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A methodology for measuring intellectual capital. A structural equations modelling approach

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1. Introduction

The past decade has been characterized by a process of growing dematerialization of the strategic resources possessed by firms. The relational capabilities of the firm, technology connected with the planning and management of firm processes, know-how, as well as the decisional autonomy and technical competencies of the employees all represent intangible assets that are determining in the value creation process of a firm (Longo & Mura, 2007; Roos et al., 2005).

The relevance of this topic is supported by the attention that financial markets attribute to the accounting of these assets. In January 2007 the International Accounting Standard Board issued a technical document in support of the 'Intangible Assets' project, which is examining the possibility of adding to the balance sheet the intangible assets that are generated internally to the firm and that are not subject to any negotiation on active markets (IASB, 2007). This 'opening up' in the accounting system has important effects on the economic evaluation of a company and on its ability to gain access to credit, in that it provides the market, the institutional investors and the financial analysts very precious information regarding the development of fundamental resources for the value creation process of a firm.

Furthermore, performance management literature has highlighted the need for specific tools for the measurement of internally-generated intangible assets, defined in managerial literature as intellectual capital (IC) (Tayles et al., 2002). These tools have been shown to greatly support management activity (Roos et al., 2005; Carlucci et al., 2004). As a matter of fact, the integration of information related to company's intellectual capital together with quantitative information relative to the firm's strategic policies, offers management a display of important indicators for the definition and the control of corporate objectives. Numerous intellectual capital frameworks have been proposed in the literature (e.g. Edvinsson & Malone, 1997; Roos et al, 2005; Sveiby, 1997), however, further research is still needed to investigate the challenges and opportunities of designing intellectual capital measurement tools that are grounded in relevant measurement theory (Bollen, 1989; M'Pherson & Pike, 2001).

The chapter we propose describes the development and implementation of an IC measurement system within an Italian company that is leader in the agricultural food product sector. Since IC creation and development is primarily founded on the actions and capabilities of the employees (Roslender et al., 2006; Roslender & Fincham, 2001), the individual employee has been used as the unit of analysis of this study. This element constitutes an innovative factor with respect to other studies which instead use MBA students (Bontis, 1998; Bontis et al., 2000), or adopt the managers' perceptions as proxy of the company they work for (Staples, 1999; Youndt & Snell, 2004). The measurement system has been developed based on two surveys that were conducted in 2005 and 2006 on all the employees of the 13 business units of the company. About 3,400 questionnaires were distributed and, with an average redemption of 35%, the sample consists of 1,117 observations. Structural equations modelling (SEM) methodology was used to validate the IC measurement model and to identify and test the effect that two specific company's human resource practices have on IC.

The chapter is structured as follows: next section describes the concept of intellectual capital as emerges from academic and practitioners' literature, followed by the theoretical model we propose in this study. The third section illustrates the methodology adopted and the data-gathering process and the following section presents the analyses of the data and the results obtained. The managerial implications of our study, together with the limitations and the future developments of the tool are described in the closing section.

2. Intellectual capital: definition and dimensions

Numerous studies have extensively reviewed and discussed the IC literature (Allee, 2000; Andriessen, 2004; Hunter et al., 2005; Roos et al., 2005; Serenko & Bontis, 2004). Therefore, the focus of this section will efficiently turn to defining the constructs we intend to measure. The following definitions summarize some of the highlights of this field.

IC scholars have generally identified three main dimensions of IC that include human capital, structural capital, and relational capital. Human capital represents the individual knowledge stock of an organization as represented by its employees (Bontis, 2002). Employees generate IC through their competence, in terms of skills and knowledge, and their attitude, and in terms of the behavioural components of employees' work (Roos et al., 2005). Structural capital consists of mechanisms and organizational procedures which support the employees in completing their tasks, and includes all non-human storehouses of knowledge in organizations like databases, process manuals, routines, strategies, and anything whose value to the company is higher than its material value (Bontis, 2000). Relational capital is associated with the network of relations that the organization and its members are able to establish both inside and outside the working environment. The resources that emerge, that are transferred and are made connatural with these multifarious relations constitute the relational capital of the organization (Adler & Kwon, 2002).

In developing a theoretical foundation for the three dimensions of IC, we have draw primarily from human capital theory (e.g., Becker, 1964; Flamholtz & Lacey, 1981; Schultz, 1961), knowledge-based theory (eg., Grant, 1996; Polanyi, 1962; Spender, 1996), and social capital theory (e.g., Jacobs, 1965; Loury, 1977; Baker, 1990). We have chosen these three theories for their explicit theoretical relevance concerning IC. As a matter of fact, each

perspective offers a different lens for understanding how firms can measure and manage their IC, giving insights of each different dimension of the IC construct.

Below, we briefly discuss the contribution that each of the three theories gives to its respective IC dimension. Specifically, we adopt the human capital theory to discuss the human dimension of the IC construct, the knowledge-based theory to examine the structural dimension, and the social capital theory to analyze the relational dimension.

2.1 Human capital

Human capital theory focuses on the concept that people possess skills, experience, and knowledge that have economic value for firms. For the purpose of this study we propose two arguments, previously discussed by Snell and Dean (1992), that expands on this proposition.

The *productivity* argument emphasizes that employee skills and knowledge represent capital because they enhance productivity, adding value to a firm. Even if part of this value is tangible, in that it is created through the transformation of firm's product, much of it is intangible, and consist in problem solving skill, in the ability to identify the key aspects of the work from those of less importance, and in the capability to be innovative and creative in performing the job (Hitt et al., 2001; Nahapiet & Goshal, 1998). A firm can choose to invest in human capital both internally developing employee skills or acquiring them on the market (Hatch & Dyer, 2004; Lepak & Snell, 1999). Internalizing employment is more desirable when firm can do so without investing in employee development, on the contrary, if employee productivity is not expected to exceed investment costs, a firm will acquire these skills on the labour market. Therefore, the decision to internalize or outsource human capital is based on a comparison of the expected returns of employee productivity (Becker, 1964).

The *transferability* argument suggests that human capital has a price on the labour market because it is valuable from other firms, and, more important, it is transferable. This argument is based on the fact that firms don't own human capital, because it is embodied in employees, who are free to move from one firm to another (Becker, 1964; Hatch & Dyer, 2004). Low employee turnover therefore, represents an important element in the firm's value creating process in that secures the firm from losing key skills, knowledge, and expertise (Arthur, 1994; Hudson, 1993). Notwithstanding, even if employees stay with a firm, their contribution depends on their willingness to perform. For this reason employee satisfaction, motivation, and commitment are decisive components in the development of human capital (Arthur, 1994; Lepak & Snell, 1999).

2.2 Structural capital

In their analysis of the intellectual capital concept, Nahapiet & Goshal (1998) clearly distinguish between two types of knowledge that form the base of IC: the people knowledge and the social knowledge. While the former represents a part of the human capital dimension, and was discussed in the previous section, we delve into the latter in defining the structural dimension of IC.

Knowledge management scholars (Polanyi, 1962; Weick & Roberts, 1993; Spender, 1996) define social knowledge as the knowledge that is shared and embedded in the organization, and suggest it comprises two elements: social explicit knowledge, and social tacit

knowledge. Social explicit knowledge, also called “objectified knowledge” (Spender, 1996), corresponds to the shared corpus of knowledge of the organization, and it depends on effective use of the institutional mechanisms, such as databases, patents, registered designs, process manuals, and information systems, that contribute to distribute knowledge and intellect (Youndt & Snell, 2004). As an evidence of the relevance of this element, Quinn, Anderson and Finkelstein (1996) show that an increasing number of organizations make major investments in the development of procedures and systems to pool and to leverage such objectified knowledge.

Social tacit knowledge, also called “collective knowledge” (Spender, 1996), corresponds to the knowledge that is embedded in the form of social practice and resides in the tacit experience of the collective (Brown & Duguid, 1991). Nelson and Winter (1982) define this form of knowledge as the organization’s genetic material that may reside in bureaucratic and formal rules, or in organization’s norms and culture, and call it “routines”. This collective knowledge is produced internally (Penrose, 1959) and may represent the outcome of firm’s evolving methods and policies that: foster and support employees in the development of new ideas and innovative approaches that give rise to extrarational learning processes (Nelson, Winter, 1982); give emphasis to quality procedures; or contribute to align employees and organizational goals (Schiemann, 2006).

2.3 Relational capital

Relational, or social¹, capital is defined as the sum of actual and potential resources embedded within, available through, and derived from the networking relationships developed by an individual or an organization (Lin, 2001; Nahapiet & Ghoshal, 1998). Therefore, social capital encompasses both the network of relations and the assets that may be mobilized through that network (Bourdieu, 1986; Burt, 1992). The networking relationships provide value for actors (e.g. individuals or organizations) by allowing them to tap into the resources embedded in such relationships for their benefit (Acquaah, 2007). Researchers at organizational level have suggested that the greater the uncertainty in the firm’s business environment, the more likely the firm will rely on networking relationships when entering into economic exchange relations (Pfeffer & Salancik, 1978; Peng & Heath, 1996).

Dyer & Nobeoka (2000) propose that networking relationships between the firm and its external stakeholders, such as customers, suppliers, and business partners, stimulate the creation, acquisition, and exploitation of knowledge and IC. In particular, networking with customers may develop both customer and brand loyalties (Park & Luo, 2001), those with suppliers may give access to quality raw materials, better service, and fast and reliable deliveries (Peng & Luo, 2000), while those with business partners reduce the possibility of opportunistic behaviour (Pisano, 1989), increase inter-firm trust (Kale et al., 2000), and enhance the evolution of inter-partner relationships in terms of freer and greater exchange of information, skills and know-how, and of development of new competences (Kale et al., 2000; Walker et al., 1997).

Also intra-firm relations, like teamwork and department integration, represent a source of knowledge development and acquisition and, consequently, contribute to the development of IC (Nahapiet & Ghoshal, 1998). Collaborations and teamwork have been shown to be

¹ Accordingly to Kale, Singh & Perlmutter (2000), in this article we use relational capital and social capital as synonyms.

important elements for the development of collective and shared knowledge in biotechnology firms (Zucker et al., 1996), and, in general, in knowledge-based firms (McGill & Slocum, 1994). As a matter of fact, cooperation among employees, rather than competition, contributes on open disclosure of information, and on building loyalty to the firm (Starbuck, 1992).

2.4 The proposed model

In this chapter we first aim to develop an IC measurement model that is coherent with the theoretical framework proposed. Secondly, we explore the effect that two specific human resource (HR) policies pursued by the company we analyzed have on the IC dimensions.

The HR policies were identified by means of numerous focus groups conducted with a panel of company managers. By means of an in-depth analysis of the firm's vision and mission we selected two strategic policies of the company that could have an effect on IC.

The first policy identified, which we define as *stakeholder management policy*, refers to the numerous corporate social responsibility and stakeholder management activities and actions that have been carried out by the firm in recent years with regard to its human resources. The second policy identified, which we define as *perception of customers/consumers policy*, represents the perception, held by the employees, of the role played by the company within its own economic environment.

In relation to the internal strategic policy we propose the following hypothesis:

H_{p1}: Stakeholder management policy positively affects IC.

Which can be divided into the following:

H_{1a}: Stakeholder management policy positively affects human capital;

H_{1b}: Stakeholder management policy positively affects structural capital;

H_{1c}: Stakeholder management policy positively affects relational capital.

In relation to the *perception of customers/consumers policy* we propose the following:

H₂: Perception of customers/consumers policy positively affects IC.

Which can be divided into the following:

H_{2a}: Perception of customers/consumers policy positively affects human capital;

H_{2b}: perception of customers/consumers policy positively affects structural capital;

H_{2c}: perception of customers/consumers policy positively affects relational capital.

Figure 1 shows the theoretical model proposed.

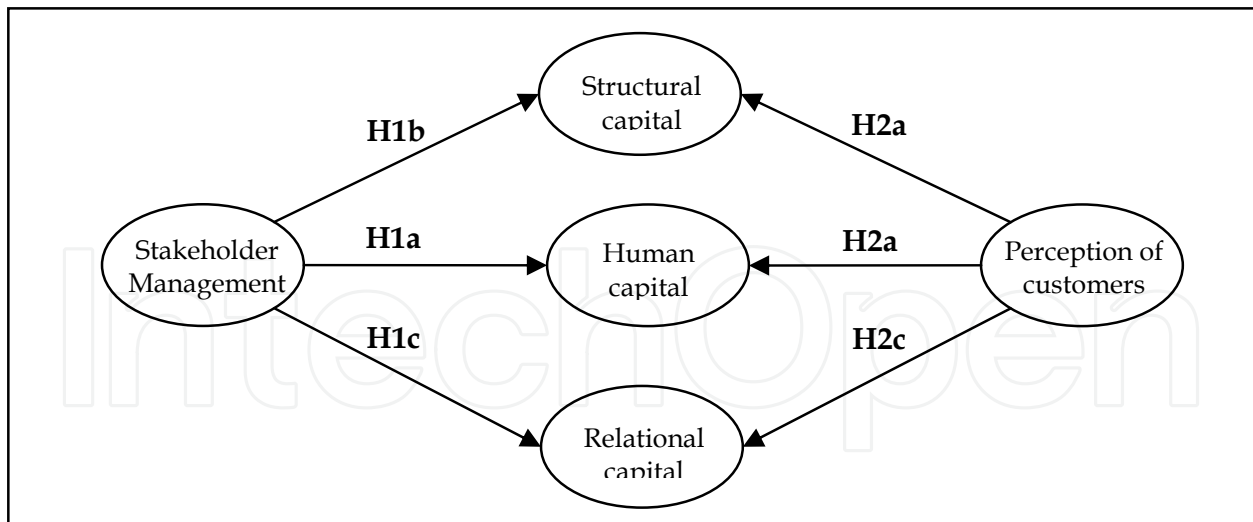


Fig. 1. The model proposed

3. Method

3.1 Measures

In order to measure intellectual capital at the individual level of analysis we employed measurement scales that were already developed in the literature. Moreover, we specifically developed two scales that measure the human resource practices adopted by the company and that were suggested to affect intellectual capital dimensions. All the scales have been fully discussed together with company management. Thirteen scales have thereby been identified and the questionnaire that has been prepared comprises 58 items on a 5 point Likert scale. Those interviewed were asked to express how they felt about the stated items, which varied from “strongly disagree” (level 1 on the scale) to “strongly agree (level 5 on the scale). The following scales were used in order to measure intellectual capital (Table 1):

Intellectual capital dimensions	Scales	Authors
Human capital	Low turnover propensity	Chalykoff and Kochan (1989)
	Job satisfaction	Zeitz et al. (1997)
	Intrinsic work reflection	Holman et al. (2001)
	Practical application	Holman et al. (2001)
Structural capital	Trust	Zeitz et al. (1997)
	Sense of belonging	Kidwell and Robie (2003)
	Responsibility	George (1992)
Relational capital	Ability to work in a group	Kidwell and Robie (2003)
	Networking and communication	Zeitz et al. (1997)
HR practices	Customers	Developed by authors
	Stakeholder management	Developed by authors

Table 1. Measures

The following control variables were used in this study: professional category, seniority within the company, gender, area of work, business unit.

3.2 Sample

Two surveys were conducted in 2005 and in 2006 taking the employees of the company as the unit of analysis. The questionnaire was sent to employees by putting it in with the employees' pay slips. Along with board managers was considered non opportune to count in 2005 survey three business units acquired few months before the administration of the survey; on the contrary these plants were included in 2006 survey. In 2005 a total of 1.310 questionnaires were sent out and 460 were returned which meant that a percentage of 35% replied. In 2006, 1928 questionnaires were sent out and 657 were returned (34 percent). The data collected are significant in that they are uniformly split up into production plants and job levels in relation to the company's population (Table 2 and Table 3).

Business Unit (BU)	BU Population (2005)	Questionnaires Returned (2005)	Redemption (%) (2005)	BU Population (2006)	Questionnaires Returned (2006)	Redemption (%) (2006)
No. 1	427	176	41.2	479	145	30.3
No. 2	144	38	26.4	117	26	22.2
No. 3	47	14	29.8	48	21	43.8
No. 4	145	29	20.0	165	30	18.2
No. 5	61	20	32.8	60	8	13.3
No. 6	40	17	42.5	41	25	61.0
No. 7	208	57	27.4	194	50	25.8
No. 8	85	37	43.5	91	44	48.4
No. 9	28	6	21.4	22	3	13.6
No. 10	125	66	52.8	108	69	63.9
No. 11	-	-	-	362	100	27.6
No. 12	-	-	-	172	84	48.8
No. 13	-	-	-	69	52	75.4
Total	1310	460	35.1	1928	657	34.1

Table 2. Survey redemption for each business unit

Job Level	Population (2005)	Questionnaires Returned (2005)	Redemption (%) (2005)	Population (2006)	Questionnaires Returned (2006)	Redemption (%) (2006)
Executives	40	10	25.0	47	15	31.9
Middle- Managers	75	34	45.3	94	30	31.9
Office workers	458	198	43.2	718	214	29.8
Manual workers	737	201	27.3	1017	359	35.3
Total	1310	443	33.8	1928	617	32.0

Table 3. Survey redemption for each job level

4. Analyses and results

4.1 Validity and reliability of the scales

The development of the measurement system comprised four consecutive stages of analysis. Using the data provided by the 2006 survey, an exploratory factor analysis was carried out on the items relative to each established category of resources, in order to define the measurement of all the constructs. We then adopted a confirmatory factor analysis, using the same sample, to evaluate how the data supplied by the employees related to the second-order measurement model composed of 11 first-order latent factors, representing the measurement scales as proposed in Table 1, and 4 second-order factors that consists of human, structural and relational capital constructs. The measurement properties of convergent validity, discriminant validity and internal consistency were all supported (analyses are available under request).

In the final step of the analyses, the adequacy of the model is formally cross-validated by means of a confirmatory factor analysis, using the 2005 survey data. The confirmatory data analysis was performed using LISREL, structural equation modelling program (Jöreskog & Sörbom, 2004). The exploratory analysis reduced the number of items adopted from 58 to 50. Tables 4 shows means, standard deviations and reliabilities for first-order latent variables both for the 2005 and the 2006 sample.

Variables	2005 sample			2006 sample		
	Means	s.d.	Cronbach's alpha	Means	s.d.	Cronbach's alpha
Sense of Belonging	3.70	1.04	0.86	3.76	1.09	0.88
Trust	3.09	1.31	0.81	3.25	1.31	0.80
Responsibility	4.03	0.99	0.62	4.01	0.90	0.79
Low turnover propensity	2.93	0.94	0.80	3.90	0.98	0.78
Job satisfaction	2.26	1.09	0.87	2.39	1.22	0.90
Intrinsic work reflection	3.94	0.80	0.76	3.91	0.88	0.79
Practical application	3.38	0.90	0.48	3.33	0.99	0.60
Ability to work in a group	3.26	1.00	0.93	3.40	1.01	0.89
Networking / Communication	2.59	0.94	0.89	2.57	0.99	0.88
Stakeholder management	2.66	0.93	0.90	2.81	0.97	0.91
Customers	3.30	0.94	0.86	3.62	0.92	0.84

Table 4. Means, standard deviations, and reliabilities

4.2 The effect of human resource policies on IC

In order to understand the effect that the human resource practices and the control variables have on intellectual capital dimensions, a hierarchical regression analysis was conducted in two consecutive steps (George, 1992). This technique allowed us to calculate, separately, the influence that the two groups of independent variables have on intellectual capital. Tables 5 and 6 synthetically show the results of the regression analysis. The values given in the column ΔR^2 indicate the variance explained by the groups of independent variables.

	Step 1 Context factors (ΔR^2)	Step 2 HR practices (ΔR^2)
Sense of belonging	13%	24%
Trust	7%	48%
Responsibility	12%	14%
Low turnover propensity	7%	19%
Job satisfaction	7%	51%
Intrinsic work reflection	10%	16%
Practical application	6%	5%
Ability to work in a group	7%	36%
Network and Communication	11%	63%

Table 5. Results of regression analysis using 2005 data

	Step 1 Context factors (ΔR^2)	Step 2 HR practices (ΔR^2)
Sense of belonging	8%	30%
Trust	6%	46%
Responsibility	5%	19%
Low turnover propensity	6%	20%
Job satisfaction	6%	54%
Intrinsic work reflection	4%	16%
Practical application	3%	10%
Ability to work in a group	5%	29%
Network and Communication	5%	64%

Table 6. Results of regression analysis using 2006 data

From the results it emerges that the human resource practices identified have a significant effect, even though its intensity varies, on most of the intellectual capital resources, and in particular on *Trust*, *Job Satisfaction*, *Networking and Communication*, and *Ability to work in a group*. Moreover, no significant differences have been found between the 2005 and the 2006 values and this further strengthens the results obtained. Figure 1 illustrates the placing of the intellectual capital resources and the impact of the company's human resource practices on the same in terms of variance explained.

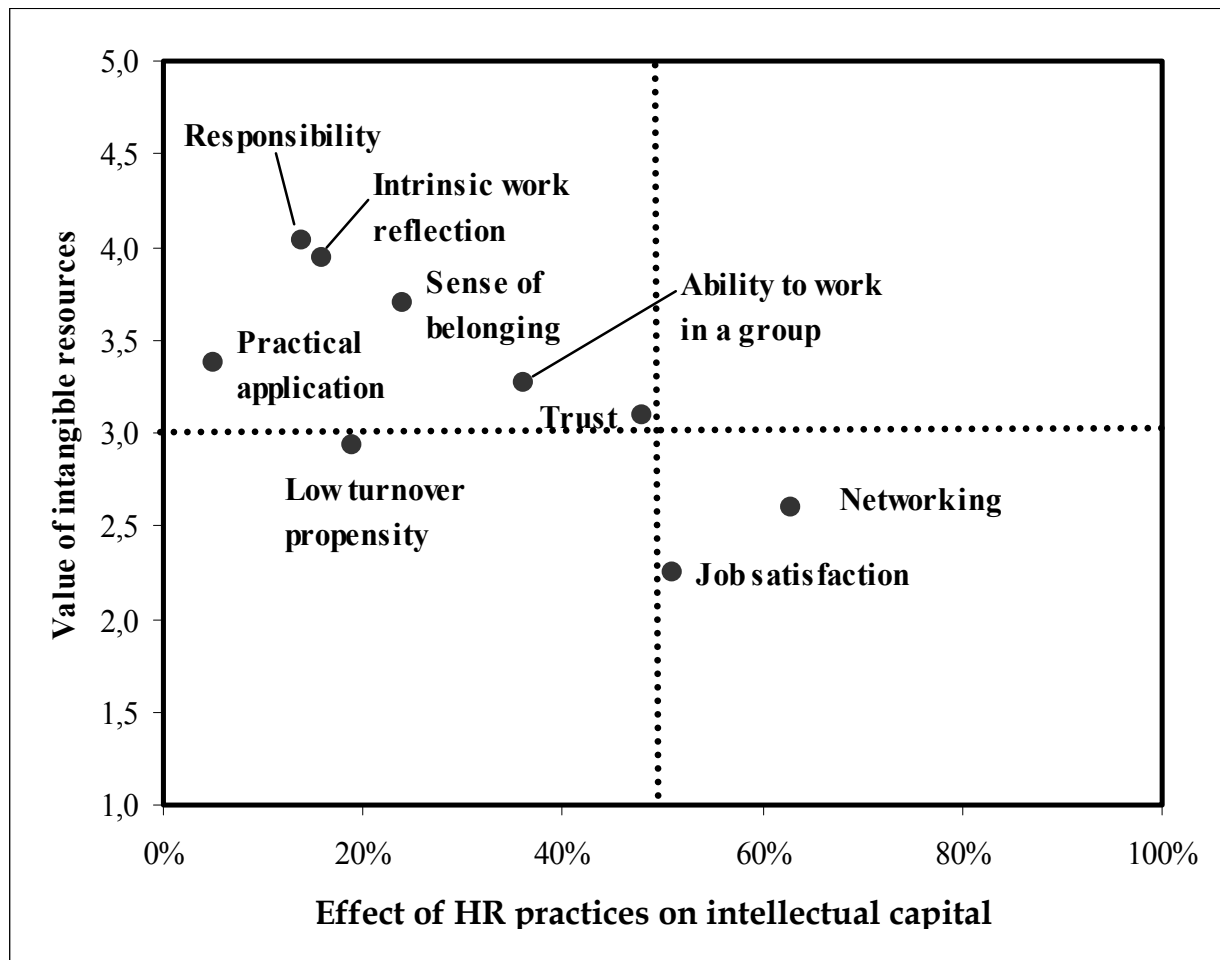


Fig. 2. Evaluation grid of intellectual capital resources – 2005 survey

The subdivision into quadrants shown in Figure 2 has been carried out exclusively to indicate the mean value of the scales and does not intend to be a reference to any objectives the company might have regarding the results of its human resource practices. The majority of the resources are positioned in the top left quadrant and they are therefore characterized by high values and low impact from human resource practices. *Networking and Communication* together with *Job Satisfaction* are to be found, on the other hand, in the bottom right quadrant which shows resources with low values and high impact from human resource practices.

The subdivision into quadrants constitutes the information that will guide all decision making within the company in relation to the human resource practices it intends to pursue. The horizontal line enables the company to establish the intervention threshold below which it can consider feedback from its human resource practices unsatisfactory. The vertical line informs the company on the impact threshold of its practices on its employees below which any input from the company does not produce significant results in terms of intellectual capital resources.

In Figure 3 a different subdivision into quadrants is adopted in order to clarify how the graph has to be used. According to this hypothesis for defining the threshold, the company might consider it interesting to focus its human resource practices on the resources shown in the bottom right quadrant, considering them to be highly influenced by the policies and at present unsatisfactory in terms of value. Its target would therefore be to move the resources

in question towards the top right quadrant. On the other hand, the company might judge it inopportune to pay attention to the resources that fall within the bottom left quadrant, due to the fact that they are only slightly influenced by human resource practices and that they would not deliver any significant increase in value.

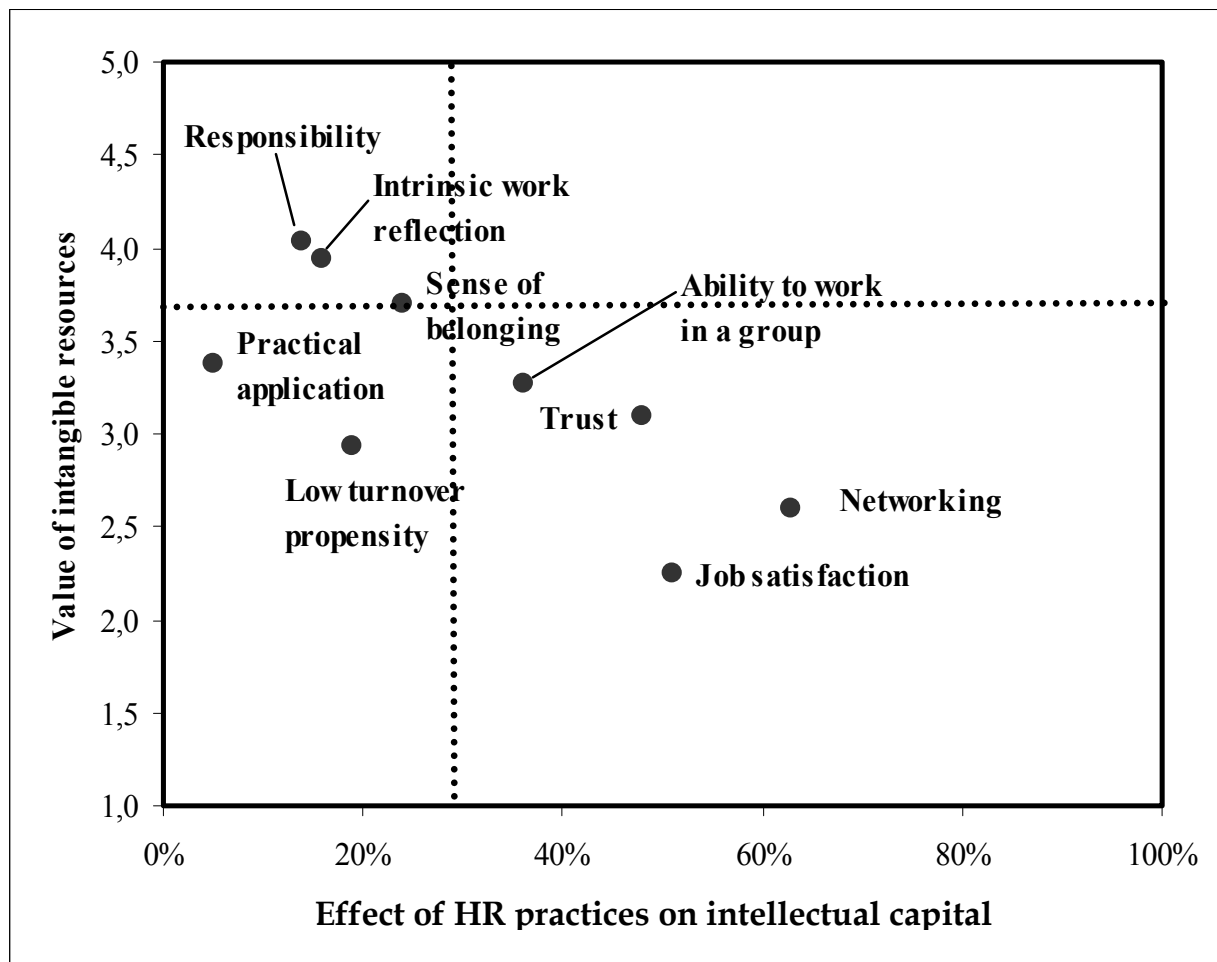


Fig. 3. Evaluation grid of intellectual capital resources – 2005 survey

In order to have a broad understanding of the effect the two human resource policies analyzed have on IC dimensions, a causal model has been developed using a structural equation modelling methodology (Figure 3). To determine the fit of the model we used the following indices: the normed fit index (NFI), the non-normed fit index (NNFI), the comparative fit index (CFI) and the chi-square statistics (Bollen, 1989) (Table 7).

Index	Sample 2005	Sample 2006
NFI	0.95	0.97
NNFI	0.97	0.97
CFI	0.97	0.98
Chi-square (d.f.)	2475.4 (718)	2689.91 (718)

Table 7. Goodness of fit indices

The results suggest a significant coherence between the model proposed and the data collected. In fact, fit indices higher than 0.9 are usually considered indicative of a good fit. The fact that the fit indices calculated using data collected in two different surveys are similar means that there is a reduced risk of there having been any non-random bias in the delivery, filling in and collection of the questionnaires over the two years. It therefore gives increased validity and strength to the results obtained.

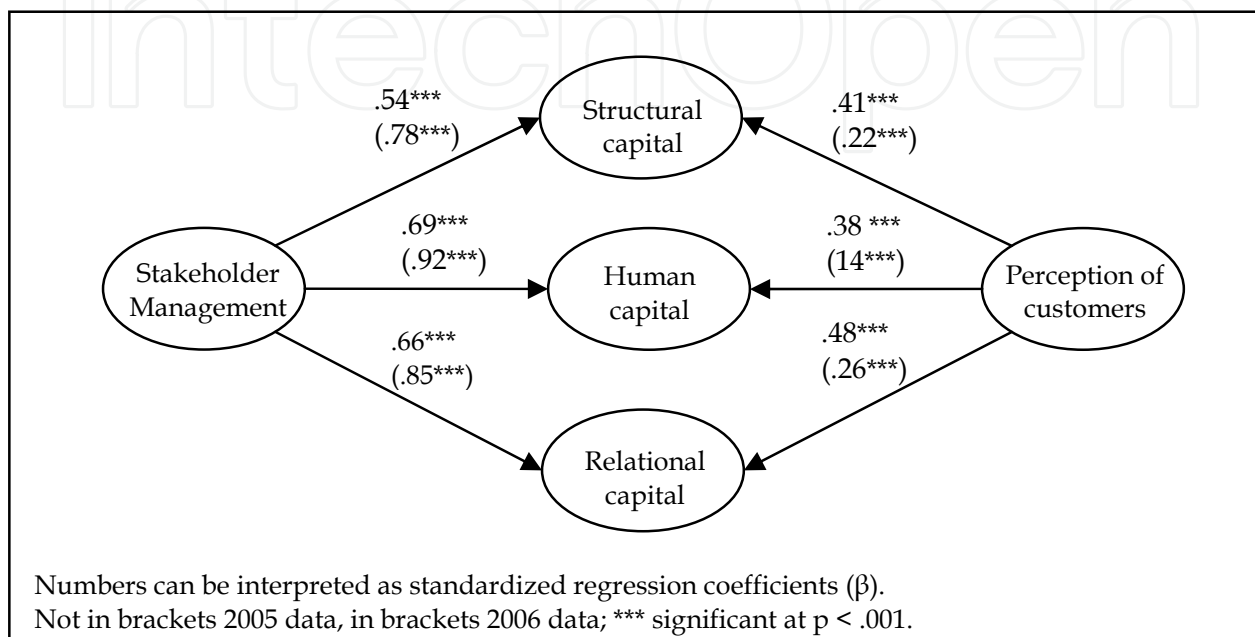


Fig. 4. The effect of human resource practices on intellectual capital dimensions

The results suggest that the perception employees have of the company's stakeholder management practices has a much greater impact than the perception of customers on all three intellectual capital dimensions and, in particular, with respect to human capital and to relational capital (Figure 4). These results underline the importance that communication has within the company. The adoption and implementation of stakeholder management practices have limited worth if they are not adequately communicated to the company's employees. The possibility of capitalizing on the value created by investments human resource practices does in fact derive from the ability of company's managers to effectively communicate to employees the actions undertaken and the results attained.

5. Managerial implications

The intellectual capital measurement system we propose can be adopted by managers as a control tool for the company's intangible assets and may also support investments on company's human resource practices. In this section we suggest some implementations of the tool within the company analyzed. Specifically, we propose a cross-section analysis of company's intellectual capital, together with a longitudinal analysis using split-samples of diverse professional categories. ANOVA analyses, t-tests and non-parametric tests have been used in order to statistically validate the results.

Figure 5 shows the intellectual capital of the company in each year of analysis. In both the surveys we found a higher level of development for the human capital and the structural capital dimensions. The company appears to be capable of increasing the motivation of its employees, and these show a desire to continue to work within the organization, and of favouring their professional advancement in terms of skill development (*Low turnover propensity* and *Intrinsic work reflection* give a very high value of approximately 4 over 5). The critical factor seems to be linked to the relational capital dimension: *Communication* is little developed and this could also help to explain the low values of the resources *Trust* and *Job Satisfaction* which are closely related to *Communication* (correlation coefficients are 0.67 and 0.77 respectively and are statistically significant at $p < 0.01$).

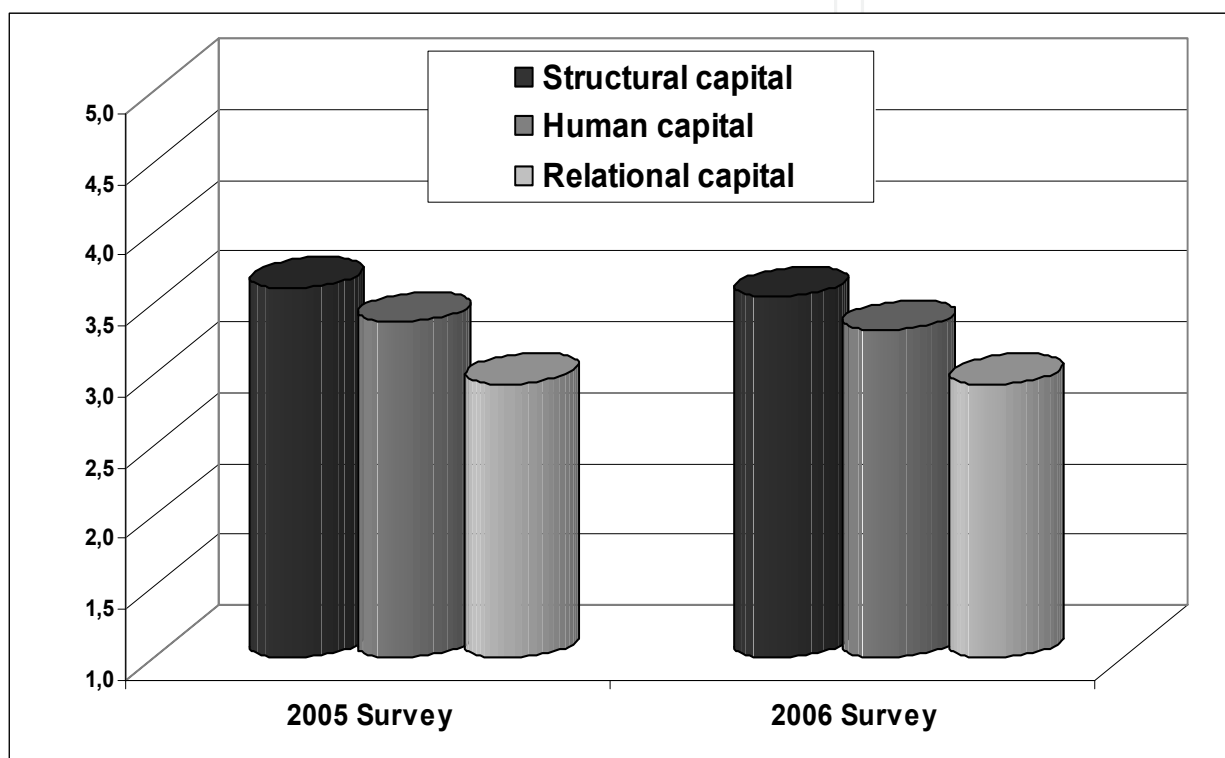


Fig. 5. Cross section analysis of the intellectual capital of the company

Comparison of the results obtained in the two consecutive years (longitudinal analysis) show decrements, although not significant in statistical terms, in the categories structural capital (-1.3%) and human capital (-1.2%). On examining the specific intellectual capital resources the t-tests show significant decrements in *Low turnover propensity* (-4%) and *Sense of Belonging* (-3%); strong decrements are also to be found in *Responsibility* (-2%) and *Communication* (-2%) (Figure 6).

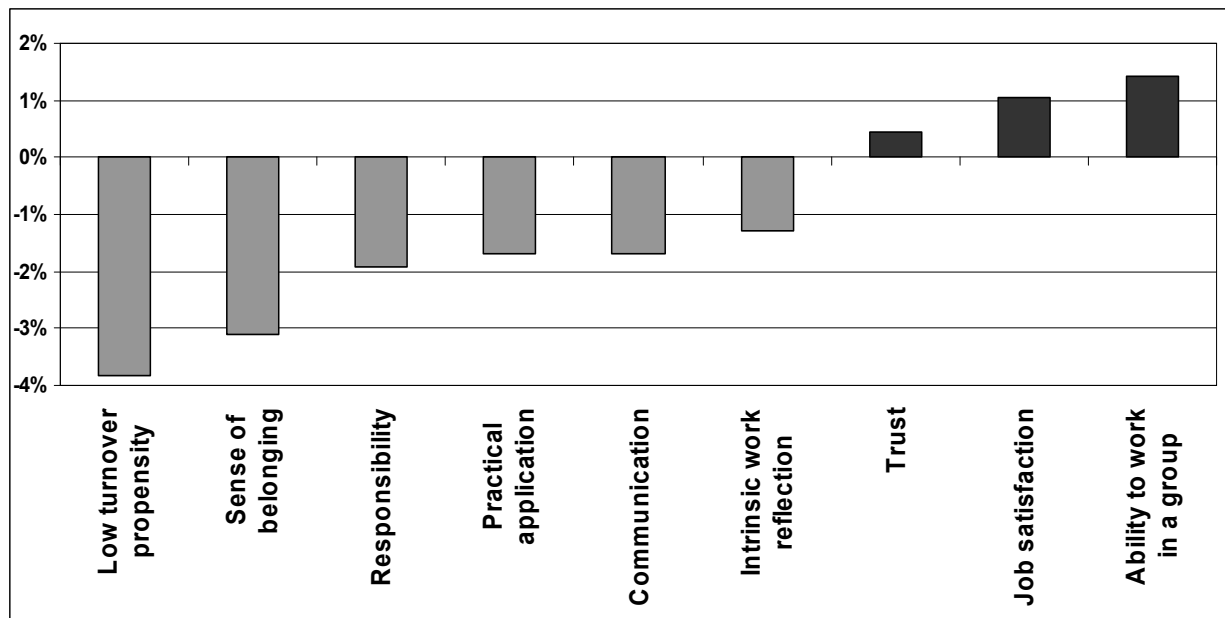


Fig. 6. Longitudinal analysis of the intellectual capital resources of the company

Besides being used as a company-wide measurement tool, the model can be adopted in order to monitor specific employees' categories. Statistical tests show a significant difference between managers and non-managers in the development of all the IC resources with the exception of *Practical application*. For each year of the survey the Managers have developed higher IC resources, particularly with regard to the resources *Trust*, *Job satisfaction*, *Responsibility* and *Communication*. However, the longitudinal analysis shows much more significant decrements in the IC resources within the Managerial category and, in particular, in *Communication*, *Job Satisfaction*, *Sense of belonging* and *Ability to work in a group* (Figure 7).

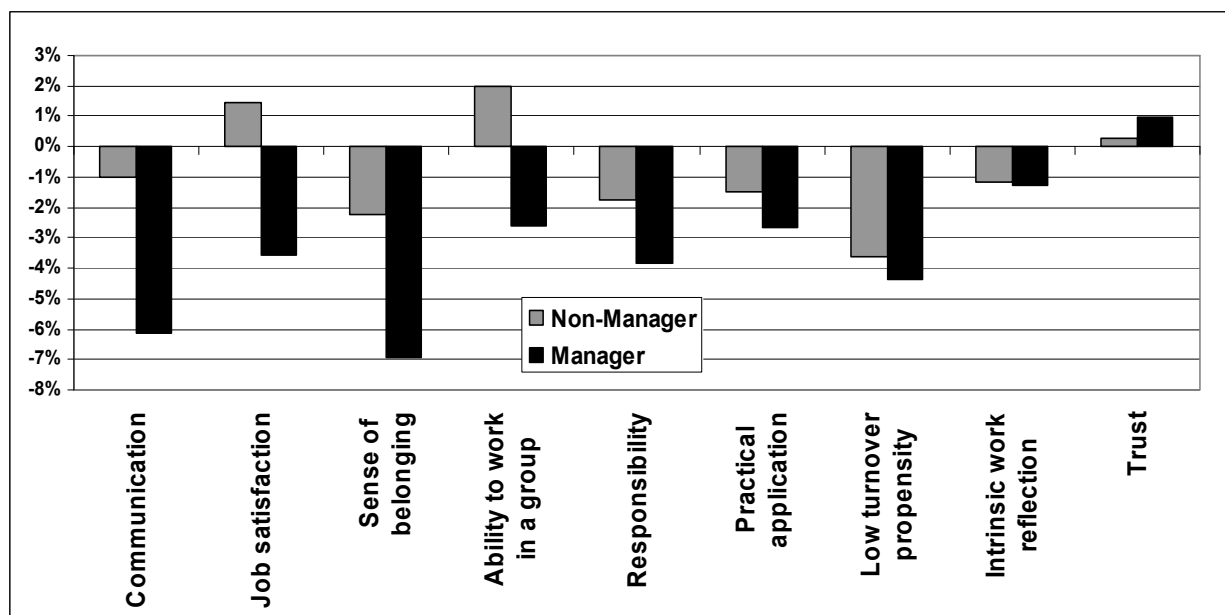


Fig. 7. Professional category - longitudinal analysis

The signal coming from the managerial category reveals an evident state of unease and widespread professional discontent. The split-samples analysis between middle-managers and executives (Figure 8) shows that middle-managers manifest relevant decrements in relational capital (-5%) and structural capital (-4%) which underlines the non-alignment of executives and middle-managers with regard to the development of intellectual capital.

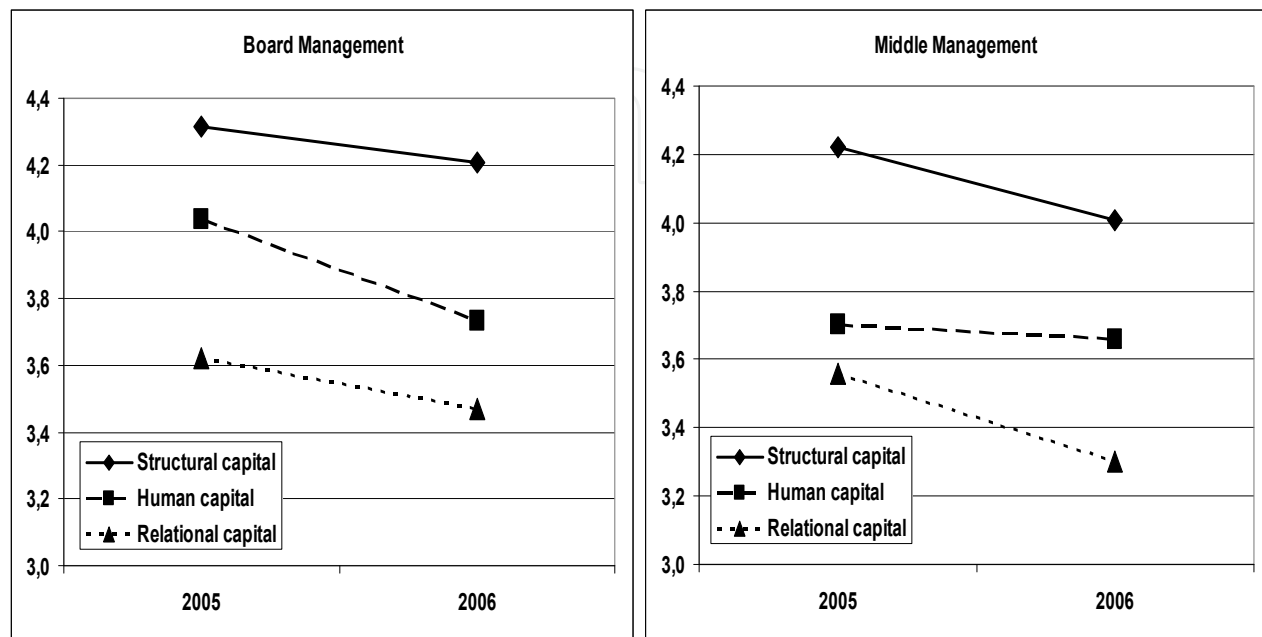


Fig. 8. Managers - longitudinal analysis

Other analyses can be proposed in relation to the plant, the seniority of the employee and other control variables, but go beyond the purpose of this chapter.

6. Conclusions

The measurement system proposed in this chapter represents a useful control tool for any organization that considers IC as a key driver for its value creation process. Measuring and monitoring over time the IC possessed by the company and assessing the effect that specific HR policies have on IC provide an important support for managers in setting targets and planning company's objectives in terms of its human resources.

By means of a quantitative case study we highlighted some implementations of the proposed model within an Italian company with a network of numerous production plants and distribution centres. The analyses conducted have underlined the existence of varied orientations in the organization's development of the IC and the presence of some critical situations that merit further examination.

The questionnaire developed in this study can be used for any kind of company that intends to measure IC.

Further research should attempt to overcome some of the limits of this study, like the exclusive adoption of perceptual indicators and the focus on a single organization, that certainly inhibits the generalizability of the findings.

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