The IC-dVAL approach

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Abstract Over the last five years several frameworks have been suggested for the development of corporate competitive advantage, on the basis of their intangible resources. These frameworks are mainly managerially oriented; they require the design of a set of metrics dealing with organisational inputs. Hence the importance of making the link between internal and external perspectives, especially those related to financial performance. Making such a link is the main aim of the intellectual capital dynamic value (IC-dVAL®) approach, which integrates four dimensions for measurement – inputs, processes, assets, and outputs – and defines ad hoc metrics for measuring intellectual capital in a dynamic way. This approach is now used at the corporate level in several contexts. It is also under consideration for implementation at the mesoeconomic and even the macroeconomic levels. The paper also presents how such an approach can be used at the country level, especially in Europe.

Introduction
The development of intangible resources is an essential issue for companies; it is also a critical issue for public organisations because of its impact on growth and employment. As is the case for companies, public organisations must develop innovative approaches, in particular in the functional “fields”: research and development, systems of education, fiscal policies and public procurement policies. Indeed, the management of intangibles clearly questions public policy at different levels: in its relationship with “productive” sectors and organisations (companies and sectors of activities), but also with regard to the intangible capacity of public organisations themselves. One can even state that the perspective for companies that has been suggested and developed here can also apply to public organisations. For example, one can point out that the development of evaluation and monitoring tools is an important option to be considered. It reinforces the capacity of training and anticipation of public organisations such as the World Bank or the IMF; European institutions; and national or regional administrations. Each of these organisations is now under high policy pressure to increase their policy, output transparency (this is one of the main aims of the policy governance concept in Europe) and reputation building.

The microeconomic perspective
The recent developments of the strategic management literature underline the growing importance of intangible factors for corporate competitiveness. More generally, various factors explain the growing interest of scholars and analysts in intangibles resources: the strong growth of services activities; the dematerialization of the manufacturing activities themselves; the recognition of knowledge and its infinite combinations as a major source of value creation.
within organisations, and the empirical demonstration of the determining character of intangibles (R&D, image, relative quality of the products and services) in the acquisition of durable competitive advantages on the business unit levels (PIMS Associates, 1994).

The work of Porter (1980, 1985, 1990) has contributed to the definition and implementation of an interesting analytical framework from which to consider competitiveness. The concept of competitive advantage is at the heart of such a development, on the basis of an analysis of the competitive forces within market structures. However, Porter’s model of the 1980s is now largely challenged by new approaches to competitiveness, especially those focusing on resources – mainly those of an intangible nature – as a main source for competitive advantage.

Indeed, as the author has underlined elsewhere (Bounfour, 2000), recent approaches have been developed, focusing on corporate intangible resources, competences and capabilities, as the main lever of creating competitive advantage. In opposition to Porter’s view, these approaches consider the fact that the differences of performance are more important within the individual industries than between industries. Within this approach, we can include different types of research:

- approaches based on core intellectual and services competencies (Quinn, 1992);
- approaches based on resources – the resource-based view (RBV) (Barney, 1991; Dierickx and Cool, 1989; Grant, 1991, 1996; Itami, 1989; Itami and Roehl, 1987; Penrose, 1959; Peteraf, 1993; Wernerfelt, 1984, 1989) and intangible resources (Bounfour, 1995, 1998a, b, c; Hall, 1993);
- approaches based on core competences (Prahalad and Hamel, 1990);
- approaches based on knowledge creation dynamics (Nonaka, 1994; Nonaka and Takeuchi, 1995);
- approaches based on competences as “organisational routines” (around the work of Nelson and Winter (1982)).

All these approaches can be considered as contributions to the foundation of a strategic paradigm for intangibles.

The RBV
The RBV of the firm is built upon seminal ideas developed by Penrose (1959), who considered the chief determinant of industry structure to be the resources possessed by the firm. Looking at the firms in terms of their resources, it naturally leads to a radical shift from the traditional product/market structure paradigm. There is no unanimity among researchers about the nature and number of resources to be considered. Wernerfelt (1984, p. 172), defines a resource as “anything which could be thought of as a strength or weakness of a given firm. More formally, a firm’s resources at a given time could be defined as those
(tangible and intangible) assets which are tied semi-permanently to the firm ... Examples of resources are: brand names, in-house knowledge of technology, employment of skilled personnel, trade contacts, machinery, efficient procedures, capital, etc”. But under what circumstances will a resource lead to high returns over a longer period of time? Wernerfelt (1989) considers competitive advantages in terms of resources (including building barriers to entry for intangibles and not solely for products). For instance, with regard to the bargaining power of suppliers and buyers, as well as the threat posed by substitute resources, different statements could be proposed: if the production of a critical resource is controlled by a monopolistic group, then it will, ceteris paribus, reduce the amount of returns available to the users of this resource (a patent holder versus its licence holder, a good advertising agency versus its client).

Dierickx and Cool (1989) stress the importance of building a coherent policy for accumulating strategic intangible assets, especially those of a non-tradable nature (reputation, quality, etc.). In their view, a key dimension of strategic formulation may be identified as the task of making appropriate choices about strategic expenditures (e.g. advertising spending and R&D outlays) with a view to accumulating required resources and skills (e.g. brand loyalty, technological expertise, etc.). In other words, appropriate time paths of relevant flow variables must be chosen to build required asset stocks. Critical or strategic asset stocks are those assets which are “non-tradable, non-imitable and non-substitutable” (Dierickx and Cool, 1989, p. 1506). Sustainability of a firm’s position for a specific asset will then depend on how easily it can be replicated. Different characteristics are therefore considered with regard to this problem of sustainability: time compression diseconomies, asset mass efficiencies, interconnectedness of asset stocks, asset erosion and causal ambiguity.

Barney (1991), on the other hand, considers only three resources: physical, human, and organisational. Finally, Grant (1991) considers the following resources: financial, physical, human, technological, reputation and, organisational. Resources are considered as being specific to companies and so non-tradable, non-imitable and non-transferable. Corporate strategy is mainly influenced by the stock of resources available at any particular time. Grant (1996) differentiates between resources and capabilities: resources are an input to the production process and constitute the basis for analysis, whereas capabilities refer to the capacity of a combination of resources to carry out specific tasks or activities. Therefore, capabilities (or competences) are at the basis of establishing competitive advantage. This notion of capability is similar to that of “core competency” developed by Prahalad and Hamel (1990), on the basis of the analysis of NEC’s success factors in information technology and semi-conductors, in comparison with its main competitors (GTE in particular). It can also be related to the concept of “core services competences” suggested by Quinn (1992).

The RBV then contributed to the establishment of a new vision of corporate performance, even if some of the developed arguments are not completely new.
The RBV, despite its broad nature, has a simple message for long-term performance: companies have to be considered as a portfolio of resources, tangibles and, more importantly, intangibles. It is these resources that allow the development of competences and therefore the establishment of a sustainable competitive position in the marketplace. This approach seems most suited to the knowledge economy: resources and competences are still “hidden values”, not sufficiently valorised in the marketplace.

The main arguments from this literature review are then the following:

- a firm’s performance is mainly influenced by its endowment of resources, rather than by its industry’s structure;
- firms are heterogeneous with respect to their resources/capabilities endowments;
- building (critical) resources may take time;
- firms may lack the organisational capabilities needed to develop new competences;
- some assets are non-tradable, e.g. tacit knowledge or reputation;
- a dynamic and consistent view of intangibles should be developed;
- efficient processes have to be implemented, especially those dedicated to combining intangible resources;
- a competitive strategy has to be built on firms’ distinctive resources and capabilities.

The intellectual capital perspective

During the last five years, a set of experiences centred on the measure of intellectual capital (IC) has been initiated. The balanced score-card approach (Kaplan and Norton, 1992, 1993, 1996a, b) has been used in several cases. However, various taxonomies for IC have also been suggested (Bontis, 1996, 1998, 1999, 2001, 2002; Brooking, 1996; Edvinsson and Malone, 1997; IFAC, 1998; Stewart, 1997; Sveiby, 1997).

The current practices around the management of intangibles are of two types: those relating to knowledge management (KM), basically as a managerial practice, and those referring more specifically to the measurement and the development of IC. KM is mainly developed around information technologies, whereas IC is more related to financial research and strategic management control. With regard to industrial sectors of applications, several industries are particularly active in both KM and IC including public services, social services, nuclear, aerospace and high-tech industries, to name a few.

The IC-dVAL approach

The extant literature as well as organisational practice suggested that it is possible to build corporate strategies of IC by integrating a link between the
financial value of assets and the internal performance of companies (Bounfour, 2000, 2002a, b). From the point of view of the management of organisations, building competitive advantage on the basis of intangibles is mainly ensured via the deployment of a “combinatory function” of these resources in a distinctive and specific way. In other words, the problem is that of the definition of a dynamic approach to corporate competitiveness, starting in particular from the implementation of organisational processes which might be referred to as its routines or patterns of current practices and learning (Teece et al., 1997).

Four dimensions
In analytical terms, four important dimensions of competitiveness must be integrated (Figure 1):

1) **Resources as inputs** to the process of production. Tangible resources, investment in R&D, acquisition of technology, etc. The principal point to be considered here is that of the identification of the intangible resources with specific high criticality, and how the level and the mode of exploitation of these resources can be improved by the adoption of specific processes.

2) **Processes**. It is through processes that the deployment of a dynamic strategy based on intangible factors can really be implemented: processes of establishing knowledge networks, and competences inside and outside the company; processes of combination knowledge; processes of just-in-time for products and services and the whole of the outputs; processes of motivation and training of personnel, etc.

3) **The building of intangible assets (IC)**. These can be built by the combination of intangible resources. Indeed, combining intangible resources can lead to specific results such as collective knowledge, patents, trade marks, reputation, specific routines, and networks of co-operation. For each one of these assets, indicators and methods for valuation can be developed.

Figure 1.
The IC-dVAL four dimensions framework
(4) Outputs. It is on this facial level that performance of companies is classically measured, through the analysis of their products and services’ market positioning. Here, one will be interested in indicators such as those relating to market share, quality of products and services, barriers to entry, and establishment of temporary monopolistic positions.

By integrating these four dimensions, the problem of corporate competitiveness – in the context of the knowledge economy – appears very complex. It should no longer be considered from the only (often static) perspective of market share or industry’s structure.

**Developing and implementing a set of metrics**

The deployment of measures is done through an overall architecture of indicators related to items, blocks of items (i.e. resources, processes and outputs), as well as to a global vision of corporate performance, through a synthetic indicator (Figure 2). A set of 25 indicators is included in this framework with organisational performance measured using benchmarking techniques. The overall index of performance (OiP) for the whole company is calculated on the basis of indices. We often use it for the calculation of the dynamic value of the IC. The whole approach has been implemented for dozens of companies and organisations at the European level: large companies, specific lines of activities within companies, as well as public organisations such as town councils.

**From micro- to meso-/macro-perspectives**

Over the last few years, several interesting IC initiatives have taken place at the national level (e.g. Sweden, Denmark, The Nordic Project, Israel), but also on a regional level (e.g. the United Nations initiative of benchmarking the Arab region (Bontis, 2002), or the Pacific Islands), with the support of the World Bank, in 1997. Most of these initiatives consisted of analysing existing
data, basically at the input and output level. Bontis (2002), for instance, extended Edvinsson’s approach, with some adaptation to a national context, and developed a structural equation model for national IC development. But we need to go further, especially by focusing on the dynamic dimension of socio-economic performance. Indeed, statistical data are now needed for clusters, communities of practice and sectors of activities, especially at the European level. Table I details the content of each data set. This framework can be used for different public policy dimensions. It has already been used in the assessment of the impact of European RTD programmes. It is also under test for reporting on intangibles in the context of the knowledge economy. Different types of IC are also recommended here for identification and measurement: human capital, innovation capital, social capital, structural capital and market capital. Each of these components is the subject of ongoing research for identification and measurement from the societal point of view.

Benchmarking
Proxy values were used for benchmarking. A set of metrics has been defined and used along the four elements of the pre-defined framework (see Table I). As was stressed earlier, the objective here is to proceed to a benchmarking of national innovation systems in Europe, in order to determine critical factors of inter-systems learning (Table II).

Preliminary results
Resource indices (Figure 3)
- For public R&D/GDP, Japan is doing better than the USA. But the USA is doing better than the European Union (EU). However, within the EU, Finland is the “best in class”, followed by Sweden and The Netherlands.
- For BERD/GDP, Japan and the USA are again better positioned than the EU (average). Sweden and Finland are again better players in Europe.
- For venture capital/GDP, we do not have comparable data for the USA and Japan. For this metric, the UK is the best player in Europe.
- For new capital/GDP, the USA is doing better than the EU. Within the EU, Finland is the best.

Process indices (Figure 4)
- Ireland is the best player in Europe for percentage of SMEs innovating in-house.
- Denmark is a leading player for percentage of SMEs innovating in cooperation. Therefore, social capital can be considered here as a strong value within this country.
Data set I. Resources (inputs) metrics
These are indicators related to measuring companies and economies resources such as: R&D, patents, technology, infrastructure, human resources, information and knowledge (know-why, know-how, know-what, know-whom), software, advertising, market research, vocational training, as inputs (investments) to operators’ activities.

Data for two types of metrics are expected to be collected here:

1. Data related to the level of investment in a specific resource – hence the investment in resources indicators, such as human resources, technology resources or information resources (e.g. an expenditure on a market resource study).
2. Data related to the cluster members performance (i.e. how do they perform compared with those best in class. Answering this question necessitates the undertaking of a benchmark exercise). Hence the performance indices.

Types of resources considered: human resources, information resources (such as patents or market research); physical resources as well as financial resources are considered as contextual elements.

Data set II. Processes metrics
These are indicators related to measuring defined processes for value creation in the new economy: networking, combining knowledge, virtual organising, alliances, agile organisation, developing routines, developing communities, developing standards, developing new business paradigms, developing communities of practice, developing networks and clustering processes, mobilising human resources, developing financial markets’ trust, and . . . public RTD fund raising, etc.

Again two types of data are expected to be collected here:

1. Data related to the level of investment in specific processes, such as a networking process or an internal communication process. Hence the investment in processes indicators.
2. Data related to the cluster members’ performance (i.e. how do they perform compared with those best in class?. Answering this question necessitates the undertaking of a benchmark exercise). Hence the processes indices.

Data set III. Outputs metrics
Indicators related to measuring defined outputs and performance in the new economy, such as: patents, trade marks, reputation, an increase in turnover, market niches, contractual contacts, communities of use, barriers to entry in specific businesses, increasing net value, etc.

Again two types of data are expected to be collected here:

1. Data related to the value for specific output, such as an additional turnover, an increase in market share, a creation of niche due to a first mover advantage. Hence the outputs indicators.
2. Data related to the cluster members’ performance (how do they perform compared with those best in class? Answering this question necessitates the undertaking of a benchmark exercise). Hence the output indices.

Data set IV. Assets metrics
Indicators related to measuring defined assets, mainly of an intangible nature, in the knowledge economy: human capital (collective routines, knowledge), innovation capital, structural capital (including technology, patents, trade marks, standard software and tools), and market capital (reputation, attractiveness, market niches, standards, etc.).

Tangible assets are indicated here as an element of context.

All the four types of assets are to be estimated into €, $ or any other currency. This can be done by resorting to traditional financial and economic methods: market-to-book value, turnover multiplier, value of replacement, Tobin Q, etc. Evaluations are carried out at different levels: business unit level, corporate level, group level.

Source: Bounfour (2002b)
The USA is doing better than the EU and Japan for percentage of Internet home access. However, within the EU, Nordic countries are outstanding (The Netherlands, Denmark, Sweden).

For ICT markets/GDP, the USA is doing better than the EU and Japan. Within the EU, Finland is the leading player.

For hi-tech value added, the USA is the leading player worldwide, followed by Japan and the EU. Within the EU, Ireland and Sweden are the best players.

Output indices (Figure 5)

- Sweden is the best player for the ratio: percentage of innovating exports on total sales.
- The Netherlands is the best in class for the unemployment rate. On average, the USA is doing better than the EU and Japan.
Finland is a good player in new-to-market products, due to Nokia’s success.

The USA is the best player for GDP per capita, followed by European Nordic countries (Denmark, The Netherlands, among others).

The USA is doing better than Japan and the EU for average annual growth of exports in high-tech products. But within the EU, Finland, The Netherlands and Denmark are excellent.
For real GDP growth, the USA is doing better than the EU. Ireland is an excellent player, due to its economic policy, mainly export-oriented; on average, the EU is lagging behind the USA, for most of these indicators.

**Asset indices (Figure 6)**
- The EU is lagging behind the USA for a major ratio: the number of scientific publications per million;
- Within the EU, Nordic countries are the best players for this ratio;
Figure 5. Output indices
Figure 6. Asset indices
• The same remarks can be applied to two major indicators for patenting: EPO and US PTO indices.

• For human capital, data attest also to the better performance by Nordic countries, except for one metric: the percentage of S&E graduates among 20-27-age population (the UK is the leading country here).

Average performance indices, national IC indices (Figure 7)

On average, we can see that for each of the four dimensions used here Nordic countries are the best in the EU (Figures 7 and 8). Therefore, they appear as those best in class in managing their IC. The question then is to what extent the Nordic countries can be referred to as a benchmark in the European arena or, more specifically, to what extent a process of “learning-by-comparing” can be implemented. This is the main subject of the benchmarking exercise still under way within the EU.
Conclusion
The four dimensions of the IC-dVAL approach can be used not solely at the microeconomic level, but also at the macroeconomic level, especially in the perspective of benchmarking IC performance. However, data availability poses a problem. Therefore, it is important that a statistical effort be provided for at the meso- or macroeconomic level, in order to achieve a better understanding of national innovation systems, and national performance in the context of the knowledge economy.

References


Further reading