Links between competence management and the knowing organisation

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Abstract: The paper intends to analyse the links between competence management and Knowledge Management (KM), adopting the Knowing Organisation Model as the main framework. A web-based survey was conducted with 168 KM leaders and HR managers from Brazilian and Portuguese middle and large size organisations. The results have given evidences that competence management is a significant antecedent of KM. A diagnosis of the sense making, knowledge creation and decision making practices in the analysed organisations is presented. The strategic role of the HR department in the KM initiative is emphasised. The paper also

discusses strengths and weaknesses of the KM initiatives, and presents some recommendations to KM leaders that may help them in increasing the maturity level of their KM projects.

Keywords: Knowledge Management; KM; competence management; organisational learning; knowledge creation; sense making; decision making; knowing organisation; human resource management.

Reference to this paper should be made as follows: de Carvalho, R.B., Ferreira, M.A.T., Choo, C.W. and Joia, L.A. (2007) 'Links between competence management and the knowing organisation', *Int. J. Learning and Intellectual Capital*, Vol. 4, No. 3, pp.222–239.

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1 Introduction

The resource-based theory identifies the organisation as a pool of resources, capabilities and competencies needed to generate physical products or intangible services (Franke, 2000). More specifically, the core competence theory emphasises how to make the best use of the available resources (Prahalad and Hamel, 1990).

The Resource-Based View (RBV) of the firm usually yields to a social and human-oriented perspective of the organisational reality. This soft approach may seem an utopia, but post-industrial society has created a curious paradox: in order to be more competitive, organisations need to be more human. The increasing global competition fosters organisations to differentiate from their competitors by the development of innovative products and services. Nevertheless, knowledge and creativity – fuels for the innovation engine – are exclusive attributes of human beings, and not of machines or technologies. Competences are the roots of competitiveness (Prahalad and Hamel, 1990). Although this is a straightforward conclusion, the perception of how deeply organisations depend on knowledge workers is quite recent, especially among firms still bounded to the industrial paradigm.

After a hard downsizing process during the nineties, many organisations need to reanimate their human perspective and the fragile processes of knowledge creation (Krogh *et al.*, 2001). Reengineering was sometimes misused as euphemism for dismissing people and cutting investments in training and education. This scenario has stressed social relationships at the workplace, and workmates have begun to see themselves not as colleagues, but as competitors escaping from the firing list. Competence management and Knowledge Management (KM) are approaches that try to rescue the essential role of individuals in sustaining the organisation. Acknowledging the importance of the collective tacit knowledge to organisation's survival is a step towards better employer-employee relationships, where the organisation offers better work conditions in order to motivate knowledge works to create and collaborate.

The paper intends to analyse the links between competence management and KM, adopting the Knowing Organisation Model (Choo, 1998) as the main framework. This paper is organised as follows. First, organisational learning and competence management concepts are discussed in order to provide a theoretical background. Section 3 presents some KM maturity models and gives a more detailed explanation of the Knowing Organisation Model (Choo, 1998). Section 4 describes the research methodology and shows the variables of the research model. Section 5 analyses the data collected in a web-based survey with 168 KM leaders and Human Resource Managers from Brazilian and Portuguese organisations. Finally, the conclusion suggests futures works and discusses the main contributions of the paper.

2 Organisational learning and competence management

The learning organisation is the result of interaction among three essential elements: individuals who take advantage of their knowledge and creative capacities, an organisation with a clear strategy and a focus on collaboration (Santos, 2003). Individuals act as learning agents for the organisation, responding to changes in the external and internal environment (Argyris and Schon, 1978). Learning can be defined as a process which changes the state of knowledge of an individual or organisation, and this change may take the form of the adoption of a new belief about causal relationships, the modification of an existing belief, the abandonment of a previously held belief, or a change in the degree of confidence with which individuals within a organisation hold a set of beliefs (Sanchez and Heene, 1997).

A survey conducted with twenty global organisations (Microsoft, Intel, Skandia and others) over six years has unveiled three fundamental elements of a learning organisation (Bartlett and Ghoshal, 1998):

- huge amount of time and effort dedicated to attract, develop and maintain their best employees
- substantial investments on the development of tools and processes to support knowledge flows
- development of relationships strongly based on trust.

Organisational learning is a way of developing the organisational capacity of continuous translation of experiences into practices that will contribute to a better performance (Bitencourt, 2004). An anthropomorphic issue of the organisational learning concept that has to be addressed is that organisations only learn through individuals (Teixeira and Guerra, 2002). Individual learning does not guarantee organisational learning, but without it no organisational learning can occur (Senge, 1990). Therefore, firms need to create work environments that result in knowledge creation and experience exchange, and also mechanisms that facilitate the interactive process that results into learning.

Organisational memory is the basis of future learning, because codified knowledge converts part of the individual learning into a collective experience (Wick and Leon, 1996). Choo (1998) proposes the concept of the 'knowing organisation' as the act of knowing involves a continuous process of social construction and collective action. According to Rus and Lindvall (2002), learning is a fundamental part of KM because employees must internalise shared knowledge before they can use it to perform specific tasks.

Teixeira and Guerra (2002) emphasise the links between organisational learning and competence management, because long-term learning promotes the development of competences. The concept of competences is associated to the organisational capacity of aggregating a set of specialised knowledge. Core competencies are the collective learning in the organisation, especially how to coordinate diverse production skills and integrate multiple streams of technologies. Sanchez *et al.* (1997) define competence as an ability to sustain the coordinated deployment of assets and capabilities in a way that promises to help a firm to achieve its goals.

Competence management is the continuous process of creating and developing knowledge, skills and attitudes, where the individual is responsible for the construction and consolidation of his/her competences (self-development) through the interaction with others in the workplace, family environment and/or social groups, adding value to the organisational activities (Bitencourt, 2004). Competence management is related to the challenge of obtaining the better alignment between individual competences and competences that help the organisation achieve strategic objectives and business results. However, studies conducted by Fleury and Fleury (2004) and Bitencourt (2004) have given evidences that organisations present great difficulties in establishing relationships between individual and organisational competences.

It is not rare to mix the concepts of competence management and KM. Competence management has major roots in the literature of human resource management, while KM has more multidisciplinary influences from information science, management, computer science, cognitive science and others. Competence management is more bound to people and to the tacit dimension of knowledge, while KM also embraces the explicit side and the usage of Information Technology (IT) to support knowledge processes.

3 Knowledge management models

The strategic role of knowledge in innovation processes has contributed to the development of KM initiatives. KM refers to identifying and leveraging the collective knowledge in an organisation to help it compete (Krogh *et al.*, 2001). KM intends to be an area of research and practice that deepens the understanding of knowledge processes

in organisations, and develops procedures and instruments to support the transformation of knowledge into economic and social progress (Carvalho and Ferreira, 2001). In fact, different aspects of these issues have been studied for decades in many different disciplines, and one of the most important contributions of the KM concept is creating a space (in academic and business world), where these many groups and points of view may discuss and work together.

Rus and Lindvall (2002) suggest that KM is a risk prevention and mitigation strategy, because it explicitly addresses risk that are quite often ignored, such as:

- loss of knowledge owing attrition
- people repeating mistakes and performing rework
- lack of knowledge and an overly long time to acquire it owing steep learning curves
- individuals who own key knowledge becoming unavailable.

Nevertheless, some doubts arise whether the KM initiatives are successful or if KM is just another management fad. To answer these questions, both researchers and practitioners have developed different approaches to understand and measure the impact of KM (Paulzen and Perc, 2002). Two of the most widely known approach among practitioners are the American Productivity & Quality Center (APQC) Road Map to KM results, and the KM Maturity Model (KMMM) developed by Siemens. The APQC Road Map is a methodology to guide organisations through the five stages of KM implementation, with relevant advice concerning processes, structures and enablers (Hubert and O'Dell, 2004). The APQC Road Map provides a qualitative evaluation of KM practices.

The KMMM provides qualitative and quantitative results, allowing a comprehensive assessment of the KM activities, which covers eight key areas: strategy and knowledge goals; environment and partnerships; people and competencies; collaboration and culture; leadership and support; knowledge structures and knowledge forms; technology and infrastructure; and processes, roles and organisation (Ehms and Langen, 2002). The KMMM received a strong influence of the Capability Maturity Model (CMM) of the Software Engineering Institute (SEI) at Carnegie Mellon University. Although the CMM (Paulk *et al*., 1995) is applied to the software development context, the KMMM adopts the same name for its five levels, and adapts the maturity concept to the KM domain.

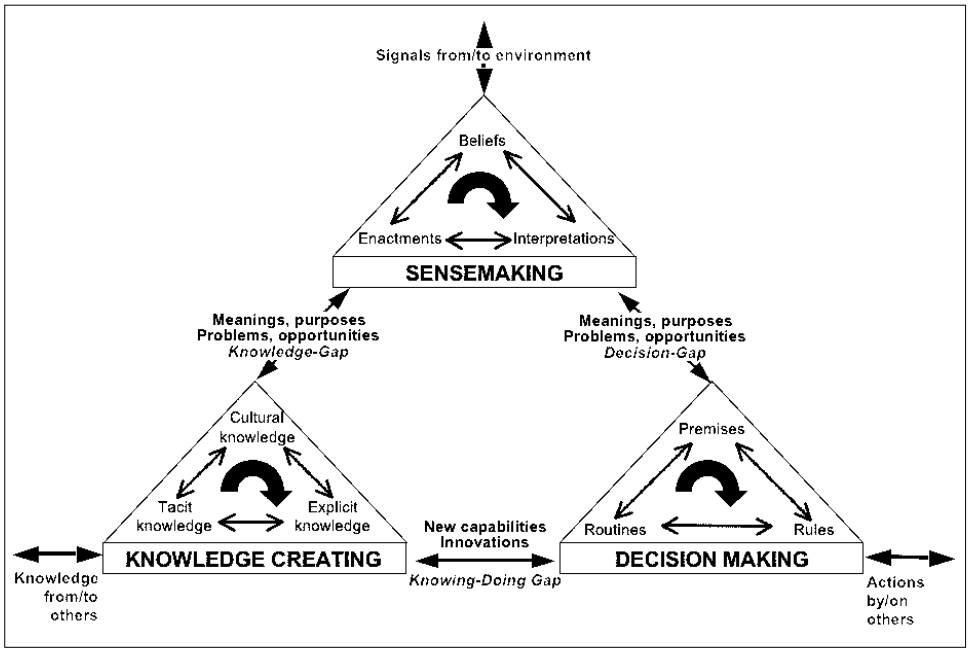
In a maturity model, the levels are characterised by specific requirements that have to be achieved on that level, and it is highly improbable to skip a level in an evolutionary process. The five levels are: initial, repeatable, defined, managed and optimising. The maturity level is assessed for the individual topics and condensed into one maturity level for each key area.

Compared to a subject such as software engineering however, the domain of KM consists more of soft subjects to be considered. However, the existence of open standards and common approaches for KM will allow future work to start from a higher level, and the most arguments that are brought against standardisation of KM can be classified as general concern against standardisation (Weber *et al*., 2002).

In order to establish a more consistent link between information and knowledge processes, the research model proposed in this paper will have the Knowing Organisation Model (Choo, 1998) as a theoretical background. This framework describes organisations as systems where the processes of sensemaking, knowledge creating and decision making are continuously interacting.

Sensemaking is related to how the organisation interprets and makes sense of its changing environment which leads to shared meanings and intent. Knowledge creation is accomplished through the conversion and sharing of different forms of organisational knowledge, resulting in new capabilities and innovation. Finally, the organisation processes and analyses information through the use of rules and routines that reduce complexity and uncertainty (Choo, 1998).

Figure 1 The Knowing Organisation Model



Source: Choo (1998)

The organisational knowledge strategy is usually a mix of exploitation and exploration (Choo and Bontis, 2002). Exploitation emphasises knowledge codification and the reuse of existing knowledge, taking advantage of organisational capital. When exploitation is overemphasised, the organisation may diminish its capacity to innovate, resulting in obsolescence. On the other hand, exploration stimulates the creation of new knowledge, applying it to the development of products and services. When exploration is overemphasised, the organisation reduces its ability to externalise knowledge and to convert it into organisational capital.

Some of the KMMM key areas overlap with the knowing organisation dimensions, so the two models were combined into a single set of KM variables described by Table 1.

Table 1 Comparison of the Knowing Organisation Model and KMMM

Knowing Organisation Model	*KM Maturity Model*
Sense making	Environment and partnerships
Sense making	Strategy and knowledge goals
Knowledge creation	Collaboration and culture
Knowledge creation	Knowledge structure and forms
Knowledge creation	People and competencies
	Leadership and support
	Processes, roles and organisation
	Technology, infrastructure
Decision making	

4 Research model and research methodology

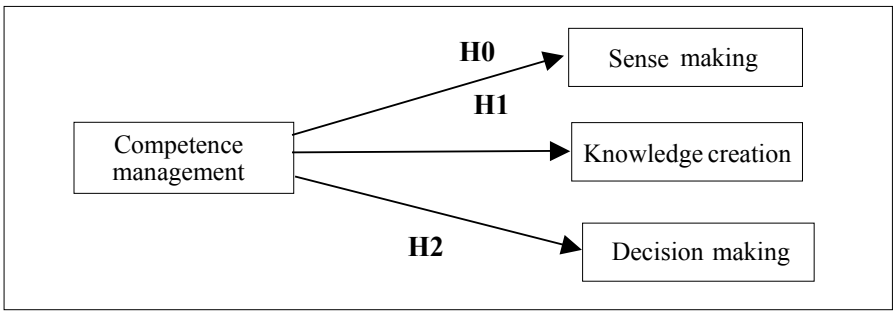
The research model has been designed to analyse the relationships between competence management and the dimensions of the Knowing Organisation Model. Figure 2 provides a graphical perspective of the research model. The hypotheses of the research model were stated as follows:

H0 *There is a linear positive relationship between competence management and sense making.*

H1 *There is a linear positive relationship between competence management and knowledge creation.*

H2 *There is a linear positive relationship between competence management and decision making.*

Figure 2 Research model



The research model's variables were translated into a questionnaire using Likert scales (0–10) with the extremes 'totally disagree' and 'totally agree'. None of the questions were written in a negative manner; therefore the value 10 always means the most advanced level of the practice being evaluated.

The model variables were submitted for discussion in a research group composed of three PhD professors and PhD students. Previous questionnaires developed by Terra and Gordon (2002) and Choo *et al.* (2000) were used as references. A preliminary version of the questionnaire was applied in two Brazilian organisations: a government bank and a chemical industry. This pilot test contributed to the tuning of some statements of the questionnaire. After review process, the model variables were converted into a web-based questionnaire and the answers were recorded in a secure SQL database.

The organisations invited to join the survey were chosen in a sample chosen by convenience and composed by members of the greatest Portuguese-speaking discussion list dedicated to the theme of KM (competitive-knowledge list supported by the Brazilian KM Society – SBGC), members of a portal discussion list (wi-intranet discussion list), members of the Portuguese KM Society (APGC) discussion list and personal contacts with KM leaders. The survey invitations to the discussion lists were sent to the group's e-mail, and the formal approval and support of the moderators were obtained previously. Table 2 presents the statements associated to each variable.

Table 2 Research model variables and their references

Construct (variable)	*References*	*Variable description*
Competence management (cm1)	Bitencourt (2004); Ehms and Langen (2002); Fleury and Fleury (2004); Weerdmeester *et al.* (2003)	The organisation has a formal and up-to-date description of the competencies that are expected for each position.
Competence management (cm2)	Bitencourt (2004); Ehms and Langen (2002); Fleury and Fleury (2004); Weerdmeester *et al.* (2003)	The organisation identifies skill gaps and develops training strategies to fill these gaps.
Competence management (cm3)	Ehms and Langen (2002)	The organisation encourages workers to enrol in work-related courses by reimbursing tuition fees and/or offering off-site training during working hours.
Competence management (cm4)	Ehms and Langen (2002); Terra (2000)	Knowledge creation and sharing attitudes are very important aspects of a worker's evaluation.
Sense making (sm1)	Choo (1998); Ehms and Langen (2002); Terra (2000); Weerdmeester *et al.* (2003)	The organisation dedicates resources to detect and obtain external information from competitors, clients, universities, government, suppliers and industrial associations.
Sense making (sm2)	Choo (1998); Ehms and Langen (2002); Weerdmeester *et al.* (2003)	The organisation develops partnerships and alliances with other organisations in order to acquire and exchange information.
Sense making (sm3)	Choo (1998); Terra (2000)	The organisation creates opportunities to discuss changes in external environment.
Sense making (sm4)	Choo (1998); Ehms and Langen (2002)	The organisation has a systematic approach to communicating its mission, values, shared meanings and common beliefs.

Table 2 Research model variables and their references (continued)

Construct (variable)	*References*	*Variable description*
Knowledge creation (kc1)	Choo (1998); Ehms and Langen (2002); Terra (2000)	The organisational culture encourages experimentation, creativity, innovation, knowledge sharing and collaboration among departments.
Knowledge creation (kc2)	Choo (1998); Terra (2000); Weerdmeester *et al.* (2003)	The organisation facilitates collaborative work by project teams that are physically separated ('virtual teams').
Knowledge creation (kc3)	Choo (1998); Davenport and Prusak (1998);Terra (2000)	The organisation promotes the creation of communities of practice.
Knowledge creation (kc4)	Choo (1998); Weerdmeester *et al.* (2003)	The organisation encourages experienced workers to transfer their knowledge to new or less experienced workers.
Knowledge creation (kc5)	Choo (1998)	The organisation has formal mentoring and/or apprenticeships programmes.
Knowledge creation (kc6)	Choo (1998); Ehms and Langen (2002); Weerdmeester *et al.* (2003)	The organisation documents its projects and makes this information easily accessible.
Knowledge creation (kc7)	Choo (1998); Ehms and Langen (2002)	The organisation maintains an organised and up-to-date information repository of good work practices and lessons learned.
Decision making (dm1)	Choo (1998); Weerdmeester *et al.* (2003)	Information about good work practices, failures and/or errors, project documentation and lessons learned is taken into account when decisions are made.
Decision making (dm2)	Choo (1998); Weerdmeester *et al.* (2003)	The organisation has established decision routines and rules to support budget planning, project analysis, allocation of resources and project preordination.
Decision making (dm3)	Choo (1998)	The organisation extensively collects information to generate multiple options and alternative solutions to its problems.
Decision making (dm4)	Choo (1998)	The organisation stimulates collaborative decision-making, allowing individuals and groups to express openly their opinions.

5 Data analysis

The model variables were converted into a web-based questionnaire using Likert scales (0–10). The answers were recorded in a secure SQL database. The questionnaire was answered by 98 Brazilian and 70 Portuguese organisations. It is hard to evaluate the response rate as a person can be member of more than one discussion list where the

survey invitation was posted. Levene's (equality of variances) was applied to the data, indicating that was possible to combine both nations into a single group, as there were no significant differences in the answer's patterns.

Among the organisations, 17% were related to government, 14% to information technology sector, 11% belong to the banking industry, 8% were chemical and petroleum industries, 6% belong to the utilities sector, and the rest is distributed across 15 industries.

Government organisations were a significant percentage (17%) of the respondents, reinforcing the assumption that it is worth investigating KM initiatives in the public sector. The good news is that the Brazilian public organisations that participated in this survey seem to be interested in the development of their structural capital. When polls unveil a change of political parties, there is usually a great loss of knowledge as social and economical programmes are not continued and most of the executive staff is changed. The availability of structural capital may help the new staff to distinguish which initiatives and practices of the former government should be e xploited or not.

Among the respondents, 43% were from IT department (IT project managers, system analysts, CIOs), 18% were from Human Resource (HR) department, 11% had specific KM roles (Chief Knowledge Officers or KM project leader), and the rest was from other departments (communications, research and development). Furthermore, 55% of the respondents have a managerial role in their organisations. There was a preponderance of medium and large organisations in the sample, as 85% of organisations have more than 100 employees, and 59% of the organisations had more than 500 employees.

The average working time in the organisation of the respondents was 9.58 years (standard deviation, sd = 7.72), and the average time in this job was 9.79 years (sd = 7.34). Actually, 52% of the respondents have been working in their job for more time than they are in their present organisation. This result indicates a high level of professional experience of the respondents contributing to the quality of the survey.

Multivariate normality analysis was performed using the Mardia's coefficient (multivariate kurtosis value) whose result was 1.098. Values of 1.96 or less indicate that there is a non-significant kurtosis, which means normality.

Table 3 provides descriptive statistics about the variables that compound the research model.

The best means of the competence management construct were obtained by the variable cm1 (description of the required competencies for each job position) and the variable cm3 (reimbursement of tuition fees of work-related courses). Organisations are discovering the importance of investing in their human capital. Of course, there is always the risk of investing in an employee, and he/she decides to leave the organisation and work for the competitor. However, it is even worse when the organisation decides not to invest in its employees and continues to deal with competencies gaps and low productivity. The variables cm2 (strategies to reduce skill gaps) and cm4 (employee evaluation based on innovation and sharing capacities) presented very similar results. If the variable cm3 is compared to cm4, it is clear to notice that the training dimension of competence management is more developed than the evaluation dimension for the organisations studied in this research.

Table 3 Descriptive statistics

Variables (construct acronym)	*Avg*	*sd*
Competence description (cm1)	6.5	3.0
Training to fill gaps (cm2)	5.6	3.0
Incentives to employee training (cm3)	6.4	2.9
Performance evaluation based on cooperation (cm4)	5.6	3.2
Resources dedicated to information gathering (sm1)	5.5	3.1
Development of strategic alliances (sm2)	6.1	3.0
Opportunities to discuss external environment (sm3)	5.7	2.9
Communication of mission and values (sm4)	6.8	2.9
Culture to support innovation (kc1)	5.8	3.0
Collaboration between project teams (kc2)	6.0	2.9
Communities of practice (kc3)	4.7	3.2
Master-apprentice knowledge exchange (kc4)	5.7	3.1
Mentorship programmes (kc5)	5.0	3.3
Project documentation (kc6)	5.6	2.8
Repositories of best practices and lessons learned (kc7)	4.9	3.0
Past documentation to support decisions (dm1)	5.0	3.0
Existence of decision routines (dm2)	5.7	3.1
Information gathering to generate alternatives (dm3)	5.4	3.0
Collaborative decision-making (dm4)	5.8	2.9

The sense-making variables had similar behaviour regarding to their frequency distributions and means. The lowest mean of the sense-making construct was obtained by the variable sm1 that is related to the existence of external information gathering practices, which are important processes of competitive intelligence and environmental scanning. On the other hand, internal communication of organisational values and mission reached a satisfactory level (variable sm4). This is good news because sense making is fostered by the existence of common meanings and shared beliefs.

The variables related to knowledge creation presented worse performance than the sense-making variables. The worst results were achieved by the creation of communities of practice (variable kc3), mentoring programmes (kc5) and lessons learned repositories (kc7). These three variables have in common the fact of being related to more formal support practices of knowledge creation, *i.e.*, practices that require a higher level of organisational support.

On the other hand, the variables related to more informal practices, such as kc1, kc2, kc4 and kc6, had little bit better means. Socialisation and collaboration, which are fundamental components of knowledge creation, are more frequent in the context of projects (kc2) when the need of multidisciplinary knowledge naturally requires a greater level of cooperation among team members. Externalisation also occurs more intensively during documentation of projects (kc6) than in the context of the creation of corporative

repositories of best practices and lessons learned (kc7). These results suggest that knowledge created has been more supported by informal practices, usually based on an organisational culture that stimulates sharing and innovation (kc1), than by formal and systematic practices. For instance, despite the low incentive to the creation of communities of practices (kc3), the employees collaborate when they need, especially within projects (kc2). Analogously, organisations seem to support informally the knowledge exchange between seniors and trainees (kc4), but this practice not always results in the establishment of formal mentoring and apprenticeship programmes.

The four decision-making variables presented similar behaviours (Table 3). The best means were achieved by dm2 (existence of decision routines) and dm4 (collaborative decision-making). The worst result of the construct was obtained by dm1, which measures the usage of project documentation and lessons learned when decisions are made. This result can be partially explained by the results of kc6 (the organisation documents its projects) and kc7 (the organisation maintains lessons learned repositories). Maybe the decision makers are not using project documentation and lessons learned because they do not exist or are not easy to access.

Among the three knowing organisation dimensions, sense-making presented the better results with average lightly superior to knowledge creation and decision making. This result may be partially explained by the increasing competitive environment that requires organisations to develop their abilities to interpret changing scenarios. Moreover, sense-making is more procedural than knowledge creation and decision making, providing then more conditions to a systematic approach through competitive intelligence and environmental scanning activities.

Factor analysis is used to unveil the dimensions of a set of variables. In this research, factor analysis was used to validate a scale by demonstrating that its variables load on the same factor, and to drop proposed scale items which cross-load on more than one factor. Nevertheless, when using factor analysis, it is necessary to verify the correlation matrix through Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (which should be greater than 0.7) and Bartlett's test of sphericity, that tests the null hypothesis that variables are not correlated on the population. Therefore, if the significance is below 0.05, the null hypothesis will be rejected. All constructs have obtained satisfactory index, according to Table 4.

Table 4 KMO measure of sampling adequacy and Bartlett's test of sphericity

		Bartlett's test of sphericity		
Constructs	*KMO*	*Chi-square*	*Degrees of freedom*	*Significance*
Competence management	0.74	289.10	3	0.00
Sense making	0.80	363.40	6	0.00
Knowledge creation	0.80	326.26	6	0.00
Decision making	0.84	455.96	6	0.00

Factor analysis was applied resulting in only one factor for each construct, as shown on Tables 5 to 8. Communality is the proportion of variance explained by common factors (Malhotra, 2001).

Table 5 Factor analysis of the competence management construct

Variables	*Factor 1*	*Commonality (h^2)*
Cm2 (training to fill skill gaps)	0.929	0.864
Cm1 (description of competence)	0.818	0.669
Cm3 (incentives to employee training)	0.816	0.665
Cm4 (performance evaluation based on cooperation)	0.663	0.439
Explained variance (Σh^2)/($\Sigma \sigma^2$)	65.92%	

Table 6 Factor analysis of the sense making construct

Variables	*Factor 1*	*Communalities (h^2)*
Sm3 (time to discuss changes in external environment)	0.893	0.797
Sm2 (strategic alliances for information exchange)	0.881	0.777
Sm1 (resources dedicated to information gathering)	0.875	0.765
Sm4 (organisational values and mission communication)	0.761	0.579
Explained variance (Σh^2)/($\Sigma \sigma^2$)	72.94%	

Table 7 Factor analysis of the knowledge creation construct

Variables	*Factor 1*	*Commonality (h^2)*
Kc7 (documents, best practices, lessons learned)	0.882	0.778
Kc1 (culture to support innovation and creativity)	0.880	0.774
Kc2 (collaboration between project teams)	0.868	0.754
Kc4 (master-apprentice knowledge exchange)	0.856	0.733
Kc6 (project documentation)	0.835	0.697
Kc3 (community of practices)	0.802	0.643
Kc5 (mentorship programmes)	0.746	0.557
Explained variance (Σh^2)/($\Sigma \sigma^2$)	70.52%	

Table 8 Factor analysis of the decision-making construct

Variables	*Factor 1*	*Communalities (h^2)*
Dm3 (information gathering to generate alternatives)	0.923	0.852
Dm2 (decision routines)	0.884	0.781
Dm1 (documents are used to support decisions)	0.875	0.766
Dm4 (collaborative decision-making)	0.875	0.765
Explained Variance (Σh^2)/($\Sigma \sigma^2$)	79.10%	

Reliability is the correlation of an item with a hypothetical one which truly measures what it is supposed to. Cronbach's alpha measures how well a set of variables measures a single unidimensional latent construct, and values over 0.8 are considered as indicators of reliability (Netemeyer *et al*., 2003). Item-total correlation is also suggested to evaluate convergence among variables, and values over 0.4 are considered adequate. Table 9 presents the results of reliability analysis.

Table 9 Reliability analysis

Constructs	*Variables*	*Inter-item correlation*	R^2	*Alpha if item deleted*	*Cronbach's alpha*	*Standardised alpha*
Competence management	Cm1	0.6396	0.5652	0.7742	0.8198	0.8221
	Cm2	0.8295	0.7300	0.6809		
	Cm3	0.6465	0.5003	0.7719		
	Cm4	0.4789	0.2603	0.8499		
Sense making	Sm1	0.7596	0.5770	0.8293	0.8753	0.8748
	Sm2	0.7728	0.5972	0.8238		
	Sm3	0.7937	0.6300	0.8160		
	Sm4	0.6080	0.3697	0.8861		
Knowledge creation	Kc1	0.8252	0.7107	0.9122	0.9283	0.9297
	Kc2	0.8119	0.7107	0.9137		
	Kc3	0.7263	0.5871	0.9221		
	Kc4	0.7983	0.6590	0.9148		
	Kc5	0.6649	0.4678	0.9287		
	Kc6	0.7667	0.6460	0.9181		
	Kc7	0.8305	0.7251	0.9117		
Decision making	Dm1	0.7769	0.6084	0.8932	0.9117	0.9117
	Dm2	0.7895	0.6494	0.8891		
	Dm3	0.8546	0.7349	0.8657		
	Dm4	0.7765	0.6100	0.8933		

Convergent validity was also performed, but for parsimony reasons, are not presented in this paper. All constructs obtained sufficient scores in convergent validity. Convergent validity evaluates how the items of a construct are positively correlated to each other (Malhotra, 2001).

Discriminant validity assesses the degree to which a concept and its indicators differ from another concept and its indicators. In order to perform discriminant analysis, the Chi-square's difference analysis proposed by Bagozzi *et al.* (1991) was used. The statistical procedure involves four steps: a confirmatory factor analysis model is defined for the constructs, a null model where the covariance of constructs is equal to 1 is defined, an alternative model where the covariance (ϕ) is freely estimated is defined, and the Chi-square's difference with one degree of freedom is used to check the null

hypothesis that the models' fit is the same. When the Chi-square's difference is greater than 3.841, the constructs pass the discrimant analysis test. As shown on Table 10, the constructs have discrimant validity.

Table 10 Discrimant validity

Paired constructs		χ^2 *(Chi-square)*			
Construct A	*Construct B*	$\phi = 1$	ϕ *free*	*Difference*	*Sig.*
Sense making	Knowledge creation	205.256	122.13	83.12	0.00
Sense making	Competence management	160.59	114.81	45.78	0.00
Sense making	Decision making	137.026	64.19	72.84	0.00
Knowledge creation	Competence management	279.81	136.85	142.96	0.00
Knowledge creation	Decision making	249.03	116.35	132.67	0.00
Competence management	Decision making	209.18	95.56	113.61	0.00

The final common criterion for construct validity is nomological validity, or the degree to which the construct as measured by a set of variables predicts other constructs that. Nomological validity assesses the relationships among theoretical constructs, confirming significant correlations. In this research, path analysis procedures were used to model the value of each dependent variable based on its linear relationship to predictors. The regression coefficient is the linear correlation between the observed and model-predicted values of the dependent variable, and its large value indicates a strong relationship.

Those constructs marked with ** indicate that the relationship is significant at the level of 1%, and those marked with *** are at the level of 0.1%. The bigger the regression value, the greater is the influence of the independent variable on the dependent variable, as shown on Table 11.

Table 11 Path coefficients of the research model

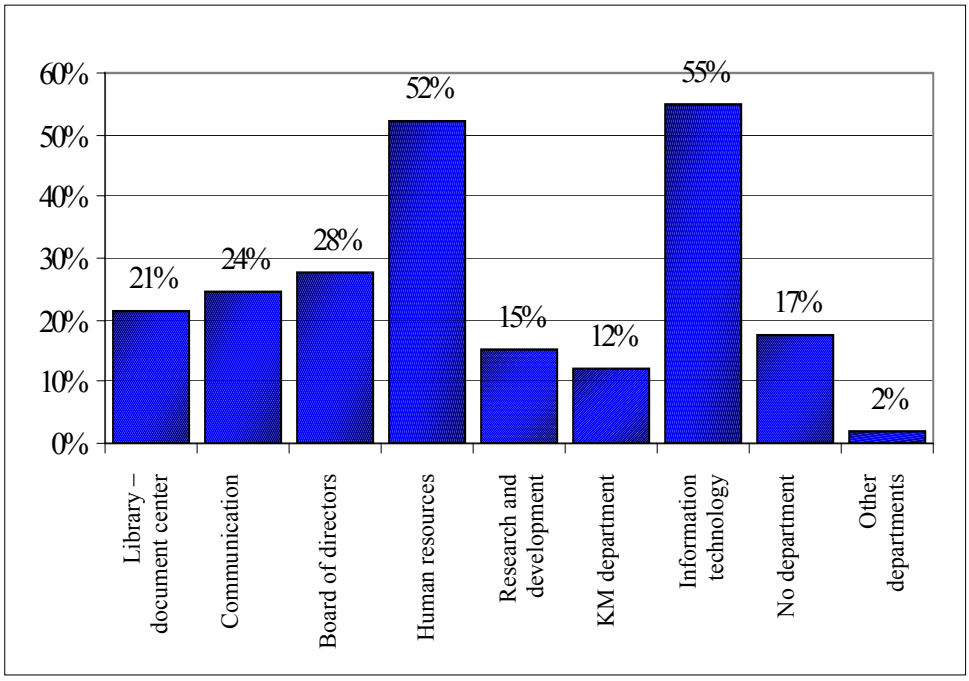
Constructs		*Regression*	*Std. error*	*t-Value*	*Sig.*
Independent	*Dependent*				
Competence management**	Sense making (hypothesis H0)	0.19	0.08	2.48	0.01
Competence management***	Knowledge creation (hypothesis H1)	0.31	0.05	5.94	0.00
Competence management (not a significant relationship)	Decision making (hypothesis H2)	0.11	0.07	1.65	0.10

Path analysis has given support to hypotheses H0 and H1, but H2. Therefore, in the scope of this research, it was found that competence management is a significant antecedent of knowledge creation (higher influence) and sense-making (lower influence), but not of decision making. These results reinforce the possibilities for synergy between competence management and KM initiatives, especially those ones supported by informal practices with emphasis on sharing and collaboration. On the other hand, the lack of

relationship between competence management and decision making can indicate the need of developing managerial competences such as leadership, analytical reasoning and negotiation. In other words, the research findings give evidences that organisations that have good competence management initiatives tend towards higher success rates in their KM projects. In the pragmatic organisational arena, there is a chance of convergence of different theoretical approaches such as Human Resource Management (HRM), organisational learning, competence management and KM. Furthermore, research's results emphasise the strategic role of the HR department on the KM journey.

The final part of the questionnaire had a question asking which department(s) were responsible for the KM initiative. This question allowed multiple responses, as more than one department can take charge of KM. Therefore the sum of percentages is over 100%. Only the option 'no department is responsible for knowledge management' did not allow multiple answers. As shown by Figure 3, the IT and Human Resource (HR) departments appeared as the main leaders of KM initiatives.

Figure 3 Departments responsible for knowledge management



It is interesting to report that few organisations (12%) have created a specific department for KM. This option may be partially explained by the organisational pragmatism and the need of reducing costs, creating then obstacles for the creation of areas related to more intangible aspects. Therefore, the creation of a specific KM area does not appear as a trend in this survey. Another relevant result was the reduced involvement of libraries and documentation centres as leaders of KM projects. A warning could be sent to the organisations (17% of respondents) where there is no explicit responsibility for KM, which may compromise the ability of the organisation to innovate and compete.

6 Conclusion

The survey results indicate that the Knowing Organisation Model (Choo, 1998) provides a consistent framework for investigating the KM phenomenon. The results point out that strategic information management practices to support the sense-making process have been more developed than the correspondent practices to support knowledge creation and decision making. One possible explanation to this phenomenon could be that market competition is forcing organisations to develop environmental scanning and competitive intelligence practices.

This research indicates too that competence management is a significant antecedent of KM, with relevant influences on knowledge creation and sense-making practices. This result indicates the interest of reinforcing the synergy between competence management and KM initiatives and developing multidisciplinary studies where the theoretical approaches from human resource management, organisational learning and KM studies may be integrated.

The research concluded that, for the studied organisations, there is a predominance of informal knowledge creation practices over formal practices. This result points out the importance of organisational cultures that stimulate sharing and innovation as, as proposed by Krogh *et al*. (2001), informality may promote a context to knowledge creation. However, excessive informality reduces the level of maturity of KM practices, since the roles in managing knowledge are not clearly defined, the financial support is not given and it is difficult to measure results.

It is important to notice that the recent discussion about KM maturity does not intend to create 'one size fits all KM', but to establish guidelines and minimum patterns to help organisations to evaluate their initiatives and to share experience using a common terminology.

Even if consulting companies and software vendors have created and developed a big KM software and services market that is continuously growing, the analysis of academic and business publications (business magazines, white papers from vendors, consulting reports) shows that the initial euphoria and excessive emphasis on IT, that characterised the first KM projects, is being gradually replaced by a wider comprehension of the social and cultural aspects of knowledge management, bringing the focus to what really matters, the knowledge worker.

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