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EMPIRICAL ARTICLE

# Effect of information management capability on organizational performance

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**Abstract** This study assesses the value for organizations of effectively managing information. It develops the information management concept from the resource-based view and proposes and validates a scale to measure the capability of information management in an organization. Empirical research in the Spanish IT consulting and telecommunication sectors enables us to vouch for the positive causal relation between information management capability and three different measures of organizational performance: competitive position, productivity, and customer satisfaction.

**Keywords** Information systems · Information management · Organizational performance · Information life cycle

## 1 Introduction

Information is one of the most important resources of a firm and information management is critical to the achievement of organizational outcomes (Steventon et al. 2012). The development of information technology (IT) has pushed forward the boundaries of what can be achieved in information management, and a large body of research has been devoted to studying these technologies and how they

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affect performance. The economic importance of IT has led to considerable academic and business interest in investigating and understanding the role IT plays in the processes of change, economic efficiency, and organizational performance (Chan 2000; Piccoli and Yves 2005). The difficulty of studying information as a resource and the spectacular rise of IT have meant that many studies use IT as a proxy for the information resources of organizations and unquestioningly assume that IT contributes to competitive success and improvement in firm results (Dewett and Jones 2001), instead of analyzing the effectiveness of the information systems (IS) these technologies help to build (Schryen 2013).

Organizations apportion large budgets for the acquisition of IT-related products under the implicit premise that these investments will bring about economic benefits. Paradoxically, however, empirical evidence of the economic and organizational effects of IT is extremely contradictory (Wade and Hulland 2004; Liang et al. 2010; Pena-Vinces et al. 2012), and provides no clear conclusions about the value of IT and the IS for organizations. This disparity in terms of results has led many of these studies to be reviewed, with divergence in their conclusions, which is attributed to theoretical or methodological inadequacies. Both causes complicate the measurement of the real value contributed by IS and the importance of information in organizations. The most serious theoretical deficiency alludes to the lack of theoretical models that guide positive research efforts, and identify the contingent variables and interaction effects that are at work in value creation through IT (Melville et al. 2004). A further source of uncertainty and discrepancies in empirical findings arises from errors in measuring the constructs (Mackenzie et al. 2011).

This research contributes empirical evidence on the value of information management for organizations, approaching the problem from the resource-based view (RBV) and focusing on information as a resource instead of IT.

The first aim of this study is to develop a concept that enables us to analyze how information is managed in firms. We propose the construct of the information management capability (IMC), which gathers the capacities and skills available to the firm for the effective management of information through its life cycle in organizations. Based on a review of the literature, we devise a scale to measure the concept that complies with the required psychometric properties. The second objective of the research is to study the effects of IMC on organizational performance. The value of information for organizations and the higher-order capacity involved in the management of information allows us to consider that IMC can create competitive advantages and to explore the effects of information management on performance directly through IMC.

The paper is divided into four parts. The first section studies the effects of firm IMC stock on achieving abnormal returns, and develops the hypotheses for contrast. Section two introduces the research methodology. The validation of the IMC measure and the empirical testing of the hypotheses are carried out with structural equations using data gathered from managers in 135 companies from two information-intensive industries, the Spanish IT consulting and telecommunications sectors. Section three analyzes the results obtained from the proposed hypotheses. Finally, we present conclusions and limitations, and suggest future lines of research.

## 2 Theoretical background

One of the theoretical models to inspire recent research in management information systems is the RBV (Wade and Hulland 2004; Liang et al. 2010). The RBV highlights the importance of resources and capabilities, particularly those of an intangible nature, in business strategy, competitiveness, and success. The essential determinant of long-term competitive advantage and economic rents is the ability to accumulate, protect and continually develop resources and capabilities that are valuable, rare, idiosyncratic and inimitable and which have imperfect mobility (Peteraf 1993; Lockett et al. 2009). Capabilities are the skills the firm possesses in deploying its resources, in a generally coordinated way, using organizational processes to achieve a desired goal. Grant (1991) stresses that, while resources can be used as a unit of analysis, true sustainable competitive advantage is achieved by articulating these resources in order to create organizational capabilities integrated within the organization and which are difficult to imitate by competitors. The more precise the coincidence of a set of complementary assets, the more marked the specificity of the intangible assets will become, and, consequently, more difficult to copy. Complementarity intensifies specificity and asset cospecialization, as well as their social complexity, and heightens the difficulties of causal observation faced by competitors (Powell and Dent-Micallef 1997). Thus, the use of IT implementing sophisticated IS, and therefore, the integration of these IS into business activities supporting the firm's strategy requires the combination of resources and capabilities (Drnevich and Croson 2013).

Many researchers (Bharadwaj 2000; Tippins and Sohi 2003; Ray et al. 2004; Liang et al. 2010; Perez-Lopez and Alegre 2012) have adopted the RBV as their theoretical perspective for IT and IS analysis, since research in the field was first undertaken by Clemons and Row (1991), Mata et al. (1995), and Powell and Dent-Micallef (1997). The core assumption of the RBV understands the firm as a set of productive assets, whose value for firm growth does not lie in the assets themselves, but rather in the services they produce, or in the way they are used. If we consider IT from the RBV, these technologies do not meet the criteria required to be considered a source of sustainable competitive advantage as they are not scarce, and are easily imitated (Powell and Dent-Micallef 1997). A firm's IT resource infrastructure (hardware, software, databases, and networks) (Lewis and Byrd 2003) can just as easily be acquired by competitors or replicated by hiring qualified staff. These assets may therefore be considered as a commodity, given the ease with which they can be copied or acquired. Thus, any competitive advantage based exclusively on IT can be imitated by competitors, and therefore, the advantage obtained quickly eroded (Liang et al. 2010; Pena-Vinces et al. 2012).

However, this is a restricted view of IT. IT can be integrated alongside other intangible assets in order to create unique capabilities that might represent a source of lasting competitive advantage (Santhanam and Hartono 2003). Authors such as Ray et al. (2005), Ravichandran and Lertwongsatien (2005), Dehning et al. (2005), and Jeffers et al. (2008) prefer to approach the study of IT assets analyzing their complementarity and integration with other organizational assets to create IS that

would help strategic business activities. This approach considers that the competitive advantages derived from IT and the IS will not emanate so much from the tangible assets in which they are materialized, but rather from the way they are used and from the services that accompany them. Following this approach, this study goes a step further and, instead of evaluating the use of IT or specific IS in organizations, focuses on the management of information as a resource and how the combination of IS, procedures, and policies from the information cycle point of view are a source of competitive advantage in organizations. The final objective of IT is information management. IT objects are assets that aid the firm in the acquisition, processing, storage, dissemination, and use of information, thus acting as facilitators of other resources through the use of information. From the RBV, any attempt to establish a relationship between IT/IS and organizational performance should be mediated by higher-order capabilities directly related to the management of information. Higher-order capabilities are built at the 'level of the game' at which strategic competition effectively occurs and do not depend on the costs and benefits of the investments relative to ad hoc problem solving (Winter 2003). Nevertheless, few studies can be found in the IS literature dealing with these capabilities and the technological bias is always present (Mithas et al. 2011).

This article does not directly consider IT assets, but the higher-order capability (IMC) to manage information that these technologies help to build. The IMC, directly related to the exploitation of an essential resource as is information, is a higher-order capability for the use and exploitation of the business value of the firm's IS.

## 3 Information management capability and organizational performance

IMC is responsible for managing such a valuable and determining resource as information. IMC focuses on information, whereas an information system is defined as the system that helps organize and analyze data. IMC can give a good idea of the business value and quality of the firm's IS, but the IMC also depends on the firm's information policy and practices. IMC should integrate the IS within the business processes, but it is also linked to the firm's information policy, to the organizational routines that promote information sharing and storing, and to the use of the IS in strategic business activities. Marchand et al. (2002) consider three types of practice in information management: (1) IT practices, (2) information management practices, including sensing, collecting, organizing, processing, and maintaining information, and (3) information behaviors and values, including aspects of information management such as integrity, formality, control, transparency, sharing, and proactiveness in information use.

Another way to define IMC is by means of the functions it carries out. To do so, it is only necessary to examine the IS functions. These functions guide the information throughout its life cycle: (1) gathering, (2) processing, (3) codification and storing, (4) access, (5) distribution, and (6) identification of information needs (Jessup and Valacich 2008). Other IS functions (Guimaraes 1988) include: (1) identification and categorization of information, (2) validation and valuation of the available

information, (3) capture of the valuable information and storage in a corporate repository, (4) modifying and updating information, (5) policies to foster and the creation and sharing of information, (6) implementation of the information search and extraction systems, and (7) information distribution procedures (Devece et al. 2015). To carry out these functions, it is compulsory to integrate and coordinate the IS in business activities. The continuous development of IT over the last four decades has brought unlimited possibilities regarding the use of information in the organization, but these technical capacities are only one part of IMC. For instance, a firm may have good information acquisition and processing mechanisms based on a sophisticated technical system, but most of the time, the distribution of information needs a negotiation process, influences, agreements, and creation of different coalitions. Since information can become the most valuable resource for organizations (Porter and Millar 1985), it cannot be expected to be shared without occasional clashes. It is also important to recognize that not all information can be handled by technological means. Verbal and visual information, although it cannot be modeled and categorized through electronic means, can be managed by setting appropriate policies.

Many of the efforts to transform companies in information-based organizations, or simply establish significant management initiatives, fail due to poor management of information policies (Davenport 1999; Lim et al. 2005). This failure is due to the fact that the initiatives are inappropriate for the general culture of the organization or that company policies are treated as a peripheral matter rather than a comprehensive one. Only when information policies are considered a natural aspect of the organization and are managed consciously do we see what the authors call "the information-based organization." Then, IMC must be understood as a combination of different skills and different routines leading to organizational and technological systems that manage information (Chen 2012; Yeh et al. 2012).

Can the IMC defined above be a source of competitive advantage? The value of the resource that the IMC manages is unquestionable. Information is an essential part of any business activity and at any hierarchical level, but it is also present in the process of coordination between functions, from the viewpoint of the value chain. Therefore, the IMC generates enterprise value, directly affecting performance and can become a strategic capability (Wheelen and Hunger 2012), acting as an inexhaustible source of competitive advantage (Nelson 1991) in those businesses where information is particularly important, as in the case of information-intensive industries.

Information-intensive industries are those whose products and services are fundamentally based on employee knowledge, and therefore, information management plays an essential role (McEvily and Chakravarthy 2002).

But can the IMC be easily copied or acquired? The sustainable competitive advantage offered by IMC would depend on isolation mechanisms, such as causal ambiguity, path dependence, and development time (Ray et al. 2005), which do not exist in the case of IT, considered independently of its business integration. Competitive advantages arising from the use of information may be protected if the capability to manage this information is absorbed into the organization through practices of idiosyncratic development, complementarity, and cospecialization with

other complex technologies (IT) and systems (IS) (Zortea-Johnston et al. 2012; Tippins and Sohi 2003). This mechanism reinforces the inimitability and scarcity of the IMC, while reducing their value outside the context of a specific firm (Service and Maddux 1999).

The implementation of information management systems often requires an in-depth reengineering of business processes involving many of the company's activities, adapting technology, procedures, and information policy to the specific context and processes, and to its idiosyncratic organization and culture. The variety of aspects to be considered in information management (Marchand et al. 2002), and the necessary adaptation to the business context hinder the copy of the whole system (Yeh et al. 2012), and make it difficult for competitors to adopt individual components of the system or technology. Thus, the idiosyncrasy and path dependence of IMC can create barriers (Barney 1986; Zhang and Lado 2001) that prevent competitors from imitating and adopting the best information management practices developed in an organization.

The explanation of IMC as an originator of competitive advantages provides us with the basis for our first hypothesis:

**H1** The extent to which an organization possesses capability in information management is positively related to the strength of its competitive position.

Apart from the competitive position in general, some specific aspects of performance can be addressed with IMC. Perhaps the most surprising situation occurs when firms achieve excellent results with their IT efforts, while others, despite being in the same line of business, continue to be victims of the paradox of productivity (Lin and Shao 2006). The application of new technologies to processes, by replacing the work factor with the capital factor, should have a direct influence on productivity. Contradictory results may arise from the lack of attention paid to the integration of resources and capabilities. Improvement in efficiency does not only derive from investment in technological assets applied to individual tasks, but also from the coordinated deployment of business activities and correct decision making enabled by IMC (Jain and Kanungo 2005; Wong et al. 2009). Thus, our second hypothesis is as follows:

**H2** The extent to which a firm possesses capability in information management is positively related to its productivity.

However, productivity does not entirely reflect the benefits afforded by IMC in firms. When investments in IT are made and they reduce general costs and increase productivity, product quality and decisions on prices are not necessarily affected (Thatcher and Oliver 2001). In contrast, technologies that reduce the variable costs of product design, development, and production may improve both product and service quality. Nonetheless, IT assets used in the customer service process are not always directly related to performance in this process (Ray et al. 2004). The strategic use of IT to improve quality involves not only the creation and introduction of a portfolio of technological applications, but also the identification of the needs of each business activity when gathering, codifying, and distributing information

(Bharati and Berg 2005). Hence, the third hypothesis associates IMC with customer satisfaction:

**H3** The extent to which an organization possesses capability in information management is positively related to its customers' satisfaction.

## 4 Design of the empirical study

### 4.1 Database

This study focuses on the area of information-intensive firms, since we consider that information may be a potentially stronger source of competitive advantage in this type of organization. Besides, the characteristics and value of IS depend on the industry (Chiasson and Davidson 2005). Consequently, two Spanish information-intensive industries were selected as the population for the study: the IT consulting and telecommunications industries. The industries selected above are ranked in the top quartile in the OECD (1999) classification of industries.

The fieldwork was carried out through a structured questionnaire, which was sent to the general manager of the company. The choice of the figure of general manager as the most suitable respondent was based on two criteria: (a) he or she is the person with the greatest knowledge on the extent to which information is used in the firm, the characteristics of the IS, and the organizational changes and associated investments in IT; (b) the general manager has the requisite level of commitment to the issues under study. Data were gathered between January and March 2013.

A total of 582 firms were identified for the study (233 from IT consulting and 349 from the telecommunications industry). The target respondent in our mail survey was the general manager. A total of 135 valid questionnaires were finally received, 66 from the IT consulting sector and 70 from the telecommunications industry. In order to control for possible nonresponse bias, we used two variables: age of the company and size of workforce to compare firms that had responded with those that had not. This comparison produced no significant differences, thus ensuring that nonresponse bias was not a complication. Besides the response rate, the means and variances of the items were compared for telecommunication and IT consulting industries and no significant differences were found.

### 4.2 Measurement of variables

#### *4.2.1 Information management capability*

The IMC construct identifies the firm's ability to effectively manage information. IMC consists of cospecialized and complementary assets, which indicate the organization's skill in managing both internal and external information. In other words, IMC is a latent construct, resulting from the interaction of a series of dimensions that represent cospecialized and complementary assets, measuring the ability in the management of information.

The concept of IMC cannot be measured directly from proxy indicators of variables such as IT-based technological or human resources. The IMC construct can only be measured by means of a set of observable variables dealing directly with the management of information within the organization. IMC is defined as a second-order latent construct, made up of four dimensions understood as first-order latent factors (Devece 2013). Following Tippins and Sohi (2003, p. 748), Scott-Morton (1991) and Guimaraes (1988), the IMC functions were grouped into four dimensions: information gathering (IG), information processing (IP), information access (IA), and needs identification and distribution of information (IDI). Indicators were adopted from previously validated instruments, such as the scales developed by Devece et al. (2015), Devece (2013), Ray et al. (2004), or Tippins and Sohi (2003).

The final scale consists of 18 items extracted form Devece (2013) (see Appendix Table 5). The 18 items were drawn from managerial self-assessment in relation to the firm's competitors. A five-point Likert scale was used to reflect the degree of agreement with the item in relation to the manager's organization; the higher the score, the greater the degree of agreement. The definitive scale is presented in the Appendix Table 5.

#### *4.2.2 Organizational performance*

According to the RBV, possession of sustainable competitive advantages should result in extraordinary income, such as capital profitability and above industry-average firm growth. Consequently, we chose to measure the strength of the firm's competitive position by means of two classic financial indicators that have been extensively adopted in the literature: profitability and sales growth (e.g., Tippins and Sohi 2003). In addition, we use a further indicator, which is more representative of the organization's global performance: its shareholder value creation (e.g., Chatterjee et al. 2002). Profitability is measured as profitability in sales. Wealth creation is taken as the average relation between the firm's market value and its book value over the previous 5-year period.

The other two performance indicators utilized in the formulation of the hypotheses are productivity and customer satisfaction. Labor productivity was measured as the average relation between the firm's added value and its total average workforce. Customer satisfaction, as a proxy for service quality, was measured by the mean index of customer satisfaction with the firm.

Each of these variables was subject to managerial self-assessment. A five-point Likert scale was used, with increasingly higher scores reflecting the managers' perception of the degree of excellence in the firm's performance in comparison with its competitors.

Because all the self-reported data in a questionnaire are provided by the same manager, the common method bias must be reduced as much as possible and estimated (Podsakoff et al. 2003). To do so, any unprecise question or vague concept in the questionnaire was reworded to obtain simple and focused questions. To assure the sincerity of the respondents, anonymity was guaranteed. Finally, a Harman's single factor test was carried out to estimate the extent of common method variance in the data. No single factor accounts for the majority of the variance in the exploratory factor analysis.

**Table 1** Descriptive statistics and correlations of the variables

| Variables | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Size (employees) | 414.8 | 1744.4 | | | | | | | | | | |
| 2. Age (years since found) | 24.4 | 18.0 | −.45** | | | | | | | | | |
| 3. Information gathering | 3.36 | .62 | −.03 | −.04 | | | | | | | | |
| 4. Information processing | 3.36 | .61 | −.01 | −.06 | .74** | | | | | | | |
| 5. Information Access | 3.46 | .65 | −.10 | .02 | .75** | .72** | | | | | | |
| 6. Inf. needs and distribution | 3.17 | .65 | −.13 | .02 | .72** | .69** | .67** | | | | | |
| 7. Profitability on sales | 3.05 | .92 | −.15 | .17 | .30** | .28** | .23** | .33** | | | | |
| 8. Growth in sales | 3.35 | .84 | −.11 | .13 | .37** | .31** | .32** | .43** | .56** | | | |
| 9. Wealth creation | 3.26 | 1.02 | −.08 | .16 | .35** | .30** | .29** | .38** | .70** | .60** | | |
| 10. Productivity | 3.75 | .87 | .04 | .00 | .40** | .33** | .30** | .36** | .50** | .53** | .55** | |
| 11. Customer satisfaction | 3.78 | .77 | .02 | .16 | .29** | .26** | .26** | .26** | .35** | .45** | .51** | .44** |

** Statistically significant at $p < 0.05$

Table 1 presents the basic statistics and correlation coefficients between the variables of the theoretical model. The dimensions of IMC (IG, IP, IA, needs IDI) were calculated as the average of their items (see Appendix Table 5).

The control variables size (number of employees) and age (years since firm's foundation) are included in Table 2 in order to discard the possible positive relationship between IMC and performance simply due to a common correlation with size or age of the company. As can be seen in Table 1, the correlation of the control variables with the remaining variables is not significant.

### 4.3 Statistical analysis

We used two-stage structural equation methodology. This methodological resource represents latent concepts from observable variables and tests causal relations on nonexperimental data when these relations are of a linear type. The EQS 6.1 statistical package was used. As our research does not fully satisfy the assumption of multivariate normality, and using Likert scales, employs noncontinuous variables, we chose the method of robust standard estimators, following recommendations by Satorra and Bentler (2001).

**Table 2** Confirmatory factor analysis of the IMC dimensions

| Item | Factor loadings | | | | Errors | $R^2$ |
|---|---|---|---|---|---|---|
| | IG | IP | IA | IDI | | |
| IG 1 | 0.67* | | | | 0.74 | 0.45 |
| IG 2 | 0.64 | | | | 0.77 | 0.41 |
| IG 3 | 0.76 | | | | 0.65 | 0.58 |
| IG 4 | 0.71 | | | | 0.70 | 0.51 |
| IG 5 | 0.77 | | | | 0.64 | 0.59 |
| IP 1 | | .70* | | | .71 | .49 |
| IP 2 | | .70 | | | .72 | .48 |
| IP 3 | | .62 | | | .79 | .39 |
| IP 4 | | .68 | | | .74 | .46 |
| IP 5 | | .73 | | | .68 | .54 |
| IA 1 | | | .78* | | .63 | .60 |
| IA 2 | | | .70 | | .71 | .49 |
| AI 3 | | | .69 | | .72 | .48 |
| IA 4 | | | .74 | | .67 | .55 |
| IDI 1 | | | | .72* | .69 | .52 |
| IDI 2 | | | | .74 | .67 | 55 |
| IDI 3 | | | | .65 | 76 | .43 |
| IDI 4 | | | | .80 | .60 | .64 |
| BBNFI | .955 | .969 | .997 | .997 | | |
| IFI | .980 | .997 | 1.00 | 1.00 | | |
| CFI | .979 | .997 | 1.00 | 1.00 | | |
| NC | 1.78 | 1.11 | .309 | .21 | | |

All factor loadings are statistically significant at $p < 0.05$

* Parameter has been equal to 1 to fix the scale of the latent variable

## 5 Results

### 5.1 Validation of the IMC measurement scale

The first stage of the two-phase modeling consists of developing a measurement model by means of the specification of factor models. Following Bagozzi (1981), analyses of dimensionality, reliability, and validity of the scale were then carried out using confirmatory factor analysis.

Prior to undertaking the confirmatory factor analysis for the validation of the scale, we studied the goodness of fit of the estimated factor models with a series of tests (Hair et al. 1999). As can be seen from the results (Table 2), the goodness of fit is confirmed for all the dimensions.

The quality of the absolute fit of the IMC scale is shown in Table 3. The recommended values for the fit index are met in all cases.

The analysis of dimensionality by means of confirmatory factor analysis enables us to validate the initially proposed dimensionalization. The goodness of fit of the factor of the IMC scale confirms the multidimensional structure of IMC as a second-order latent factor made up of the four dimensions identified in the theory. At the same time, the first-order factor models validate the unidimensionality of the four dimensions. First, we estimated the individual reliability of the indicators with the squared multiple correlation coefficient ($R^2$). It can be observed that this index exceeds the minimum value of 0.40 in all indicators. Second, the magnitude of the factor loadings, with values above or very close to 0.7, also ensured validity (Hair et al. 1999). Third, the internal validity was reaffirmed with the statistical significance of each loading obtained between the indicator and the latent variable ($t$ value greater than 1.96 for $p = 0.05$ in all cases). The discriminant validity, evaluated using the correlations between the dimensions (Table 1), indicates that all the variables are different constructs, as their values are lower than 0.80. If values lie above this threshold, factors are shown to provide the same information.

### 5.2 Empirical testing of the hypotheses

The second of the two-stage application of the structural equations model deals with the confirmation of the substantive hypotheses. To do this, once the measurement model had been confirmed, the causal relations between variables were analyzed, and the structural model was specified by means of covariance structure models. Here, we observed the causal relations between IMC stock and firm performance.

**Table 3** Confirmatory factor analysis of the IMC scale

| Dimension | Factor loadings | Errors | $R^2$ |
|---|---|---|---|
| 3. Information gathering (IG) | .88 | .47 | .78 |
| 4. Information processing (IP) | .85 | .53 | .72 |
| 5. Information access (IA) | .85 | .54 | .71 |
| 6. Inf. needs and distribution (IDI) | .81 | .59 | .66 |
| BBNFI = .99; IFI = 1.00; CFI = 1.00; NC = .26 | | | |

In our model, the exogenous latent variable is the firm's ICM stock. At the same time, we observed an endogenous variable, that of organizational performance. Five structural models were created to test our three hypotheses, each model with a different indicator of organizational performance (profitability, sales growth, shareholder value creation, productivity, and customer satisfaction) measured with a single item (Hayduk and Littvay (2012). All the models follow the structure shown in Fig. 1. The performance variables used for each of the five models respectively were profitability, growth in sales, and wealth creation (H1), productivity (H2), and customer satisfaction (H3).

The inclusion of all the individual observable indicators in a complete structure model requires the sample size to be larger. In order to solve this problem and to reduce the complexity of the IMC scale, we created composite variables (IG, IP, IA, and IDI) calculated as the average of their items (see Appendix Table 5). Aggregate measurement indicators for the structural modeling are frequently employed (Gribbons and Hocevar 1998). Hence, in order to measure the individual dimensions of the IMC construct, we took a single indicator, the mean of all its observable items, and used its aggregation as the estimation of each of these latent variables (IMC dimensions).

### *5.2.1 Relationship between ICM and firm competitive position (H1)*

In order to measure the competitive position variable we used three indicators: sales profitability, growth of sales, and firm wealth creation. These three measurements of performance generated three models (model 1, 2, and 3 in Table 4). The estimation of the three structural models for hypothesis H1 showed adequate overall fit indices in all cases (Table 4).

Once the overall fit of the model had been established, we observed the fit of the model in order to verify whether the estimated parameters were significant in the causal model (Table 4). The absolute, incremental, and parsimonious fit indices of the three first models are adequate. The following step was to examine the individual reliability of the IMC dimensions. All the coefficients ($\lambda$) were

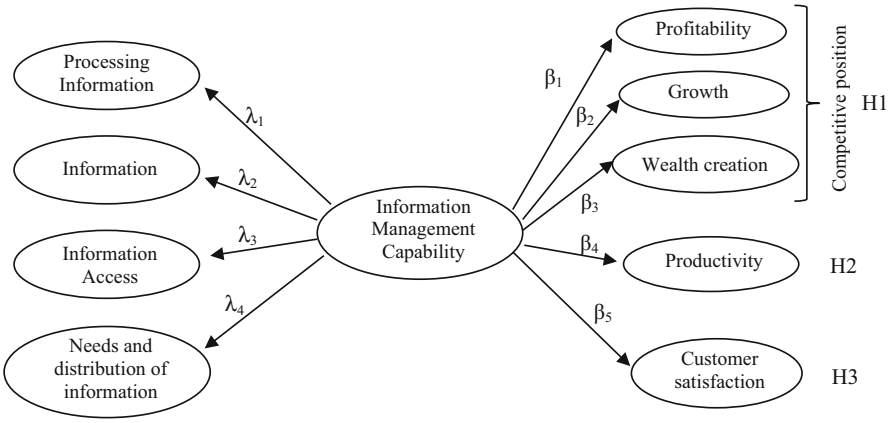


**Fig. 1** Theoretical model

**Table 4** Confirmatory factor analysis of the IMC scale

| Model Dependent variable | 1 Profitability on sales | 2 Growth in sales | 3 Wealth creation | 4 Productivity | 5 Customer satisfaction |
|---|---|---|---|---|---|
| $\beta$ | .33** | .42** | .39** | .42** | .32** |
| $R^2$ | .11 | .18 | .15 | .17 | .10 |
| $\lambda_1$ | .89 | .89 | .89 | .89 | .89 |
| $\lambda_2$ | .84 | .84 | .84 | .84 | .84 |
| $\lambda_3$ | .84 | .84 | .84 | .84 | .84 |
| $\lambda_4$ | 81 | 82 | 82 | 82 | 82 |
| BBNFI | .987 | .98 | .99 | .99 | .99 |
| IFI | 100 | .997 | 1.00 | 1.00 | 1.00 |
| CFI | 1.00 | .997 | 1.00 | 1.00 | 1.00 |
| NC | .64 | 1.16 | .71 | 0.59 | .15 |

** $p < 0.01$

comfortably in excess of 0.70, thus revealing the high variance that each dimension has in common with the latent variable it measures. Therefore, on the whole, the measurement model fits the data, as the measured indicators of the various theoretical concepts are reliable and valid.

In the structural equations of the first three causal models corresponding to H1, we obtained positive coefficients for the relationship between IMC and performance ($\beta_1 = 0.33$, $\beta_2 = 0.42$, $\beta_3 = 0.39$), which were also statistically significant ($p < 0.01$). In addition, the explanatory power on the variance of profitability, growth in sales, and wealth creation ($R_1^2 = 0.11$, $R_2^2 = 0.18$, $R_3^2 = 0.15$) is considerable bearing in mind the complexity of factors that affect the endogenous variables. Therefore, the empirical evidence confirms hypothesis H1, demonstrating the noteworthy explanatory capacity of variation in the firm's competitive position attributable to IMC.

### *5.2.2 Relationship between IMC and firm productivity (H2)*

The estimation of the structural model for hypothesis H2 shows the absolute, incremental, and parsimonious fit indices to be adequate (Table 4, model 4). In the structural equation of the causal model corresponding to H2, we obtained a positive coefficient ($\beta_4 = 0.42$) that was statistically significant ($p < 0.01$). The structural model also shows considerable power in terms of the variance of productivity ($R_4^2 = 0.17$). The empirical evidence therefore confirms hypothesis H2, once again demonstrating the significant relationship between organizational performance (measured here by productivity) and IMC.

### *5.2.3 Relationship between IMC and customer satisfaction (H3)*

The absolute, incremental, and parsimonious fit indices of the structural model for hypothesis H3 are adequate (Table 4), where $\beta_5 = 0.32$ and this value is statistically

significant (Table 4). The structural model also presents a relatively high $R_5^2$ (0.10) for the endogenous variable (customer satisfaction). The empirical evidence therefore confirms hypothesis H3.

## 6 Conclusions

The value of information for organizations has continuously been recognized since the work of Galbraith (1973), but proving this fact has been always difficult due to the intangible nature of information. Researchers have found more practical results in the study of IS and IT, and research into the effects of IT on competitive position and organizational results has aroused considerable interest over the last three decades. However, the state of the art of the knowledge surrounding the problem presents certain confusion due to the lack of conclusive results (Pena-Vinces et al. 2012). The main problem associated with most previous studies is that they focus on the tangible components of IT, some even studying specific technological applications, and the validity of the systems in terms of using information is not considered. The flow of resource allocation for IT investments or those devoted to personnel directly involved in IS has, on the whole, been adopted as a proxy for IS capabilities within the firm. Reasonable doubt exists over the suitability of this measurement approach, which pays little attention to the human or organizational components that are essential in the creation of competitive advantages and sustainable extraordinary results. Information management involves a combination of technology, organization, and processes. We therefore propose the concept of IMC, and suggest that it is composed of idiosyncratic, cospecialized, and complementary assets that allows us to treat information on four fronts: IG, IP, access to information, and identification of information needs and distribution of information. The principal aim of this study, which is to prove the positive relationship between IMC and performance, has been satisfactorily achieved.

IMC exerts a significant direct effect on organizational performance, whatever indicator (profitability on sales, growth in sales, wealth creation, productivity, and customer satisfaction) is adopted. Not only does IMC contribute to the advancement of a stronger competitive position, but also enables the reinforcement of competitive advantages in costs (by augmenting productivity) or in differentiation (by intensifying customer satisfaction). Our findings confirm the conclusions of previous studies that use different methodologies but share the same approach. For instance, Ray et al. (2004) find evidence to suggest that managerial IT knowledge improves performance in service processes.

The research findings have notable managerial implications. The internationalization of the Spanish firms belonging to the telecommunication and IT consulting industries and the globalization of these industries (Valor and Sieber 2005) ensure the global relevance of this study. The assurance that the substantial resources are allocated for an effective information management system is no trivial matter. The belief that information management can be improved by the introduction of IT is well established, as shown by the constant growth in investments in technical

infrastructure and IT products. Nonetheless, organizations increasingly find that simply adopting technologies for the management of information, with no additional organizational, managerial, or human changes, does not produce any positive effect. The incentive for greater performance should start with the integration of IS in the business activities and the use of information as a strategic resource. In order to improve its performance, a firm must introduce information management programs to reinforce the effectiveness and use of IS in business processes, routines, and individuals.

Consequently, the publicity put out by hardware and software firms, claiming IT as a panacea to improve firm competitiveness has no grounds. Even more serious is the waste of public funds on the promotion of the IT economy, which focuses only on subsidies for acquiring tangible resources, ignoring the intangible capabilities that complement it and make possible the benefits of a stout life cycle of information in organizations.

We recognize that a time lag exists between IMC development and the observation of extraordinary rents and competitive advantages, which leads to a recommendation for longitudinal studies. Likewise, our conclusions only remain valid so long as the conditions under which the data were gathered do not change. Although the IMC measurement scale has been successfully validated, it represents an exploratory contribution that requires new empirical studies to test and refine it. In particular, although measurement based on managerial perception is well established in strategic research, studies devoted to further demonstrate its validity and reliability should continue. Finally, any generalization of the findings should be considered with caution, given the sample bias towards information-intensive industries.

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## Appendix

See Table 5.

**Table 5** Measurement scale of information management capability (IMC) *Source* (Devece 2013)

| Dimensions and items | Information management capability |
|---|---|
| IG | Information gathering |
| IG 1 | Capacity to obtain information about advances in technology by means of competitive intelligence systems |
| IG 2 | Availability and efficacy of competitive intelligence systems to capture updated and important information about competitors |
| IG 3 | Availability and efficacy of competitive intelligence systems to capture updated and important information about financial markets and legislation |

**Table 5** continued

| Dimensions and items | Information management capability |
|---|---|
| IG 4 | Availability and efficacy of information systems to capture information about internal processes (e.g., ERP) |
| IG 5 | Availability and efficacy of competitive intelligence systems to capture updated and important information about customers and markets |
| IP | Information processing |
| IP 1 | Ability to synthesize and condense information for a better analysis |
| IP 2 | Ability to update and eliminate errors in the information |
| IP 3 | Ability to deliver information adapted to the context of users |
| IP 4 | Ability to classify and arrange information |
| IP 5 | Ability to deliver information in the correct form for easy interpretation |
| IA | Information access |
| IA 1 | Existence of an effective system of explicit knowledge codification |
| IA 2 | Employees access information quickly and without difficulties |
| IA 3 | Existence of effective systems and technologies (intranet, extranet, etc.) accessible to every employee to obtain the information needed |
| IA 4 | Existence of effective routines to codify and store information |
| IDI | Needs identification and distribution of information |
| IDI 1 | Existence of effective routines (maintenance) to identify information needs |
| IDI 2 | Existence of an effective information distribution systems to personnel, customers and suppliers |
| IDI 3 | Existence of an effective policy to motivate the personnel in information sharing |
| IDI 4 | Ability to transfer and develop new information by means of dialogue and debate (reports distribution, presentation meetings, notice boards, round tables, electronic forum, etc.) |

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