Intangible Assets?", The Wall Street Journal

### **1.1 Definition and distinction of Intangibles**

The semantic meaning of the adjective intangible is "unable to be touched, not having physical presence or difficult to describe, understand or measure or difficult to define; or simply not tangible".<sup>7</sup> In other words, it defines intangible items as something hidden but still real and, in economic terms, with value. However, as Andriessen clarifies, the big deal with intangible resources is that they are in fact intangible<sup>8</sup>.

When contextualized to the economic or business-related field, intangible phenomena are defined by several terms like intellectual capital, intangible assets, intellectual property, knowledge assets etc.<sup>9</sup> These terms are usually used to characterize a specific type of intangibles or are used interchangeably in a general manner. For the purpose of this thesis, the terms intangible values (or more generally intangibles) will be used to define the broad category of intangible phenomena, while intangible assets will refer to those items that can be recognized under the standards defined by IFRS.

It is actually very difficult to find a single and shared definition of intangible. For this reason, Kaufmann and Schneider have gathered in their paper several definitions of intangibles used in the academic literature.

<sup>&</sup>lt;sup>7</sup> Oxford Wordpower Dictionary, 2003, Oxford University Press, p. 360

<sup>&</sup>lt;sup>8</sup> Andriessen, D., (2004), *"Making Sense of Intellectual Capital, Designing a Method for the Valuation of Intangibles"*, Elsevier Butterworth-Heinemann, p.58

<sup>&</sup>lt;sup>9</sup> Kaufmann, L., Schneider, Y., (2004), *"Intangibles: a synthesis of current research"*, Journal of. Intellectual Capital, Vol. 5 No. 3, pp. 366-388

Author	Year	Term/Concept	Definition
Bukh, P.N.; Larsen, H.T.; Mouritsen, J.	2001	Intellectual capital	IC "is not one thing, it is fragile construct, which has to be continuously supported and held together by a whole array of interrelated elements" p. 88
Bukh, P.N.; Johanson, U.	2003	Intellectual capital	No definition, authors concentrate
Brennan, N.; Connell, B.	2000	Intellectual capital	" the knowledge-based equity of a company", p.1
Edvinsson L	1997	Intellectual capital	No definition
Harrison S.	2000	Intellectual capital	" I monifold that can be converted
Calling Call	2000	Intellectual capital	
Sullivan Sr, P. H.	0001	T . 11 . 1 1	into profit", p.34
Heisig, P.; Vorbeck, J.; Niebuhr, J.	2001	Intellectual capital	"IC is valuable, yet invisible", p 60
Mouritsen, J.; Bukh, P.N.; Larsen, H.T.; Johansen, M.R.	2002	Intellectual capital	"IC is not a conventional accounting or economic term. It may be an effect, it may be a departmental strategy, it may be a mathematical formula", pp. 10-11
Petty, R.; Guthrie, J.	1999	Intellectual capital	No own definition; authors state "that knowledge management is about the management of the intellectual capital controlled by a company" p 18
Edvinsson, L.; Malone, M.S.	1997	Intellectual capital and Intangible assets	"Intangible assets are those that have no physical existence but are still of value to the company."
Ordonez de Pablos, P.	2003	Intellectual Capital	"A broad definition of intellectual capital states that it is the difference between the company's market value and its book value. Knowledge based resources that contribute to the sustained competitive advantage of the firm form intellectual capital." p. 63
Petty, R.; Guthrie, J.	2002	Intellectual capital	IC " as the economic value of two categories of intangible assets of a company", p. 158. Authors name as categories organisation and human capital
Rastogi, P.N.	2003	Intellectual capital	"IC may properly be viewed as the holistic or meta-level capability of an enterprise to co-ordinate, orchestrate, and deploy its knowledge resources towards creating value in pursuit of its future vision." p. 230

Figure 5 - Literature intangible definitions

Author	Year	Term/Concept	Definition
Stewart, T.A.	1998	Intellectual capital	"IC is intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth = collective brainpower",
Sullivan, P.H.	2000	Intellectual capital	"IC is knowledge that can be
Wood, J.	2003	Intellectual capital	no definition, states that IC is
Bonfour, A.	2003	Intangibles	no definition, states that the definition has a strong influence on the measurement and evaluation of intangibles
Bontis, N.; Dragonetti, N.C.; Jacobsen, K.; Roos, G.	1999	Intangible resources, Intellectual capital as a subcategory	IC "is quite simple the collection of intangible resources and their flows", intangible resources is "any factor that contributes to the value generating processes of the company", p. 397
Canibano, L.; Sanchez, P.; Chaminade, C.; Olea, M.; Escobar, C.G.; Garcia-Avuso, M.	1999	Intangibles	Adjective that goes along with various concepts as resources and investments, authors name existing definitions
Daum, J.H.	2002	Intangible assets & Intellectual capital	No definition; names different kinds of intangibles, such as human capital and knowledge
Funk, K.	2003	Intangibles	No definition, mentions management credibility, innovativeness, brand identity, ability to attract talents, research leadership, social and environmental responsibility
Garcia-Ayuso, M.	2003	Intangibles	No definition
Johanson, U.; Martensson, M.; Skoog, M.I.	2001	Intangibles	No own definition; authors name and compare existing ones
Lev, B.	2001	Intangibles	"An intangible asset is a claim to future benefit that does not have a physical or financial (a stock or a bond) embodiment", p. 5
Gu, F.; Lev, B.	2001	Intangible assets	Intangibles are defined by their major drivers. Authors name R&D, advertising, IT and human resource practices as drivers
Sveiby, K.E.	1997	Intangible asset	Defines intangibles over its three categories, all are derived from an organization's personnel

*Figure 6 - Literature intangible definitions (continued)* 

Author	Year	Term/Concept	Definition
N.N.	2001	Intangible Assets	Intangible assets "are non current, nonfinancial claims to future benefits that lack a physical or
Yang, S.; Brynjolfsson, E.	2001	Intangible assets	Inancial form", p. 6 No definition, just a statement that intangible assets are costly to create and create a stream of expected benefits over period of vears
Michalisin, M.1 D.; Kline, D.M.; Smith, R.D.	2000	Intangible resources	No clear definition, just differentiation between terms;
Sanchez, P.; Chaminade, C.; Olea, M.	2000	Intangibles	Differentiation between intangible resources which can be measured a one moment and intangible activities that arise during a period of time
Granstrand, O.	1999	Intellectual property	IP is property directly related to the creativity, knowledge and the identity of an individual
Günther, T.	2001	Immaterial values	No definition; names different kinds of intangibles such as brands and patents
Kriegbaum, C.	2001	Immaterial values	Author states that immaterial values are as physically not embodied financial goods. Their nature is not monetary. They are an economic advantage for the
AK "Immaterielle Werte im Rechnungswesen" der SG	2001	Immaterial values	company Negative description: non-monetary values without
Grant, R.M.	1997	no term	No definition; covers only
Kaplan, R.S.; Norton, D.P.	2001	no term	No definition, just separate financial performance measure and non-financial performance measures
Chan, L.K.; Lakonishok, J.; Sougiannis, T.	2001	no term	No definition; cover only R&D and advertising

#### *Figure 7 - Literature intangible definitions (continued)*

It can be noticed from *Figures 5, 6* and 7 that many authors include somehow the word knowledge in their definitions referring to some form of economic value attached to the intangible asset, pointing out their profit generation potential. For example, Gu and Lev describe intangibles as *"a claim to future benefits that does not have a physical or financial embodiment"*<sup>10</sup> while Edvinsson and Malone define intangibles as those items *"that have no* 

<sup>&</sup>lt;sup>10</sup> Lev, B., Gu, F., (2001), *"Intangible assets: measurement, drivers, usefulness"*, New York University, New York

*physical existence but are still of value to the company*".<sup>11</sup> Finally Sullivan simply claims that is *"knowledge that can be converted into profits*"<sup>12</sup>.

Still, these definitions result relatively broad and do not give an exhaustive explanation of intangible values. It is, in fact, not clear how knowledge can be converted into future benefits (i.e. profits) by itself. That is because intangibles often need tangible items to realize their value. According to Grüber, four criteria must be used to further characterize intangibles in correlation with tangible items and better define their differences:

- The function of the tangible component
- The economic interest associated with the item
- The relative values of the components
- The reproduction of the respective item.<sup>13</sup>

According to the first criterion the classification of the item depends on the purpose of its tangible part: if this has supporting function only, then the element can be classified as intangible. Let's take as an example the brand of a famous soccer club like Juventus and an unbranded soccer match t-shirt (without Juventus' logo and colors). Juventus' brand and consequently its value are better conveyed if sewed on a t-shirt than just spread with a word of mouth, still the brand Juventus remaining the same. In other words, the t-shirt only acts as medium, carrying the value of the intangible. The same would happen to a license that is certified on a document: in this case the certification itself has only a supporting role and thus the item can be deemed as intangible.

In the case of the second criterion, if the economic interests stress on the intangible portion of the item, then it can be considered as intangible. In the case of the Juventus t-shirt, the economic interest is attached to what the brand represents more than the tangible item that carries it. Regarding the patent, the economic interests are linked to the protective characteristics of the license rather than the certification it is written on. In both cases, the item would be considered again as intangible.

<sup>&</sup>lt;sup>11</sup> Edvinsson, L., Malone, M. S., (1997), *"Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower"*, HarperBusiness, New York

<sup>&</sup>lt;sup>12</sup> Sullivan, P.H., (2000), "Value-Driven Intellectual Capital – How to Convert Corporate Assets into Market Value", Wiley, New York

<sup>&</sup>lt;sup>13</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, pp. 37-40

According to the third criterion, the classification is driven by the component with higher value. Consequently, if the intangible element is higher in value than the tangible portion, then the item can be classified as intangible. Carrying on with the case of the soccer t-shirt, let's use data present on the official Adidas website (Juventus technical sponsor): the price of a soccer match t-shirt without Juventus brand is priced at  $\pounds 29.95^{14}$  (price that already incorporates Adidas brand value) while an official Juventus t-shirt has a price of  $\pounds 62.97^{15}$ . This means that, considering for the sake of the example Adidas brand value negligible, the brand value of Juventus is of  $\pounds 33.02$ . This result becomes even more evident if a Juventus t-shirt with a player's name is selected: the price goes up to  $\pounds 99.95$ . From this daily life example, it clearly emerges the added value provided by the intangible to the physical item.

Finally, the concept behind the reproduction criterion is that an intangible element turns into a tangible one when it is reproduced making the intangible portion less relevant due to the reproduction occurrence. For instance, a piece of art like the Mona Lisa can be undoubtedly categorized as intangible following the previous criteria. However, when it is reproduced in innumerous copies, these no longer include the intangible component that makes it so unique. For this reason, the original artwork kept in the Louvre museum has an invaluable price while its copies are sold for few dozens of euro at the museum's gift shop.

All in all, despite the different definitions given by the academic literature, the best way to describe intangible values is by differentiate them from tangible elements. Still this reference to the physical substance of tangible items is not enough for a complete description of intangibles, but the four criterion abovementioned can be considered a solid basis for further and more thorough analysis: for each individual case, all the criteria must be considered in combination with each other to determine if the tangible or intangible component prevails.

<sup>&</sup>lt;sup>14</sup>Adidas Official Website Store, https://www.adidas.it/maglia-tiro/FT8436.html

<sup>&</sup>lt;sup>15</sup> Adidas Official Website Store, https://www.adidas.it/maglia-home-juventus/DW5455.html

### **1.2** Economic attributes and properties of Intangibles

Like the definition of intangible values, there has been a lot of discussion regarding their economic nature. From the economic point of view, intangibles have a set of properties indicating their contribution to the value of a company.<sup>16</sup> These properties may be classified into two different categories:

- Value drivers, which enhance the company's value
- Value distractors, which restrict or destroy value

This categorization states that intangibles are associated both with benefits and costs, which must be carefully considered and balanced when it comes to their management. *Figure 8* summarizes drivers and distractors including more detailed attributes.



Figure 8 - Value drivers & Value distractors of Intangibles

- Scalability
  - Non-rivalry refers to lack of opportunity cost while exploiting intangibles potential. A company can use intangibles in several repetitive and contemporary applications without diminishing their usefulness. On the contrary, tangible items compete for alternative uses: in fact, their deployment in a specific situation prevents their utilization in another concurrent setting, letting opportunity cost arise. For example, Ferrari can use its brand on cars, social media, merchandising etc. at the same time without losing its profit

<sup>&</sup>lt;sup>16</sup> Lev, B., (2001), *"Intangibles: Management, Measurement, and Reporting"*, Brookings Institution Press, Washington D.C., p. 21

generating potential, while a production line used to manufacture a specific model cannot be contemporary deployed for another operation.

- Naturally, the non-rivalry attribute allows intangibles to have increasing returns which are furtherly enhanced by the absence of limitations about production capacities and economies of scale: in contrast with physical items, intangibles are only limited by the market size in which they are deployed.
- Network effects
  - The possible repetitive use of intangibles may result in a network effect typical of product innovation. This network is created when an industry standard arises providing value to a product because of its conformity to the standard itself.<sup>17</sup>
  - The benefits produced by the network effect increase with size (as more parties interact with each other) and may also result in a positive feedback effect where profits generate additional profits, hence a stable competitive advantage.
  - An increased network size can lead to positive externalities: "every time someone adopts a product that is compliant with the standard, this creates a positive externality on the entire stock of existing users. [...] The greater the number of users adopting a compliant good, the greater the number of potential links, and the greater becomes the economic value of the good to each user."<sup>18</sup> For instance, let's think to the famous text messaging app "Whatsapp" which has set a new communication standard using internet networks; the adoption of the standard by an enormous amount of users has produced a positive externality which has tremendously increased the economic value of the company which has been sold for \$19.3Bn in 2014 against an initial investment of few millions of dollars in 2009.

<sup>&</sup>lt;sup>17</sup> Cantamessa, M., Montagna, F., (2015), *"Management of innovation and product development: Integrating business and technological perspectives"*, Springer, p. 72

<sup>&</sup>lt;sup>18</sup> Cantamessa, M., Montagna, F., (2015), *"Management of innovation and product development: Integrating business and technological perspectives"*, Springer, pp. 72-73

- Therefore, network effects point out the intangibles' strategic relevance: if an entity manages to set a standard for a specific market, it creates a substantial competitive advantage and high barriers to entry that market.<sup>19</sup>
- Partial excludability
  - The company which is owner of an intangible value may not be able to prevent other entities from benefiting from the intangible itself. Let's take as example the knowledge acquired by an employee: when the employee leaves the company brings the knowledge with him to the new entity. The only way for the company to retain this knowledge by codifying it to make it available to other employees.
  - Spillover effects arise when competitors manage to gain know-how circumventing the legal protection of a patent issued by the company.
- Inherent risk
  - On one hand, intangibles have very volatile values and their usefulness is difficult to assess and quantify.
  - On the other hand, companies spend huge amounts of money in innovation processes which include a big amount of intangible value. These sunk costs represent a high risk because of the uncertainty related to the eventual business success derived from the intangible component.
- Non-tradability
  - Since it is very challenging to price intangibles, the markets on which these may be traded are usually very small or even absent.
  - The non-tradability is also related to the challenges in drawing contracts with standardized features and able to rebuild the cost structure of the item<sup>20</sup>

In brief, a company which wants to exploit intangible values in order to create profits must be able to set a market standard exploiting positive network externalities, trying to reduce as much as possible inherent risks related to the intangible and protecting its profit potential with a comprehensive legal and internal protection in order to prevent partial excludability.

<sup>&</sup>lt;sup>19</sup> Cantamessa, M., Montagna, F., (2015), *"Management of innovation and product development: Integrating business and technological perspectives"*, Springer, p. 93

<sup>&</sup>lt;sup>20</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 44

Of course, this is not easy to apply in nowadays competitive and increasingly interconnected market where knowledge and competences are easily transferable and accessible to everyone.

### **1.3 Classification of Intangibles**

In order to complete the taxonomy about intangible values, this section deals with their classification. Just as it is for their characterization, there is no unanimous and shared classification scheme for intangibles and many authors have tried to create a comprehensive categorization. Nonetheless, according to Grüber<sup>21</sup> there are two general approaches to classify intangibles:

- Legal classification
- Economic classification

#### **1.3.1 Legal Classification**

This typology of categorization focuses on the legal properties of intangible values paying attention to the enforcement of legal rights over them. Following this criterion, the authors Von Keitz, Dawo, Hepers, and Velte have outlined three main categories of intangibles showed in *Figure*  $9^{22}$ .



Figure 9 – Legal classification of Intangibles

<sup>&</sup>lt;sup>21</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 45

<sup>&</sup>lt;sup>22</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 45

- The economic benefits arising from the category of rights are legally or contractually guaranteed meaning that there is the chance, for those owning the intangible, to prevent third parties to benefit from this. In this case the intangible value is identified and recognized by law, public authority, or contractual arrangement. Examples of intangible items included in this category are industrial property rights, trademarks, concessions, registered design, copyrights, rights to use and exploit certain assets.
- Contrarily to rights, Economic values are not defended by legislation or contractual arrangements. Consequently, the benefits arising from these intangibles are not to be considered exclusive for the owner who cannot prevent third parties to exploit them. Like the previous category, these intangibles can be individually identified and measured separately from the remaining entity. The intangibles belonging to this class are non-protected invention, technical know-how, trade secrets and some software applications.
- The category of economic advantages distinguishes itself from the previous two because the intangible value is not separately identifiable from the whole entity. The economic benefit from these types of intangibles arise at the company level. This feature creates more difficulties in the evaluation of their impact and on their disclosure to company's stakeholders. Examples of the economic advantages are expenditures for marketing and advertisement, start-up costs, expenditures for research and development, training expenses, corporate culture, management philosophy, non-contractual relationship with customers and suppliers.

#### **1.3.2** Economic Classification

The economic categorization classifies intangibles according to their function within the company rather than their legal features. In the academic literature numerous frameworks can be found as shown in *Figure 10*.

Author	Year	Intangible Categories
Abhayawansa	2010	Human Capital, External Capital, Internal Capital
Allee	2008	External Relationships, Human Competence, Internal Structure, Social Citizenship, Corporate Identity, Corporate Identity, Environmental Health
Arvidsson	2003	Human Capital, Relational Capital, Organizational Capital, R&D, Environ/Social
Bontis	1999	Human Capital, Structural Capital, Relational Capital, specifically excluded: Intellectual Property
Brooking	1997	Market Assets, Human-Centered Assets, Intellectual Property Assets and Infrastructure Assets
Canibano et al.	2002	Human Capital, Structural Capital, Relational Capital
Czwalinna	2008	Human Capital, Innovation Capital, Customer Capital, Supplier Capital, Investor Capital, Process Capital, Location Capital
Danish Agency for Development of Trade & Industry	1998	Human Resources, Customers, Technology, Processes
Daum	2005	Human Capital, Relational Capital, Organizational Capital
Edvinsson	1997	Human Capital, Structural Capital (Customer Capital, Organizational Capital, Innovation Capital, Process Capital)
Garcia-Meca	2005	Human Capital, Customers, Processes, Technology, Innovation/Research/Development, Strategy
Garcia-Meca/Martinez	2007	Human Capital, Customers, Organizational, Innovation / Research / Development, Strategy
Guthrie/Petty	2000	Employee Competence (Human Capital), Internal Capital (Structural), External Capital (Customer/Relational)
Kaplan/Norton	2004	Human Capital, Information Capital, Organization Capital
Konrad Group/Sveiby	1989	Individual Capital, Structural Capital
Lev	2001	Innovation-related Intangibles, Human Resource Intangibles, Organizational Intangibles
Mouritsen et al.	2001	Employees, Customers, Processes, Technology
Ordonez de Pablos	2003	Human Capital, Structural Capital, Relational Capital
Roos/Roos	1997	Human Capital, Structural capital (Customer Focus, Process Focus, Renewal and Development Focus)
Sanchez et al.	2000	Human Capital, Structural Capital, Relational Capital
Schmalenbach Society	2001	Human Capital, Innovation Capital, Customer Capital, Supplier Capital, Investor Capital, Process Capital, Location Capital
Sveiby	1997	Employee Competence, External Structure, Internal Structure
Stewart	1997	Human Capital, Structural Capital and Customer Capital

Figure 10 - Economic classification schemes of Intangibles

Looking at the last figure it can be noticed that *"three common themes dominate the different classification schemes: Human Capital or Employee Competence, External or Relational Capital as well as Organizational Capital"*<sup>23</sup>.

Edvinsson and Malone define human capital as the "combined knowledge, skill, innovativeness, and ability of the company's individual employees to meet the task at hand"<sup>24</sup> while Sveiby refers to employee competence as the "the capacity to act in a variety of situations to create both tangible and intangible assets"<sup>25</sup>. These two very similar definitions outline the contribution employees give as intangible value through their attitude and competence.

Relational or external capital is linked to the relationship a company has with its stakeholders. According to Abhayawansa external capital are *"all resources linked to a firm's relationship* with external stakeholder including suppliers, customers, partners, government and the community plus the perceptions held about the firm by these stakeholders that can benefit the firm"<sup>26</sup>. The relationships with customers, allies and partners, suppliers, shareholders, debt providers, public administration, community and mass media then provide additional intangible value to the company.

Finally, organizational capital refers to that codified knowledge that allows the company to perform all its activities to reach its strategical goals. The critical feature of organizational capital is that these capabilities, despite being used by employees, will stay within the entity when the they leave, even if they have been the ones who introduced that knowledge in the company's processes. In fact, Petrash defines it as *"that knowledge that has been captured/institutionalized within the structure, processes, and culture of an organization"*<sup>27</sup>.

<sup>&</sup>lt;sup>23</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 49

<sup>&</sup>lt;sup>24</sup> Edvinsson, L., Malone, M. S., (1997), *"Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower"*, HarperBusiness, New York

<sup>&</sup>lt;sup>25</sup> Sveiby, K. E., (1997), *"The New Organisational Wealth: Managing and Measuring Knowledge Based Assets"*, Berrett Koehler, San Francisco,

<sup>&</sup>lt;sup>26</sup> Abhayawansa, S. A., (2010), *"Sell-side analysts' use and communication of intellectual capital"*, Ph.D. thesis, Sidney

<sup>&</sup>lt;sup>27</sup> Petrash, G., (1996), *"Dow's Journey to a Knowledge Value Management Culture"*, European Management Journal, vol. 14, no. 4, pp. 365-373

#### **1.3.3 International Accounting Standards Classification**

Intangibles categorizations described above do not perfectly match with that provided by the International Accounting Standard Board (IASB) whose focus is mainly on items which may be identifiable and measurable, in order to be recognized as assets on a balance sheet. To be considered identifiable, the intangible should be separable from the company (there may be the possibility to sell it, transfer or license it), or it must arise from contractual or legal rights (this takes into account only the categories of legal rights and economic values in the legal classification).

IFRS 3 deploys a relatively detailed classification in describing intangible assets:

- Marketing-related assets: used primarily in the marketing or promotion of products or services. Examples are Trademarks, trade names, service marks, collective marks, certification marks and Internet domain names<sup>28</sup>
- Customer-related assets: they refer to customer lists (consisting of information about customers such as names and contact information) and customer relationships (exist between an entity and its customer if the entity has information about the customer and has regular contact with the customer and the customer has the ability to make direct contact with the entity)<sup>29</sup>
- Artistic-related assets: include plays, operas and ballets, books, magazines, newspapers and other literary works, musical works such as compositions, song lyrics and advertising jingles, pictures and photographs, video and audiovisual material, including motion pictures or films, music videos and television programs<sup>30</sup>
- Contract-based assets: represent the value of rights that arise from contractual arrangements such as advertising or supply contracts, licensing and franchise agreements, mortgage servicing contracts<sup>31</sup>
- Technology-related assets: include computer software, databases and trade secrets (like secret formulas, recipes and processes)<sup>32</sup>

<sup>&</sup>lt;sup>28</sup> IFRS 3(2008).IE18-IE22

<sup>&</sup>lt;sup>29</sup> IFRS 3(2008).IE23-IE31

<sup>&</sup>lt;sup>30</sup> IFRS 3(2008).IE32-IE33

<sup>&</sup>lt;sup>31</sup> IFRS 3(2008).IE34-IE38

<sup>&</sup>lt;sup>32</sup> IFRS 3(2008).IE39-IE44

Provided that internally generated intangibles are not recognized on financial statements, all the other intangibles acquired in a business combination that are not identifiable and separable from the rest of the company are classified as "Goodwill" which is defined by the International Glossary of Business Valuation as *"that intangible assets arising as a result of name, reputation, costumers, loyalty, location, products and similar factors not separately identified"*<sup>33</sup>.

From this rich list of classifications, which sometimes overlap and mix up with each other, one can foresee the difficulties of translating these intangible values into the objective criteria that an accounting system must provide. This discussion will be tackled in the next chapter where all accounting rules and standards regarding intangible assets will be analyzed.

<sup>&</sup>lt;sup>33</sup> International Glossary of Business Valuation Terms, https://www.nacva.com

### **CHAPTER 2**

# **ACCOUNTING TREATMENT OF INTANGIBLE ASSETS**

In the previous chapter the main features and properties of intangibles have been analyzed. In the last part of the chapter the classification under IFRS 3 has been outlined giving a first hint on how intangible assets represent a big challenge for standard setters because of their complex and not straightforward nature. These chapter will deal with the reporting and accounting of intangible values starting with an overview on IFRS and the accounting standard that regulates intangibles, IAS 38. It will carry on with a parallel analysis of the criteria set by both the IFRS and the US GAAP standards regarding intangible assets pointing out the main differences. The analysis will start with the description of the recognition criteria to capitalize intangibles as assets in the balance sheet, will then move on the different methods of their subsequent measurement and the disclosure requirements. Finally, the main issues about the actual reporting environment will be discussed and these will be the ground for the improvement proposals described in the last chapter.

#### 2.1 IFRS, IAS 38 and US GAAP

From 1973 International Accounting Standards Committee (IASC) have developed, as independent body, International Accounting Standards (IASs) with the purpose of developing a single set of international accounting principles. On the 1<sup>st</sup> of April 2001, the IASC was renamed as the International Accounting Standards Board (IASB) and, regarding the international accounting standards, IAS was renamed as International Financial Reporting Standards (IFRS). With the establishment of the IASB it was decided to adopt all the IASs previously developed with the condition that these would have been superseded if in contradiction with the principles established by the IFRSs. With the Regulation N. 1606/2002 issued by the European Commission *"these standards should, wherever possible and provided that they ensure a high degree of transparency and comparability for financial reporting in the Community, be made obligatory for use by all publicly traded Community companies"*<sup>34</sup>.

<sup>&</sup>lt;sup>34</sup> Regulation (EC) No 1606/2002 of the European Parliament and of the Council of 19 July 2002 on the application of international accounting standards

The standard IAS 38 is the one dealing with the accounting treatment of intangible assets and it is complemented and implemented in compliance with the IFRS 3 (business combination), IFRS 13 (fair value measurement) and IAS 36 (impairment of assets).

The first version of the IAS 38 was issued in 1998 substituting the IAS 9 which treated Research & Development costs only<sup>35</sup>. The IAS 38 version currently used is the one revised in 2004 which was part of a project promoted by the IASB whose aim was to *"improve the quality of, and seek international convergence on, the accounting for business combinations and the subsequent accounting for goodwill and intangible assets acquired in business combinations"<sup>36</sup>. The main changes were related to the notion of "identifiability" of the intangible assets, their useful life and the amortization methods, and the accounting treatment of in-progress research and development activities acquired into a business combination. During the following years, further amendments have been made:* 

- May 2008: Improvements to IFRSs (measurement of intangible assets in business combinations)
- December 2013: Annual Improvements to IFRSs 2010 2012 Cycle (proportionate restatement of accumulated depreciation under the revaluation method)
- May 2014: Clarification of Acceptable Methods of Depreciation and Amortization (Amendments to IAS 16 and IAS 38)<sup>37</sup>

In the first two paragraphs, the standard defines its scope specifying that it is not applicable to:

- Expenditures on the development and extraction of minerals, oil, natural gas, and similar non-regenerative resources
- Financial assets (IAS 12)
- Recognition and measurement of exploration and evaluation assets (IFRS 6)
- Intangible assets that are within the scope of application of another Standard<sup>38</sup>

<sup>&</sup>lt;sup>35</sup> IAS 38, para. 133

<sup>&</sup>lt;sup>36</sup> IAS 38, para. IN2

<sup>&</sup>lt;sup>37</sup> History of IAS 38, Deloitte Global Services Limited, https://www.iasplus.com/en/standards/ias/ias38

<sup>&</sup>lt;sup>38</sup> IAS 38, para. 2

Even if IFRS tries to make financial statements more comparable in the international context, the standards are required in 125 countries but major capital markets like Japan, China and United States still do not adopt them. Being the US the most important capital market, it is important to analyze American Generally Accepted Accounting Principles (GAAP) issued by the Financial Accounting Standard Board (FASB). The standards concerning intangible assets are FAS 141 (Business Combinations), FAS 142 (Goodwill and Other Intangible Assets) and FAS 86 (Accounting for the costs of computer software to be sold, Leased or Otherwise Marketed).

### 2.2 Applications and Definitions

According to IAS 38 an intangible *"is an identifiable non-monetary asset without physical substance"*<sup>39</sup> that need to meet the following criteria in order to be included in the balance sheet:

- Identifiability: this criterion is respected when the intangible asset can be separated from the company, transferred, licensed, rented or exchanged, both individually and linked to a contract or when the intangible asset derives from contractual or legal rights regardless of whether these rights are transferable or separable from the entity.<sup>40</sup>
- Future economic benefits: the IASB defines these benefits as the potential direct or indirect contribute to the company's cash flow. These may include income from the sale of products or services, cost savings or other benefits arising from the entity's use of the asset (e.g. use of intellectual property in a production process that reduces production costs).<sup>41</sup>
- Control: it occurs when an entity can exploit the future economic benefits generated by the asset by limiting access to it to third parties. Control may derive from legal rights that can be protected in court (e.g. patent rights), even if this is not a necessary condition for control (e.g. market knowledge).<sup>42</sup> Nonetheless it results *"more difficult to provide evidence of control in absence of enforceable legal rights"*<sup>43</sup>. For example,

<sup>&</sup>lt;sup>39</sup> IAS 38, para. 8

<sup>&</sup>lt;sup>40</sup> IAS 38, para. 11-12

<sup>&</sup>lt;sup>41</sup> IAS 38, para. 17

<sup>&</sup>lt;sup>42</sup> IAS 38, para. 13-16

<sup>&</sup>lt;sup>43</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 59

the benefits deriving from employees' skills are not considered totally under control of the company because attached to the knowledge of a specific person and thus the firm cannot ensure any beneficial flow. With the same logic, the economic benefits deriving from loyalty, customer relationships and market share cannot be fully controlled and thus recognized as individual intangible assets.

The absence of only one of these three requirements means that the cost incurred for the purchase or production of the asset is charged to the income statement.

On the other side, US GAAP defines an intangible asset more simply as an asset without physical substance, excluding assets of a financial nature. FAS 142 (Goodwill and Other Intangibles Assets) establishes the initial recognition criteria and methods provided for intangible assets acquired individually or as part of a group of assets. These can be recognized as intangible assets if they reflect the criteria set out in the Statement of Financial Accounting Concepts 5 (measurability, relevance, reliability) and, unlike IAS/IFRS, they do not need to be necessarily identifiable or derive from legal rights being then less rigorous and possibly more inclusive.

### 2.3 Recognition and Measurement

According to IAS 38, it is not sufficient to meet the definition of intangible asset to be recognized on the balance sheet. Also, the following two criteria must be met:

- The expected future benefits attributable to the intangible asset that will flow to the entity must be probable
- The cost of the asset must be measured reliably<sup>44</sup>

Concerning the first point, the IASB does not specify any quantitative threshold but assumes that the management applies reasonable assumptions to estimate the probability at his best. The cost at which the intangible asset is initially recognized must be determined differently depending on how the asset is acquired. IAS 38 provides for the following methods of acquisition:

- Assets acquired separately
- Acquisition as part of a business combination
- Acquisition through government grants

<sup>44</sup> IAS 38, para. 21

- Exchanges of assets
- Internally generated goodwill
- Internally generated intangible assets

FAS 142 shows an important difference with respect to IAS/IFRS in that it establishes that an intangible asset acquired individually or as part of a group of other assets, with the exception of acquisitions by business combination, must initially be recorded at its fair value<sup>45</sup>.

#### 2.3.1 Intangible Assets acquired separately

If an asset is acquired separately, its cost can be reliably determined by the price paid, including any import duties and taxes related to the purchase, as well as the costs incurred in preparing the asset for its use<sup>46</sup>. Examples of directly attributable costs are comprise *"costs of employee benefits arising directly from bringing the assets to its working conditions", "professional fees arising directly from bringing the asset to its working conditions", "costs of testing whether the asset is functioning properly"<sup>47</sup>. The following costs, on the other hand, must necessarily be charged to the income statement and must not be recorded in the balance sheet:* 

- Costs for the introduction of a new product or service, including advertising and promotional activities
- The costs of expanding the business, including staff training costs
- General and administrative expenses and other direct charges<sup>48</sup>

The recognition of costs in the book value of an intangible asset terminates when the asset is capable of functioning; costs incurred to use or reuse the intangible asset shall therefore not be capitalized.

In the event that the intangible item is obtained thanks to the receipt of a government grant, the entity may choose either of two accounting treatments:

Recognition of the intangible asset and the fair value grant

<sup>&</sup>lt;sup>45</sup> FAS 142, para. 9

<sup>&</sup>lt;sup>46</sup> IAS 38, para. 27

<sup>&</sup>lt;sup>47</sup> IAS 38, para. 28

<sup>48</sup> IAS 38, para. 29

 Recognition of the intangible asset at its nominal value plus attributable expenses to prepare the asset for its intended use.<sup>49</sup>

In the US GAAP, according to the FAS 142 "An intangible asset that is acquired either individually or with a group of other assets (but not those acquired in a business combination) shall be initially recognized and measured based on its fair value. [...] The cost of a group of assets acquired in a transaction other than a business combination shall be allocated to the individual assets acquired based on their relative fair values and shall not give rise to goodwill"<sup>50</sup>. It is further specified that in exchange transactions, the consideration paid is generally considered equal to the fair value of the asset acquired.

#### 2.3.2 Intangible Assets acquired as part of a Business Combination

In the hypothesis of acquisition of the intangible asset through a business combination, such as the purchase of a company or branch of business, the cost of its acquisition is represented by the fair value of the same asset at the date of the transaction (IFRS 3 - Business Combinations)<sup>51</sup>. In determining the fair value, market expectations regarding the probability that the future economic benefits inherent in the asset will flow to the company are taken into account. The intangible asset must be recognized separately from goodwill if its fair value can be reliably determined and, if it meets the conditions for recognition, it must be recognized by the acquirer even if it does not appear in the financial statements of the acquiree.

To measure the fair value of the intangible asset acquired, the company's management has to use valuation techniques which may be categorized in three classes:

- Market approach
- Cost approach
- Income approach

The first technique values intangibles by looking at the market price of the asset or referring to the selling price of similar items<sup>52</sup>. The cost approach is based on the calculation of

<sup>&</sup>lt;sup>49</sup> IAS 38, para. 29

<sup>&</sup>lt;sup>50</sup> FAS 142, para. 9

<sup>&</sup>lt;sup>51</sup> IAS 38, para. 33-34

<sup>&</sup>lt;sup>52</sup> Reilly, R. F., Schweihs, R. P., (1998), "Valuing Intangible Assets", McGraw-Hill, p.147

reproduction and replacement costs while the income approach employs techniques that discount future cash flows deriving from the use of the asset.

Naturally, each of the abovementioned approaches present drawbacks that are worth to be mentioned. Concerning the market approach, an active market on which prices are available is often absent due to the unique features of the intangibles and for this reason it is rarely used. Cost approaches present conceptual pitfalls since they provide current replacement costs while the value of intangibles relies mainly on its future capacity to generate cash inflows. Consequently, the most used method is the income approach whose main issues are:

- The direct stream of cash related to the asset is difficult to identify since intangibles usually generate economic benefits in combination with other assets
- What useful life to assign to the intangible is usually difficult to estimate unless provided by the terms of a legal right
- The discount rate to be used

In addition to these approaches other methods have been used during the years:

- Incremental cash flow method makes an estimate of the additional cash flows available to the company because of the exploitation of the intangible asset
- Multi-period excess earnings method appraises the cash flows related to the asset and measures their fair value by discounting them to present value. It assumes that the supporting assets used in combination with the intangible are leased from a third party (the cash flows attributable to supporting assets are subtracted from the computation of the intangible asset value)<sup>53</sup>
- Relief-from-royalty method which establishes the value of the intangible by discounting the future licensing fees the firm should pay if it did not own the asset

Regarding the US GAAP, FAS 141 deals with business combinations and outlines the same rules as IAS 38 except for *"that the amounts assigned to tangible and intangible assets to be used in a particular research and development project that have no alternative future use shall be charged to expense at the acquisition date"*<sup>54</sup>.

 <sup>&</sup>lt;sup>53</sup> Puca, A., Zyla, M., (2019), *"The Intangible Valuation Renaissance: Five Methods"*, Enterprising Investor Forum, CFA Institute
 <sup>54</sup> FAS 141, para. 42

#### 2.3.3 Internally generated Goodwill

IAS 38 establishes that internally generated goodwill can never be recognized as an asset because it does not meet the recognition criteria since it is not an identifiable resource controlled by the entity whose cost can be reliably measured.

Internally generated goodwill cannot be separated from the business as a whole and cannot derive from contractual or other legal rights.

Also for US GAAP, internally generated goodwill cannot be booked and can only be recognized when a business combination is completed.

#### **2.3.4 Internally generated Intangible Assets**

IAS 38 specifies that an internally generated intangible asset that meets the conditions for recognition in the balance sheet is identifiable only during the development phase of an internal research and development process. The accounting standard requires the company to identify two phases, that of research and that of development:

- Research is an original and planned investigation undertaken with the prospect of achieving new knowledge and discoveries, both scientific and technical
- Development is the application of the results of research and other knowledge to a plan or project for the production of new or improved materials, devices, processes, systems or services, before the start of commercial production or use<sup>55</sup>

If these two phases are not identifiable, the entity shall treat the cost as if it were incurred only in the research phase and therefore cannot be capitalized<sup>56</sup>. Research expenditure shall be recognized as an expense in profit or loss when incurred.

An intangible asset arising from the development phase shall be recognized if, and only if, the enterprise can demonstrate:

- The technical feasibility of completing the intangible asset to make it available for use or sale
- The intention to complete the intangible asset for use or sale
- The ability to use or sell the intangible asset

<sup>&</sup>lt;sup>55</sup> IAS 38, para. 8

<sup>&</sup>lt;sup>56</sup> IAS 38, para. 53

- How the intangible asset will generate probable future economic benefits by demonstrating the existence of a market for the intangible asset or its products or its effective usefulness when used internally
- The availability of adequate technical, financial and other resources both to complete the development of the asset and for its use or sale
- The ability to measure reliably the cost attributable to the intangible asset during its development<sup>57</sup>.

In order to determine whether an internally produced intangible asset is capable of generating future economic benefits, the entity must measure these benefits in accordance with IAS 36 (Impairment of Assets) identifying whether the flows are generated independently or together with other assets. If so, the entity must also determine the cash generating unit to which the development activity relates<sup>58</sup>.

The cost of an internally generated intangible asset is the sum of the expenses incurred from the date on which the asset first meets the criteria for recognition, including all directly attributable expenses. Charges already expensed on the P&L cannot subsequently be capitalized<sup>59</sup>. IAS 38 also specifies that the capitalization of costs can never lead to the recognition of an intangible asset value that is higher than its recoverable value. In any case, capitalization of certain internally generated intangible assets is prohibited when the related costs cannot be distinguished from the cost incurred to develop the business as a whole: this is the case for trademarks, publishing rights, customer lists and similar items<sup>60</sup>. In addition, the following costs cannot be recognized as intangible assets:

- Certain start-up costs as they are not correlated with future economic benefits
- Personnel training costs because the company does not exercise sufficient control over them
- Advertising and promotional expenses because they cannot be distinguished from expenses incurred to create or increase the goodwill of the company as a whole
- Expenses incurred to relocate or reorganize part or all of the business.

<sup>&</sup>lt;sup>57</sup> IAS 38, para. 57

<sup>&</sup>lt;sup>58</sup> IAS 38, para. 60-61

<sup>&</sup>lt;sup>59</sup> IAS 38, para. 65-66

<sup>&</sup>lt;sup>60</sup> IAS 38, para. 63-64

*Figure 11* summarizes the two-step process to be followed in order to recognize intangible assets according to IAS 38



Figure 11 - Recognition of Intangible Assets according to IAS 38

With regard to US GAAP, the relevant principles are FAS 2 and FAS 142. FAS 2 defines research and development activities:

- Research: is a planned investigation or critical investigation to acquire new knowledge, with the expectation that it will be useful in the development of a new product or service or process or for its significant development if already existing
- Development: translation of research results into a plan or project for a new product or process or for the improvement of an existing one<sup>61</sup>.

In the American accounting system "all research and development costs [...] shall be charged to expense when incurred"<sup>62</sup>. It is also specified that the costs for materials, equipment and installations that are acquired or built for research and development activities and which may be used in alternative uses must be capitalized. Their cost must be charged to the income statement as cost of research and development if the materials, equipment and installations are not likely to future alternative uses.

<sup>&</sup>lt;sup>61</sup> FAS 2, para. 8

<sup>62</sup> FAS 2, para. 12
# 2.4 Subsequent Measurement

Also for intangible assets, IAS/IFRS establish that the valuation after the first recognition can be made with two accounting treatments: the cost model and the revaluation model. The model adopted for the accounting of an intangible asset must be applied for the entire class of intangible assets<sup>63</sup>.

Under the cost model, an intangible asset must be recognized at cost less accumulated amortization and impairment losses<sup>64</sup>.

Under the revaluation model an intangible asset must be recognized, after initial recognition, at its fair value net of amortization and impairment losses accumulated after measurement, referring to an active market. The revaluation must be carried out regularly in relation to the volatility of the fair value of the intangible asset and, in any case, when the fair value differs significantly from the carrying amount of the asset<sup>65</sup>.

The impairment test of an asset must be formally carried out annually for:

- Intangible assets with an indefinite useful life
- Intangible assets not yet available for use
- Goodwill
- Where there are indications of a potential impairment of an intangible asset.

It is not possible to apply the revaluation to intangible assets not previously recognized. If only part of the cost has been recognized as an asset because it did not meet the conditions for recognition, the standard allows the fair value measurement of the entire asset, even for the part not recognized<sup>66</sup>. If fair value measurement results in an increase in the carrying amount of an intangible asset, this must be allocated to a "revaluation surplus" in equity. If the revaluation is subsequent to a previous write-down, the revaluation shall be recognized in the P&L as income<sup>67</sup>. If fair value measurement results in a decrease in the carrying amount of an intangible asset, it must be recognized as a cost in the income statement. If the writedown is subsequent to a previous revaluation, this must be deducted from the revaluation

- <sup>65</sup> IAS 38, para. 75
- <sup>66</sup> IAS 38, para. 77

<sup>&</sup>lt;sup>63</sup> IAS 38, para. 72

<sup>&</sup>lt;sup>64</sup> IAS 38, para. 74

<sup>&</sup>lt;sup>67</sup> IAS 38, para. 85

surplus up to its maximum amount and only the difference, if any, must be charged to the income statement<sup>68</sup>.

Under US GAAP, only the cost model is allowed and if the intangible asset is subject to amortization, it must be subject to impairment testing and the impairment test must be conducted annually. Subsequent reversal of a previously recognized impairment loss is not permitted<sup>69</sup>.

In the following sub-paragraphs, the specific accounting treatment for goodwill and computer software will be discussed, being these two relevant elements of the balance sheet.

## 2.4.1 Goodwill

According to IFRS 3, goodwill is *"the excess of the cost of the business combination over the acquirer's interest in the net fair value of the identifiable assets, liabilities and contingent liabilities"*<sup>70</sup>. After initial recognition, the goodwill acquired must always be capitalized. For both IAS/IFRS and US GAAP, goodwill is not amortized but, at least annually and whenever an impairment loss is presumed, it must be subjected to an impairment test.

In case of negative goodwill, alternatively defined by IFRS 3 as bargain purchase, which is a business combination in which the book value of the acquired company exceeds the consideration paid by the acquirer, the latter *"shall recognize the resulting gain in profit or loss on the acquisition date"*<sup>71</sup>.

Under US GAAP, however, negative goodwill must be allocated to reduce proportionately the value assigned to the assets acquired, including research and development activities acquired and expensed. The fiscal impact of these different accounting treatments must not be neglected.

<sup>&</sup>lt;sup>68</sup> IAS 38, para. 86

<sup>&</sup>lt;sup>69</sup> FAS 142, para. 17

<sup>&</sup>lt;sup>70</sup> Deloitte, (2008), "Business combinations and changes in ownership interests – A guide to the revised IFRS 3 and IAS 27", p. 84

<sup>&</sup>lt;sup>71</sup> IFRS 3, para. 34

### 2.4.2 Computer software

For software-related costs, IAS 38 requires the classic differentiation between the research phase, during which costs must be charged to the income statement, and the development phase, during which costs incurred must be capitalized. The Standard Interpretation Committee 32 (Intangible assets – website cost) then analyses in more detail the costs related to the development of websites establishing that an internally developed website should be recognized as an intangible asset only if it meets the definition for intangible assets in IAS 38. SIC 32 specifically indicates the identification of the development stage of a website and its accounting treatment:

- Planning stage during which expenses incurred shall be recognized in the income statement
- Application and infrastructure development, graphic design and content development phases, during which the expenses incurred must be capitalized if they are directly attributable to the intangible asset and comply with the capitalization criteria set out in IAS 38
- Operating phase during which the development of the website is completed and any expenses incurred must be recognized as an expense in the income statement.<sup>72</sup>

Differently, US GAAP identifies two types of computer software: those produced for sale and those intended for internal use. The costs incurred for the analysis of the potential realization of a software intended for sale are considered research and development costs and therefore must be charged to the income statement as regulated by FAS 2. The accounting treatment of computer software for internal use is instead governed by Statement Of Position 98-1 (Accounting for the Costs of Computer Software Developed or Obtained for Internal Use) which gives first a definition of software for internal use by stating that:

- It must be acquired, developed internally or modified to meet the requirements of the internal needs of the company
- During development and modification no development plans must be provided aimed at offering the software on the market.<sup>73</sup>

<sup>&</sup>lt;sup>72</sup> SIC 32, para. 7-9

<sup>&</sup>lt;sup>73</sup> SOP 98-1, para. 12

SOP 98-1 identifies three phases related to software development:

- Preliminary project: at this stage the costs incurred are charged to the income statement
- Application development: at this stage the costs incurred to develop software for internal use must be capitalized
- Post-implementation and operational phase: in this phase the costs incurred are charged to the income statement.

Costs incurred to make improvements must be expensed or capitalized according to their nature. For example, costs incurred for a modification that extends the useful life of the asset without providing additional functionality must be charged to the income statement. In the case of costs that meet the capitalization criteria, they must be allocated to the intangible asset and amortized on a straight-line basis over the useful life of the software.

### **2.4.3** Amortization of Intangible assets

IAS 38 identifies two categories of assets: those with an indefinite useful life and those with a finite useful life and only the latter are subject to the amortization process. An intangible asset has an indefinite useful life (which does not mean infinite) when it is not possible to predict a limit beyond which it can no longer generate economic benefits<sup>74</sup>.

Also according to US GAAP, and more particularly according to FAS 142, the accounting representation of an intangible asset must refer to its residual useful life: if the asset has finite useful life is subject to depreciation, while if the asset has an indefinite useful life it is not amortized<sup>75</sup>.

### 2.4.3.1 Intangible assets with finite useful life

The useful life of an intangible asset is regarded as finite if the entity expects the associated cash flows to continue over a defined period of time. The amortization process of individual assets shall *"reflect the pattern in which's the asset future economic benefits are expected to be consumed by the entity"*. If this pattern cannot be identified the depreciable amount shall be allocated on a straight-line basis over its useful life<sup>76</sup>. The amortization process must begin

<sup>&</sup>lt;sup>74</sup> IAS 38, para. 88

<sup>&</sup>lt;sup>75</sup> FAS 142, para. 11

<sup>&</sup>lt;sup>76</sup> IAS 38, para. 97

when the asset is available for use and ends when it is sold or classified as available for sale. The value to be amortized must be reduced in advance by its residual value, even if the same accounting standard provides that the residual value of an intangible asset is considered to be zero unless there is a formal commitment by a third party to acquire the asset at the end of its useful life and there is an existing active market<sup>77</sup>. Regarding intangible assets subject to amortization, the same rules apply both to IAS/IFRS and US GAAP<sup>78</sup>.

#### 2.4.3.2 Intangible assets with indefinite useful life

Intangible assets with an indefinite useful life are not amortized, as it is not possible to reliably estimate the period for which the company expects cash inflows from the asset<sup>79</sup>. These assets must therefore be subjected to an impairment test at least annually to identify any losses in value. Goodwill and trademarks are generally included among assets with an indefinite useful life. It is management responsibility to review the useful life of the asset to verify whether the requirements for classifying it as an asset with indefinite useful life are met. The change in the useful life from indefinite to finite may be an indicator that the asset has lost value and, consequently, the asset must be subjected to an impairment test<sup>80</sup>. Regarding intangible assets not subject to amortization, the same rules apply both to IAS/IFRS and US GAAP<sup>81</sup>.

# **2.5** Retirement and Disposal of Intangible assets

An intangible asset shall be derecognized when sold or when its use is no longer expected to generate future economic benefits<sup>82</sup>. Derecognition must take place in accordance with IAS 18 (Revenue) if it is in the context of a sale of assets, or in accordance with IAS 17 in the case of disposals through sale or leaseback transactions<sup>83</sup>.

The gain or loss that may result from the termination or disposal is determined by the difference between the net proceeds from the disposal and the carrying amount of the asset

<sup>&</sup>lt;sup>77</sup> IAS 38, para. 100

<sup>&</sup>lt;sup>78</sup> FAS 142, para. 11-15

<sup>&</sup>lt;sup>79</sup> IAS 38, para. 107

<sup>&</sup>lt;sup>80</sup> IAS 38, para. 110 e IAS 36

<sup>&</sup>lt;sup>81</sup> FAS 142, para. 16-17

<sup>&</sup>lt;sup>82</sup> IAS 38, para. 112

<sup>&</sup>lt;sup>83</sup> IAS 38, para. 114

itself; this amount must be charged to the income statement unless another accounting standard establishes otherwise<sup>84</sup>.

It is important to note that, in accordance with IAS 36, if goodwill has been allocated to a cash-generating unit and the entity disposes of an asset that is part of that unit, the goodwill associated with it shall be:

- Included in the carrying amount of the asset when determining profit or loss from disposal
- Determined on the basis of the relative values of the divested asset and the retained portion of cash-generating units, unless the entity can demonstrate that some other methods better reflect the goodwill associated with the divested asset<sup>85</sup>.

Regarding the retirement and disposal of intangible assets, the same rules apply both to IAS/IFRS and US GAAP, which specify that when only a portion of goodwill is allocated to a business to be divested, the residual goodwill remaining in the entity shall be tested for impairment<sup>86</sup>.

# 2.6 Disclosure Requirements for Intangible assets

The IAS 1, IAS 38 and IFRS 13 address the disclosure requirement for intangible assets. According to IAS 1 companies must disclose intangibles as separate lines on the balance sheet while IAS 38 indicates the information to be disclosed specifically for each type of intangible<sup>87</sup>. For instance, the entity must disclose, for each asset class, which are the intangibles acquired or internally generated specifying the useful life, eventual amortization method and rate, and a reconciliation of the beginning and end of the period carrying amount. Moreover IFRS 13 requires the company to disclose information regarding the fair value measurements of the intangibles owned, such as valuation inputs and techniques<sup>88</sup>.

While IFRS 3 and IAS 38 display guidelines on the disclosure of recognized assets, there is no requirement to disclose information regarding internally generated ones (such as brands, mastheads, publishing titles, customer lists) since they are not recognized on financial

<sup>&</sup>lt;sup>84</sup> IAS 38, para. 113

<sup>&</sup>lt;sup>85</sup> IAS 36, para. 86

<sup>&</sup>lt;sup>86</sup> FAS 142, para. 39

<sup>&</sup>lt;sup>87</sup> IAS 38, para. 118-123

<sup>&</sup>lt;sup>88</sup> IFRS 13, para. 91-99

statements. Other non-compulsory disclosures regard expensed items like training expenditures, advertising and promotional activities. Still, the standard encourages entities to disclose as much information as possible for those assets that are significant for the business and stakeholders.

US GAAP provides the same principles as the IAS/IFRS.

# 2.7 Recap of key differences between IFRS and US GAAP

Therefore, although the IASB and the FASB are working together to achieve greater convergence among their standards, there are still discrepancies between firms following the two different sets of rules because of the gap between the accounting treatment of intangible assets thus affecting their comparability.

Here it follows a table with the main differences between IFRS and US GAAP standards concerning intangible assets.

	IFRS	US GAAP
Internally Generated Intangibles	It is possible to recognize an internally generated intangible asset by capitalizing its development cost (apart those expressly prohibited by the IAS 38 as brands, mastheads, computer software, licenses and so on)	It is not possible to recognize any internally generated intangible asset (apart from internal-use software and website development cost)
Subsequent Measurement Methods	Both Cost and Revaluation Model applicable	Only cost Model applicable
Research & Development Costs	Research Costs: expensed Development Costs: capitalized	Both Research & Development Costs expensed
Goodwill Allocation	Cash-generating Unit	Reporting Unit

Table 1 - Differences between IFRS and US GAAP about the accounting treatment of intangible assets

# 2.8 Issues and Criticism

In the previous paragraphs both IFRS and US GAAP accounting standards for intangible assets have been described and analyzed. In this paragraph the issues with the current reporting environment will be discussed and the impact that an incomplete information disclosure about intangible assets may have on companies and financial markets at large.

### 2.8.1 Decreasing relevance of current reporting environment

In the past decades the role of financial accounting has been debated, why and how its relevance has decreased. As stated in the introduction of this paper, this decreasing relevance is related to the increasing market-to-book values observed on financial markets<sup>89</sup>: since many intangible resources are not recognized by financial accounting, the equity of a company is not faithfully reflected by the book value presented on financial statements which are deemed to be insufficient.

While intangible assets recognition acquired through separate transaction does not seem to be problematic (due to the underlying transaction which gives reliable and measurable information itself), the ones regarding intangibles acquired in business combination or internally generated result to be extremely challenging for both standard setters and financial statements users.

In section 2.3.2 different methodologies to determine the fair value for asset acquired in business combination have been outlined: each of these methods requires high management discretion, "as the inputs for the valuation techniques require subjective judgement due to the uniqueness of the respective intangibles" and for this reason "recognizing intangible assets at fair value is always associated with the discussion about relevance and faithful representation"<sup>90</sup>. These last two characteristics are key for financial statements because it is crucial to disclose information that users can trust in order to evaluate and realize the companies' fundamentals.

Regarding internally generated intangibles, the company must demonstrate that the assets meet the criteria for the development phase in order to be recognized and capitalized on the

<sup>&</sup>lt;sup>89</sup> Canibano, L., Garcia-Ayuso, M., Sanchez P., (2000), *"Accounting for intangibles: A literature review"*, Journal of Accounting Literature, Vol. 19, p. 103

<sup>&</sup>lt;sup>90</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 75

balance sheet. Also in this case the requirement is associated with significant management discretion, since no numeric thresholds are specified to distinguish in which phase the asset is, thus involving a high degree of subjectivity. It is, in fact, up to the management to argue one way or the other for each specific case with the risk of reporting similar assets with different accounting treatments, finally resulting in less comparability among companies (even if in the same industry).

Another issue arises with those intangible assets which cannot be recognized if internally generated while reported if acquired through a business combination such as goodwill, brands, publishing rights, customer lists etc. Again, the different accounting treatments cause less comparability among companies if they go for acquisition or internal growing strategies. Even if accounting standards are not conceived to offer the entire value of a company, the balance sheet should be able to incorporate all its resources and claims, hence also internally generated intangibles.

Overall, "the reason for such differences in the accounting treatment is due to a combination of the attributes related to the financial accounting model and to the specific nature of intangible values"<sup>91</sup>. Still, by not recognizing a relevant portion of a company's assets and by not being obliged to disclose additional information, current accounting standards do not provide a comprehensive picture of an entity's resources and claims to its users.

### 2.8.3 Impact of failing to provide information on Intangible Values

To understand the limits of the actual reporting system, it is fundamental to describe its main purposes. The goals of financial accounting are:

- To reduce information asymmetries which occurs when a party owns greater material than the other party in an economic transaction
- To protect capital markets efficiency in which prices must always reflect available information
- To promote market fairness which implies integrity and transparency of the available information

<sup>&</sup>lt;sup>91</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 76

In the market different participants have different capabilities and, in this direction, financial accounting provides a common ground to all stakeholders so that they can equally access and share information providing markets of a certain degree of fairness. If some data about intangible assets are not disclosed, this fairness can be jeopardized and some market participants can have more information than others (think to the different data gathering capabilities of institutional and private investors).

Consequent to information asymmetries, informed market participant can earn abnormal returns by exploiting their privileged position deteriorating market efficiency. *"In addition, information asymmetries caused by the omission of intangible values may further result in increasing bid-ask spreads and therefore, in decreasing trade volumes and social gains from the trade"*<sup>92</sup>.

Furthermore, the lack of information about intangibles can affect the efficient resource allocation. In the semi-strong efficient market form<sup>93</sup>, prices reflect less information about an entity as non-reported items are not be publicly available (or at least more difficult to be obtained). In this way prices are a less effective indicator and market participants make less informed decisions. *"The disclosure of additional information on intangible values as part of financial accounting and reporting would result in more informed prices"*<sup>94</sup>. In the case of weak efficient market form<sup>95</sup> additional information may help to perform fundamental analysis enabling market participants to better estimate the company's future cash flows and hence more aware decisions.

Last but not least, lack of comprehensive information may cause an increase of the cost of capital for the company: due to the risk associated with incomplete disclosure, higher return on investments may be asked by investors. The same applies to lenders who will ask for a higher cost of debt.

<sup>&</sup>lt;sup>92</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 79

<sup>&</sup>lt;sup>93</sup> Semi-strong form efficiency contends that security prices have factored in publicly available market and that price changes to new equilibrium levels are reflections of that information

<sup>&</sup>lt;sup>94</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 81

<sup>&</sup>lt;sup>95</sup> In the weak-form efficient market, security prices fully reflect all past market data

With all that being said, it is clear that an improvement in financial accounting standards concerning intangible assets is needed to provide more and better information to market participants and avoid market anomalies.

In the next chapters possible improvements will be proposed and discussing eventual pros and cons of each approach.

# **CHAPTER 3**

# **COMPANIES' PROJECTS AND THEIR VALUATION**

In the last part of the previous chapter the main issues regarding the current financial accounting and reporting environment have been analyzed and it has been explained why it is not able to fully depict companies resources when it comes to intangible assets. In this chapter the topic of project valuation will be introduced and discussed using the project management approach. This part will result crucial to understand some of the proposals made in the fourth and last chapter of this work, answering to its research question. In the first part of this chapter a very quick introduction to the world of project management will be made with a specific focus on the definition and characteristics of companies' projects. It will carry on identifying and describing the main categorization of project valuation techniques and will then analyze specifically those related to the financial side. In this part the different methodologies will be explained and their main pros and cons discussed in order to build the ground for the discussion of the last chapter.

# 3.1 The project and its characteristics

According to the PMBOK Guide, "A project is a temporary endeavor undertaken to create a unique product, service, or result"<sup>96</sup>. Every active company continuously undertakes projects in order to improve its market position. The adjective "temporary" that accompanies the definition of a project, refers to the longevity of the company's commitment to that set of activities composing the project itself. Still the outcome for which the project is initiated is meant to create lasting benefits to the entity. Even though some activities and procedures are common and repetitive for different projects, it is key to state that "every project creates a unique product, service, or result"<sup>97</sup>. The outcome deriving from every project can be either tangible or intangible but, in each case, it is useful to meet company's operational and/or strategic objectives.

<sup>&</sup>lt;sup>96</sup> Project Management Institute, (2013), "A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition", p. 3

<sup>&</sup>lt;sup>97</sup> Project Management Institute, (2013), "A Guide to the Project Management Body of Knowledge (PMBOK<sup>®</sup> Guide) – Fifth Edition", p. 3

Projects may have several levels of complexity according to the size of the company and of the results to be achieved. Consequently, it is clear that the difficulty in managing these projects increases as well and it is here that project management comes into play: it is defined as *"the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements"*<sup>98</sup>.

Project management activities have the task to identify the requirements and address the needs, concerns and expectations of the various stakeholders related to the project. It must do that while balancing the project constraints which can be summarized as:

- Quality
- Scope
- Schedule
- Budget
- Resources
- Risks

For the purposes of this thesis, the discussion will focus on the financial, resources and risks constraints which are especially involved at the beginning of the decision making process when the management is in charge to choose which are the projects to be undertaken to maximize the value for the company.

# **3.2** Project Portfolio selection methods

"There are two ways for a business to succeed at new products: doing projects right, and doing the right projects"<sup>99</sup>. This sentence outlines the relevance that project selection has within the strategic activity of a company. Entities must always choose among several projects proposals coming from different departments and must find the best methodologies in order to pick the ones that best meet organizational objective according to the constraints abovementioned.

<sup>&</sup>lt;sup>98</sup> Project Management Institute, (2013), "A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition", p. 5

<sup>&</sup>lt;sup>99</sup> Cooper, R. G., Edgett, S. J., Kleinschmidt, E. J., (2002), *"Portfolio management-fundamental to new product success"*, in P. Belliveau, A. Griffin, & S. Somermeyer (Eds), PDMA ToolBook for New Product Development, New York, Wiley, pp. 331–347

Over time project selection methods have progressively changed<sup>100</sup>: because of the new business and technology environment they have become more sophisticated and complex taking into account several quantitative and qualitative aspects. According to Flechas Chaparro et al. the following categorization can be outline for project selection methods<sup>101</sup>:

- Financial methods: the most important criterion taken into account is the profitability of the project. These methodologies are widely used by managers to establish which projects maximize the expected returns.
- Probabilistic methods: they analyze several different scenarios by producing a huge number of possible outcomes based on stochastic or random values. The most used is the Monte Carlo simulation.
- Option pricing theory: these methods combine the mathematical methods used for financial option pricing with the capital asset pricing model (CAPM) to compute how demand varies according to variables like the pricing strategy adopted.
- Strategic methods: managers, who are aware of both internal and external needs of company's stakeholders, create budget buckets in which projects can be categorized and prioritized, thus enabling the company to focus on different aspect of its organizational goals.
- Scoring methods: they are based on the set of project requirements. Managers create
  a ranking of ratings and weight on which projects must be evaluated and those who
  do not pass a specified threshold are not selected. The main weakness of these
  methods is managers subjectivity in the determination of these parameters.
- Combinatorial optimization: this category includes methods which are usually complex to use because they require a lot of information. The most popular are multicriteria decision-making methods (MCDM), data envelopment analysis and analytical hierarchy approaches (AHP).
- Behavioral methods: they are useful for the initial part of the project selection when few input data are available. They are based on building a consensus to undertake the project within the company based on the opinions of managers and experts.

<sup>&</sup>lt;sup>100</sup> Cooper, R. G., Edgett, S. J., Kleinschmidt, E. J., (1999), *"New product portfolio management: practices and performance"*, Journal of Production Innovation Management, 16(4), pp. 333-351.

<sup>&</sup>lt;sup>101</sup> Flechas Chaparro, X.A., Vasconcelos Gomes, L.A., Souza Nascimiento, P.T., (2019), *"The evolution of project portfolio selection methods: from incremental to radical innovation"*, Revista de Gestao Vol. 26 No.3, pp. 212-236

- Mapping approaches: very popular because are helpful in identifying gaps, assist to balance the project portfolio and detect where the entity's capabilities should be reinforced. They are usually based on matrices and bubble diagrams where it is easy to see where the company stands in terms of strategic position.
- Real options: these methods help "managers to define a portfolio (which projects and when they should be run) among several seemingly economic outcomes and projects"<sup>102</sup> because they include flexibility and volatility so that the company is able to react during the course of the investment learning from the experience gained. These methods actually differ from the traditional financial ones because the strategy related to the project evolves with time and with the real characteristics of the environment in which the projects is run.
- Integrated methods: these approaches employ different methods belonging to the abovementioned categories to guide the portfolio selection process.
- Information gap theory: this method, differently from the traditional ones based on the maximum expected benefits, is based on the identification of knowledge gaps, uncertainties and risks allowing analysts to identify what can be considered important about the system, spotting strengths and weaknesses of the project under evaluation.
- Scenario-based approach: these methods deal with exogenous uncertainties creating several possible situations. They are very useful when a lot of missing data are not influenced by the project (e.g. industry growth, macroeconomic trends, customer tastes). These methods help companies to imagine future possible cases and *"explore the joint impact of various uncertainties"*<sup>103</sup>.

It is obvious that the most used methodologies are those that provide an economic value as yield for the project.

<sup>&</sup>lt;sup>102</sup> Flechas Chaparro, X.A., Vasconcelos Gomes, L.A., Souza Nascimiento, P.T., (2019), *"The evolution of project portfolio selection methods: from incremental to radical innovation"*, Revista de Gestao Vol. 26 No.3, pp. 212-236

 <sup>&</sup>lt;sup>103</sup> Shoemaker, P., (1995), *"Scenario planning: a tool for strategic thinking"*, MIT Sloan Management Review, 36(2), pp. 25-40

### 3.2.1 The Risk factor

However, before describing more in detail these methodologies it is fundamental to clarify which are the main risks related to projects and how they are taken into consideration by the different approaches. According to Micalizzi's classification there are several risk factors that interact and influence each other having an impact on the outcome of a project<sup>104</sup>:

- Technical and economic risk
- Operational and financial risk
- Specific and systematic risk
- Industry risk
- Market risk
- Country risk

The first type of risk is economic, such as market price trends, is linked to factors external to the project while on the other hand the technical risk depends on elements endogenous to the project. Both influence the timing of the investment since the former pushes to delay it in order to acquire additional information on the economic environment and the latter tends to anticipate it to collect information on the project potential.

Operational risk depends on the structure of the company and its activities, in particular the distribution of fixed and variable costs. Financial risk, on the other hand, relates to leverage, i.e. the ratio of debt to equity, market rates and exchange rate fluctuations. These two types of risk are linked to the irreversibility of decisions: the higher the fixed costs of a project and hence the costs of abandoning it, the less reversible the choice made will be. These factors, therefore, can be a real deterrent to investment.

Systematic and specific risk are concepts that refer to the world of finance. The first concerns macroeconomic events that have an impact on the whole economy while the second includes the risks of the industry in which the company operates. Managers will, therefore, be encouraged to differentiate investments as much as possible in order to minimize specific risk and try to control systematic risk as much as possible.

Industry risk includes the influence of the choices made by competitors while technological risk plays a crucial role especially in sectors where innovation is crucial. These two types of

<sup>&</sup>lt;sup>104</sup> Micalizzi, A., (1997), *"Opzioni reali. Logiche e casi di valutazione degli investimenti in contesti di incertezza"*, Egea, Milano, pp.13-20.

risk give rise to the concept of interdependence of decisions: corporate strategies will have to be assessed according to the life cycle of the sector and price choices.

Market risk is linked to three elements: fashion trends and consumer tastes; the risk of insolvency or payment delays, also known as customer risk; difficulties in the procurement of raw materials also defined as supplier risk.

Finally, the country risk, which concerns companies that operate on international markets and must manage relations with the authorities of foreign countries.

In the following sub-paragraphs, the most used methodologies will be described in more detail pointing out their respective pros and cons with respect to the characteristics common to the majority of projects.

#### 3.2.2 Static NPV

The valuation starts with the estimation of costs and revenues linked to the project thus building what is called the free cash flow over the life of the project itself. From the financial theory, it known that money has time value, hence these future cash flows must be discounted (i.e. converted) into today's value through the formula

$$PV = \frac{FV}{(1+k)^n}$$

where:

- *FV* = *future* value
- *PV* = *present* value
- k = discount rate
- n = number of time period

This type of approach is based on the inclusion of the company-specific risk component in the discount rate. The risk-free rate is thus adjusted according to the specific characteristics of the entity. For the calculation of static NPV, future cash flows, with a time horizon ranging from 0 (time of project inception) to N (time of project end), are then discounted at a certain rate k and added together. The value of the initial investment  $I_0$  should be subtracted from this sum.

$$NPV = -I_0 + \sum_{t=0}^N \frac{FCF}{(1+k)^t}$$

where k = r + WACC, with r equal to the risk-free rate and WACC to the weighted average cost of capital. The latter represents the cost that the company has to bear in order to collect the necessary resources from shareholders or external lenders and is computed as

$$WACC = K_e \frac{E}{D+E} + K_d \frac{D}{D+E} (1-\tau)$$

where:

- $K_e = cost of equity$
- $K_d = cost of debt$
- E = Equity
- D = Debt
- $\tau = Tax \ rate$

If the project net present value is greater than zero, then it is considered financially feasible. Companies use this as a "go/no go" decision-making approach abandoning those projects with negative NPVs and prioritizing candidate projects in NPV descending order.

While this method makes it very easy to incorporate the company's financial structure and therefore its risk profile, it also photographs the situation at a given time and assumes that it will remain unchanged for the duration of the project. Being this is a rather remote hypothesis, especially in a world in constant evolution and change, this method is not really accurate even though the most used.

#### 3.2.3 IRR versus NPV

Another method often used in practice, because of its ease, in place of the static NPV, is the Internal Rate of Return (IRR). It is defined as *"the discount rate required to achieve an NPV of zero for a given stream of cash flows"*<sup>105</sup>. The objective of this approach is to maximize the IRR across mutually exclusive projects: in other words, the larger the IRR the more feasible becomes the project. *"However, IRR ignores the capacity to reinvest and captures a project's rate of gain, not the size of the gain"*<sup>106</sup>. For this reason, it is more adequate to employ IRR complementarily with NPV, instead of independently. In fact, a project may have the highest NPV but not the highest IRR: in this case the higher NPV project should be chosen.

<sup>&</sup>lt;sup>105</sup> De Marco, A., (2011), "Project Management for Facility Constructions", Springer, p. 83

<sup>&</sup>lt;sup>106</sup> Brealey, Myers, Allen, (2006), "Principles of Corporate Finance", McGraw-Hill, New York

#### 3.2.4 Dynamic NPV

The dynamic version of the NPV is based on the Decision Tree Analysis and the Monte Carlo Simulation which predict the evolution of the project on the basis of different scenarios that could occur, each of them having a specific level of probability.

#### **3.2.4.1** Decision Tree analysis

The decision tree analysis includes the activities related to a project and the fundamental choices related to it. The diagram allows to visualize the interdependence between the activities, to isolate and give a timeliness separation to the decisional moments.

The diagrams are made up of square nodes, i.e. the points at which decisions are made. From the square nodes branch off the branches that lead to the circular nodes that represent the different scenarios that can be realized with respect to the decisions taken. Each branch is associated with a value corresponding to the probability that a given event will occur.

The tree is built from left to right but in order to calculate the probability linked to the nodes and especially to the starting node it is necessary to apply the roll back method, i.e. go from right to left.

Let's suppose that company A has developed a financial services platform which uses artificial intelligence algorithm to help clients in finding the best investment products for their profile. If the company directly launches the platform on the market must invest  $\leq 50$  thousands for one year and has 40% of probability to get an income of  $\leq 170$  thousands in case of success. Alternatively, it may also undertake a series of market related tests in order to check the platform appeal on potential clients. According to an expert these tests have a 70% probability of giving a positive feedback and the company must invest  $\leq 10$  thousands for another year. In case the tests give a positive feedback, the platform success probability is equal to 80%, 40% in case of negative feedback. Regardless on the tests results, the company may choose to carry on with the platform launch, spending further  $\leq 5$  thousands or sell the project: in case of positive test feedback the income from the sale would be  $\leq 55$  thousands,  $\leq 5$  thousands otherwise. Finally, the company may choose to immediately sell the platform without performing any test realizing an income of  $\leq 20$  thousands. A discount rate of 8% is used.

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Figure 12 - Decision Tree Platform Project

In *Figure 12* the decision-making is schematized using the roll-back approach. First the expected value of the terminal nodes a, c and d must be computed:

■ Node 
$$a = \frac{0.4(170-50)+0.6(-50)}{1+0.08} = €17$$
 thousands

■ Node 
$$c = \frac{0.8(170-50-10-5)+0.2(-50-10-5)}{1+0.08} = €66$$
 thousands

• Node 
$$d = \frac{0.4(170-50-10-5)+0.6(-50-10-5)}{1+0.08} = \text{€3 thousands}$$

At this point it is clear that at Node 2 it is more profitable to launch the platform than sell the project (whose income is 55 - 10 = €45 thousands). For the same reason, at Node 3 the best choice is to launch the platform on the market (selling the project would give a negative income, 5 - 10 = -€5 thousands).

After solving nodes 2 and 3, it is possible to compute the value for node b:

• Node 
$$b = \frac{0.7(66) + 0.3(3)}{1 + 0.08} = \text{€43 thousands}$$

Finally, it is easy to choose among the three initial options (direct platform launch, perform market tests, immediately sell the project) computing the maximum value:

$$\max(platform \ launch = \notin 17k, market \ tests = \notin 43k, project \ sale = \notin 20k)$$

The main advantage of dynamic NPV is to highlight the critical phases of a project and the interdependencies between the different phases. However, the approach results quite rigid: in order to apply it must always be possible to understand what interrelationships can occur and their consequences. In addition, events probabilities must be known a priori and the adaptability of management is not taken into consideration, which is fundamental when evaluating investments in contexts of uncertainty.

#### 3.2.4.2 Monte Carlo simulation

The Monte Carlo simulation<sup>107</sup> is used to solve problems where random variables are included and allows to understand how the result changes according to variations in the input parameters. Such a result is possible because with this method not a precise estimate of the current value is obtained, but its probability distribution. Therefore, it allows to measure the risk of the investment based on its volatility.

With this method the variables are linked together within equations that describe the relationships present in the system. Thanks to this structure it is possible to understand what the result can be when the elements that make up the system change. This approach proves to be efficient especially in presence of interrelation between the decisions taken at different times of the investment and when there is a strong uncertainty in the values assumed by the key parameters involved. The key elements of Monte Carlo simulations are:

- Internal parameters specified and controllable by the decision maker
- External input variables that cannot be controlled by the decision maker but can be described through a probability distribution
- Output variables represented by those indicators relevant for the investment decisions

• The model which is the mathematical equation which links the variables to each other First of all, it is necessary to identify the relevant parameters and exogenous variables also through a sensitivity analysis which allows to highlight the impact of the change of a variable on the final result. Then the model that will link the variables to each other and allow to determine the output variables chosen is defined. It will also be important to consider the

<sup>&</sup>lt;sup>107</sup> DeFusco, R.A., McLeavey, D. W., Pinto, J.E., Runkle, D. E., (2019), *"CFA Program Curriculum Level I"*, Volume 1, CFA Institute, pp. 555-561

correlations between the variables: the quality of the results and their correct interpretation depends on the model being correctly explained.

Another fundamental step is the attribution of the probability distribution to the input variables. Therefore, it will be necessary to identify the values that they can assume linked to the probability of their occurrence.

Finally, the simulation that consists in generating as many values as possible of the output variable is carried out. A distribution of the output variable is obtained, according to which it is possible to identify the value that with greater probability could be had in reality.

This methodology makes it possible to work with a high number of variables and to express the relationship between them. This value, however, also represents the fundamental limit of the simulation: in fact, it is not easy to explain the probability distributions of the variables and there is also the risk that the whole method is influenced by the subjectivity of those who choose the variables, create the distributions and elaborate the model.

### 3.2.5 Traditional approaches limitations

Even if the abovementioned methodologies are well-established and widely used in practice by many companies, they are not able to cope with a dynamic and non-deterministic approach to projects evaluation<sup>108</sup>.

Discounted Cash Flow methods for example use a deterministic approach which takes into consideration only a set of inputs, cash flows, without considering their volatility. Even though the dynamic NPV gives more insights regarding uncertainty analyzing different scenarios, these are based on probability estimations which may be difficult to compute reliably. Furthermore, Discounted Cash Flow approaches use discount rates higher than the risk-free rate because they consider the risk premium of the project. Doing this they account only for the downside of the risk, potentially bringing to the rejection of a profitable project just because of its high uncertainty.

Despite its simulation random approach, Monte Carlo Simulations again do not take into account for possible management decisions during the course of the project and hence on its final valuation.

<sup>&</sup>lt;sup>108</sup> Mun, J., (2002), *"Real Options Analysis - Tools and Techniques for Valuing Strategic Investments and Decisions"*, John Wiley & Sons, Hoboken, New Jersey, p.82

### 3.2.6 Real Options

As it has been pointed out in the previous paragraphs, *"traditional approaches assume a static decision-making ability"*<sup>109</sup>. When project cash flows are forecasted, they are considered to be known and without volatility.



Figure 13 - Straight-Line Discounted Cash Flow

However, in reality, uncertainty is present and may considerably affect the business conditions under which the project is running. For this reason, also cash flows may vary from the initial estimation, sometimes being actually below or above the predicted value.



Figure 14 - Discounted Cash Flow with uncertainty

Naturally the higher the uncertainty related to project cash flows the higher the volatility of its eventual profitable outcome. For this reason, the employment of traditional methodologies can represent an easy "go/no go" approach when projects have very high or

<sup>&</sup>lt;sup>109</sup> Mun, J., (2002), *"Real Options Analysis - Tools and Techniques for Valuing Strategic Investments and Decisions"*, John Wiley & Sons, Hoboken, New Jersey, p.82

low Net Present Values, but they result inappropriate when there is high uncertainty and management flexibility represents a key element to modify the course of the project in a advantageous (hence profitable) direction. Let's consider *Figure 15* below:





If management has the option to expand the project by entering into different markets or developing a new technology, it may exploit the green area above the mean predicted cash flow levels. On the contrary, if management has the option to give up on a particular product, market or technology when operating and business conditions worsen, to possess and execute such an abandonment or switching strategy may become valuable. When the right time comes, management has then the agility and adaptability to execute these options changing its strategy during the course of the project.

It is then clear that an approach which takes into account for these elements must be employed, and this is done by Real Options which *"assume a dynamic series of future decisions where management has the flexibility to adapt to given changes in the business environment"*<sup>110</sup>. This methodology has strategic value when:

- Uncertainty is present
- Uncertainty is a key driver for the value of the project
- Management has flexibility
- Flexible strategies are executable
- Management makes rational decisions in executing these strategies

<sup>&</sup>lt;sup>110</sup> Mun, J., (2002), *"Real Options Analysis - Tools and Techniques for Valuing Strategic Investments and Decisions"*, John Wiley & Sons, Hoboken, New Jersey, p.82

#### 3.2.6.1 Differences between Real and Financial Options

In finance "an option is a derivative contract in which one party, the buyer, pays a sum of money to the other party, the seller or writer, and receives the right to either buy or sell an underlying asset at a fixed price on a specific expiration day or at any time prior to the expiration date"<sup>111</sup>.

There can be different types of underlying such as stocks, bonds, commodities, interest rates and currencies. If the exercise of the option involves the purchase of securities, the option is defined as *call* while it is called *put* in case the underlying is sold when the option is exercised. According to their architecture, options can be described as asymmetrical instruments since they imply a high reward for the buyer because he bears very limited losses. In fact, if he chooses not to buy/sell (according to the type of option purchased), his loss will only be equal to the price of the option (which is called premium). Whereas, when the value of the option increases and the buyer exercises it, the seller may lose a consistent amount of money with respect to the limited inflow (the premium) received at the moment of the sale. According to this structure, the risk for the buyer is minimal and maximal for the seller.

It becomes valuable to exercise a call option whenever the underlying asset has a value higher than the fixed predetermined price (strike price): in this instance the option is said to be *inthe-money*, vice versa it is *out-of-the-money*. When it comes to put options, to exercise is valuable when the strike price is higher than the price of the underlying asset.

The value of the option at expiration is called intrinsic value and differs according to its type:

$$C_T = \max(S_T - K, 0)$$
$$P_T = \max(K - S_T, 0)$$

where:

- *C<sub>T</sub>* is the value of the call option
- *P<sub>T</sub>* is the value of the put option
- $S_T$  is the value of the underlying asset at the expiration date
- *K* is the value of the strike price
- *T* is the expiration date

<sup>&</sup>lt;sup>111</sup> Chance, D. M., (2019), "CFA Program Curriculum Level I", Volume 6, CFA Institute, p. 25



Value of the Underlying Asset, S

Figure 16 - Call Option payoff diagram



Value of the Underlying Asset, S

Figure 17 - Put Option payoff diagram

In the case of real option instead, the concept is that the owner of the option (the management in case of companies project) reserves itself the right to take a decision to perform a certain action in a specific time in the future. The asset underlying the option are usually real estate or intellectual property, projects of different nature, R&D activities etc. which are not the traditional financial traded assets. In the case of real options, then the key elements are:

- *S*, present value of the project (which is the underlying of the option)
- X, strike price, i.e. the expenditure required to start the project
- *t*, *expiration of the option (time period in which the decision can be postponed)*
- σ, investment risk
- r<sub>f</sub>, risk free interest rate throughout the life of the option

When it comes to this kind of options, another factor that must be considered is irreversibility: this may be linked, for example, to an initial expenditure which is not recoverable in the future. The relevance of this element is related to time and to the possibility of delaying a decision, waiting for better conditions. Naturally, this chance carries some risks: for example, while the management decides to postpone the decision, a competitor may enter the market and take advantage of the first-come first-served benefits. This opportunity cost allows the investment to be considered as a call option.

Even if financial and real options share some features, it is also important to discuss their differences in order to understand how to correctly assess and evaluate them. Both the financial options and the real options are characterized by:

- A context of uncertainty
- Irreversibility
- The choice between two or more alternatives
- The possibility of delaying or suspending the investment decision.

Uncertainty is related to the risk of a future outcome different from the one expected and in particular it refers to returns on the investment.

Irreversibility is an element that makes the investment sensitive to variations of dynamic factors like interest rates or raw material prices and broader economic environment stability. For this reason, an investment characterized by a high degree of irreversibility is usually delayed waiting for the acquisition of more data in order to reduce vagueness. In financial options, irreversibility coincides with the exercise of the option itself.

The chance of suspending or postponing can be defined as an opportunity cost: if from one perspective it is possible to obtain better data and reduce the risk, then it may leave space for contenders to act. For financial options, the chance to delay the choice to buy or sell the underlying is the key characteristic of the instrument.

Besides these similarities, there are several differences. The first regards the decision moment: in finance, the closer the option is to its expiration date, the lower the uncertainty, whereas for real options the manager must decide even if the uncertainty has not been cleared. Furthermore, the option during its life can assume different values becoming in-themoney or out-of-the-money. The buyer of a financial option cannot react to these movements and, unless owns an American option (which allows the option to be exercised during its lifetime), cannot decide the right time to exercise it. Conversely, in real options the value

fluctuation drives the decision-maker to modify the variables under his control to mitigate the movements of the underlying asset and prevent losses.

Expiration date is known in financial options while this does not hold for real ones: in fact, there is usually no defined time frame within which to make the decision (let's take as example R&D activities in the development of new products).

In finance, the value of an option is given by the difference between the price of the underlying asset and the strike price, while for real options the value is not easily determinable as it is related to company-related factors, which cannot be estimated with absolute certainty, such as: skills, market position, entry barriers, existence of patents or licenses, brand knowledge, technical knowledge, R&D investments, fixed assets, etc.

In addition, financial options are traded in regulated markets where information about movements in the underlying are available to all investors at any time while for real options monitoring the value of the underlying asset is not as easy.

A key variable that distinguishes the two types of option is volatility: in finance the standard deviation of the underlying is used while for the real case the estimation of volatility is a challenging point to solve: some argue that the volatility of company's stock can be used but this is not always a precise estimate of each project's volatility and can lead to misleading results; moreover, each new project is unlikely to have an equivalent on the market from which volatility can be estimated. Finally, it must be taken into consideration that both internal and external elements can have an impact on the volatility of the real investment (for example development time and raw material prices).

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### 3.2.6.2 Types of Real Options

In the case of an investment there are different types of decisions that management can take and that can occur at different times within the life of a project. These may be:

- Option to delay
- Option to expand
- Option to contract
- Option to convert
- Option to wait and see
- Option to abandon

The deferral option concerns the decision to delay the start of a project waiting for better information or an event that increases the value of the investment. This option is feasible if it is considered that the deferral does not compromise the technical feasibility of the project. The decision, therefore, depends on uncertain variables that affect the value of the option itself.

The expansion option concerns the possibility to increase the size and structure of the project. The third type, contraction option, goes in the opposite sign to the previous one and may depend on an unfavorable and unforeseen evolution of the market.

If a project is prematurely discontinued, the possibility of converting it (conversion option) can be considered: in this way the initial investment would not be completely lost. This depends, for example, on the degree of adaptability of the product, the plant built or the production process.

The temporary suspension option is halfway between the first and last (deferral and abandonment). At the basis of its implementation there must be an economic advantage to implement the project suspension for a certain period of time.

The last type (abandonment option) must be considered in case the investment can no longer be continued. It should be verified whether the costs incurred for the start-up of the project can be recovered, at least in part.

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#### 3.2.6.3 Real Option analysis calculations

When it comes to the computational side of Real Options, three main methods can be used based on models developed for pricing financial options.

The first one is the Black-Scholes-Merton model which was developed in 1973 for calculating the values of call and put options. The model involves quite complex math with the resolution of some partial differential equations with specified boundary conditions linked to the values assumed by the variables affecting the option to be valued<sup>112</sup>. From these it is possible to derive closed form analytical solution which for call options is:

$$C = S_0 N(d_1) - K e^{-rT} N(d_2)$$

where:

- C is the value of the call option
- S<sub>0</sub> is the current value of the underlying asset
- *K* is the cost of the investment or strike price
- r is the risk free rate of return
- T is the time to expiration

• 
$$d_1 = \frac{\ln\left(\frac{S_0}{K}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$

• 
$$d_2 = d_1 - \sigma \sqrt{T}$$

•  $N(d_1)$  and  $N(d_2)$  are the values of the standard normal distribution at  $d_1$  and  $d_2$ 

While this model is widely used in finance to value options, it results quite limited when it comes to real options. Firstly, it has been developed for European options which can be exercised only at maturity, while real options can be exercised any time during their life. Secondly, Black-Scholes developed their model assuming that the underlying asset follows a lognormal distribution which holds for the majority of financial assets, but it is not necessarily true for real ones. Finally, it takes into account a constant volatility in the value of the underlying asset and this condition cannot hold in the case of real options.

Even if some of these constraints may be overcome by adjusting the Black-Scholes formula, the complexity increases promoting what is called a "black-box" approach, where the model is used losing the intuition behind the application.

<sup>&</sup>lt;sup>112</sup> The mathematical demonstration of the Black-Scholes-Merton formula is omitted because it is not key for this paper. For further explanation refer to: Hull, J. C., (2015), *"Options, futures, and other derivatives"*, Pearson, Toronto

The second methodology uses the Monte Carlo simulation similarly to the one described for the Discounted Cash Flow approach. The option life is divided in time steps and for each of these thousands of possible paths of the underlying asset are generated with boundaries given by its volatility like shown in *Figure 18*.



Figure 18 - Cone of uncertainty and Monte Carlo simulation

For every simulation, the starting value of the underlying asset is  $S_0$  and in each following step this value is updated through the formula

$$S_t = S_{t-1} + S_{t-1}(r * \delta t + \sigma \epsilon \sqrt{\delta t})$$

where:

- $S_t$  and  $S_{t-1}$  are the values of the underlying asset at time t and t-1
- σ is the value of the underlying asset volatility
- $\epsilon$  is the simulated value from a standard normal distribution with mean 0 and variance 1

By computing the asset values for each time step until the end of the option life, the value of the project is available for each simulation. At this point these values are discounted at the risk-free rate and averaged to obtain the final value of the project.

The last and most used approach to compute the value of Real Options is the employment of the binomial tree. It is similar to the decision tree analysis proposed in Section 3.2.4: once all the possible outcomes have been calculated, the decision of exercising or not the option where appropriate is made at every time step and then the results are recursively combined going back to the starting point of the tree thus obtaining the option value.



Figure 19 - Binomial Tree

As shown in Figure 19,  $S_0$  is the root node of the tree and the initial value of the underlying asset. At each time step the value of the asset can increase or decrease respectively by a factor u and  $d = \frac{1}{u}$ . At the first time step the value of the asset can be  $S_0u$  or  $S_0d$ , at the second time step  $S_0u^2$ ,  $S_0ud$ , or  $S_0s^2$  and so on until the end of the tree. The last nodes represent all the possible values of the underlying asset (i.e. the project). The risk-neutral probabilities approach is used to solve the binomial tree, assuming a risk-free rate to discount the cashflows throughout the tree itself. The magnitude of the factors u and d depends on the asset volatility and are computed as

$$u = e^{\sigma \sqrt{\delta t}}$$
 and  $d = e^{-\sigma \sqrt{\delta t}}$ 

where:

- σ is the volatility of the project cash flows
- δt is time associated with each time step of the tree

The risk-neutral probability is defined as

$$p = \frac{e^{r\delta t} - d}{u - d}$$

Once these parameters have been computed for each node of the tree, the option value is computed at the terminal nodes by comparing the value of the asset with the strike price and deciding to exercise or not the option. Afterwards, the expected asset value must be calculated at the second-last time step using the formula

Expected Asset Value =  $[p * (Option Value at next upward node) + (1 - p)(Option Value at next downward node)] * e^{-r\delta t}$ 

This operation must be iterated recursively until the root of the tree. In this way the final Expected Asset Value is obtained. This should be then compared with the project Net Present Value previously calculated using the Discounted Cash Flow method to find the additional Option Value of the project.

The total time length of the tree represents the life of the option and can be divided in as many time steps as desired. Naturally, the higher the number of time steps, the higher the accuracy of the option valuation.

The binomial method is the one favored by the majority of analysts because its advantages more than compensate its disadvantages. Even if it fails to give an option value as accurate as the Black-Scholes formula, it provides an approximation of the result that is generally employed in practical applications because it is obtained with a few steps of time in the binomial tree. Input parameters such as strike price and volatility can be easily changed during the life of the option. Any jumps and losses can be adjusted without complicated modifications. All these elements, in addition to the transparency of the underlying framework, allow an easy explanation of the results for the approval of senior management.

#### 3.2.6.4 Real Option application

To compare the different types of real options let's see an example that allows to understand how to use the binomial tree in the evaluation of a project.

Recalling the example presented in Section 3.2.4, company A wants to evaluate the development of a financial services platform which uses artificial intelligence algorithm to help clients in finding the best investment products for their profile. This project requires an initial investment ( $I_0$ ) of  $\notin$  250 thousands. It is expected that this project can generate cash flows of  $\notin$  300 thousands if demand is high (scenario that can occur with a probability of p = 0.6), and  $\notin$  100 thousand if demand is low (with a probability q = 1 - p = 0.4). It is assumed that the value of the project has a multiplicative binomial trend with the following factors u = 1.5 and d = 0.5.

To proceed in the calculation of the value of the options, first of all what is called twin security must be defined. This is a security that is exchanged on the market with a risk profile equal to that of the project. The current price of the twin security is  $S_0 = 50$ . The risk-free rate on an annual basis is 8%. At this point the yield of this security must be computed:

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$$k = \frac{E(S)}{S_0} = \frac{0.6 * 75 + 0.4 * 25}{50} - 1 = 10\%$$

Again, the goal is to compute the value of the project at time  $t_0 = 0$ .

The problem can be schematized as in *Figure 20* and the present value of the project can be computed as:



#### Figure 20 - Initial Binomial Tree

The Net Present Value of the project is then  $NPV = PV - I_0 = - \notin 50$  thousands. The result is, therefore, negative and the project should not be implemented if the analysis stops at the Net Present Value calculation and in the absence of real options. If, instead, real options exist, they should be valued precisely because they allow to consider uncertain events at the time of the initial decision, but which can have a significant impact on the performance of the investment.

#### **Option to delay**

Let's assume now that the company has a patent protecting the new algorithm and this allows to delay the launch of the platform by one year. Certainly, the patent adds value to the investment as it leaves the previous market scenario intact with all the resulting benefits in terms of profits. The management will then decide to start the project if the value the following year will be higher than  $I_0$ . The option to wait can be seen as a call option with an exercise price equal to the initial investment calculated at time  $T_1$ . The final value, in the up state as well as in the down state, will be the result of the maximization between the net investment value and zero (which means not starting the project).



Figure 21 - Delay Option Binomial Tree

Indicating with *E* the extended value of the project and assuming that an additional  $I_1$  investment of  $\leq 270$  thousand is required at time  $T_1$ .

$$E_{+} = \max(V_{+} - I_{1}, 0) = \max(300 - 270, 0) = 30$$
$$E_{-} = \max(V_{-} - I_{1}, 0) = \max(100 - 270, 0) = 0$$
$$V_{+} = 300$$



Figure 22 - Extended value of the project

Now, the risk-neutral probability must be computed using the values of the twin security

$$p = \frac{1 + r_f - d}{u - d} = \frac{1.08 - 0.5}{1.5 - 0.5} = 0.58$$

The value of  $E_0$  is

$$E_0 = \frac{[p * E_+ + (1 - p) * E_-]}{1 + r_f} = \text{€16.1 thousands}$$

The value obtained is the so-called extended NPV which incorporates the premium option which in this case is equal to  $\notin 66.1$  *thousands* which is equal to the difference between  $E_0$  and the NPV computed above.
#### Option to expand

Once company A has decided to start the project, it may decide to expand it, for example by introducing new functionalities to the platform. In this case the expansion can be seen as a call option whose exercise may increase the value of the project itself. The expansion involves an additional expenditure of €150 thousands but guarantees a value equal to double that if the option is not exercised.

$$E_{+} = \max(V_{+}, 2V_{+} - I_{1}) = \max(300, 600 - 150) = 450$$
$$E_{-} = \max(V_{-}, 2V_{-} - I_{1}) = \max(100, 200 - 150) = 100$$

With p = 0.58,

$$E_0 = \frac{[p * E_+ + (1 - p) * E_-]}{1 + r_f} - I_0 = \text{€30.55 thousands}$$

The option premium is equal to  $E_0 - NPV = \pounds 29.7 - (-\pounds 50) = \pounds 80.55$  thousands

#### **Option to contract**

If there is an option to reduce the investment, this can be regarded as a put option. The initial investment will therefore be divided into two parts: the first to be made immediately (€125 thousands) and the second in the following year for an amount of €135 thousands (€125 thousands\*1.08). In the case of an unfavorable evolution the company has the possibility to reduce the investment and to disburse only €95 thousands instead of the €135 thousands foreseen saving €40 thousands that we will call  $I_{1^*}$ . It is also expected that the value of the project will be halved.

$$E_{+} = \max(V_{+} - I_{1}, 0.5V_{+} - I_{1^{*}}) = \max(300 - 135, 150 - 40) = 165$$
$$E_{-} = \max(V_{-} - I_{1}, 0.5V_{-} - I_{1^{*}}) = \max(100 - 135, 50 - 40) = 10$$

With p = 0.58,

$$E_0 = \frac{[p * E_+ + (1 - p) * E_-]}{1 + r_f} - I_0 = -€32.5 \text{ thousands}$$

The option premium is equal to  $E_0 - NPV = -€32.5 - (-€50) = €17.5$  thousands This type of option has great relevance in case of new products or features since the company can limit the initial investment in order to decide later whether to continue with the project or abandon it according to market developments.

#### **Option to convert**

This is the case when management decides to interrupt the project already started and use what has been achieved in other initiatives. It is assumed that the alternative use has the following dynamic, with the factors u = 1.2 and d = 0.6 and p = 0.83.



Figure 23 - Alternative project Binomial Tree

The conversion option is convenient in the event of the worst alternative  $V_{-}$  of 100.

$$E_{+} = \max(V_{+}, A_{+}) = \max(300, 216) = 300$$
$$E_{-} = \max(V_{-}, A_{-}) = \max(100, 108) = 108$$

With p = 0.58,

$$E_0 = \frac{[p * E_+ + (1 - p) * E_-]}{1 + r_f} - I_0 = -\text{\ensuremath{\in}} 46.89 \text{ thousands}$$

The option premium is equal to  $E_0 - NPV = -\text{\ensuremath{\in}} 46.89 - (-\text{\ensuremath{\in}} 50) = \text{\ensuremath{\in}} 3.11 thousands$ 

#### Option to wait and see

This possibility is considered in the event of unfavorable market conditions that lead the company to temporarily suspend the execution of the project. In this case, the variable costs would be higher than the income from the investment. It is assumed that the income is 40% of the value of the project, the variable costs amount to  $\leq 50$  thousands and the fixed costs to  $\leq 30$  thousands. In addition, the investment can be made in two tranches with an immediate disbursement of  $\leq 125$  thousands. For this call option the revenues in the case of a favorable market are  $M_+ = \leq 120$  thousands and in the unfavorable case  $M_- = \leq 40$  thousands.

$$E_{+} = (V_{+} - C_{f}) - \min(M_{+}, C_{v}) = (300 - 30) - \min(120,50) = 220$$
$$E_{-} = (V_{-} - C_{f}) - \min(M_{-}, C_{v}) = (100 - 30) - \min(40,50) = 30$$

With p = 0.58,

$$E_0 = \frac{[p * E_+ + (1 - p) * E_-]}{1 + r_f} - I_0 = \text{\&}4.81 \text{ thousands}$$

The option premium is equal to  $E_0 - NPV = \pounds 4.81 - (-\pounds 50) = \pounds 54.81$  thousands

#### **Option to abandon**

In the case of projects that require high investment and have a rather long-time horizon there is a possibility that the value of the project will become negative due to changes in the business environment. The possibility of abandonment therefore becomes relevant in order to avoid further economic outlays that could burden an already existing business crisis.

Abandonment takes the form of a call option in which the exercise price is represented by the additional investment to continue the project. The investment is also divided into two parts: an immediate one worth €125 thousands and one in a year worth €135 thousands (€125 thousands capitalized at the risk-free rate).

$$E_{+} = \max(V_{+} - I_{1}, 0) = \max(300 - 135, 0) = 165$$
$$E_{-} = \max(V_{-} - I_{1}, 0) = \max(100 - 135, 0) = 0$$

With p = 0.58,

$$E_0 = \frac{[p * E_+ + (1 - p) * E_-]}{1 + r_f} - I_0 = -€36.39 \text{ thousands}$$

The option premium is equal to  $E_0 - NPV = -\text{\ensuremath{\in}} 36.39 - (-\text{\ensuremath{\in}} 50) = \text{\ensuremath{\in}} 13.61 \text{ thousands}$ 

In this chapter it has been showed the different possible ways a company may evaluate its projects. Usually these valuations implicitly include intangible values that rarely are considered by financial accounting. For this reason, this chapter is key to understand some of the proposals made in the last chapter on how reporting may better capture intangibles' contribution.

# **CHAPTER 4**

# **HOW TO IMPROVE REPORTING OF INTANGIBLES**

In the previous chapters, a descriptive analysis has been made digging into the topic of intangible values, pointing out their main characteristics, the way they are categorized and accounted in current financial statement, and how instead companies value them directly or indirectly through project valuation. In this final chapter several possible methods will be proposed to improve the disclosure of information related to intangible values starting with those proposals already presented in the past highlighting their pros and cons. Both practitioners and academics have suggested different options to improve the current reporting system and these may be classified in two broad categories:

- Proposals to extend and improve the reporting of intangibles within the traditional financial statements
- Proposals to provide additional information related to intangibles outside the traditional financial statements using new statements and exhibits

Following this part, a research conducted by Stephan Grüber<sup>113</sup> regarding the needs of financial analysts when it comes to intangible values will be discussed, and this will be the prologue to the final proposal of this thesis which will use the project management approach to answer to the research question. Finally, conclusion and future prospects will be drawn.

# 4.1 Extended reporting outside Financial Statements

The proposals that have come up during the years may be distinguished on the different approach used to look at intangibles: top-down methods and bottom-up methods. The former work from the general view to the specific one using deductive reasoning while the latter start from individual elements to reach finally a broader and comprehensive perspective of the problem.

Top-down approaches are based on the difference between market and book value of the company identifying in this difference the significance of intangibles. The methods mentioned in this work are:

<sup>&</sup>lt;sup>113</sup> Grüber, S., (2014), "Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts", Springer, pp. 166 et seqq.

- Tobin's q
- Intangible Asset Statement
- Statement of Intellectual Capital

On the opposite side, bottom-up approaches determine individual intangible values of a company providing several indicators. The main methods used in practice are:

- Balance Scorecard
- Intangible Capital Navigator
- Skandia Navigator
- Intangible Asset Monitor
- Value Chain Scoreboard

## 4.1.1 Top-down Approaches

#### 4.1.1.1 Tobin's q

The Tobin's q is defined as the ratio between the market value of an entity and the replacement cost of its assets (which is the cost that the company would spend to acquire again all its assets at the current market price). In formulas,

$$Tobin's q = \frac{Market \ value \ of \ installed \ capital}{Replacement \ cost \ of \ capital}$$

If the ratio is bigger than 1, it means that the market values the company more than the assets reported on its financial statements (even if calculated at their market value). This reflects that the entity is worth more because of some hidden unrecorded assets, its intangible values. On the contrary, if q < 1 the market value of the firm is lower than its assets replacement costs suggesting that the company is possibly undervalued or that it is not have any intangible capabilities for which the market is willing to pay a premium.

Finally, if the ratio is exactly equal to 1, the market recognizes the company the exact fair value of its assets, condition which is very rare in practice.

The rationale behind the Tobin's q is similar to the one of the Price-to-Book ratio and even though the former is less influenced by reporting standards, it may still be biased by the market values incorporated in its result. The hypothesis that the difference between market prices and book values accounts for companies intangible assets only and that the price can be considered the fair value of an entity is contradicted on a daily basis, since stock prices may be driven by several technical factors that not necessarily include entities intangible capabilities. Furthermore, it is usually challenging to correctly estimate the exact replacement cost of all the assets available to a company.

#### 4.1.1.2 Calculated Intangible Value

Assuming again the concept according to which market value captures the intangible portion of an entity that has not been recognized on financial statements, the Calculated Intangible Value (CIV) implies that an effective and efficient use of intangibles allows a company to obtain returns on its invested capital higher than the average of the industry in which it makes business.<sup>114</sup> The following equation describes how the CIV is built:

$$CIV = \frac{ER_e - (ER_e * TR_e)}{Cost \ of \ Capital_e}$$

where:

- *TR<sub>e</sub>* is the tax rate of the entity
- $ER_e$  is the entity excess return over the industry,  $ER_e = R_e R_i$
- $R_e$  is the average absolute return of the entity
- $R_i$  is the average absolute return of the industry,  $R_i = IC_e * ROA_i$
- *IC<sub>i</sub>* is the invested capital of the entity
- ROA<sub>i</sub> is the average return on assets of the industry

This indicator points out the contribution that intangible assets make to help the company achieving a competitive advantage with respect to its peers. In this direction, it allows an easier company-to-company comparison since a relative high value shows that the entity is capable to employ its intangible values generating more profits with respect to companies in its same industry. Contrarily, a decreasing or even a negative value means that the entity is not able to generate superior earnings in the use of its intangible capabilities.

However, at this point arises the first conceptual issue related to the CIV: a negative value of this measure would mean a negative value of an entity's intangible assets, which is not possible for obvious reasons. Moreover, this indicator does not consider those intangibles that contribute to the normal which are usually those reported on financial statements. Finally, CIV gives a single value which does not fully depict the nature of each intangible asset.

<sup>&</sup>lt;sup>114</sup> Andriessen, D., (2004), "Making Sense of Intellectual Capital, Designing a Method for the Valuation of Intangibles", Elsevier Butterworth-Heinemann

## 4.1.1.3 Intangible Asset Statement

In his paper Haller tries to solve the issue of reporting the value of intangible assets in one single value<sup>115</sup>. The solution proposed again starts from the market value of the entity and aims to explain it by splitting this amount in four categories which represent the different value drivers of the company.

Market Value of the Entity (Market Capitalization)					
./.	Book Value and Hidden Reserves of Tangible and Financial Assets				
=	Sub-Total I				
./.	Book Value and Hidden Reserves of Recognized Intangible Assets				
=	Sub-Total II				
./.	Identifiable but Non-Recognized Intangible Assets (Economic Values)				
=	Sub-Total III = Goodwill (Residual)				
./.	Non-Identifiable Intangible Assets (Economic Advantages)				
=	Sub-Total IV				

Figure 24 - Intangible Asset Statement

The first group includes all the tangible and financial assets owned by the company while the other three comprehend all the company's intangible assets:

- Book value and hidden reserves of recognized intangibles
- Identifiable but not recognized intangibles
- Non-identifiable intangibles

Thanks to this framework, Haller explains that it would be easier, for financial analysts and capital providers in general, to assess the intangible capabilities and potential of an entity. However, he specifies that "the statement should also be audited to ensure a certain degree of reliability"<sup>116</sup> in order to verify the hypothesis used to measure the value of the different intangible assets.

In summary, the main advantage that this approach guarantees with respect to the previous two is that it distinguishes between several types of intangibles that may contribute in different proportion to the market value of a company. There still remain issues regarding the attempt to assign a numerical value to those intangibles that are not identifiable.

<sup>&</sup>lt;sup>115</sup> Haller, A., (1998), *"Immaterielle Vermögenswerte. Wesentliche Herausforderung für die Zukunft der Unternehmensrechnung"*, pp. 587 et seqq.

<sup>&</sup>lt;sup>116</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 99

## 4.1.2 Bottom-up Approaches

### 4.1.2.1 Balanced Scorecard

The Balanced Scorecard is a model developed by Kaplan and Norton<sup>117</sup> that provides a framework on which to set up the development of a strategic and balanced dashboard to run the company. It facilitates the process of translating the strategy into action, i.e. into objectives and measures applicable at operational level. It is usually composed by both financial and non-financial measures which are divided in four main areas:

- Financial perspective
- Process related perspective
- Customer perspective
- Learning and innovation perspective



Figure 25 - Balanced Scorecard

Even if it has not been thought for intangibles reporting, the balance scorecard may be used to measure the intangible capabilities of an entity thank to its multi-perspective approach which allows to see the cause-effect relationship between intangibles and the other assets used by the company to reach its strategical objectives<sup>118</sup>. However, it results challenging to summarize the outcome of the scorecard in few indicators and even more difficult to create a uniform information disclosure for a company-to-company comparison.

<sup>&</sup>lt;sup>117</sup> Kaplan, R. S., Norton, D. P., (1992), *"The Balanced Scorecard – Measures that Drive Performance"*, in: Harvard Business Review 1992, vol. 70, no. 1, pp. 71- 79

<sup>&</sup>lt;sup>118</sup> Andriessen, D., (2004), *"Making Sense of Intellectual Capital, Designing a Method for the Valuation of Intangibles"*, Elsevier Butterworth-Heinemann

#### 4.1.2.2 Skandia Navigator

The Skandia navigator developed by Edvinsson<sup>119</sup> identifies the relationships between components of intellectual capital and financial results. The company performance is considered from different points of view. The economic-financial perspective represents the past management while the current one depends on indicators related to customer relations, process management and human capital.





For each of these aspects, the Skandia navigator consists of a system of indicators which can be monetary, percentage or direct counting. In addition to more common financial measures, the framework includes indicators like the number of patents owned, number of employees, market share, R&D invested in basic research or product development etc.

The aim is to highlight the intangible assets and the strategic contribution to the company's growth. Its drawback mainly consists in the lack of consistency regarding indicators over time and for companies in different sectors.

### 4.1.2.3 Intangible Asset Monitor

Sveiby<sup>120</sup> proposes a conceptual framework based on three families of intangible assets:

- External structure (brands, customer relations with suppliers)
- Internal structure (organization: management, legal structure, manuals, systems, attitudes, R&D, software)

<sup>&</sup>lt;sup>119</sup> Edvinsson, L., (1997), *"Developing intellectual capital at Skandia"*, in: Long Range Planning 1997, vol. 30, no. 3, pp. 320-331.

<sup>&</sup>lt;sup>120</sup> Sveiby, K. E., (1997), *"The Intangible Assets Monitor"*, in: Journal of Human Resource Costing & Accounting 1997, vol. 2, no. 1, pp. 73-97.

Individual competence (education, experience).

While the efficiency of an organization's internal structure, or "operational efficiency", has historically been part of the more traditional accounting measure, the other two intangible assets are not. In its conceptual model, Sveiby identifies four measurement indicators for each of the three immaterial assets:

- Growth
- Innovation (i.e. change)
- Efficiency
- Stability

	Market Value			
	Tangible Assets	Intangible Assets		
		External Structure	Internal Structure	Competence
Growth				
Innovation				
Efficiency				
Stability				

Figure 27 - Intangible Asset Monitor

Still in this concept the financial perspective is absent, being extremely challenging to find a monetary value for certain families of intangibles. Moreover, this tool lacks comparability since different companies may use different KPIs within the same categories of intangible assets.

## 4.1.2.4 Value Chain Scoreboard

The Value Chain Scoreboard was developed by the economist Baruch Lev<sup>121</sup> with the aim of proposing a comprehensive and effective information system, focused on intangible capital and able to shed light on companies' capabilities and performance.

Lev defines the value chain as the economic process of innovation, which is vital for the survival and success of the business, which begins with the discovery of new products and services and processes, proceeds through the development and industrialization phase of these discoveries and with demonstration of their technological feasibility, culminating finally in the marketing of new products and services.

<sup>&</sup>lt;sup>121</sup> Lev, B., (2001), *"Intangibles: Management, Measurement, and Reporting"*, Brookings Institution Press, Washington D.C.

Discovery & Learning	Implementation	Commercialization
<ol> <li>Internal Renewal</li> <li>Research &amp; development</li> <li>Workforce training &amp; development</li> <li>Organizational capital, processes</li> </ol>	<ul> <li>4. Intellectual Property</li> <li>Patents, trademarks and copyrights</li> <li>Licensing agreements</li> <li>Coded know-how</li> </ul>	<ul> <li>7. Customers</li> <li>Marketing alliances</li> <li>Brand values</li> <li>Customer churn and value</li> <li>Online sales</li> </ul>
<ul> <li>2. Acquired Capabilities</li> <li>Technology purchse</li> <li>Spillover utilization</li> <li>Capital expenditures</li> </ul>	<ul> <li>5. Technological Feasibility</li> <li>Clinical tests, food and drug administration approvals</li> <li>Beta tests, working pilots</li> <li>First mover</li> </ul>	<ul> <li>8. Performance</li> <li>Revenues, earnings &amp; market share</li> <li>Innovation revenues</li> <li>Patent &amp; know-how royalties</li> <li>Know-how earnings &amp; assets</li> </ul>
<ul> <li>3. Networking</li> <li>R&amp;D alliances and joint ventures</li> <li>Supplier and customer integration</li> <li>Communities of practice</li> </ul>	<ul> <li>6. Internet</li> <li>Threshold traffic</li> <li>Online purchases</li> <li>Major internet alliances</li> </ul>	<ul> <li>9. Growth Prospects</li> <li>Product pipeline &amp; launch dates</li> <li>Expected efficiencies &amp; savings</li> <li>Planned initiatives</li> <li>Expected breakeven</li> </ul>



As shown in *Figure 28*, the first phase is the "Discovery and Learning" phase, in which a massive allocation of resources is required with a high level of intangible investments. This first step is given by the following dimensions:

- Internal Renewal: this refers to all those activities within the company that generate new ideas for new products, services or processes. Lev stresses the importance of making known the detailed amount of the investments, for example, if R&D is aimed at implementation for the improvement or maintenance of new products, for the improvement or maintenance of existing products or for improve the efficiency of production processes.
- Acquired Capabilities: Lev highlights the recent tendency to draw knowledge from external sources, such that the total value of these assets often exceeds even the value of research conducted internally
- Networking: it represents the third source of new ideas and new knowledge; it refers to the existence of alliances and formal active collaborations aimed at the research or integration of suppliers and customers in the various operations.

The second phase is the Implementation which includes:

 Intellectual Property: are the legally protected intangible assets, and therefore patents, trademarks and copyrights. The presence of patents and trademarks can certainly be a sign that a certain product, service or process can have a future on the market. Information about patents and their attributes (such as the number of references to a company's patent portfolio in subsequent patents, i.e. forward citations) are quantifiable, standardized and confirmed by many searches as drivers of value. In fact, such indications are useful indicators of the quality of companies' research activities and improve the market value of the companies themselves.

- Technological Feasibility: this must be taken into consideration in order to propose products, services or processes that can be placed on the market or introduced into the company.
- Internet: Internet use offers measures of interest in products, services or processes of the company; for example, you can measure the number of visitors to the site. Of particular importance are the measures on the "stickiness" of customers, i.e. the intensity of Web use, such as time average time spent on the company's website or the number of pages read, and the measures concerning the customer loyalty as well as the number of repetitive buyers. Many searches have demonstrated the existence of a link between these measures and the market value of the undertakings to which they relate.

The third phase is commercialization. In this phase they are analyzed:

- Customers: they are the focal point of marketing.
- Performance: these are measures of business performance but focused on value added given by knowledge assets
- Growth Prospects: this is the only component of the system that considers the use of forecast information and is not based on actual data. Growth prospects are highly demanded by financial analysts.

The structure is adaptable to any kind of organization through the analyst's choice of appropriate indicators that must meet three conditions:

- They must be quantitative
- They must be standardized to allow comparison between companies for evaluation and benchmarking purposes
- They must be confirmed by empirical evidence as really useful for those who are about to use them.

One of the main advantages brought by the development of the Value Chain Scoreboard is the approach inherent in its very structure towards innovation and development, the main drivers for growth. The weaknesses of this methodology are the usual subjectivity in the allocation of some indicators in a specific context rather than in another and the lack of general criteria to facilitate the user's understanding of the results.

In summary, both top-down and bottom-up approaches offer various ways to overcome the issue related to the lack of information of intangible assets. While the formers are able to provide a value to a company's intangible capabilities, it is then hard to break this value down in order to understand the contribution of each single intangible to the company performance. In this way, the single factors that build the total value are not disclosed and detected raising doubts on the actual usefulness to the recipients of these information. On the other hand, the latter methodologies provide indicators for different types of intangible assets, even if their creation process is not always transparent. Furthermore, most often these indicators are company-specific, preventing any comparison between entities. Despite these pitfalls, bottom-up approach provides a more comprehensive view of the intangible capabilities owned by an organization by indicating which are its drivers for value creation.

## 4.2 Extended reporting within Financial Statements

The proposals to extend the reporting of intangibles within the traditional financial statements (balance sheet, income statement, cash flow statement) have the objective to provide further information to users by posting additional intangible assets possibly reducing or even eliminating the current inconsistencies in the accounting treatment for different classes of intangibles. Some initiatives propose just minimal changes to the current environment intervening just on the recognition criteria for intangible assets, while others propose more drastic options which involve changes in the fundamentals of the accounting model.

## 4.2.1 AASB Discussion Paper

In 2008 the Australian Accounting Standard Board (AASB) has issued a discussion paper which represents one of the most complete and recent initiatives for the improvement of the accounting and reporting of intangibles under IFRSs<sup>122</sup>. The principal aim of the paper was to rethink some provisions of IAS 38 by proposing new rules for the initial recognition and measurement of internally generated intangible assets and discussing how they should be accounted for in the future. This goal comes from the view that when an intangible qualifies as an asset, then it does not matter which is its origin (i.e. acquired externally or internally generated) and should be then analyzed in the same way. The paper proposes two different approaches to reach its goal: one based on a cost model, another based on a valuation model.

### 4.2.1.1 Changes with a Cost-based Model

According to this approach, internally generated intangibles would be initially recognized at cost, as it already happens for separately acquired intangibles with the current provisions of IAS 38. In case the requirements for recognition would not be met, the expenditure would be immediately expensed a cost in the income statement<sup>123</sup>.

The main change in the accounting treatment for internally generated assets is the elimination of the distinction between the research and development phase since, according

<sup>&</sup>lt;sup>122</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne

<sup>&</sup>lt;sup>123</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne, para. 75-76

to the AASB there is no conceptual basis for treating differently the expenditures arising from these two phases. The proposal following this reasoning distinguishes instead between two types of internally generated assets:

- Planned internally generated intangibles: these are related to a minimal management plan which has the purpose to effectively generate
- Unplanned internally generated intangibles: assets that arise from daily operations without a specific intent<sup>124</sup>

It is up to the management to differentiate when an asset is planned or not since it is their task, as decision-makers, to initiate and execute projects and activities linked to the generation of intangible assets.

Intangible items must still respect the two requirements provided by IAS 38 to be recognized as assets (i.e. future economic benefits must probably flow to the entity and the item must be reliably measurable). Associated with the new classification proposed, AASB's paper points out that only planned intangibles meets the recognition criteria because both expected economic benefits and measurability can be demonstrated just when a plan to develop the intangible asset is successfully implemented and completed<sup>125</sup>.

While planned internally generated assets include those items that arise from both research and developments phases, they also have a broader spectrum which embraces other internally generated intangibles like publishing rights which may be capitalized if result of a discrete plan and are currently not recognized under IAS 38.

Another relevant input is related to those plans which failed or have been modified: these may still give rise to an intangible asset if some knowledge has been generated and can be exploited by the company in the future producing economic benefits<sup>126</sup>.

Even if it introduces very valuable modification to the current accounting environment, this approach still presents some issues: with the introduction of the distinction between planned and unplanned intangibles there may be management discretion and inconsistencies since many companies promote the creation of new ideas without a structured and organized

<sup>&</sup>lt;sup>124</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne, para. 41

<sup>&</sup>lt;sup>125</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne, para. 77

<sup>&</sup>lt;sup>126</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne, para. 47

process which may be reconducted to a planned activity. Moreover, this approach does not solve the problem of internally generated such as brands which usually arise through undefined and unstructured processes and would still be not recognized, even if they often represent a big portion of an entity's intangibles.

### 4.2.1.2 Changes with a Valuation-based Model

According to the valuation-based approach, internally generated intangibles would be initially recognized at their fair value<sup>127</sup>. While this method is currently applied for intangibles acquired through a business combination, AASB point out that there is no reason why this should not be applied to internally generated assets<sup>128</sup>: it suggests to recognize them using a technique based on an hypothetical business combination which would recognize all those assets that would normally be recognized in a business combination except for goodwill<sup>129</sup>. This approach would solve the issue for internally generated brands, customer lists etc. that would finally find their place on the balance sheet.

Similarly to the cost-based model, the value-based approach would increase the availability of information related to internally generated assets but would result in substantial management discretion due to the fair value measurement of the intangible items. This problem may be overcome by a comprehensive disclosure of assumptions and measurement techniques used in the fair value valuation.

## 4.2.2 Additional Proposals

During the years other suggestions have been proposed to improve the reporting of intangible assets within the traditional financial statements.

Haaker, for example, starting from the idea that the balance has the task to give the proper value of a firm, proposes to change the valuation model to full fair value financial statements which would be based on the concept of Cash Generating Units (CGU). Following this method, all intangible assets, both acquired and internally generated (including goodwill) would be recognized on the balance sheet for the respective CGU together with other assets and

<sup>&</sup>lt;sup>127</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne, para. 171

<sup>&</sup>lt;sup>128</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne, para. 96

<sup>&</sup>lt;sup>129</sup> Australian Accounting Standard Board (AASB), (2008): *"Discussion Paper, Initial Accounting for Internally Generated Intangible Assets"*, Melbourne, para. 113

liabilities<sup>130</sup>. Even if this proposal would allow a comprehensive disclosure of all intangible assets, thus reducing the difference between market and book values, there may arise implementation issues related to the subjectivity of associating an asset/liability to this or another CGU, violating the accounting objectivity principle.

Another interesting proposal regards the creation of a portfolio of intangible assets to be presented on the balance sheet. It is usually challenging for individual intangibles to be recognized on the balance sheet because it is not possible to identify separate cash flows, detect possible future economic benefits or reliably quantify the cost arising from the single asset. Potentially, the aggregated recognition of group of assets related to each other may solve this issue. Nonetheless, it must be pointed out that it may be troublesome to identify intangible assets with similar characteristics due to their unique nature and there would be the problem related to the comparability between companies, since each of them may group its intangibles in a different way.

Finally, Burger et al.<sup>131</sup> propose, similarly to the AASB model, to completely eliminate the distinction between research and development phase for internally generating assets and suggest to pursue a method on a project-by-project basis following four criteria for the recognition of an intangible asset:

- The project must be initiated based on an internal decision
- The project ca be distinguished from other initiatives in terms of functions, timing and financing
- The project must be actively pursued
- The project is expected to bring future economic benefits to the entity

<sup>&</sup>lt;sup>130</sup> Haaker, A., (2007), "Grundgedanken zu einer Reform der Bilanzierung immaterieller Vermögenswerte nach IAS 38 und zur zweckadäquaten Ausgestaltung einer IFRS-Informationsbilanz" (Teil II), in: KOR 2007, vol. 7, no. 6, pp. 332-341

<sup>&</sup>lt;sup>131</sup> Burger, A., Ulbrich, P., Knoblauch, J., (2006), *"Zur Reform der Bilanzierung von Forschungs- und Entwicklungsaufwendungen nach IAS 38"*, in: KOR 2006, vol. 6, no. 12, pp. 729-737.

## 4.3 A new approach for Intangible Assets reporting

This thesis has tried until now to make an idea as clear as possible about the issues and techniques related to the reporting and analysis of intangible assets. In the last two paragraphs, several possible solutions have been described, with relative pros and cons. Now, building upon the abovementioned proposals, a new possible approach will be presented using some of the project management concepts explained in Chapter 3, thus answering to the research question posed at the beginning of this work.

Every time a new framework is developed, the first question that must be asked is: who are the recipients and beneficiaries of it? In this case, the main audience, who is interested in a more comprehensive disclosure of intangible assets, are the users of financial statements, hence financial analysts. These professional figures are those who analyze companies in the first place and possibly drive the capital allocation in financial markets. Consequently, it is key for them to have the most complete picture of a company in order to make investment recommendation. For this reason, the proposal presented in this paragraph tries to take into account the main preferences expressed by a sample of 1100 financial analysts interviewed in a research published by Grüber in his paper<sup>132</sup>.

Generally, financial analysts collect and process information from several sources, both internal and external to the company such as conference calls, direct management contact or analyst meetings<sup>133</sup>. However, financial reports remain the most used information source. For this reason, the framework proposed should be included in the financial information released by companies on a regular basis (annually or quarterly if the company is listed). In addition, analysts have confirmed to prefer fundamental factors rather than technical methods when valuing a company, strengthening the idea that the information needed must come from the company itself.

The tools and valuation techniques mostly used by financial analysts are built on figures included in financial accounting and reporting. For example, when using a DCF model, analysts forecast company's future cash flows by estimating revenues, costs and their future trends. In the assessment of such items, a deep knowledge of the intangible values of the company

<sup>&</sup>lt;sup>132</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, pp. 166 et seqq.

<sup>&</sup>lt;sup>133</sup> Grüber, S., (2014), *"Intangible Values in Financial Accounting and Reporting: An Analysis from the Perspective of Financial Analysts"*, Springer, p. 402

may result crucial to define the future cash generating potential of the entity. For instance, when performing a ratio analysis, analysts use quantitative figures to put in relationship different financial statements items. Changing the accounting model recognizing more intangible assets would then have implications on the ratios employed in the evaluation of the entity, and the eventual introduction of new and specific indicators related to intangibles may help in the assessment and comparison between companies. Accordingly, the approach suggested here is based on numerical figures which may help analysts in their quantitative valuation.

The research has revealed that even if financial analysts ask for further information related to intangible assets, these should not be included in the traditional documents, but they would prefer to have a specific statement dedicated to intangible values only. For this reason the new framework includes, next to the classical statements, an "Intangibles balance sheet" in which both acquired and internally generated intangible assets would be disclosed, leaving only tangible and financial assets on the traditional balance sheet which would be untied from the invisible portion of the company. In this document, intangible assets acquired separately or through a business combination would be reported following the current rules. The difference would then arise for those intangibles internally generated. The main idea is to further develop the project-by-project approach suggested by Burger et al. As it has been demonstrated in Chapter 3, project, even if no cash outflow has been already made. Several methodologies have been explained but only one was capable of taking into account the possible flexibilities inherent to these initiatives and consequently the values of intangible assets involved: Real Option method.

Therefore whenever a company commits itself towards a project (or planned activity, using the terminology proposed by the AASB), its valuation is performed through the Real Option method and the result, hence the value of the project itself, is posted as an asset on the "Intangibles balance sheet" and the same value is included in the equity of the company in a specific portion reserved to intangible values. Since projects generally have different durations and may last for more than a year, the value of each project should be tested for impairment periodically, also according to the decisions taken by the management which influence the value of the real option. Once the project is terminated, the management would have the task to assess the expected useful life of its results: if the expected future economic

benefits are considered finite in time, then amortization would be needed to decrease the value of the asset and consequently the portion of intangible equity associated with it; in case it is not possible to determine a useful life for the asset generated, this would not be subjected to any amortization but only tested for impairment.

Following the preference expressed by the analysts interviewed by Grüber, all the expenditures incurred relative to the project should be immediately expensed because the cash outflows do not necessarily have an impact on the value of the intangible asset.

This approach solves the problem related to the distinction between research and development phase and the concern that many analysts have raised regarding the discrepancy between costs and future economic benefits generated by the intangible asset, blaming the cost model to be extremely conservative and not sufficiently representative. Naturally, being Real Options an internal method used by management, all the assumptions made to reach the value of the project and thus the asset to be posted on the "Intangible balance sheet" should be adequately disclosed and periodically externally audited, in order to be sure that the figures presented are not overestimated and fairly reflect the value of the asset. In addition the reporting for this kind of information should become mandatory and with detailed rules to be defined according to the different business sectors: the first point is related with implementation issues, since companies, if not obliged to disclose certain information, may simply not adopt the reporting for several reasons (cost/benefit concerns, competitive advantage, etc.); the second is key for comparability reasons, since analysts require more consistency among companies reporting when it comes to the disclosure of intangible assets information.

For those internally generated intangibles that cannot be valued through the Real Option method, such as brands, customer lists etc., the approach suggested consists in evaluating them using a hypothetical business combination technique. This allows to have a quantitative value, which is preferred by financial analysts, also for those assets whose intrinsic characteristic is mainly qualitative and difficult to quantify internally.

The preference towards quantitative disclosure does not mean that companies will not disclose qualitative information. In the notes attached to the "Intangibles balance sheet" additional information related to all techniques employed for evaluating the assets must be disclosed and eventual further explanation provided.

# CONCLUSION

This thesis has started from a real-life observation: there is a big gap between what a company is worth for the market and what instead is written on its financial statements. This gap may be in some cases macroscopic and it is so mainly in those companies characterized by a large portion of knowledge and technological features. For this reason, the driver for the gap between market value and book value has been identified in intangible assets. Consequently, the first step has been to understand what intangible values are, what are their characteristics and how they may contribute to companies' value. After this, Chapter 2 has dealt with the accounting and reporting side of the topic, describing and analyzing the international standards related to intangible assets, pointing out differences between IFRS and US GAAP standards and highlighting the main issues the current reporting environment brings for the valuation of an entity. After having established a real deficiency of the current accounting system this work has tried to find a possible solution going first through the academic literature presenting several approaches proposed during the years. Finally, a new possible framework has been presented whose approach took inspiration from the project management valuation techniques explained in Chapter 3. The Real Option method has turned out to be a great help to value all those internally generated intangible assets that arise through those planned activities like research and development which are always key for companies, especially in certain industry such as technology and pharma. Hence, the research question posed at the beginning of this thesis which was "Can the valuation of a company's project portfolio fill the gap between its book and market value?" finds a positive answer since the project valuation through Real Options allows to disclose more key information related to a big portion of intangible assets on financial statements. However, some other types of internally generated assets like brands and customer lists cannot be analyzed with the Real Options method due to their highly qualitative nature and for this reason the hypothetical business combination technique has been proposed in order to give, as far as possible, an objective and quantitative estimation.

Naturally, this work does not pretend to give the ultimate solution to this challenging topic but may provide an input for further studies to design an eventual appropriate system for the future. The idea of building an entire balance sheet for intangibles may represent a good starting point to give the adequate space to this kind of assets whose relevance is becoming

prevalent and needs to be estimated and disclosed appropriately. It might not be ignored, companies may be reluctant to fully disclose so many information related to intangible assets for several reasons, the main related to a possible loss of competitive advantage or the high cost to make them available thus exceeding the benefit of their disclosure. It may be then challenging to enforce a mandatory reporting system because of the missing endorsement coming from companies themselves. However, when setting new standards, the needs of the final users of financial statements must be taken into great consideration: as highlighted by the research mentioned in Section 4.3, financial analysts ask for a more standardized and comprehensive disclosure for intangible assets and the framework proposed in this thesis has tried to go towards this direction.

Last but not least, whatever the framework adopted is, it remains crucial to have an harmonization across different accounting systems establishing a universal standard that can ensure comparability between companies in global markets, thus enabling a fair capital allocation able to support the future economic growth.

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