

Bridging the gap Between Intellectual Capital Models: An Ancestry/Chronology Approach

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Abstract

Since the first coining of the term 'intellectual capital' (IC) in Stewart's "Brainpower" article of 1991, IC has gained popularity and interest amongst researchers from different disciplines as a source of attaining and maintaining competitive advantages. The result of these disciplines (e.g. human resources, accounting, marketing and finance) feeding into the IC literature has been a dramatic increase in the number of IC models. The diversity of the models has given rise to different approaches for realising the value of IC, provided different taxonomies for classifying IC, and introduced different practices for managing, measuring and reporting IC. This variety has made it a challenge for organisations to select the appropriate model to systematically manage, measure and report their organisational knowledge.

This paper visualises the roots of IC models in the literature by examining the foundations and principles on which they are based. Such a visualisation affords the opportunity to establish common bases for IC modelling in order to reduce the diversity between IC models and increase their practical applicability. These bases are: the tendency towards enhancing the taxonomy of IC, and the tendency towards establishing the practices of managing, measuring and reporting IC. The main contribution of this paper is three ancestry/chronology diagrams that visualise fifty-four IC models and the rationale behind their development, which in turn brings greater coherence to the literature on IC modelling and conceptualisation.

Keywords: Intellectual capital (IC), IC modelling, IC taxonomy, IC practices, Ancestry

1. Introduction

The actual developments of intellectual capital (IC) frameworks began in 1994 when Skandia, the giant Swedish insurance company, developed the Skandia Navigator framework to measure and report its IC (Edvinsson and Malone 1997). According to Stewart (1997), the Skandia Navigator received wide acceptance among researchers and made a significant contribution toward the development of a number of subsequent IC frameworks.

The field of IC is truly multidisciplinary, spanning most functions and disciplines. Managers from various disciplines have developed a number of IC frameworks to strategically deal with IC, in search of competitive advantage. This creates little agreement and much confusion regarding suitable IC frameworks, their usage and the extent to which such tools are applied in the organisation (Marr 2005). This paper aims to establish common bases for IC modelling in order to reduce the diversity between IC models and increase their practical applicability. The paper starts by presenting three significant classifications of IC frameworks developed by prominent researchers. As a result, the paper identifies fifty-four IC frameworks and then investigates the ancestries behind their development. Three ancestry/chronology diagrams are designed and presented to simplify the visualisation of those IC frameworks' development. As a result, the paper distinguishes between those frameworks that were developed originally for IC and those that were not. Finally, the paper identifies and proposes two common bases for classifying IC frameworks and classifies IC frameworks accordingly. This work has formed the basis of a PhD study in which the objective is to investigate the abilities of using IC to support the electronic publishing process at Jordanian newspapers.

2. Classifications of IC frameworks

The IC literature contains a plethora of IC frameworks. Two strategies were adopted to aid the identification of IC frameworks in the literature. The first was an ancestry approach through an extensive literary analysis. During this stage, forty frameworks were identified through analysis of key literature, namely Luthy (1998), Ricceri (2008) and Sveiby (2001a, 2010). These three studies present a number of IC frameworks in the literature and provide significant ways for classifying them based on their functionalities. The second strategy was a primary research for IC frameworks in related peer-

reviewed international journal, namely Journal of Intellectual Capital (JIC). During this stage, a further fourteen frameworks were identified. In total, this paper investigates fifty-four frameworks.

2.1 Luthy's (1998) classification

Luthy (1998) proposed two general methods for classifying IC measurement frameworks. The first method is the component by component evaluation, which includes frameworks that measure the value of particular IC components such as patents owned by the company; the second method is the organisation level evaluation, which includes frameworks that measure the value of IC in financial terms at the organisation level without reference to individual components of IC.

2.2 Sveiby's (2001, 2010) classification

Sveiby (2001a) identified twenty-one intangible assets measurement models, which increased to forty-two in 2010 (Sveiby 2010), and classified them under four main groups according to their ability to assign a dollar value and their level of details. According to Sveiby (2010), the four groups are:

- *Direct Intellectual Capital Method (DIC)*: includes frameworks that tend to evaluate the monetary value of the intangible assets by breaking it down into identifiable components.
- *Market Capitalisation Method (MCM)*: includes frameworks that tend to calculate the monetary value of companies' IC using the difference between its market and book values.
- *Return on Assets Method (ROA)*: includes frameworks that tend to follow an accounting approach to calculate the value of companies' IC.
- *Scorecard Method (SC)*: includes frameworks that tend to break down the IC or intangible assets into identifiable components, but with no estimation of their monetary values.

2.3 Guthrie and Ricceri's (2002) classification

Guthrie and Ricceri (2002) examined Sveiby's four groups and suggested grouping them into two approaches: the stock approach and flow approach. Stock approach is concerned with calculating the dollar value of IC, whereas the flow approach is concerned with identifying the knowledge resources that drive value creation, and the relations between them, rather than assigning a dollar value to these resources (Guthrie and Ricceri 2002).

The three aforementioned classifications provide close methods for classifying the functionalities of a number of IC frameworks in measuring, managing and reporting intangible assets. However, the line of distinction between those frameworks that are suitable for IC in particular and those that are suitable for intangible assets in general is not very clear.

3. An ancestry approach to investigating IC frameworks

This paper follows an ancestry approach to investigate IC frameworks in the literature. It involves using citations from relevant studies to track down earlier IC research on which the studies are based. This method provides a clearer picture of the development of IC frameworks by identifying not only the main catalysts behind their developments but also the convergence points between their developments. This helps to establish common bases for IC modelling and justifies the decision of considering frameworks in this paper as suitable or not for dealing with IC. To simplify the visualisation of this ancestry approach, three ancestry/chronology diagrams are designed and presented in this paper, as shown in Figures 1, 2 and 3. For example, Figure 1 shows the ancestry/chronology of thirteen frameworks. The vertical axis of the diagram includes three layers that tell of three different events. The first and upper layer is titled "Stimulating Events" and contains yellow boxes that depict events that played a major role in introducing and developing frameworks in the literature as IC frameworks.

The second layer, titled "General Models (Not IC)" contains yellow boxes that introduce a number of general models and concepts. These general frameworks were developed for different reasons and later used as a basis for developing models in the IC literature such as discounted cash flows and the residual income models. The last and third layer shows the chronological order of the development of IC models extending from the 1960s until 2012. The horizontal axis of the diagram shows the backgrounds of the models. As connected by arrows, the diagram depicts the ancestry of the thirteen IC models as either a result of the occurrence of some stimulating events or as derived from or developed based on other IC models or general models.

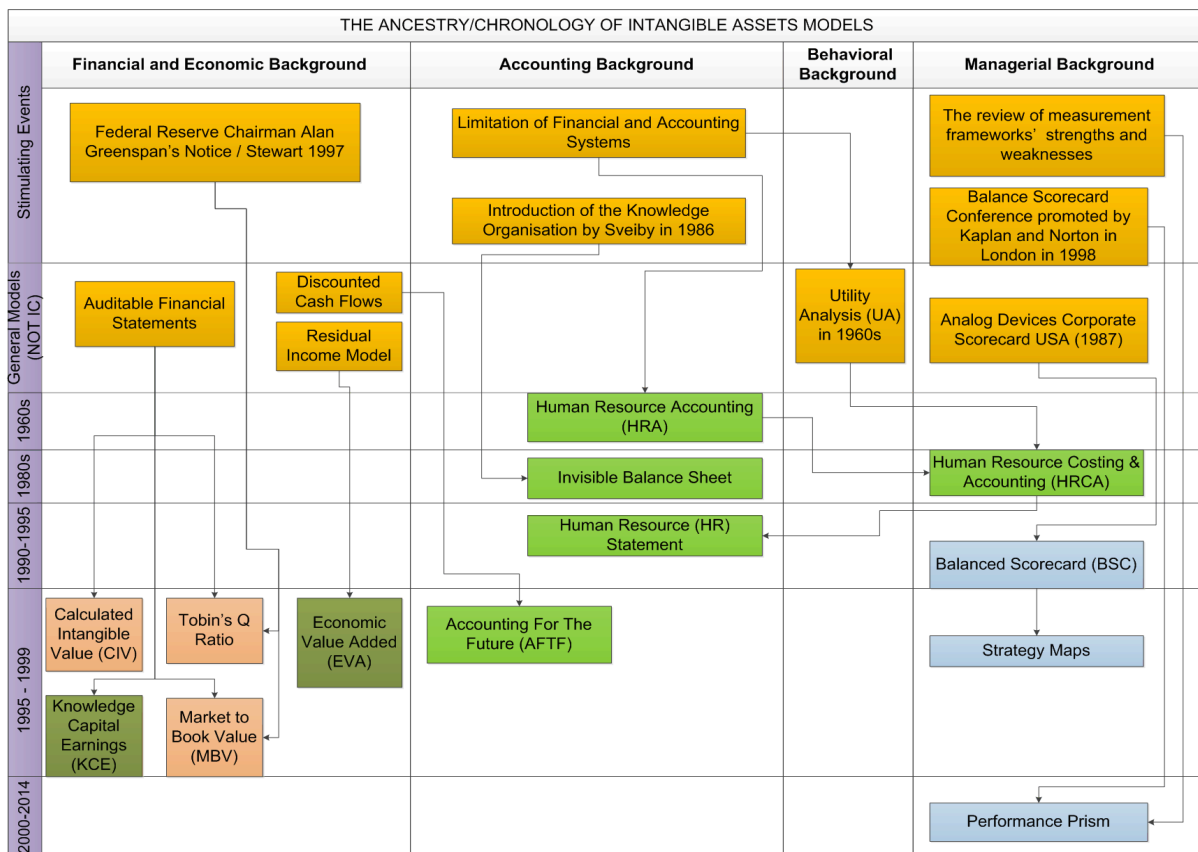


Figure 1: The ancestry/chronology of thirteen models: ■ MCM Models ■ DIC Models
■ ROA Models ■ SC Models

3.1 Frameworks that were not originally developed for IC

According to Sullivan (2000), there was no discernible pattern of IC as a discipline before Stewart's "Brainpower" article of 1991 but different origins of what later contributed to the development of the IC discipline could be distinguished. Thirteen frameworks out of the fifty-four were not originally developed for IC purposes but were considered later by researchers as suitable for IC as shown in Figure 1.

3.1.1 Frameworks providing taxonomies of intangible assets that intersect with the IC taxonomy

The IC literature provides different taxonomies of the first level of IC components. This can be attributed to the number of models from different disciplines that have fed into the IC literature. However, there is a consensus between researchers (e.g. Edvinsson and Malone 1997; Stewart 1997; Boedker et al, 2005) that IC is classified into three main components: human capital, structural capital and relational capital. This first-level classification of IC components is also consistent with the European Commission findings documented in the MERITUM (Measuring Intangibles to Understand and Improve Innovation Management) Project (2002). Eight frameworks were found to provide taxonomies of intangible assets that intersect with this taxonomy of IC, as follows:

- Direct Intellectual Capital frameworks

Shown in Figure 1, the Human Resource Accounting (HRA) model was developed within the accounting field as a result of the inefficiency of traditional accounting reports in addressing employees' intangible resources such as employees' skills, experiences and knowledge (Flamholtz, 1985). Building on the HRA model, the Human Resource Costing and Accounting (HRCA) model was developed within the human resource management field to report the costs incurred in the acquisition and development of employees (Johanson et al., 1998). The human resource (HR) statements were issued to address intangible HR indicators (e.g. training and development, and employee-related investments) in Finnish companies' annual reports. According to Sveiby (2010), the HR statement is a management application of the HRCA that is widespread in Finland.

Based on the concept of 'Knowledge Organisation' introduced in 1986, the Invisible Balance Sheet framework was developed by a group of managerial and accounting experts to measure and report thirty-five key indicators of intangible resources (Sveiby et al. 1989). The Accounting For The Future (AFTF) framework is a value-added accounting system based on discounted expected future cash flows which aims to translate companies' intangible assets (human resources, reputation, etc.) into tangible future cash flows (Nash 1998).

- Scorecard method frameworks

The Balanced Scorecard (BSC) and Strategy Maps are financial frameworks that measure companies' performance level by assigning indicators that address intangible assets (Kaplan and Norton 1996). The Performance Prism is a managerial framework that addresses the organisation's relationship with all of its stakeholders and links them to related strategies, processes and capabilities (Neely et al. 2002).

3.1.2 Frameworks indicating the overall value of IC

In Figure 1, five frameworks from a financial background have been considered in the literature as suitable for indicating the value of IC, as discussed below.

- Market Capitalisation method frameworks

According to Stewart (1997, p.226), the Tobin's Q Ratio and Market-to-Book Value (MBV) were considered "good" measures due to their ability to provide an indication of the overall value of IC. In the same context, the Calculated Intangible Value (CIV) adapts a financial method used to evaluate companies' brand equity into a seven-step calculation method (Stewart, 1997).

- Return on Assets method frameworks

Economic Value Added (EVA™) financially measures IC in that changes in EVA™ provide an indication of whether the firm's IC is productive (Stern Stewart & Co. 2012). Knowledge Capital Earnings (KCE) is a financial equation that matches earnings with the assets that generate them to measure companies' knowledge assets and earnings (Webber 1999).

3.2 Frameworks that were originally developed for IC

The remaining forty-one frameworks were originally developed for IC. Based on the reasons behind their development, this paper proposes two common bases for classifying these IC frameworks:

- The practices base: includes frameworks that were developed to manage, measure and report IC.
- The taxonomy base: includes frameworks that were developed to enhance the taxonomies of IC.

3.2.1 The practices base

IC frameworks were mainly developed to fulfil three different practices: to manage, measure and/or report IC (Boedker et al, 2005). These practices overlap in a direct and indirect manner and are complementary to each other. IC management relates mainly to increasing those components of IC that are likely to yield the highest returns for the company over time; that is, the ability to identify, leverage and capitalise on intangible resources in an integrated manner to develop IC (Boedker et al. 2005).

Taking into account the famous quote "What gets measured gets managed", Leliaert et al. (2003) indicated that IC measurement is the first step in understanding how to manage the IC of an organisation. IC measurement includes identifying and assigning metrics or indicators to assess the use of the organisation's knowledge resources and activities (Society for Knowledge Economics 2005). Finally, IC reporting reflects the efforts undertaken in the IC management and measurement practices, and communicates them with internal and external stakeholders with the aim of showing the organisation's invisible sources to achieve competitive advantages (MERITUM Project 2002). Considering Sveiby's (2010) four groups of classifications, thirty-five frameworks are classified under this basis, as shown in Figure 2.

- Market Capitalisation method frameworks

Based on the "Market Capitalisation" financial principle, the Investor Assigned Market Value (IAMV™) measures IC by distinguishing between three types of company market values: investor assigned market value, attainable market value, and true market value (Standfield 2001).

- Return on Assets method frameworks

The Value Added Intellectual Coefficient (VAIC™) is an equation that uses accounting based figures to measure the value creation efficiency of IC (Pulic 2000).

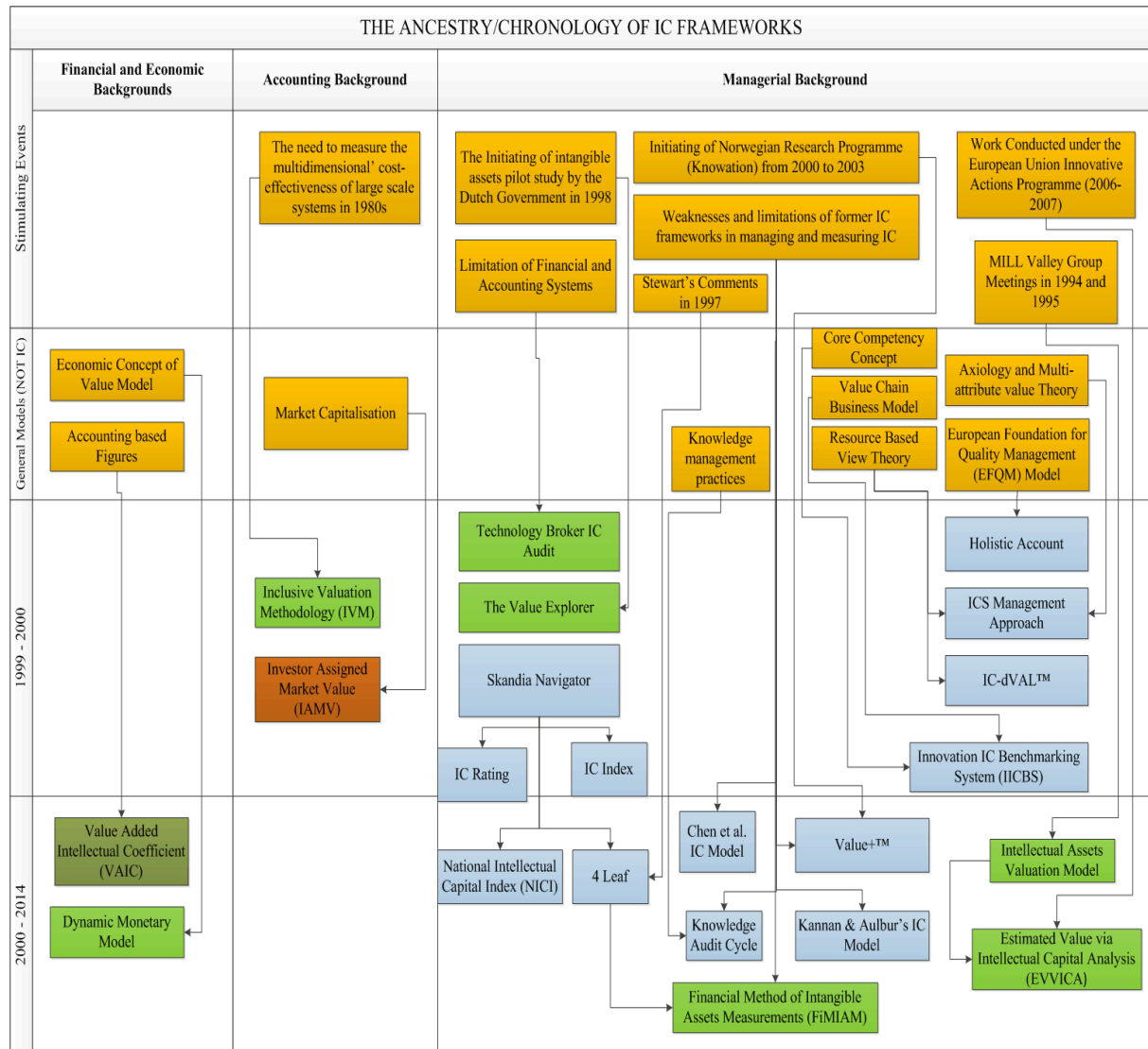


Figure 2: the ancestry/chronology of twenty-two IC frameworks

■ MCM Models
 ■ DIC Models
 ■ ROA Models
 ■ SC Models

- Direct Intellectual Capital method frameworks

The Technology Broker IC Audit identifies a number of IC indicators and calculates their dollar value by offering three financial methods: the cost approach, the market approach and the income approach (Brooking 1996). Based on the concept of core competencies, the Value Explorer framework was developed as an accounting approach to enable accountants to report more efficiently on their companies' IC through a five-step approach (Andriesson 2005, p. 475). The Inclusive Valuation Methodology (IVM) was developed to "respond to the accounting community's need for an efficient technique to measure multidimensional cost-effectiveness of large scale systems" (McPherson and Pike 2001, p. 250). IVM uses hierarchies of combined weighted indicators and focuses on relative rather than absolute values (McPherson and Pike, 2001). The Intellectual Assets Valuation model was developed to provide implications for corporate strategic planning and general and human resource management on how to extract value from IC by classifying and valuing companies' intellectual property as part of IC (Sullivan 2000).

The Financial Method of Intangible Assets Measurements (FiMIAM) measures the monetary value of IC by providing a direct link between IC components and financial capital, while including their interactions and interdependencies (Rodov and Leliaert 2002). Based on the economic concept of

value model, the Dynamic Monetary Model measures IC by considering and measuring only the human capital component of IC (Milost 2007). The Estimated Value via Intellectual Capital Analysis (EVVICA™) is an extension or evolution of the net present value financial model (McCutcheon 2008, p. 80). EVVICA™ assesses the likelihood of success of a new product development cycle by using current and anticipated IC resources as an analogue or metaphor (McCutcheon 2008).

- Scorecard method frameworks

As shown in Figure 2, the Skandia Navigator was in 1994 the first model to be developed specifically to measure and report the IC. The Skandia Navigator as a financial framework analyses up to 164 indicators covering five components: financial, customer, process, renewal and development, and human (Edvinsson and Malone 1997). In 1995, the Holistic Account was developed as an accounting model to measure and report RAMBØLL's IC, covering nine intangible accounts by assigning accounting indicators to them (Pedersen 1999). The Intellectual Capital Services (ICS) Company introduced their IC model as a strategic management approach based on a development of the resource-based theory of the firm (Pike et al. 2005).

By adopting the structure of the Skandia framework, four managerial-based frameworks were developed as shown in Figure 2. The IC-Index is a context-specific model that links IC with the organisation strategy. It adopts a bottom-up approach for measuring IC by creating an index of the organisation's relevant intangible resources, and urges management to assign them weights based on their importance (Roos et al. 1998). The IC Rating® models also views IC in a strategic context, but considers three future-looking perspectives when measuring IC: effectiveness, risk and renewal (Intellectual Capital Sweden AB 2009). The Four-Leaf model aims to serve as a management decision-making tool by illustrating the existing overlaps between the main IC components that create new knowledge (Leliaert et al. 2003). Finally, the National Intellectual Capital Index (NICI) serves as a mapping system of the intangible resources which helps to uncover and manage the IC of nations.

In order to overcome the weaknesses and limitations of earlier IC frameworks in managing and measuring IC, six managerial-based frameworks were developed as shown in Figure 2. The Knowledge Audit Cycle helps managers to assess six knowledge dimensions of an organisation's capabilities and to implement knowledge management practices in order to maintain and grow them (Marr and Shiuma 2001). The Innovation Intellectual Capital Benchmarking System (IICBS) allows companies to identify and benchmark their core innovation capacities or key IC against world-class competitors in their sectors (Marti 2001). The Intellectual Capital Dynamic Value (IC-dVAI) is a financial management framework that dynamically measures the performance of IC by building a link between the financial value of assets and the internal performance of companies (Bounfour 2003). Chen et al.'s (2004) IC framework provides managers of the Chinese companies with timely necessary information to enable them to modify their strategies of IC management according to the specific situation. Kannan and Aulbur's IC framework holistically measures IC by combining elements of the perceptual, process, financial and social impact of IC (Kannan and Aulbur, 2004). The Value+™ is a performance management framework that identifies, measures and improves IC by distinguishing knowledge in terms of activities rather than repositories (Bygdås et al. 2004).

As a result of conducting government and research projects, seven managerial-based IC frameworks have been developed as shown in Figure 3. The MERITUM guidelines were developed by an EU-sponsored research project to provide a common framework for managing, measuring and reporting IC (MERITUM Project 2002). The Danish guideline was published as a recommendation by a government-sponsored research project to help Danish organisations to support and communicate the development of their knowledge management strategies through developing an external IC statement (Mouritsen et al. 2003). The Intellectual Capital Statements (the "German guideline") was developed to manage and report IC in German SMEs by adjusting previous pioneering Scandinavian IC management and reporting frameworks (FMEL 2004). Intellectual Assets-based Management (IAbM) is a guideline issued by the Japanese Ministry of Economy, Trade and Industry to help Japanese companies to prepare efficient IC reports (Johanson et al. 2009). The Austrian Universities Act framework was issued by the Austrian government to force state universities to prepare and disclose IC reports for presenting, evaluating and communicating their previous development and future strategy (FMESC 2013). The Extended Performance Account was developed to guide and inspire Australian organisations to better manage their knowledge-intensive resources (SKE 2005), whereas the Intellectual Capital University (ICU) report was developed to help universities and research organisations in managing and reporting their IC resources.

The Ancestry / Chronology of IC Frameworks

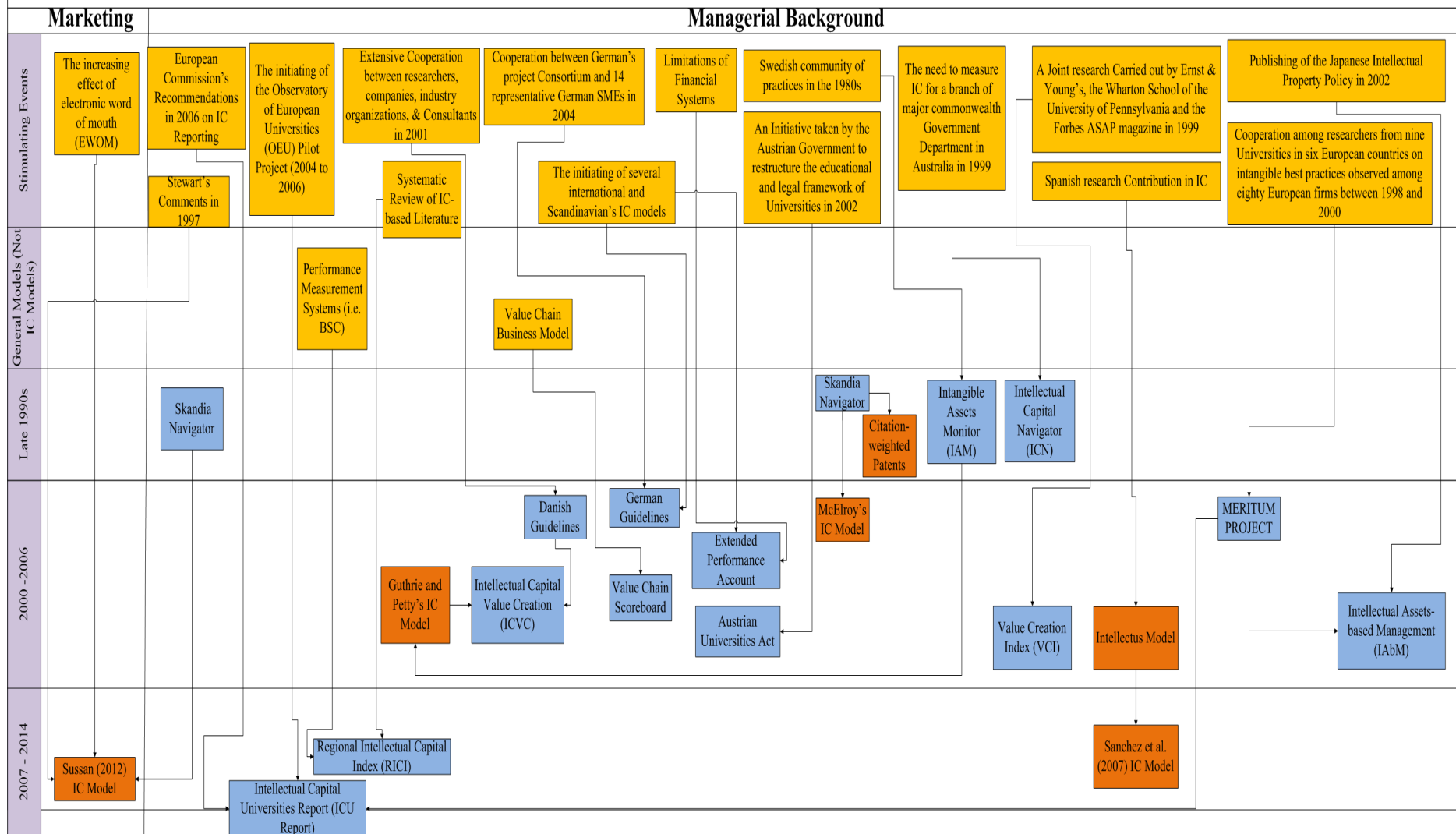


Figure 3: The ancestry/chronology of nineteen IC Frameworks: ■ Taxonomy base models ■ SC Models

Figure 3 includes another four managerial-based IC frameworks: the Intellectual Capital Navigator (ICN) measures IC by visualising the management views of its IC resources deployment and then assigning values to these resources (Roos and Jacobsen 1999). The Value Chain Scoreboard™ was developed as a matrix of non-financial indicators to report innovation activities of intangibles internally (i.e. managers) and externally (i.e. investors, suppliers) (Lev 2001). The Intellectual Capital Value Creation (ICVC) framework was developed to investigate an Australian organisation's IC management, measurement and reporting practices, and was inspired by two IC models: Petty and Guthrie's IC tripartite model and the Danish Guidelines (Boedker et al. 2005). Finally, the Regional Intellectual Capital Index (RICI) holistically measures the IC ownership of a region (Schiuma et al. 2008). The Intangible Assets Monitor (IAM) is a financial framework that measures relevant indicators of intangible assets according to the "Swedish Community of Practice" (Sveiby 2001b).

3.2.2 Frameworks developed to enhance existing IC taxonomies

Researchers (e.g. Boedker et al. 2005; Pike et al. 2005) pointed out that, for an IC model to be embraced by organisations, there is a strong need to provide a definition for the taxonomy of IC components. Six managerial-based frameworks were developed mainly to enhance the taxonomy of IC as shown in Figure 3.

The Citation-Weighted Patents adopted the structure of the Skandia framework but deals with customer capital at the same level as human and organisational capitals (Petrash 1996). Guthrie and Petty's IC framework adopted Sveiby's IAM framework to examine the annual IC reporting practices at Australian companies (Guthrie and Petty 2000). McElroy's IC framework adapted the Skandia navigator framework to redefine the IC taxonomy to include "social capital" as a main component of IC. The Intellectus framework explicitly includes social capital in the IC taxonomy (Bueno et al. 2004). Emanated from the Intellectus model, Sanchez et al.'s (2007) IC framework places culture as an independent component of IC. Finally, Sussan's (2012) IC framework includes business to customer (B2C) and customer to customer (C2C) as sub-components of relational capital. The framework was built mainly on Stewart's (2007) comments on IC, Skandia and the IC Rating frameworks (Sussan 2012).

4. Application for practising managers

Based on the catalysts behind their development, this paper argues that some frameworks introduced in the literature are more suitable for dealing with IC than others. Thirteen out of fifty-four frameworks introduced in this paper were found to have not been originally developed for IC, but were considered in the literature as suitable for IC. This is either because of their taxonomy of intangible assets which intersects with the taxonomy of IC (eight frameworks), or their ability to indicate the overall monetary value of IC (five frameworks). Forty-one frameworks were found to have been originally developed for IC. These frameworks either focus on constructing the practices of managing, measuring and/or reporting IC (thirty-five frameworks), or aim to enhance the IC taxonomy by adding new components and/or sub-components to it (six frameworks).

By considering the two categories, it becomes clear that frameworks in the second category are more appropriate for dealing with IC than those in the first category. This is due to their tendency to clearly address intangible assets that make up the main components of IC (i.e. human capital, structural capital and relational capital). They provide managers with different ways of managing, measuring and/or reporting their companies' IC. Moreover, frameworks in the second category tend to investigate ideas relating to the influence of IC on the behaviour of the capital and labour markets, that is, to provide new taxonomies of IC that have proved significant applications in different sectors and different countries. Figure 4 summarises this classification of the fifty-four frameworks.



Figure 4: Proposed classification of the fifty-four models

5. Summary

The development of the IC frameworks takes place in different disciplines. This has introduced a plethora of IC frameworks that cause confusion as to the appropriate framework to apply in any given situation. This paper has followed an ancestry approach to investigate fifty-four frameworks in the literature. It was demonstrated that frameworks in the literature can be firstly distinguished into two groups: frameworks that were originally developed for IC and those that were not but were introduced later to deal with IC. Secondly, the reasons behind the development of those frameworks that were originally developed for IC were presented and it was demonstrated that these can be distinguished into two bases: the taxonomy base and the practices base. The implication of this paper to practitioners is that it adds to the continued discourse about evolving frameworks in the IC literature by communicating a classification method to distinguish IC frameworks according to the catalysts of their development. This aims to help future research to avoid becoming trapped in the plethora number of frameworks in the IC literature by distinguishing those frameworks that are suitable for dealing with IC.

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