

Intellectual Capital and Value Creation: Evidence from the Portuguese Banking Industry

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Abstract: Intellectual capital has been described as intangible assets that may be used as a source of sustainable competitive advantage. However, intellectual capital components have to interact, to create value. Previous studies demonstrate that intellectual capital is positively and significantly associated with organizational performance. Our aim is to consolidate these findings, examining the inter-relationships and the interaction effects among intellectual capital components and organizational performance, in the Portuguese banking context.

Keywords: Intellectual capital, human capital, relational capital, structural capital, value creation.

1. Introduction

Wealth and growth in today's economy are primarily driven by intangible (intellectual) assets. The rise of new economy has highlighted the fact that the value created depends far less on their physical assets than on their intangible ones. These assets, often described as intellectual capital, are being recognised as the foundation of individual, organizational and national competitiveness in the twenty-first century (Wigg, 1997; Bounfour and Edvinsson, 2005). As noticed by Pike *et al.* (2002:659), "as the business society is developed, the key step in value creation has ascended an intellectual staircase".

Intellectual capital has been identified as a set of intangibles (resources, capabilities and competences) that drives the organizational performance and value creation (Roos and Roos, 1997; Bontis, 1998; Bontis *et al.*, 2000). This suggests causal relationships between intellectual capital and organizational value creation (Marr and Roos, 2005). However, intangible assets seldom affect performance directly. Instead, they work indirectly through relationships of cause and effect (Kaplan and Norton, 2004).

From the management point of view it is essential to recognise that none of the elements of that set of intangibles is *per se* sufficient for a successful performance. These key elements need to be combined to generate value. In this context, intellectual capital is a phenomenon of interactions, transformations and complementarities, meaning that a resource's productivity may improve through the investments in other resources.

Despite the tremendous theoretical improvement during the last years, intellectual capital phenomenon requires theory and research methodology that enhances the integration of theory construction and theory testing. Research in intellec-

tual capital is actually, at critical cross-roads with increased emphasis on developing theoretical concepts and testing relationships guided by such concepts. It is vital to consolidate some findings, namely arrive at a set of operational measures that meet minimal criteria of measurement.

Some authors (Churchill, 1979; Venkatraman, 1989; Straub, 1989) claim that the linkage between theoretical definitions and their corresponding measures has been generally weak, despite "the process of construct development and measurement is at the core of theory construction" (Venkatraman, 1989:944). Linking theory construction (exploratory) to theory testing (confirmatory) is a *sine qua non* condition for the management theory development (Hughes *et al.*, 1986) and comparing findings in different settings is an important tool that serves that purpose.

Previous studies (Bontis, 1998; Bontis *et al.*, 2000) demonstrate that intellectual capital is positively and significantly associated with organizational performance.

The purpose of our study is: (i) to validate a set of operational measures, which compared with other studies, may result in a measurement instrument for financial sector; (ii) to examine interrelationships among intellectual capital components and organizational performance and; (iii) to study interaction effects among intellectual capital components and organizational performance.

2. Reviewing the literature

2.1 Intellectual capital

There is no widely accepted definition of intellectual capital. However, the literature revision point out that intellectual capital is essentially related to "knowledge that can be converted into value" (Ed-

vinsson and Sullivan, 1996:361). Moreover, at least three elements are common in almost all definitions: (i) intangibility; (ii) knowledge that creates value and; (iii) effect of collective practice. This means that are excluded all irrelevant intangibles that have no function over the firm's future potential and it is assumed that competitive advantage depends on how efficient the firm is in building, sharing, leveraging and using its knowledge.

The most important challenge for researchers is to prove that intellectual capital creates value (MERITUM, 2001). Our focus is on intellectual capital value drivers and the way its different components interact to generate value. Which component is most valuable may have different answers depending on internal and external organizational variables.

The literature presents a great number of classification schemes for intellectual capital. However, a convergent taxonomy emerged, categorising intellectual capital onto three components: (i) human capital; (ii) structural capital and; (iii) relational capital.

2.1.1 Human capital

Human capital is the primary component of intellectual capital (Edvinsson and Malone, 1997; Stewart, 1997; Bontis, 1998; Choo and Bontis, 2002), because human interaction is the critical source of intangible value in the intellectual age (O'Donnell *et al.*, 2003).

A macroeconomic perspective recognizes human capital as the driver of national economic activity, competitiveness and prosperity (OECD, 1996). On individual level, human capital is defined as a combination of four elements: (i) genetic inheritances; (ii) education; (iii) experience and; (iv) attitudes about life and business (Hudson, 1993). The organizational perspective refers to human capital as "the source of innovation and strategic renewal" (Bontis, 1998). Gupta and Roos (2001) added that "core intellectual capital", comprising competence, intellectual agility and attitude, are the potential of synergies for the value creation.

Knowledge generation and transfer is an essential source of firm's sustainable competitive advantage, but it entirely depends on the individuals' willingness. As such, if the human capital can suggest the economic potential of individuals within a firm, it is also true that the outcomes are intimately connected to motivation.

Although not a goal itself, motivation should serve to support the organization's goal. Thus, managing motivation, especially balancing intrinsic and

extrinsic motivation is an important and hard-to-imitate competitive advantage (Osterloh and Frey, 2000).

2.1.2 Structural capital

Structural capital represents the organization's capabilities to meet its internal and external challenges. It includes infrastructures, information systems, routines, procedures and organizational culture. Structural capital is the skeleton and the glue of an organization because it provides the tools (management philosophy, processes, culture) for retaining, package and move knowledge.

Banking industry scenario has recently changed. Globalization, deregulation and internationalization create new business challenges. In the past, banks sought to improve their balance sheet and asset growth, increasing profitability. But, since the Basle Accord, the emphasis is on assets productivity, capital efficiency and revenue growth. Information and communication technology has been largely used in a variety of ways to reduce costs, increase efficiency and accelerate innovation, drivers of today's banking performance.

2.1.3 Relational capital

Relational capital is the knowledge embedded in the relationships with any stakeholder that influences the organization's life. The literature defends that relationships with stakeholders are the necessary condition for building, maintaining and renewing resources, structures and processes over time, because through external relationships firms can access critical and complementary resources. Recently, some authors (Prahalad and Ramaswamy, 2000) suggest that customers become a new source of competence for the organization because they renew the overall competence of the organization and rejuvenate the knowledge base preventing it from the obsolescence in a turbulent environment (Gibbert *et al.*, 2001).

Relational capital can be measured as a function of longevity (Bontis, 2002), while marketing relationship literature argues that long lasting relationships are a source of competitive advantage (Håkansson and Snehota, 1995)

There is evidence of how employees' satisfaction, motivation and commitment have positive influence in customer satisfaction, loyalty and retention, leading to higher firm's productivity (Kaplan and Norton, 1996, 2004).

2.2 Organizational performance

Organizational performance is a recurrent theme in various domains of management, becoming an important concept in strategic management because performance improvement is the *time test* of any strategy (Schendel and Hofer, 1979). Based on the perspective of organizational effectiveness, Venkatraman and Ramanujam (1986) circumscribed the concept of organizational performance. According to the authors organizational performance is a subset of organizational effectiveness. The narrowest conception of organizational performance considers the use of financial indicators (e.g., sales growth, return on investment and return on equity) while the broader concept of organizational performance includes emphasis on indicators of operational performance (i.e., non-financial). We consider in our study both aspects of performance (i.e., financial and operational indicators).

2.3 Value creation

Intellectual capital refers to the intellectual assets from a strategic and global perspective (Viedma, 2002). We argue that, from a strategic perspective, intellectual capital is used to create and apply knowledge to enhance firm value. Value creation

is at the heart of strategic management and the rationale of intellectual capital is its ability to create value. Thus, intellectual capital and strategy are intricately woven. In this sense, a perspective based on the intellectual capital provides a more holistic view of the firm and its value, driving and nurturing the strategy. Nevertheless, given the uniqueness of each firm's configuration of knowledge characteristics and the idiosyncrasies of the firm's history, it does suggest that there are a variety of routes to success.

Intellectual capital is a matter of creating and supporting connectivity between all sets of expertise, experience and competences inside and outside the organization. The "value platform" model explains in an illustrative way the importance of a balanced intersection between the three dimensions. The contribution of this model is to show that: (i) the organizational value is created in the interaction of the three dimensions and; (ii) the intersection area increases, as the three dimensions interact.

3. Research model and hypotheses

Based on the literature revision, the model supporting our research is depicted in figure 1.

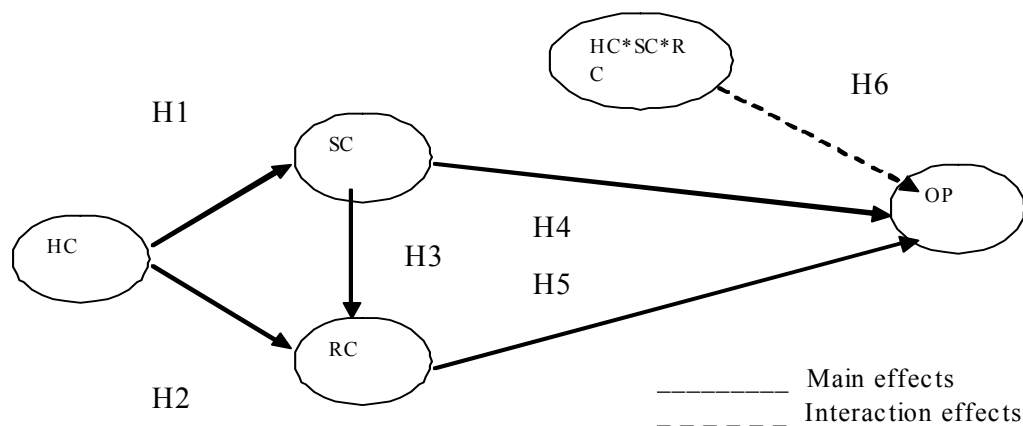


Figure 1: Research model

Hypotheses to be tested are:

H₁: Human capital is positively associated with structural capital;

H₂: Human capital is positively associated with relational capital;

H₃: Structural capital is positively associated with relational capital;

H₄: Structural capital is positively associated with organizational performance;

H₅: Relational capital is positively associated with organizational performance;

H₆: The relationship between human capital and organizational performance is positively moder-

ated by the interaction between structural capital and relational capital.

4. Research methodology

4.1 Measurement instrument

We used the original questionnaire developed by Bontis (1997), administered in Canada and Malaysia, with eight more items extending the concept of relational capital. A copy of the questionnaire can be requested to the authors. Following Churchill's (1979) recommendations, the 63 original items were validated again. Independent assessment of validity enhances the quality of

measures. New items were included after being submitted to the recommendation of the author's original questionnaire.

With a total of 71 items and a cover letter explaining the concept of intellectual capital, the questionnaire was administered with a letter from the President of Portuguese Institute of Banking Management explaining the aims of the study (academic purpose) and assuring confidentiality. Literature encourages the use of some tactics to stimulate response rate: (i) the existence of a sponsoring organization; (ii) the status of person signing letter accompanying questionnaire and; (iii) the use of follow-ups.

All questions are perceptual. The subjective approach has been used extensively in empirical studies, based on executive's perceptions, having been justified by several authors. Venkatraman and Ramanujam (1986) and Dess and Robinson (1984) have found consistency between executive's perceptions of performance and objective measures.

Measures studied are borrowed from other disciplines. Intellectual capital is interdisciplinary and borrowing measures can be expected because the constructs studied are embedded in theories from other disciplines. Moreover, as Peter (1981:138) explains: "the availability of multi-item scales from other disciplines substantially increases the probability of a validation study".

The instructions in the questionnaire were altered to replace the words "organization", "industry" and "transaction" with "bank", "sector" and "operation", respectively. The ten performance items were reworded in accordance with banking system accounting plan, reflecting a more familiar financial language. Respondents were asked to state how their bank's performance compares to that of their competitors.

4.2 Data collection

Data were collected from a sample of 53 banks, all affiliated members of the Portuguese Bankers Association.

Intellectual capital is an organizational construct that requires "strategic awareness" from informants to answer the questionnaire. Thus, a range of key informants was sought, including chief executive officers, regional directors and the directors of functional areas. Despite the limitations of "key informant" methodology (Phillips, 1981), we used this method of data collection because the organizational characteristics we intend to measure are only known by a selected set of members. Hambrick (1981) evidences that "strategic aware-

ness" may affect organizational performance. Other studies (Chen *et al.*, 1993; Kumar *et al.*, 1993) provide encouraging evidence about the utility of the "key informant" approach. The informants were chosen not on a random basis but because they have special qualifications such as status, number of years in the profession, or specialized knowledge.

Content validity was attempted through the depth of literature search and expert opinions (Bontis, 1998; Darroch and McNaughton, 2002; Chin, 1998).

The measurement instrument was pre-tested through personal interviews with eight banking managers, aiming: (i) to correct weaknesses and ambiguities in the questionnaire; (ii) to identify the most knowledgeable people about the subject and; (iii) to grasp the sector dynamics.

To validate the instrument, a pilot test was carried out at a convenience sample of 178 members (including first, second, third and fourth-levels executives). The 151 returned questionnaires, helped us to purify the measures and to refine the sample design. Pilot study indicated that: (i) strategic awareness cannot be assumed to exist, at all high levels in the organization; (ii) strategic awareness declines as we move downward in the organization; (iii) strategic awareness mostly depends on the informant's position and status in the organization.

Given the literature insights and our empirical findings, we applied the final test only to the chief executives and to the first and second-levels executives.

An analytical sample resulting in a response rate of at least 150, as recommended by Chin (1998) was sought to ensure sufficient statistical power. To attain a sample of 150 observations, 430 executives (chief, first and second levels) were drawn from a list of 1081.

An extensive review of mail survey response studies indicates that some form of follow-ups can increase response rates. Thus, two follow-ups (letters, telephone calls and e-mails) were carried out. We defined a cut-off time of eight weeks and evaluated the "resistance factor" (Huxley, 1980). Consistent with previous studies (Huxley, 1980; Parasuraman, 1982), the resistance over time, rather than continuously increasing during the survey, it was relatively high at first, dropped for a short period even before the first follow-up could have any effect, then started to increase. Total answers (253), after 8 weeks, represent a response rate of 58,8%.

5. Data analysis

To avoid the standard assumptions of multinormality and the necessity of a large sample size, Wold's (1982) method of Partial Least Squares (PLS) was used for parameters estimation. PLS, considered a "second generation multivariate technique" (Fornell, 1987:408), is a powerful approach to analyse structural models, involving various constructs and multiple indicators. PLS model is analysed and interpreted sequentially in two stages: (i) the assessment of the measurement model (validity and reliability of measures), followed by; (ii) the assessment of the structural model. This sequence ensures that the researcher has reliable and valid measures before attempting to draw conclusions about the nature of the relationships among the constructs.

Pilot test results helped us to refine the measures and retain the reliable items. Cronbach's alpha coefficients for each of the four constructs are fine, since the alpha values are greater than 0,93, exceeding the level of 0,7, considered good for exploratory research (Nunnally, 1978).

To validate the intellectual capital dimensions established *a priori*, a principal components factor analysis (Varimax rotation) was performed. Following Hair *et al.*'s (1992) recommendations, items that loaded at least 0,50 in its corresponding construct were retained. To confirm our factor findings, we used the PLSGRAPH 3.0 to assess individual item reliabilities. Results are very similar in the two approaches. Thus, we retained items that simultaneously loaded: (i) 0,50 in its corresponding construct by the principal component analysis, and; (ii) 0,50 in the individual item reliabilities by the PLS analysis, considered acceptable at the early stage of theory development (Chin, 1998). As a result, 48 items, from the 71 original items, were used in our final test.

It is important to notice that comparing studies in the three different international contexts (Canada, Malaysia and Portugal) we found that from the 48 total items, 15 are simultaneously reliable in the three studies and 18 are reliable in, at least, two contexts.

Once collected the final data, we assessed the measurement model (*outer model*) and the structural model (*inner model*).

6. Discussion of results

6.1 Measurement model

The measurement model consists of the relationship between the constructs and the indicators

(i.e., items) used to measure them. We assessed the adequacy of the measurement, examining: (i) individual item reliabilities; (ii) convergent validity and; (iii) discriminant validity.

Table 1 reports the measurement model results. Individual items reliabilities were determined by examining the loadings of measures on their corresponding constructs. Individual factor loadings greater than 0,70, indicates a high degree of individual item reliability. Cronbach indicators are all greater than 0,94, exceeding Nunnally's (1978) heuristics. Internal consistency, a measure recommended by Fornell and Larcker (1981), is similar to Cronbach's alpha but preferred in this context because it estimates consistency based on actual construct loadings.

Discriminant validity was assessed by examining the correlation matrix of the constructs. Satisfactory discriminant validity among constructs is obtained when the diagonal indicating the square root of the average variance extracted (AVE) is greater than all other entries in the corresponding rows and columns. This implies that the variance shared between any two constructs is less than the variance shared between a construct and its indicators, which is our case.

As the measurement model satisfies the criteria for convergent and discriminant validity, our next step was to evaluate the structural model.

6.2 Structural model

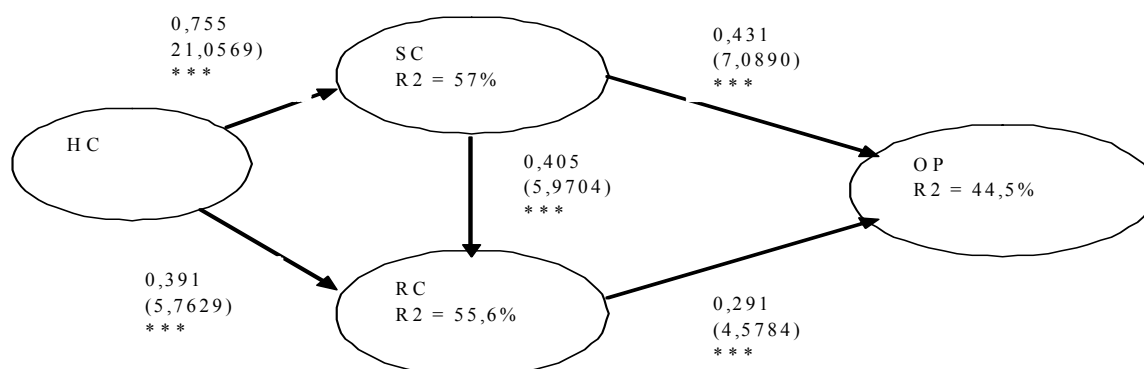
We started by running the main effects model, presented in figure 2. To test the structural model included: (i) estimated path coefficients, interpreted as standardized beta weights in the regression analysis; (ii) t-statistics, using jackknifing procedure, a nonparametric test of significance, and; (iii) R^2 for each endogenous construct, to assess the proportion of variance in the endogenous constructs which can be accounted for by the antecedents.

Since PLS makes no distributional assumptions, traditional parametric methods of significance testing (e.g., χ^2) are not appropriate. Therefore, a jackknifing method, produced by the blindfolding algorithm provided by the PLSGRAPH 3.0, was used to ascertain the stability and significance of the parameter estimates.

Table 1: Measurement model results

Items	Number of items	Cronbach Alpha	Internal consistency (Fornell and Larcker)	Discriminant validity (*) (Correlation of constructs)				R squared (%)		
				H	S	R	P			
Human	14	0,9505	0,9569	0,783						
Structural	10	0,9406	0,9498	0,755	0,809				57,0	
Relational	14	0,9501	0,9563	0,697	0,700	0,782			55,6	
Performance	10	0,9416	0,9507	0,568	0,634	0,592	0,812		44,5	
	Loadings									
Human	H1	H3	H5R	H6	H7	H8	H9	H10	H11	
	0,7769	0,7848	0,7958	0,7893	0,7592	0,7768	0,7604	0,7538	0,8210	
	H12	H15R	H17	H18	H20					
	0,7702	0,8127	0,7552	0,7766	0,8287					
Structural	S2	S3	S6	S7	S8	S9	S10	S11	S12	S15
	0,8389	0,8665	0,7954	0,7743	0,8483	0,8028	0,8469	0,7703	0,7901	0,7488
Relational	R6	R8	R9	R10	R11	R14	R16	R17	R18	
	0,8003	0,7646	0,7489	0,7280	0,8464	0,8433	0,8710	0,7608	0,7272	
	R19	R20	R21	R22	R23					
	0,7984	0,7214	0,7445	0,7658	0,8010					
Performance	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
	0,7897	0,8555	0,7593	0,7594	0,7986	0,8292	0,8165	0,8350	0,7795	0,8854

(*) Diagonal elements in the correlation of constructs matrix are the square roots of average variance extracted.



Note: Top number is path, t-values in brackets, *** significant at p-value<0,001.

Figure 2: Model I (main effects)

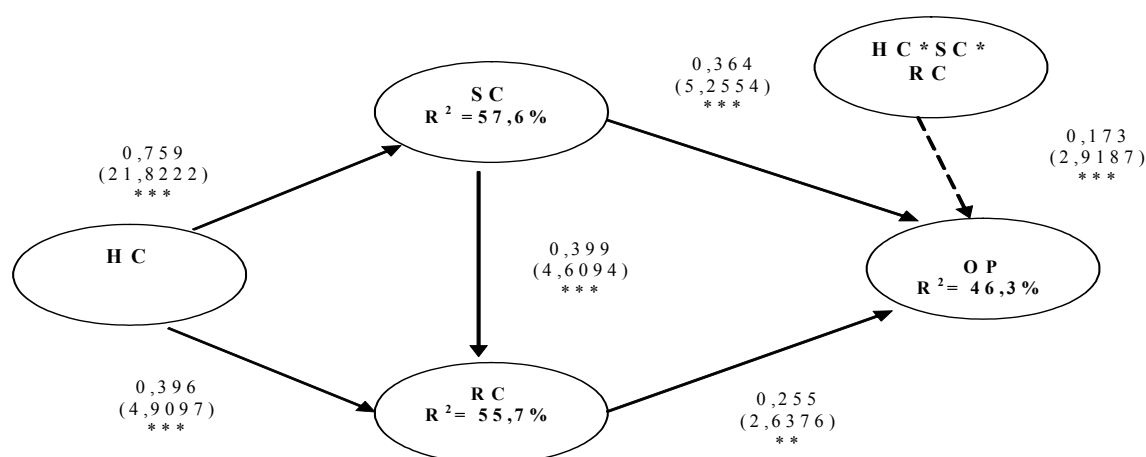
R^2 indicates that 44,5% of the variation in the organizational performance are accounted for the model. The overall fit of the structural model can be evaluated by the incidence of significant relationships among the constructs on the one hand, and by the explained variance on the endogenous latent variables on the other.

Consistent with prior research (Bontis, 1998; Bontis *et al.*, 2000), significant effects indicate direct and indirect relationships between intellectual capital components and organizational performance. All paths in the structural model are substantive and significant at the 0,001 level.

Next, we included the moderating variables in addition to the main effects. As in the regression analysis, the predictor and moderators variables

(HC*SC*RC) are multiplied to obtain the interaction term. As suggested by Chin *et al.* (1996), to get the interaction construct we run, first, the model without interactions and saved the construct scores. These construct scores are created multiplying each standardized indicator with their respective weight provided from PLSGRAPH. Then, we multiplied the construct scores, creating a single item interaction. The single indicator approach assures the content validity, because the single indicator of the interaction is the sum of all product indicators.

Figure 3 depicts the results for overall structural model, comprising main and interaction effects. The R^2 for model II increased to 0,463, attributable to the moderating effects.



Note: Top number is path, t-values in brackets, *** significant at p-value <0,001; ** significant at p-value <0,01.

Figure 3: Model II (main and interaction effects)

As expected, structural capital and relational capital positively moderates the relationship between human capital and organizational performance. Evidence of moderation exists when the interaction term accounts for significant residual variance in the dependent variable. A significant R^2 change here indicates that human capital, structural capital and relational capital interact to influence organizational performance. The true effect of interaction term can be calculated through the effect size:

$$f = [R^2 (\text{interaction model}) - R^2 (\text{main effects})] / R^2 (\text{interaction model})$$

The interaction effect produces an effect size of 0,0389 providing empirical support for the assumption that organizational value is created in the interaction of the three dimensions of intellectual capital.

7. Implications and directions for future research

The findings of this study have several implications. First, previous studies recommend generalization of their results to other countries. Our study proves that intellectual capital is substantively and significantly related to the organizational performance in the Portuguese banking industry. Future research can extend the present work in several directions. We recommend the replication of the study in other industries and other countries, namely in Europe where the cultural and historic diversity are important elements to build the uniqueness of intellectual capital.

Second, a group of measures were found to converge with those used in the two previous studies

(Canada and Malaysia). For research on intellectual capital to be meaningful, valid estimates of constructs and their relationships to one another need to be obtained. Without this, intellectual capital theory development becomes a perilous undertaking, and the benefits of better understanding its value in the organization will be difficult to achieve. The measurement instrument was refined and proves to be appropriate for this kind of research in different settings, which can pave the road for future administrations in other countries.

Third, it would be desirable to see whether an alternative approach to the research issue would lead to different results. For instance, it should be interesting apply to the same sample the VAIC™ method (Pulic, 2005), attempting to identify how efficiently intellectual capital and capital employed create value and to ascertain whether capital employed or intellectual capital is the decisive resource for banking success.

Fourth, our study proves empirically that intellectual capital is a phenomenon of interactions. As suggested by the “value platform” model, value is created when intellectual capital components interact, and as more they interact, more value is generated.

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