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# Intangible assets in higher education and research: mission, performance or both?

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## Abstract

**Purpose** – This paper aims to discuss the role of intangible assets in higher education and research institutions and to present a measurement framework, along with an illustrative application.

**Design/methodology/approach** – A review of existing theories and practical experiences is undertaken to build the core conceptual model and a dashboard of indicators. The model is then applied to investigate the mission and performance angles of intellectual capital with reference to an Italian higher education and research institution.

**Findings** – Creating intangible assets is at the core of the mission of education and research organizations. The identification and measurement of intellectual capital are thus an operational priority to evaluate the alignment between strategic orientation and performance within such institutions.

**Research limitations/implications** – The research has to be considered as exploratory and presents a single case, resulting in the need for further applications. However, the dashboard of metrics proposed is comprehensive and can thus represent a useful ground for refinements, mostly related to the links between indicators and management/strategy issues.

**Practical implications** – The dashboard can be used as a stakeholder communication tool and a *tableau de bord* to support the strategic decisions related to the human, social and structural capital of education and research organizations.

**Originality/value** – The paper presents a first discussion on the systematic identification, classification and reporting of intellectual capital indicators in higher education and research.

**Keywords** Higher education, Intangible assets, Intellectual capital, Research

**Paper type** Research paper

## 1. Introduction

The centrality of intellectual capital (IC) has primarily emerged in the business world but there is today a growing interest also in non profit organisations (NPOs). Unlike concepts as industrial organisation, resource-based view and knowledge-based view, the concept of IC can be indeed used as a valid strategic management framework and competitive tool for non-profit institutions (Kong, 2007a, 2008; Kong and Prior, 2008).

IC provides non-profit managers a better understanding of the internal and external issues in their organizations. At this proposal, it has been highlighted how IC can help develop a learning culture that transforms social service non-profit organizations (SSNPOs) into dynamic learning organizations (Kong, 2009). Member-serving non-profit organizations (MSNPOs) have been also investigated to examine the role of governance structure, shared knowledge, decision making and benefit sharing. These elements play a significant role in learning processes for innovation; flatter governance structures support the dissemination of knowledge effectively, making

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members more able to take decisions in the organizational innovation process (Kong *et al.*, 2009).

Among NPOs, the role of Higher Education (HE) and research organizations is particularly relevant in the economic structure of countries and regions as they add value in terms of educated workforce and enhanced entrepreneurship. However, the IC value of HE institutions is rarely discussed when cost and efficiency performance is debated (Fairchild and De Vuyst, 2005). HE systems are immersed today in an intense transformation process triggered by the need to make universities more flexible, transparent, competitive and comparable. To face these challenges, HE institutions need to consciously manage the processes of creating their knowledge assets and recognise the value of IC to their continuing role in society (Rowley, 2000). Knowledge assets underpin core competencies of any organisation. Therefore, they play a key strategic role and need to be measured (Marr *et al.*, 2004). Institutions that adopt a strategic approach to the management of IC see this as an opportunity to enhance their market position (Klein, 1998).

There are thus a number of reasons why the IC in HE and research should represent a core aspect to investigate and measure. First, IC can help to shift strategic focus of NPOs towards intellectual resources and enhance their capability to adapt to the challenges posed by the non-profit environment since some of the theoretical roots of IC come from the core competence theory (Mouritsen *et al.*, 2005). Second, IC is a key value driver for organisational competitiveness and performance improvement (Schiuma and Lerro, 2008), but financial accounting and reporting practices generally fail to recognise these assets. Third, the ranking of education and research organizations should be based more on consistent, objective and shared metrics, also to strengthen the links among universities and companies on the basis of a common language. The entrenchment in traditional measurement paradigms represents, in this sense, a barrier to explore the most interesting reason for measuring intangibles, i.e. learning (Sveiby, 2000). A fourth reason to measure IC stays in the fact that measurement could bring the "ivory-tower philosophy" of researchers closer to real requirements of the public and industry, resulting in a more transparent assessment of performance (Fazlagic, 2005). Finally, IC should play a key role in strategic human resource management (SHRM) and human resource management (HRM) practices within organizations. IC can be conceptualised as correlated to both SHRM and HRM, thus adding strong support for the need to measure IC accurately (Kong and Thomson, 2009).

Models, frameworks and methodologies for measuring knowledge assets have mostly focused at the firm level, with an economic or strategic focus. The increasing cooperation between universities and firms has resulted in the demand for similar processes of evaluation for both players. However, none of these methods has been applied in the public sector or, more specifically, in the NPOs (Kong, 2007b). Accordingly, universities and research organisations have to implement new management and reporting systems which incorporate intangibles.

In such scenario, there are two questions addressed in this article:

(1) How to integrate the perspective of intangible assets creation, as a strategic mission, within the performance angles of higher education and research institutions?

(2) Which classification and measurement framework can be developed to capture an extensive view of intangible capital?

The following section presents a review of most relevant approaches presented in literature to measure IC and its key components. The different contributions are used to build a representation and measurement dashboard (section 3). The framework defined is then applied (section 4) to illustrate the results achieved by an advanced education and research institution. Finally the model and its application are discussed, along with some final remarks and avenues for further research (sections 5 and 6).

## 2. Background

Since the early 1990s, many conceptualizations of IC have been proposed (Bontis, 1998, 2001, 2002; Edvinsson and Malone, 1997; Kaplan and Norton, 2004; Klein and Prusak, 1994; Seemann *et al.*, 2000; Stewart, 1998). Beside the interest in the academic and consulting fields, also supranational organisations like OECD, European Union and World Bank show an increasing attention towards this issue.

IC has been described as intellectual material that has been formalised, captured and leveraged to produce a higher valued asset (Klein and Prusak, 1994). IC is about how to let the knowledge of an organisation work for it and have it create value (Roberts, 1999) and includes all intangible resources as well as their interconnections (Bontis *et al.*, 1999). An interesting conceptualization sees IC as the combination of intangible resources and activities that allow an organisation to transform a bundle of material, financial and human resources in a system capable of creating stakeholder value (European Commission, 2006) and organisational innovation (Lerro *et al.*, 2009).

In particular, IC can be thought as the economic value of two categories of intangible assets of a company, i.e. organisational capital and human capital (OECD, 1999). IC includes thus a set of intangible elements (resources, capabilities and competences) that drive the organizational performance and value creation (Bontis, 1998; Bontis *et al.*, 2000; Roos and Roos, 1997). This suggests causal relationships between intellectual capital and organizational value creation (Marr and Roos, 2005). However, despite the consistent body of knowledge accumulated, there is still a lack of systematic studies of the links between IC and value creation of organizations. The rationale for managing IC should be to get the most of direct and indirect benefits for the organization and its stakeholders. The investigation of how IC sustains and drives value creation dynamics is thus a key issue to be addressed (Schiuma *et al.*, 2007).

The intangible nature of IC renders the measurement a quite complex issue and one of the aspects of managing IC is measuring it (Roos and Roos, 1997). There are two schools of thought with regard to measuring knowledge assets (Leibowitz and Wright, 1999). Researchers try to find appropriate metrics to measure knowledge or they look for indicators, mostly outcomes of knowledge activities, because knowledge in itself cannot be measured.

Methods for IC measurement can be classified in four basic categories (Malhotra, 2003):

(1) market capitalisation;

(2) return on asset;

(3) direct intellectual capital; and

(4) scorecard.

The first three models focus on the financial side of measurement and the monetary value of intangible assets (Andriessen and Tiessen, 2000; Stewart, 1997; Sullivan, 2000), whereas scorecard approaches consider indicators linked with the strategic objectives of the organization and cover major perspectives such as financial, customer, internal processes, and learning. Scorecard models are widely used in practice and among them three methods are particularly diffused:

(1) *Balanced scorecard* (Kaplan and Norton, 1992).

(2) *Intangible asset monitor* (Sveiby, 1997).

(3) *Skandia Navigator* (Edvinsson and Malone, 1997).

The balanced scorecard helps providing a more comprehensive view of a business, encouraging managers to select measures from three additional perspectives of performance besides financial value: customer, learning and growth and internal business processes. The intangible asset monitor takes a knowledge-based view of performance and adopts the concept of intangible assets as related to internal structure (e.g. intellectual property, corporate culture, management processes), external structure (e.g. relationships with customers and suppliers) and competencies of people (human capital). For each area, organisations report three types of indicators, i.e. growth, efficiency, and stability, with the ultimate objective to support management control. The Skandia Navigator, developed in the pioneer Skandia Group, reflects five key business dimensions that should be measured, i.e. financial focus, customer focus, process focus, renewal and development focus, and human focus.

These methods can provide the theoretical foundation of IC analysis and reporting. However, in the HE and research context only a small part of this intellectual value is identified and very limited tools exist to measure and manage them (Cañibano and Sánchez, 2004). Some representative frameworks have been provided in the last few years by the European Commission and other institutions.

A first contribution is contained in the *Guidelines for Managing and Reporting on Intangibles* in the frame of the MERITUM project funded by the EU V Framework Programme (MERITUM, 2002). The project developed 77 case studies in six countries (Denmark, Finland, France, Norway, Spain, and Sweden) and the main result was a set of guidelines for measuring and reporting intangibles in companies.

Another example is the document *Intellectual Capital Statements* published in 2003 by the Danish Ministry of Science, Technology and Innovation. The first issue, published in 2000, was tested by a mixed sample of 80 Danish firms. The Danish guidelines can be applied as an instrument for IC management as they acknowledge the need for knowledge management initiatives and define a set of indicators to measure and follow up them.

In December 2004, the EU Commission set up a high-level expert group to propose measures to stimulate the reporting of IC in research-intensive small and medium enterprises (SME). The result was the document *RICARDIS* - Reporting *Intellectual Capital to Augment Research, Development and Innovation* in *SMEs* in which IC reporting by companies and other organisations such as universities is highlighted as being paramount in the knowledge economy.

Another recent initiative is the *Intellectual Capital Report 1999-2004* by the Austrian Research Centers (ARC), which is the most outstanding and longest experience in reporting IC in research centres. In fact, the ARC model and principles

have become the mandatory foundation for IC reporting in Austrian universities (Leitner, 2005).

Based on the results of the mentioned initiatives, the *Intellectual Capital Report for Universities* (ICU Report) has been developed by the Observatory of European Universities (OEU) within the *PRIME Network* of Excellence (OEU, 2006). A total of 15 universities and research institutes from eight European countries have worked to develop a common framework and build a battery of indicators to measure and compare the intangibles in research activities. The initiative provided a "strategic matrix" containing five thematic dimensions (funding, human resources, academic output, third mission, and governance) and five transversal issues (autonomy, strategic capabilities, attractiveness, differentiation profile, and territorial embedding).

On the basis of such guidelines, some universities and research centres started to develop a report for describing their intellectual assets and knowledge flows. Among these institutions, it is useful to mention the following: Autonomous University of Madrid (Sánchez *et al.*, 2006), Austrian Research Centre (ARC, 2000), Austrian Universities (Federal Ministry of Education, Science and Culture of Austria, 2002), INGENIO (2002), Lausanne University (Switzerland) and SPRU – Science and Technology Policy Research (UK).

## 3. Building an integrated IC dashboard

The review of theoretical approaches and real experiences suggested a set of requirements for defining and measuring intellectual capital in HE and provided the necessary criteria and methods for building an integrated dashboard.

The intangible asset monitor and the balanced scorecard methods classify intangible assets in human, customer and structural capital. This classification could be effectively applied to HE and research, with the concept of customer being referred to students and external faculty members. The RICARDIS project suggests a set of general indicators useful for all institutions, a set of sector-specific indicators (for universities and research institutions), and some institution-specific indicators that can be chosen by each university, allowing for individual considerations. In the MERITUM project, one thing which is particularly interesting is that indicators are organised under different headings or transversal issues which correspond to the strategic objectives of the institution (e.g. efficiency, openness, knowledge codification). These objectives are directly linked with the component of IC in terms of human, organizational and relational capital. Another interesting classification is the Knoware Tree framework (Schiuma *et al.*, 2008), which organises IC in two main components:

(1) knowledge assets related to the stakeholders of the organisation; and

(2) knowledge assets related to the tangible and intangible infrastructure of the organisation.

The first component can be further divided in human capital and relational capital whereas the second component includes organisational capital and social capital.

Building on these contributions, Figure 1 shows a descriptive model of IC for HE and research institutions. For each IC component, i.e. human, organizational and relational capital, some sub-components are identified which correspond to the strategic objectives of the organization. The list of key goals was obtained starting from a wider analysis of objectives which have been compared with those reported in

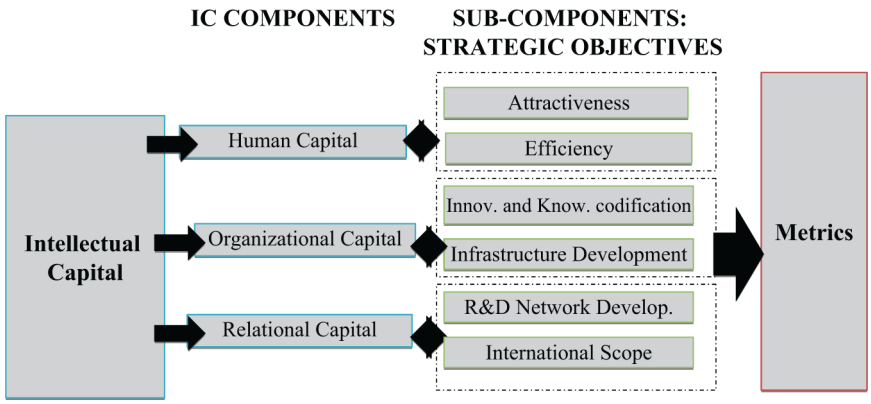


**Figure 1.**
Framework for IC measurement in higher education and research

the initiatives and projects mentioned in this section. The strategic aims of HE institutions, as declared by the EFMD Quality Assurance Criteria (EFMD, 2007), have also been considered. A final list of six strategic goals has been then obtained:

(1) attractiveness;
(2) efficiency;
(3) innovation and knowledge codification;
(4) infrastructure development;
(5) R&D network development; and
(6) international scope.

For the human capital component, two areas are particularly important. The first is "Attractiveness", i.e. the capacity of the organization to draw and retain talents through a strategy of high quality and a culture of openness. The second area is "Efficiency", i.e. the ratio between output/value created and human resources used at this purpose. Related to the organisational capital, innovation and knowledge codification refers to the performance of the institution in terms of scientific publications, research projects and spin-offs, whereas infrastructure development is referred to the enhancement of IT systems for teaching, learning and research, as well as the development of "traditional" facilities such as libraries and laboratories. Relational Capital is also associated to two sub components. The first is R&D network development, i.e. the delivery of education and research results to the external environment and the monitoring of relations created with external actors such as governments, industry and other research centres. The second sub-component is "International scope" and includes the aspects aimed to evaluate at which extent the institution is open to exchanges with the international scientific and industrial community.

After the identification of sub-components, the next step was to associate a set of indicators, keeping in consideration a set of important requirements:

- the system of metrics should function as a management tool to help set measurable objectives, develop and allocate resources, create strategy, monitor results, and facilitate decision-making ("internal reporting" function);

- the measurement system should function as a communication tool to attract financial resources, human resources, and enhance relationships with stakeholders ("external reporting");
- indicators have to promote a visualisation of outputs for each strategic objective, refer to the institution's value creation process, go beyond financial indicators, be verifiable and allow follow-ups, and be easily collected and available inside the organization (Kok, 2007); and
- indicators should be useful to facilitate the decision making process, relevant for modifying or confirming expectations of decision makers, transparent to facilitate comparisons over time and across institutions, reliable and trustworthy.

Table I shows the final list of 62 indicators (29 for the human capital, 17 for organizational capital and 16 for relational capital) which are organised for each IC component and strategic objective. The indicators in italics are those more directly considered as output of the various strategic objectives. However, there is no specific importance weight or ranking among the different indicators and all contribute to provide a comprehensive perspective of the intangible value of the organization.

## 4. Applying the IC dashboard

The IC dashboard has been applied at the e-Business Management Section (eBMS) of Scuola Superiore ISUFI, a public and non-profit HE and research institution inside the University of Salento (Italy). The eBMS was created in 1999 and is today the central node of a network of research centres operating in Jordan, Morocco, Syria and Tunisia. The eBMS integrates business and ICT management curricula in undergraduate, Master's and PhD programs, as well as in advanced research projects focused on digital and organizational innovation in traditional and complex industries.

This paper shows an in-depth analysis of how IC indicators have evolved at the eBMS in the period 2001-2008. A case study method has been adopted (Yin, 1994) and the research has benefited from a direct involvement in the activities of the school, as the authors of this article have been students, research fellows and finally faculty members of the centre. Data have been collected through different sources:

- annual reports of the school;
- interviews with faculty and staff members;
- students' reports and deliverables;
- administration documentation;
- technology infrastructure reports; and
- faculty reports.

For most of metrics, values were already available whereas some estimation has been necessary for evaluating other indicators.

Hereafter, it is reported a detail of human, organizational and relational capital measures. Three years have been considered as "milestones", i.e. 2001 (fully operational year, after the start-up phase), 2008 (most recent data available), and 2004 (middle year) and the variation 2008/2001 was also calculated. The discussion of indicators which follows is focused on the most significant insights with respect to the

| | |
|---|---|
| *Human capital* | |
| Attractiveness | % of students with technology background |
| | % of students with business background |
| | No. of undergraduate students |
| | No. of Master's students |
| | No. of PhD students |
| | *No. of total students* |
| | No. hours of class per day |
| | % of students satisfied with the organization |
| | % of learners' complaints |
| | No. of courses per students |
| | Average age of students |
| | No. of new people recruited |
| | % of students with more than two years of experience |
| | % of students admitted on total applications |
| | % of job placement after six months from degree |
| | No. of alumni |
| | *% of students applying for more advanced programs* |
| | *% of former students covering staff/faculty positions* |
| Efficiency | No. of faculty members |
| | No. of staff members (research and administration) |
| | % of faculty v. total employees |
| | *% of staff v. total employees* |
| | % of faculty v. total students |
| | *% of staff members v. total students* |
| | Average age of faculty |
| | Average age of staff |
| | Average evaluation of faculty made by students |
| | % of faculty graduated at the institution |
| | *No. of hours dedicated by faculty to seminars* |
| | No. of new people recruited |
| *Organizational capital* | |
| Innovation and knowledge codification | *No. of pilot applications developed* |
| | % of success in project acquisition (on tot. presented) |
| | No. of ongoing research projects |
| | No. of publications in intern. conference proceedings |
| | No. of books published/edited by faculty members |
| | No. of publications in international journals and books |
| | *No. of international publications per faculty member* |
| | No. of spin-off companies |
| | *No. of patents* |
| | No. of international awards received |
| Infrastructure development | *No. of software platforms for education/research* |
| | *IT expenditure per person* |
| | % of IT expenditure on total costs |
| | No. of PCs per student |
| | No. of PCs per staff member |
| | No. of PCs per faculty member |
| | *No. of books available in the library* |

(*continued*)

**Table I.**
Intellectual capital dashboard indicators

| | |
|---|---|
| *Relational capital* | |
| R&D network development | *No. of new partnerships developed* |
| | No. of companies involved in education activities |
| | No. of companies involved in research activities |
| | No. of research institutions involved in educ. activities |
| | No. of research institutions involved in res. activities |
| | *No. of keynote visitors at the eBMS* |
| | No. of visits to partner companies and research centres |
| | No. of hits on the eBMS website |
| | *No. of e-mails received and sent* |
| International scope | No. of students with international experience |
| | *% of international students* |
| | *No. of international staff members* |
| | *No. of agreements signed with intern. partners* |
| | No. of countries with collaborations developed |
| | % of intern. speakers invited in learning programs |
| | No. of faculty members in international conferences |

**Table I.**

mission and performance of the school, and the relationships found among IC components and their trend.

*4.1 Human capital analysis*

A first area considered is the development of human capital enabled by the education programs organised at the school (Table II).

In the "Attractiveness", it can be noticed the varying predominance of technology and business background of students. In 2001, business background was prevalent with 65 per cent whereas in 2008 technology background was the majority, with 70 per cent. This trend is a proof of the interdisciplinarity attitude and mission of the school and its tendency to diversify profiles and competencies rather than targeting a unique cultural background. In fact, the school designs and delivers interdisciplinary curricula based on the integration of information and communication technology (ICT) management and business management topics. Other interesting aspects are the average daily number of class hours per student and the number of courses per student, decreased by 50 per cent and 33 per cent over the years. A reason for this trend can be found in the "learning in action" strategy adopted at the eBMS, requiring practice on real projects and laboratory sessions rather than traditional lectures. Finally, interesting data are related to the number of students applying for more advanced programs (i.e. Master's and PhD), grown by 88 per cent in 2001-2008, and the percentage of students covering staff/faculty positions (increase of 200 per cent). The increase of students applying for more advanced programs can be reasonably correlated with the decrease of learners complaint (− 75 per cent from 2001 to 2008) and the growth of students satisfied with the organization (23 per cent from 2001 to 2008).

Related to the "Efficiency" measures, three points have to be highlighted. First, there has been a consistent increase (233 per cent) of faculty members in the period 2001-2008, showing a medium/long term growth strategy of the school. These data are aligned with the increase of total number of students, and thus with the need to provide

| | 2001 | 2004 | 2008 | Var. 01/08 (%) |
|---|---|---|---|---|
| *Attractiveness* | | | | |
| Percentage of students with technology background | 35 | 45 | 70 | 100 |
| Percentage of students with business background | 65 | 55 | 30 | −54 |
| Number of undergraduate students | 0 | 4 | 16 | / |
| Number of Master's students | 15 | 12 | 23 | 53 |
| Number of PhD students | 6 | 18 | 16 | 167 |
| Number of total students | 21 | 34 | 55 | 162 |
| Number hours of class per day | 8 | 6 | 4 | −50 |
| Percentage of students satisfied with the organization | 75 | 85 | 95 | 27 |
| Percentage of learners' complaints | 20 | 10 | 5 | −75 |
| Number of courses per students | 18 | 15 | 12 | −33 |
| Average age of students | 25 | 24 | 26 | 4 |
| Percentage of students with more than two years of experience | 12 | 8 | 30 | 150 |
| Percentage of students admitted on total applications | 60 | 40 | 20 | −67 |
| Percentage of job placement after six months from degree | 70 | 80 | 95 | 36 |
| Number of alumni | 33 | 68 | 153 | 364 |
| Percentage of students applying for more advanced programs | 16 | 14 | 30 | 88 |
| Percentage of former students covering staff/faculty positions | 4 | 8 | 12 | 200 |
| *Efficiency* | | | | |
| Number of faculty members | 3 | 5 | 10 | 233 |
| Number of staff members (research and administration) | 15 | 26 | 50 | 233 |
| Percentage of faculty members on total employees | 16.7 | 16.1 | 16.7 | 0 |
| Percentage of staff on total employees | 83.3 | 83.9 | 83.3 | 0 |
| Percentage of faculty members on total students | 1.3 | 14.7 | 18.2 | 27 |
| Percentage of staff members on total students | 71.4 | 76.5 | 90.9 | 27 |
| Average age of faculty | 45 | 42 | 39 | −13 |
| Average age of staff | 24 | 28 | 32 | 33 |
| Average evaluation (0/10) of faculty made by stud. | 7 | 8 | 9 | 29 |
| Percentage of faculty members graduated at the eBMS | 0 | 1 | 6 | / |
| Number of hours dedicated by faculty to internal seminars | 180 | 300 | 500 | 178 |
| Number of new people recruited | 7 | 3 | 12 | 71 |

**Table II.**
Human capital indicators

to more persons continuous mentoring and tutoring in education and research activities. Second, six out of the ten faculty members (in 2008) received a Master's or PhD degree by the eBMS. This is in line with the mission of the school to attract and retain talented people and could be also assumed as a proof of satisfaction of students graduated at the school. Third, the number of faculty members on the overall number of students increased by 27 per cent in the period 2001-2008. This reflects the education strategy adopted by the school, which requires an intensive coaching of students. Finally, the decrease of the average age of faculty members (−33 per cent) is aligned with the increase of former students covering faculty or staff positions (200 per cent).

*4.2 Organizational capital analysis*

The second component analysed is the development of organisational capital (Table III).

Concerning "Innovation and knowledge codification" metrics, the significant increase (about five times more) of research projects acquired by the eBMS is an important performance, along with the increase (217 per cent) of pilot applications developed as an output of those projects. These data are aligned with the increased number of faculty members involved as project managers and the increased number of students involved in projects (as a phase of their competence development path). This is in line with the strategy of the school to strictly integrate education and research activities. Moreover, the growth of international publications (1100 per cent from 2001 to 2008) is associated with the growth of research projects (500 per cent) that represent a kind of "experimental laboratory" to test the research hypothesis and build the theory which is then published.

Concerning the "Infrastructure development", an increase can be noticed in the number of platforms for education and research (from two to eight) as well as the ratio of IT costs on total expenditure. These data are associated with the growth of pilot applications developed and the number of research projects carried on. It also proves a key strategic choice of the school, i.e. to invest deeply in information technology as a core asset and enabler of innovative knowledge management, learning and project management.

| | 2001 | 2004 | 2008 | Var. 01/08 (%) |
|---|---|---|---|---|
| *Innovation and knowledge codification* | | | | |
| Number of pilot applications developed | 7 | 12 | 26 | 271 |
| Percentage of success in project acquisition (on tot. presented) | 90 | 93 | 95 | 6 |
| Number of ongoing research projects | 3 | 12 | 18 | 500 |
| Number of publications in intern. conference proceedings | 2 | 12 | 15 | 650 |
| Number of books published/edited by faculty members | 1 | 2 | 7 | 600 |
| Number of publications in international journals and books | 1 | 4 | 12 | 1,100 |
| Number of international publications per faculty member | 1.3 | 3.6 | 3.4 | 155 |
| Number of spin-off companies | 0 | 0 | 0 | / |
| Number of patents | 0 | 0 | 0 | / |
| Number of international awards received | 0 | 1 | 3 | / |
| *Infrastructure development* | | | | |
| Number of software platforms for education and research | 2 | 4 | 8 | 300 |
| IT expenditure per person (euro) | 56,667 | 112,903 | 44,167 | −22 |
| Percentage of IT expenditure on total costs | 2,460 | 5,980 | 7,450 | 203 |
| Number of PCs per student | 1.5 | 1 | 1 | −33 |
| Number of PCs per staff member | 1.5 | 1 | 1 | −33 |
| Number of PCs per faculty member | 1 | 1 | 1 | 0 |
| Number of books available in the library | 1,100 | 1,450 | 1,870 | 70 |

**Table III.**
Organizational capital indicators

*4.3 Relational capital analysis*

The third component analysed is the "Relational capital" (Table IV).

"R&D network development" indicators show two aspects which deserve a special attention. The first is the strong increase of relationships with companies in education and research projects (400 per cent). This reflects, from one side, the action learning strategy which needs projects and intense links with the industrial world and, from the other, the mission of the school to develop public-private partnerships in the stakeholder university perspective (Margherita and Secundo, 2009). The second point is the increase (160 per cent) of outstanding professionals visiting the school for education and projects activities.

Concerning the "International scope", the mission of the eBMS to operate at global scale is demonstrated by the number of international speakers invited in education programs (growth of 240 per cent in eight years) and the number of international students mostly coming from Mediterranean areas (increase of 200 per cent from 2001 to 2008). This data confirms the vision of the school to build a broad network of competencies and collaboration among Southern Mediterranean countries. Moreover, the data is associated with the increase of institutions involved in research and education activities of the school (100 per cent and 150 per cent of increase from 2001 to 2008).

| | 2001 | 2004 | 2008 | Var. 01/08 (%) |
|---|---|---|---|---|
| R&D network development | | | | |
| Number of new partnerships developed | 3 | 5 | 4 | 33 |
| Number of companies involved in education activities | 3 | 1 | 7 | 133 |
| Number of companies involved in research activities | 4 | 6 | 20 | 400 |
| Number of research institutions involved in educ. activities | 2 | 3 | 4 | 100 |
| Number of research institutions involved in res. activities | 2 | 4 | 5 | 150 |
| Number of keynote visitors at the eBMS | 5 | 7 | 13 | 160 |
| Number of visits to partner companies and research centres | 3 | 5 | 8 | 167 |
| Number of hits on the eBMS website | 45,000 | 74,000 | 98,000 | 118 |
| Number of e-mails received and sent | 31,680 | 68,200 | 140,000 | 342 |
| *International scope* | | | | |
| Number of students with international experience | 3 | 5 | 7 | 133 |
| Percentage of international students | 30 | 80 | 90 | 200 |
| Number of international staff members | 0 | 0 | 18 | / |
| Number of agreements signed with international partners | 0 | 1 | 2 | / |
| Number of countries with collaborations developed | 1 | 2 | 4 | 300 |
| Percentage of intern. speakers invited in learning programs | 25 | 70 | 85 | 240 |
| Number of faculty members in international conferences | 2 | 12 | 15 | 650 |

**Table IV.**
Relational capital indicators

## 5. Discussion and conclusions

The analysis of single indicators and their trends shows the existence of likely relationships among IC components. Human capital and organisational capital are related in that the increase of faculty members and students (Attractiveness and Efficiency) seems to be positively aligned with the growth of pilot applications developed, research projects and total number of publications (Innovation and Knowledge codification). Also relational capital and organisational capital are connected, as illustrated by the increase of partnerships developed and companies involved in education and research activities (R&D network development) and their alignment with the growth of pilot applications developed, the number of research projects and international publications (Innovation and Knowledge codification). Finally, the growth of job placement after six months from degree and the growth of students applying for more advanced programs are positively linked with the percentage of international students and number of agreements signed with international partners, because of the expanding network of the school. This suggests a positive relationship between human capital and relational capital.

The title of this paper argues about the potential twofold role that IC has in organizations devoted to HE and research. First, IC development is a mission for such institutions as they are created and funded with the purpose to build the workforce of tomorrow, stimulate organizational and technological innovation, and enhance the network of value adding relationships which cross-fertilize industrial and academic expertise. Second, IC is a metric of performance and the intangible report may well represent for HE and research organizations what the balance sheet and the income statement are for business companies. Mission statements represent the cornerstone of most organizational strategies and the role that they can play in the measurement and reporting of an organization's IC has been also highlighted (Bart, 2001).

The identification and measurement of intangible assets can help evaluate the alignment between strategic orientation and performance. In the case of the eBMS, the analysis of IC indicators allowed to cross-check the alignment of results with the founding strategies of the school:

- interdisciplinary competencies and curricula;
- learning in action methods requiring practice on real projects and laboratory sessions rather than traditional lectures;
- scouting and retention of young talents based on quality and satisfaction;
- intense student coaching and tutoring;
- integration of education and research activities;
- relevant investment in ICT for learning and research; and
- synergic links with the industrial world through value adding public-private partnerships.

Reporting IC can allow to set measurable objectives aligned with the strategic mission of the organization as well as to assess "in process" the performance in terms of creating human, organizational and relational capital. In this perspective, a crucial internal reporting or *tableau de bord* function is served to support important decisions linked with resource identification and capital budgeting. At this proposal, the IC components must fulfil both organizational and client needs before competitive

advantage would be realised (Kong and Prior, 2008). A trigger of effectiveness of IC measurement stays in the development of a model which is rooted in the language of the organisation and communicated to all its parts (Nørreklit, 2000). For application to NPOs, the IC framework must be easy to use and disseminate through the whole organisation.

An external reporting function can be identified in the perspective of making public a set of organization-specific information. The dashboard of IC can be a communication tool (e.g. an annual report) to enhance relationships with perspective students, partners, and other stakeholders, and allow for public evaluation and comparison of the organization. Even though assessing university's output and inputs is not a new idea, implementing IC approaches in HE institutions means one step forward and IC report can be seen as a way for comprehensively and systematically visualizing inputs, outputs and processes. Practitioners and experts argue that those universities able to develop both culture and the capacity to identify, manage and report their IC will be advantageously placed. IC reporting may well become mandatory for universities in the near future and specific models are thus needed to be developed. This means for HE managers accepting the necessity of balancing the three types of IC components. Therefore, they need to look to aspects such as organizational culture to nurture an environment that supports all three components of IC (Kong and Thomson, 2006).

## 6. Limitations and future research

This article has presented a first discussion on the systematic identification and reporting of IC indicators in HE and research organizations, with the limitation deriving from the application to a single case. Next research will be dedicated to apply the framework to other university departments and research centres, with the purpose of cross-validation and comparison of findings. A second research path will be to integrate the IC measurement framework within a larger management dashboard which uses indicators as basis for strategic decisions and value creation. Third, it would be desirable to prove empirically that intellectual capital is mostly a matter of virtuous interaction and value is created only when human, social and structural capital allow to create a platform of knowledge creation and experimentation. A more in-depth study of the relationships among indicators can thus provide useful insights to shape strategic choices and performance of HE and research institutions. Finally, interviews with directors and managers of HE and research institutions will help to prioritize and assign a weight to IC indicators, and consolidate the identification of metrics associated to each strategic objective, supporting a stronger visualization of outputs for decision making processes.

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