INFORMATION SYSTEM MANAGEMENT COMPETENCIES OF BUSINESS EXECUTIVES IN SPAIN: INSIGHTS FROM AN EXPLORATORY DELPHI STUDY

IE Working Paper SI8-107-I 26 / 11 / 2003

Salvador Aragón

Instituto de Empresa
Information Management
Research Center*
María de Molina, 12, 4.
28006, Madrid-Spain
salvador.aragon@ie.edu

Ryan Peterson

Instituto de Empresa
Information Management
Research Center*
María de Molina, 12, 4.
28006, Madrid-Spain
ryan.peterson@ie.edu

Abstract

This paper presents an exploratory study of Information Systems (IS) competencies of business managers in Spain. Following resource-based theory and a knowledge-based view of IS competencies, an extensive review of the literature is conducted to identify a comprehensive list of IS competencies of business managers. In order to validate the business IS competence model, a Delphi study is conducted using two panels consisting of general managers and IS managers. The results indicate that IS competencies of business managers involve a fluid mix of both explicit and tacit knowledge components, and suggest that 'core' IS competencies of business managers involve knowledge and experience in the strategic management of IS. Core business IS competencies involve having knowledge about IS strategy, IS investment management, IS resource allocation, IS sourcing options, IS relationship management and IS change management, and professional experience in IS projects and managing IS. This paper concludes by discussing the implications of these findings and provides several directions for future research.

Keywords

Management of IS, IS competencies, Business management, Resource-based theory, Delphi study

* *Research sponsored by Accenture*
* *Research sponsored by Accenture*

Depósito Legal: M-20073-2002 I.S.S.N.: 1579-4873

INTRODUCTION

Almost a decade ago, Rockart (1996) concluded that unless Information Systems (IS) are included in business managers' strategy and mental models, the best IS organizations would not succeed. Today, innovative inter-organizational enterprise systems, collaborative electronic networks, and electronic customer relationship management are shaping business models, work patterns, and organizational lifestyles, and the locus of IS innovation has shifted from technology to business.

IS expertise is no longer confined to the realm of the IS organization. Consequently, IS competence of business managers is a *sine qua non* for realizing business value with IS (Boynton et al., 1994; Mata et al., 1995; Peterson et al., 2000; Rockart 1996; Ross et al., 1996; Sambamurthy & Zmud, 1997; 1999). Business managers are now expected and need to take co-ownership of IS investments, co-leadership of IS projects and IS implementation, and the management of IS benefits (Bassellier et al., 2001; Ward & Peppard, 2002).

We have, however, a limited and partial understanding of what exactly business managers need to know about (the governance and management of) IS in order to manage IS investments and IS benefits effectively in contemporary organizations. While previous studies have identified core IS organizational competencies and key IS capabilities (Bharadwaj, 2000; Sambamurthy & Zmud, 1997; Feeny & Willcocks, 1998), there is a void in empirical research on the requisite IS competencies of the business and its managers. This situation is exacerbated by the lack of understanding on the importance and relevance of business IS competencies for the future, particularly within the emerging "e-Europe" (Commission of the European Communities, 2002).

The present study addresses this void in empirical research and focuses on contributing to theory development in the field of business IS competencies. The research objective is to explore, identify and validate key IS competencies of business managers, and provide a comprehensive business IS competency model (BISCO). Our main research question is: What is the requisite set of IS competencies of business managers for managing IS in contemporary organizations?

The remainder of this paper is structured as follows. In the following section, we provide a theoretical background to IS competencies, and the research methodology is outlined in section three. The results of this study are presented in section four, and we conclude in section five by discussing the results and implications of this study and identifying directions for future research.

THEORETICAL BACKGROUND

In general, competence refers to a set of knowledge, skills, personality traits and attitudes, integrated with (work) experience, which are deemed essential for effective performance. IS competence of business managers is defined as the set of IS-related knowledge and experiences that a business manager possesses and develops over time, which enables him/her to exhibit effective behavior in the management of IS (Bassellier et al., 2001; Sambamurthy & Zmud, 1997).

This knowledge-based perspective of IS competence builds forth on resource-based models and knowledge-based theories of organization and management (Barney, 1991; Grant, 1996), and is in line with the growing literature and support for a resource-based view of IS management (Bharadwaj, 2000; Mata et al., 1995; Rockart, 1996; Ross et al., 1996). The knowledge-based model distinguishes resources from capabilities, where knowledge-based resources represent organizational-specific knowledge stocks and processes, and capabilities reflect the ability to combine and integrate knowledge-based resources (Grant, 1996). The basic premise of this study is thus that knowledge-based IS competencies of business managers are positively associated with the ability to manage IS effectively (Boynton et al., 1994; Bassellier et al., 2001; Bharadwaj et al., 1999; Brown & Magill, 1994; Reich & Benbasat, 2000; Sambamurthy & Zmud, 1997, 1999).

Table 1. Knowledge-based IS Competencies of Business Managers.

Explicit IS Knowledge	Factors	Bassellier et al. (2001)	Ives et al. (2002)	Gorgone (2001)	Gant (2001)	Reich (2000)
Technology	Current Technology Portfolio	✓	✓	✓	✓	✓
	New Technologies	✓	✓	✓	✓	✓
	Competitor's IS use	✓	✓		✓	✓
Applications	Current Application Portfolio	✓	✓	✓		✓
	New Applications	✓	✓			✓
	Emerging Business Models		✓	✓	✓	✓
System Development	Development Methodologies	✓	✓	✓	✓	✓
	Project Management	✓	✓	✓		✓
	Change Management		✓	✓	✓	✓
Management of IS	IS Strategy, Policy and Planning	✓	✓	✓	✓	✓
	IS Resource Allocation	✓	✓			✓
	IS Relationship Management		✓	✓	✓	✓
Access to IS Knowledge	IS Knowledge Networking	✓				
	Secondary IS Knowledge Sources	✓				
Implicit IS Knowledge	**Factors**					
Experience	Personal IS Use	✓				✓
	IS Project Experience	✓				
	IS Management Experience	✓				✓
Frames of Reference	Business Process View	✓	✓		✓	✓
	IS Transformation View	✓	✓		✓	✓

The knowledge-based approach of IS competence emphasizes business IS knowledge, and excludes skills and/or personality traits, as the former assumes specific predefined tasks, while the latter focuses on general, non-task related personal attributes, both of which are too static and/or generic to capture the dynamic nature and specificity of IS competencies (Bassellier et al., 2001). Focusing on knowledge and experiences emphasizes the explicit and tacit nature of IS competencies, i.e., the formal (codified and explicit) know-how and know-why, and personal frames of reference (Nonaka, 1994; Polanyi, 1967; Senge 1990).

Frames of reference are 'cognitive filters' or 'internal standards' shaped through previous experiences, a person uses (implicitly) to describe or evaluate a situation. These highly personal and subjective frames of reference describe a repertoire of tacit knowledge that is used to impose structure upon, and impart meaning to, otherwise ambiguous, social and

situational information to facilitate understanding, competence-development and learning (Gioia & Chittipeddi, 1991). Knowledge is thus viewed as a fluid mix of framed experiences, values, contextual information, and expert insights, which provides a framework for evaluating and assimilating new experiences and information (Nonaka, 1994; Polanyi, 1967; Senge 1990).

Based on an extensive review of the literature and expert consultations, Bassellier et al. (2001) develop a basic model of business managers' IS competence. The model, which is supported by several other authors, distinguishes between *explicit* and *implicit* IS knowledge (Table 1), each consisting of different factors constituting business management IS competence. Other studies corroborate this *general* list of IS competencies of business managers (Boynton et al., 1994; Bharadwaj et al., 1999; Brown & Magill, 1994; Peterson et al., 2000; Sambamurthy & Zmud, 1999; Weill & Broadbent, 1998). The question remains, however, what the requisite set of *specific* IS competencies of business managers should be in order to manage IS in today's changing business environment. In the following section, we describe the research design and methodology used to answer this question.

RESEARCH DESIGN AND METHODOLOGY

In order to identify and validate the requisite set of specific IS competencies of business managers, an exploratory research design was adopted. Due to (a) the complex and contextual nature of IS competencies of business executives, (b) the contemporary orientation of the research, (c) the lack of a cumulative research base on IS competencies of business managers, and (d) the ill-defined terminology surrounding IS competencies, a Delphi research methodology was deemed appropriate (Galliers, 1991).

The Delphi research methodology is well established in social and economic sciences, particularly in the areas of technology forecasting and socio-economic impacts. (Adler & Ziglio, 1995; Turoff, 1971, Helmer, 1959; Loye, 1978). In general, a Delphi study aims at the identification of objectives, priorities, and/or alternatives, and/or the exploration and correlation of judgments concerning complex (multi-disciplinary and/or cross-functional) phenomenon (Moore, 1987). Helmer (1959) concludes that Delphi studies are particularly useful and relevant for investigating complex and dynamic phenomena for which it is difficult to define explicit 'laws of science'. Under these conditions, the qualified judgment of a specific group of professionals can serve as a *proxy* indicator (Turoff, 1971).

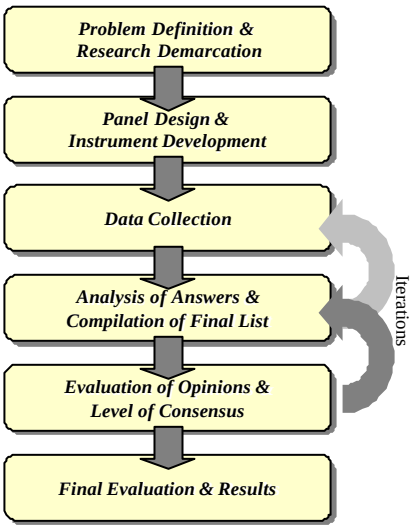

Figure 1. Different Stages of Delphi Study.

In recent years, the use of Delphi studies has gained increasing acceptance among IS researchers, particularly in areas where experiential information regarding a complex phenomenon or concept is critical, and for which there is no empirically or theoretically established body of norms or knowledge (Bharadwaj et al., 1999; Nambisan et al. 1999).

This Delphi study was conducted in six stages (Fig. 1). Following the definition of the problem and research questions (*Stage 1*), the panel and instruments were designed and developed (*Stage 2*). In addressing the requirements of validity, a structured questionnaire was developed consisting of two parts: (a) a list of IS competencies and descriptions following the literature review (see Section 2, Table 1); (b) open questions regarding other IS competencies not included in part (a) and additional comments. The importance of IS competencies for business managers was measured using a Likert-scale from 1 (not important) to 10 (extremely important).

This questionnaire was directed at two panels of professionals in Spain. The first panel consisted of 32 general managers (Panel G) representing different business functions. The second (complementary) panel consisted of 29 IS managers (Panel S) from different industries (Table 2). Using two panels of professionals across different functions from different industries minimizes bias and improves validity (Lang, 1998).

In the first round of data collection (*Stage 3*), the questionnaire was sent electronically to both panels, including a cover letter introducing the relevance and objectives of the study, and soliciting participation. Data was collected in March and April of 2003.

Table 2. Panel Composition and Characteristics.

Panel G: General Managers	#	Panel S: IS Managers	#
Marketing &Sales	10	Academia	2
Operations & Production	8	Public Administration	3
Top Management	3	Construction	4
Human Resources	3	Manufacturing	4
Finance & Law	3	Distribution	4
Research & Development	2	ICT	4
IS	2	Financial Services	4
Logistics	1	Other	14
Total	***32***		***29***

Based upon a first analysis of the answers, a final list of IS competencies was compiled (*Stage 4*), and redirected to the panels. This process of soliciting feedback (electronically and anonymously) was conducted in three iterations until a specific level of consensus was achieved (*Stage 5*). The level of consensus, which is an indicator of the reliability of the results (comparable to Cronbach a), was measured after each round through the predictive association index (PIA), which assesses the stability (non-significant variation) among the answers of participants in successive rounds of data collection (Chaffin, 1980; Goodman, 1954). The PIA ranges from 1 (complete stability) to 0 (no stability). Given the exploratory nature of this study, a PIA of 0.75 was deemed appropriate (Chaffin, 1980). For the final round and evaluation of the results (Stage 6), the PIA for the general panel was .83, and .93 for the IS panel, thus assuring stability (i.e., high level of consensus) and reliability of the results.

RESULTS

The results of the Delphi are presented in Table 3, with the IS competencies of business managers ranked according to their level of importance within the general management panel. The level of importance within this panel ranges from moderately important (5.20) to highly

important (8.56), with an average importance of 7.12. The level of importance within the IS panel also ranges from moderately important (5.93) to highly important (8.93), with an average importance of 7.83.

Within the general management panel, the most important IS competencies of business managers are: IS strategy and policy, a transformation view/vision of IS, IS management experience, IS relationship management, change management, emerging business models, IS sourcing, new technologies, and IS project management experience. These IS competencies include both explicit and implicit knowledge, and involve particularly knowledge about and experience in the management of IS.

Table 3. Importance of IS Competencies for Business Managers according to General and IS panels.

Factors		Dimension		General	IS	Ave.
A	IS strategy & policy [B]	Management	Explicit	8.56	8.07	8.32
B	IS transformation view [G]	Frame of Ref.	Implicit	8.13	7.48*	7.81
C	IS management experience [B]	Experience	Implicit	7.94	8.28*	8.11
D	IS relationship management [G]	Management	Explicit	7.88	7.59	7.74
E	Change management [B]	Management	Explicit	7.81	8.38	8.09
F	Emerging business models [G]	Applications	Explicit	7.81	7.52	7.67
G	IS project management experience [B]	Experience	Implicit	7.78	8.79*	8.23
H+	IS sourcing [B]	Management	Explicit	7.38	8.14*	7.76
I	New technologies [B]	Technology	Explicit	7.38	7.93	7.66
J	IS resource allocation [S]	Management	Explicit	7.31	8.93*	8.12
K	New applications	Applications	Explicit	7.19	7.59	7.39
L+	IS investment management [S]	Management	Explicit	7.13	8.72*	7.93
M	Competitor's IS use	Technology	Explicit	7.06	8.10	7.58
N	Business process view	Frame of Ref.	Implicit	6.90	6.00	6.45
O	IS knowledge networking	Access	Explicit	6.90	7.93*	7.42
P	Current technology portfolio	Technology	Explicit	6.53	7.90*	7.22
Q	IS knowledge sources	Access	Explicit	6.47	7.62	7.04
R	IS project management	Development	Explicit	6.22	8.03*	7.13
S	Application portfolio	Applications	Explicit	6.13	7.62*	6.88
T	System development	Development	Explicit	5.84	7.90*	6.87
U	Personal IS use	Experience	Implicit	5.20	5.93	5.57
			PIA	***.83***	***.93***	

G-Most important IS competencies in general panel; **S**-Most important IS competencies in IS panel; **B**-Most important IS competencies in both panels; *significant difference p<.01; + added to list of IS competencies after first round of data collection.

Complementing this view of general managers, the IS management panel considers the following IS competencies as most important: IS resource allocation, IS investment management, IS project management experience, change management, IS management experience, IS sourcing, new technologies and IS strategy and policy. These IS competencies also include both explicit and implicit knowledge, and involve knowledge about and experience in the management of IS (with the exception of knowledge about new emerging Information and Communication Technologies).

Both panels coincide in the importance of (a) knowledge about IS strategy & policy, IS sourcing, new technologies, and change management, and (b) experience in IS management and IS project management experience (Fig. 2). These results confirm previous studies that indicate that IS competencies of business managers involve a fluid mix of both explicit and tacit knowledge components (Bassellier et al., 2001; Nonaka, 1994, Polanyi, 1967; Sambamurthy & Zmud, 1997; Senge, 1990). These findings also indicate that 'core' IS competencies of business managers involve knowledge and experience in the *strategic* management of IS (e.g., strategy, sourcing, change), thereby supporting previous studies that IS competent business involvement is essential for effective IS governance (Bassellier et al.,

2001; Boynton et al., 1994; Brown & Magill, 1994; Peterson et al., 2000; Rockart et al., 1996; Sambamurthy & Zmud, 1999; Weill & Broadbent, 1998).

Contrary to previous studies (Bassellier et al., 2001; Ives et al., 2002; Jarvenpaa & Ives, 1991; Keen, 1991; Rockart et al., 1996; Reich, 2000;), IS competencies that are considered as *less* important for business managers across both panels include: (a) the personal use of IS applications and desktop software by business managers, and (b) a process-view (vs. functional view) of the business (Fig. 2). While *not considered un-important*, both IS competencies seem to be less important today, in comparison to the 1980s and early 1990s.

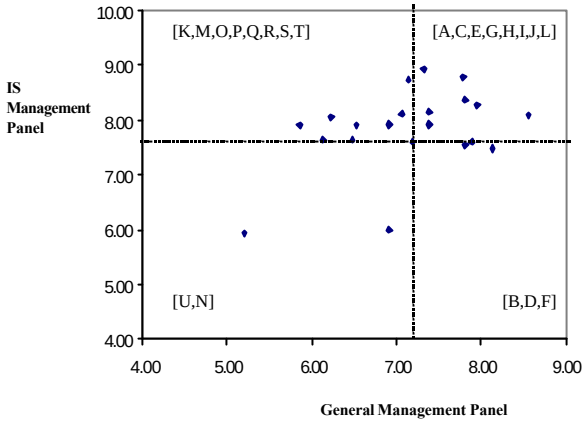

Figure 2. Scatter-plot of IS Competencies.

During this period, PCs and desktop software were introduced in the market, and became widely available to organizations and business managers. Within this time-frame, business management's personal experience and use of IS applications was deemed essential, because experimenting and using IS, would develop a familiarity with technologies and would encourage business management to take more interest in the management of IS (Bassellier et al., 2001). While this reasoning seems logical and suitable for the 1980s and early 1990s, today however, business managers are 'regular', or in many instances 'heavy' users of IS applications and desktop software. The adoption of web-based software and electronic mail applications (and the improvement and simplification of user-interfaces) has propelled and intensified the personal usage of IS in recent years, thus making the personal use of IS applications a less important IS competence in today's business environment.

This same explanation applies to the lesser importance of a process-view of the business. During the early 1990s, the ability to envision the organization in terms of business processes crossing functional areas represented a business' process adaptiveness (Bassellier et al., 2001). It was considered essential for the survival of the firm, as witnessed by numerous publications and developments in the areas of, e.g., business process reengineering, business process mapping, business process redesign, and/or business process integration. Today however, many business managers have changed their functional view of the business, and increasingly regard the organization as an interrelated set of processes, emphasizing not only internal process integration, but moreover, external process integration with suppliers, business partners and customers. Moreover, our findings indicate that the general management panel regards relationship management as an important IS competence (see Table 3).

Table 4. Support for Business IS competencies.

Explicit IS Knowledge	Factors	Support?	Literature
Technology	Current Technology Portfolio	Moderate	Bassellier et al. (2001), Ives et al. (2002), Gorgone (2001), Gant (2001), Reich (2000), Bharadwaj et al. (1999), Weill & Broadbent (1998)
	New Technologies	Strong	Vitale et al. (1986), Keen (1991), Bassellier et al. (2001), Ives et al. (2002), Gorgone (2001), Gant (2001), Reich (2000), Weill & Broadbent (1998)
	Competitor's IS use	Moderate	Bassellier et al. (2001), Ives et al. (2002), Gant (2001), Reich (2000), Weill & Broadbent (1998)
Applications	Current Application Portfolio	Moderate	Bassellier et al. (2001), Ives et al. (2002), Gorgone (2001), Reich (2000), Bharadwaj et al. (1999), Weill & Broadbent (1998)
	New Applications	Moderate	Bassellier et al. (2001), Ives et al. (2002), Bharadwaj et al. (1999), Reich (2000)
	Emerging Business Models	Strong	Ives et al. (2002), Gorgone (2001), Gant (2001), Reich (2000), Bharadwaj et al. (1999), Weill & Broadbent (1998)
System Development	Development Methodologies	Weak	Bassellier et al. (2001), Ives et al. (2002), Gorgone (2001), Gant (2001), Bharadwaj et al. (1999), Reich (2000)
	Project Management	Moderate	Bassellier et al. (2001), Ives et al. (2002), Gorgone (2001), Reich (2000), Bharadwaj et al. (1999), Weill & Broadbent (1998)
	Change Management	Strong	Ives et al. (2002), Gorgone (2001), Gant (2001), Reich (2000), Weill & Broadbent (1998)
Management of IS	IS Strategy, Policy and Planning	Strong	Bassellier et al. (2001), Ives et al. (2002), Gorgone (2001), Gant (2001), Reich (2000), Peterson et al. (2000), Weill & Broadbent (1998), Bharadwaj et al. (1999), Rockart et al. (1996)
	IS Resource Allocation	Strong	Bassellier et al. (2001), Ives et al. (2002), Reich (2000), Peterson et al. (2000), Weill & Broadbent (1998), Rockart et al. (1996)
	IS investment management (new)	Strong	Peterson et al. (2000), Weill & Broadbent (1998), Rockart et al. (1996), Boynton et al. (1994), Ward & Peppard (2002)
	IS sourcing (new)	Strong	Peterson et al. (2000), Weill & Broadbent (1998), Rockart et al. (1996), Bharadwaj et al. (1999), Lacity & Willcocks (2001)
	IS Relationship Management	Strong	Peterson et al. (2000), Weill & Broadbent (1998), Rockart et al. (1996), Boynton et al. (1994), Ives et al. (2002), Gorgone (2001), Gant (2001), Bharadwaj et al. (1999), Reich (2000)
Access to IS Knowledge	IS Knowledge Networking	Moderate	Bassellier et al. (2001), Nambisan et al. (1999)
	Secondary IS Knowledge Sources	Moderate	Bassellier et al. (2001), Nambisan et al. (1999)
Implicit IS Knowledge	**Factors**		
Experience	Personal IS Use	Weak	Bassellier et al. (2001), Reich (2000), Nambisan et al. (1999)
	IS Project Experience	Strong	Bassellier et al. (2001), Peterson et al. (2000), Weill & Broadbent (1998), Rockart et al. (1996), Boynton et al. (1994)
	IS Management Experience	Strong	Bassellier et al. (2001), Reich (2000), Peterson et al. (2000), Weill & Broadbent (1998), Rockart et al. (1996), Bharadwaj et al. (1999), Boynton et al. (1994)
Frames of Reference	Business Process View	Weak	Bassellier et al. (2001), Ives et al. (2002), Gant (2001), Reich (2000), Bharadwaj et al. (1999)
	IS Transformation View	Strong	Bassellier et al. (2001), Ives et al. (2002), Gant (2001), Reich (2000), Peterson et al. (2000), Bharadwaj et al. (1999), Weill & Broadbent (1998)

Interestingly, but not entirely surprising, the IS management panel regards certain IS competencies as more important than the general management panel. These IS competencies include, knowledge about the IS application portfolio, IS knowledge networking, the current IS technology portfolio, IS project management, and system development methodologies. These are all (technology/systems) activities and IS competencies, which are (still) at the core of IS organizations and departments (Rockart et al., 1996). The (relatively) high importance placed on these IS competencies by the IS management panel is therefore a reflection of the core activities and processes (and concerns, problems, and challenges) in their professional

working environment, which consequently shapes their frame of reference and their interpretation of the importance of IS competencies for business managers.

In reviewing and summarizing the results, we conclude that the findings yield partial support for the Business IS competence (BISCO) model as proposed by Bassellier et al. (2001), and described by Ives et al. (2002), Gorgone (2001), Gant (2001), and Reich (2000). Specifically, the findings support the importance of 'Management of IS', 'Technology', 'Applications', 'Experience' and 'IS Frame of Reference', yet do not provide strong and convincing support for 'System Development' and 'Access to IS Knowledge' (Table 4).

DISCUSSION

If information systems are so important and fundamental to today's businesses, why is it that we know so little about the essential IS competencies of business managers? While much effort has been invested in scrutinizing the IS competencies and capabilities of the IS organization and its professionals, there is scant empirical evidence regarding requisite business IS competencies for the management of IS. This study addressed this void in empirical research and was aimed at contributing to theory development in the field of business IS competencies. The research objective was to explore, identify and validate key IS competencies of business managers, and provide a comprehensive and contemporary perspective of business IS competencies.

Business IS competencies describe the set of IS-related knowledge and experiences a business manager possesses and develops over time, which enables him or her to manage IS effectively. The results of this study indicate that contemporary IS competencies of business management involve a mix of both explicit and tacit IS knowledge, in which knowledge is viewed as a fusion of framed experiences, values, contextual information, and expert insights, which provide an operational framework for evaluating and assimilating new experiences and information.

The findings yield important insights into the *specific* business IS competencies for managing IS in *contemporary* organizations. These business IS competencies involve (Fig. 3):

- from a *business* perspective: IS strategy and policy, IS transformation view, IS relationship management, change management, emerging business models, IS sourcing, new technologies, and IS management experience and IS project; and
- from an *IS* perspective: IS resource allocation, IS investment management, IS sourcing, new technologies, IS strategy and policy, change management, IS management experience, IS project management experience.

While business and IS managers may have different views on the specific business IS competencies, their complementarity is striking. The focus on IS transformation by general management (output-oriented) complements the focus on IS investments by IS management (input-oriented). The importance of emerging business models (business-focused) complements the importance placed on competitor's IS use (IS-focused) by IS managers. Likewise, IS project management (short-term, dynamic) complements IS relationship management (long-term, stable). This complementary focus and dynamic balance adds flexibility to the development of business IS competencies.

The crux of business management IS competencies, however, centers on the *strategic management* of IS. This involves an in-depth understanding of (I) IS strategy, (II) IS investment management, (III) IS resource allocation, (IV) IS sourcing options, (V) IS relationship management and (VI) IS change management, and (VII) professional experience in IS projects and managing IS. In essence, these IS competencies reflect the foundation of business and management, i.e., the strategic planning, organization, coordination and business monitoring of IS. Questions which are thus pertinent to business management include: What is the strategic impact of IS? How do I align business and IS strategies? What is the business case for investing in IS? How do I manage my IS investment and benefits lifecycle? How do I allocate and obtain IS resources? How do I manage internal and external IS relationships? How do I manage IS-enabled business change and transform my organization?

The message is clear: business managers do not require in-depth technical understanding in order to manage IS for realizing business value. In the past, too often business managers were 'lured' in getting technically involved in IS, whereas the real focus should be on managing the business context in which IT is applied and used.

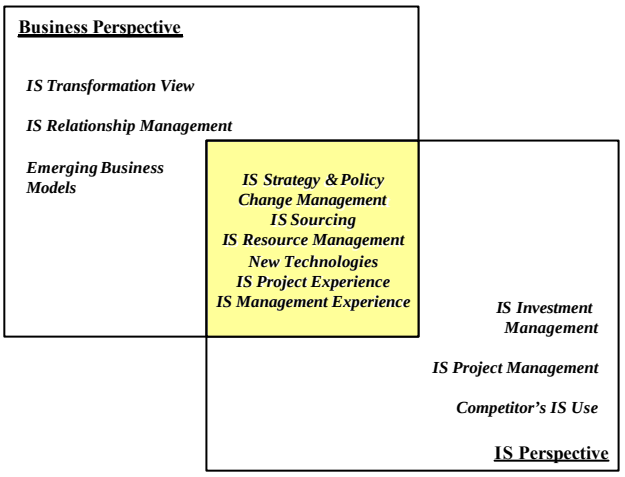

Figure 3. Complementary Perspectives on Business' IS Competencies.

However, while we are eager to answer the question 'what should business management know in order to be IS competent?', the findings also indicate that explicit IS knowledge ('know-what') is necessary, but not sufficient in order to develop IS competence. Experience in IS projects and the management of IS are equally important. Business managers build expertise in IS over time through their active participation and (mental) involvement in IS (management) activities. Experiences and reflection are the basis for developing tacit IS knowledge ('know-how' and 'know-why'). Thus, besides knowing, business managers should be 'exposed' to the practicalities of managing IS. Herein, lies a 'new' role (and challenge) for IS organizations, IS professionals and the IS profession, i.e., that of 'educator' or 'mentor'.

The foregoing findings and lessons learned hold important implications for both theory and practice. The results indicate that business IS competence is a complex construct, consisting of multiple dimensions, involving explicit and tacit IS knowledge resources, which are essentially intangible assets. From a resource-based perspective (Barney, 1991; Grant, 1996), business IS competencies are (in contrast to technical IS competencies), a relatively rare, distinctive and enduring quality of an organization's internal environment, which distinguishes it from other organizations as a result of business management's deeply embedded IS knowledge and IS experiences (Bassellier et al., 2001; Mata et al., 1995; Ross et al. 1996).

Business IS competencies can take years to develop, and often entail socially complex, causally ambiguous, and historical traits cited as essential to realize the full potential of IS (Mata et al., 1995; Ross et al., 1996). In fact, previous studies (Boynton et al., 1994; Reich & Benbasat, 2000; Brown & Magill, 1994, Sambamurthy & Zmud, 1999) indicate that IS competencies of business management indeed have a positive impact on IS governance capability, i.e., the (cross-functional) managerial ability to direct and coordinate the multifaceted activities associated with the planning, organization and control of IS (Sambamurthy & Zmud, 1997). Hence, based on the findings of this study and previous research, and following the resource-based view that capabilities reflect the ability to build, integrate, and deploy knowledge-based resources (Grant, 1996), we hypothesize that business IS competencies have a positive effect on IS governance capability.

Furthermore, in response to changing business and technological environments, and organizational and managerial learning, it is essential that organizations continuously adapt and develop their business IS competencies. This agility or strategic flexibility is crucial for developing suitable IS competencies and dynamic business IS capabilities such as IS governance capability. Dynamic business IS capabilities emphasize the importance of adapting and renewing IS resources and IS competencies within a changing environment (Teece, 1998).

The results of this study suggest that IS competencies of business managers are indeed evolving and adapting in response to managerial learning, shifting business needs, and changing environments (Fig. 4). In the original IS competence model, Bassellier et al. (2001) include and discuss the importance of, e.g., systems development, access to IS knowledge, personal use of IS, and a process-view of the organization. The results of this study suggest, however, that these IS competencies have evolved or 'matured', and are no longer as important today as they were yesterday. Instead, knowledge regarding IS out- and in-sourcing, IS change management, and a relational view of the business seem to be the important emerging business IS competencies for managing IS in contemporary organizations. This process of evolution and adaptation underscores the importance of (un-)learning business IS competencies within a changing environment. Often, the problem is not how to create new IS competencies, but how to undo old IS habits and thoughts.

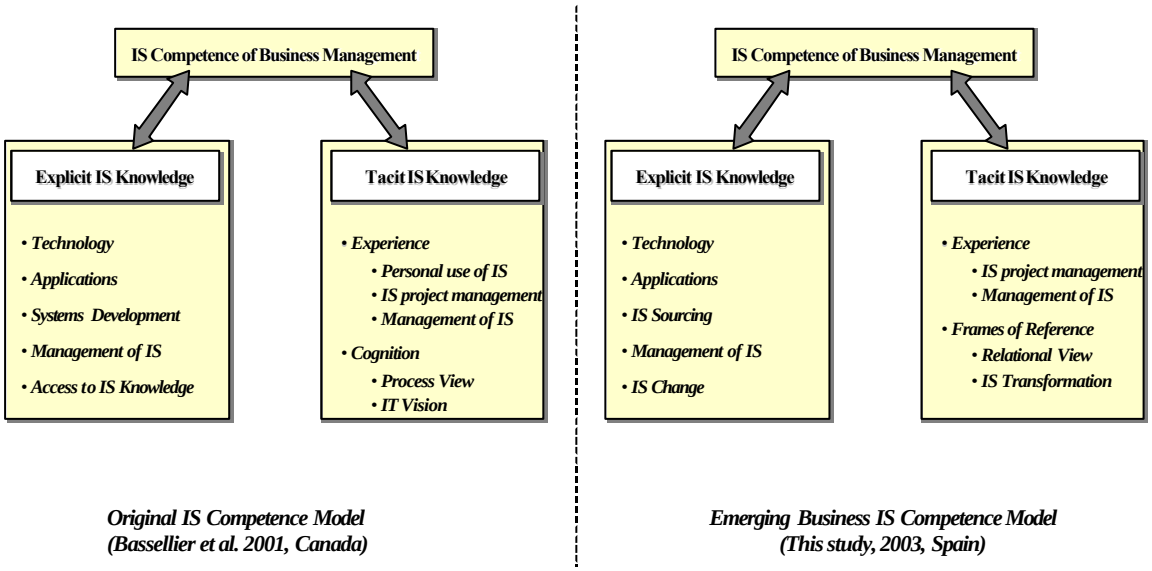

Figure 4. An Evolving Business IS Competence Model.

CONCLUSIONS

Pending more empirical research, the results of this study (can) hold important implications for practice. For educational and (management) training institutions (e.g., universities and business schools) our findings may imply some 'renewed soul searching', i.e., rethinking and redeveloping the content and format of IS/MIS courses targeted at graduate and (executive) MBA audiences. The findings suggest that, besides (general) management of IS, (specific) themes related to IS sourcing, IS change management, IS relationship management, IS investment management are vital for contemporary IS programs and management training. These themes are not always explicitly included in 'Management of IS' educational/training programs (Bassellier et al., 2001). Moreover, and particularly for (executive) MBA audiences, 'hardcore' technology and application topics should be discussed in small, targeted and focused doses, and always related to the business/management context.

In terms of *tacit* IS knowledge, the findings suggest that *IS management reflection* and *IS management experiences* are crucial for the development of business IS competencies. This has at least two important implications. First of all, for developing tacit IS knowledge, experience-based learning is essential, and introducing this into (virtual) classrooms will challenge many current educational, pedagogical and andragogical practices. Yet, assisting management students in building tacit IS knowledge provides a rich and long-lasting learning experience.

Besides the well-known strategies of participation-based learning, and the use of teaching cases and (group-based) case discussion, additional, more experience-based solutions can be adopted. Some examples include: (a) have management students introduce themselves using an IS perspective, or an IS issue they need to resolve; (b) solicit active participation by 'expert' management students, and have them discuss the key lessons learned; (c) draw parallels between existing skills, knowledge or other program areas, and the management of IS, and in due process use stories and metaphors; (d) introduce lab exercises, focused 'real-life' IS projects, and role-playing as a means of simulating 'real' experiences; and/or (e) use 'visual' artifacts (e.g., IS strategy documents, software, CIOs) in class to illustrate, demonstrate and emphasize key messages (Nambisan et al., 1999; Peterson et al., 2000; Reich, 2000).

These experience-enhancing practices leverage the (tacit) expertise and experience of students, and engages management students more deeply into learning about IS and the management of IS. Management IS education is thus a process through which management students become aware and share significant IS-related experiences. Moreover, from a motivational perspective, these practices can significantly enhance the attention, relevance, confidence, and satisfaction of management students (Reigeluth, 1983).

The relevance of tacit IS knowledge and the importance of IS management experience and IS management reflection for the development of business IS competencies, also holds important implications for corporate business environments. Traditional business activities and organizational mechanisms, such as technology and vendor demonstrations, IS conferences or workshops, specialized (functional) IS training, IS task groups, IS steering committees, CIO appointments and/or enterprise ('knowledge') portals and ('knowledge') intranets, fall short of the goal of building business IS competence (Bassellier et al., 2001; Nambisan et al., 1999; Peterson et al., 2000; Reich, 2000).

Developing and sharing tacit IS knowledge involves socialization (Nonaka, 1994) and the development of mutual understanding and shared beliefs between business and IS managers (Reich & Benbasat, 2000), for which the foregoing mechanisms provide insufficient knowledge integration capability. In stead, organizations and managers should turn their attention to richer knowledge carriers and development mechanisms, including e.g., (a) (in)formal *cross*-training of business and IS managers, (b) job-rotation or -transfer of managers across different functions within and across departmental, functional and business boundaries, (c) performance measurement and rewards based on business IS competence development and team performance, (d) co-location of business and IS managers, and/or (e) collaboration with knowledge institutes (e.g., research centers, universities and/or business schools) which is beneficial to both current and future business executives. While these mechanisms have traditionally been regarded as 'informal' or of 'secondary importance' in IS, research suggests that they are critical for achieving high-performance (Boynton et al., 1994; Chan, 2002; Peterson et al., 2000).

The foregoing lessons learned and implications should, however, be interpreted within the boundaries and limitations of this study, i.e., an exploratory Delphi study focused on analytical-theoretical generalization and theory-building, consisting of a relatively small sample. Consequently, we do not suggest that these results should be generalized across all types of environments. Considering these limitations and the conclusions of this study, however, does provide several directions for future research.

More empirical research is definitely required in the area of business IS competencies. Specifically, future research should (statistically) validate the business IS competence model proposed in this paper. Two complementary avenues for achieving this are (a) a large-scale survey-based study and (b) multiple (longitudinal) case studies. Both these research strategies will provide insight and validate the (evolution in the) dimensions of business IS competencies, and the complex relationships between business IS competencies and IS governance capability. A second area of future research should focus also on identifying and validating the organizational mechanisms that influence the development of business IS competencies. This is highly relevant as it will provide an understanding and explanation of how and why business IS competencies are developed, and what type of mechanisms organizations can use to enhance and adapt the IS competencies of their business managers in a changing environment. Finally, future research should extend the knowledge-based model of business IS competencies with skills and personality traits to develop a holistic view of business IS competencies, and its associated mechanisms and impacts on IS governance capability and IS business value realization.

In summary, the conclusions and propositions presented here offer an evolving and contemporary perspective through which researchers can explore, examine, and explain the development and impact of business IS competencies. The results of this study should stimulate further organizational discussions and empirical research regarding business IS competencies. We hope this will be realized through the joint and multidisciplinary efforts of academia and industry.

REFERENCES

Adler M. & Ziglio, E. 1995. Gazing into the oracle: the Delphi method and its application to social policy and public health. London, UK: Jessica Kingsley

Barney, J. 1991. Firm Resources and Sustained Competitive Advantage, Journal of Management, 17, pp. 99-120.

Bassellier, G., Reich, B.H. & Benbasat, I. 2001. Information Technology Competence of Business Managers: A Definition and Research Model. Journal of Management Information Systems, 17, 4, pp. 159-182

Bharadwaj, A. 2000. A Resource-Based Perspective on IT Capability and Firm Performance: An Empirical Investigation, MIS Quarterly, March, pp. 169-197.

Bharadwaj, A.S., Sambamurthy, V. & Zmud, R.W. 1999. IT Capabilities: Theoretical Perspectives and Empirical Operationalization, in Proceedings of the Twentieth International Conference on Information Systems, Charlotte, NC, pp. 378-385.

Boynton, A.C., Zmud, R.W. & Jacobs, G.C. 1994. The influence of IT management practice on IT use in large organizations, MIS Quarterly, 18, 3, pp. 299-318.

Brown, C.V. & Magill, S.L. 1994. Alignment of the IS Functions with the Enterprise: Toward a Model of Antecedents, MIS Quarterly, 18, 4, pp. 371-403.

Chan, Y.E. 2002. Why haven't we mastered alignment? The importance of the informal organization structure. MIS Quarterly Executive, 1, 2, pp.97-112.

Commission of the European Communities 2002. eEurope 2005: An information society for all. COM(2002) 263 final, Brussels, Belgium.

Chaffin, W. 1980. Individual stability in Delphi studies, Technological Forecasting and Social Change, 6, 4, pp. 67-73.

Feeny, D.F. & Willcocks, L. 1998. Core IS capabilities for exploiting information technology, Sloan Management Review, 39, 3, pp. 9-21.

Galliers, R. D. 1991. Choosing appropriate information systems research approaches: a revised taxonomy. In: H. E. Nissen, H. K. Klein, & R. Hirschheim (ed.), Information systems research: contemporary approaches and emergent traditions. Proceedings of the IFIP TC8/WG8.2 Working Conference on the Information Systems Research Arena of the 90s. Challenges, perceptions, and alternative approaches, Copenhagen, Denmark, 14-16 December, 1990.

Gant, D.B. 2001. Taking the technology out: Using a strategic e-commerce focus in the CIS classroom, Communications of the AIS, 7, 12, http://cais.isworld.org/contents.asp.

Gioia, D. A. & Chittipeddi, K. 1991. Sensemaking and sensegiving in strategic change initiation, Strategic Management Journal, Vol. 12, pp. 433-448.

Gorgone, J.T., Gray, P., & Feinstein, D. 2000. Model curriculum and guidelines for graduate degree programs in Information Systems. Communications of the AIS, 3, 1, http://cais.isworld.org/contents.asp.

Goodman, L. 1954. Measures of Association for Cross Classifications, Journal of American Statistic Association, 49, 732-764

Grant, R. M. 1996. Prospering in Dynamically Competitive Environments: Organizational Capabilities as Knowledge Integration, Organization Science, 7, pp. 375-387.

Helmer, O. 1959. On the Epistemology of the Inexact Sciences. Management Science, 6, pp. 25-52.

Ives, B., Valacich, J., Watson, R., & Zmud, R. 2002. What every business student needs to know about information systems. Communications of the AIS, 9, 30, http://cais.isworld.org/contents.asp.

Keen, P.G.W. 1991. Shaping the future: Business design through information technology, Boston, Harvard Business School Press.

Lang, T. 1998. An overview of four futures methodologies (Delphi, Environmental Scanning, Issues Management and Emerging Issue Analysis): Hawaii Research Center for Futures Studies, University of Hawai. http://www.soc.hawaii.edu/future/j7/LANG.html.

Loye, D. 1978. The Knowable Future: A psychology of forecasting and prophecy. New York: John Willey & Sons.

Mata, F.J., Fuerst, W.L. & Barney, J.B. 1995. Information Technology and Sustained Competitive Advantage: A Resource-Based Analysis, MIS Quarterly, 19, 4, pp. 487-505.

Moore, C. M. 1987. Group Techniques for Idea Building. Newbury Park, CA, USA: SAGE Publications, Inc.

Nambisan, S., Agarwal, R. & Tanniru, M. 1999. Organizational mechanisms for enhancing user innovation in information technology. MIS Quarterly, 23, 5, pp. 365-395.

Nonaka, I. 1994. A dynamic theory of organizational knowledge creation. Organization Science, 5, 1, pp.14-37.

Peterson, R.R., O'Callaghan, R. & Ribbers, P.M.A. 2000. Information Technology Governance by Design, Proceedings of the Twenty-First International Conference on Information Systems, Brisbane, Australia, pp. 435-452.

Polanyi, M. 1967. Tacit dimension. London: Routledge & K.Paul.

Ravichandran, T. & Lertwongsatien, C. 2002. Impact of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective, Proceedings of the Twenty-Third International Conference on Information Systems, Barcelona, Spain, pp. 577-582.

Reigeluth, C. 1983. Instructional-Design Theories and Models: An Overview of their Current State, Lawrence Erlbaum Associates, Inc., London.

Reich, B.H. 2000. Designing the IT course within an executive MBA program. Communications of the AIS, 3, 15, http://cais.isworld.org/contents.asp.

Reich, B.H. & Benbasat, I. 2000. Factors that influence the social dimension of alignment between business and information technology objectives, MIS Quarterly, 24, 1, pp. 81-111.

Rockart, J.F., Earl, M.J. & Ross, J.W. 1996. Eight Imperatives for the New IT Organization, Sloan Management Review, 38, 1, pp. 43-55.

Ross, J.W., Beath, C.M. & Goodhue, D.L. 1996. Develop Long-Term Competitiveness Through IT Assets, Sloan Management Review, 38, 1, pp. 31-42.

Sambamurthy, V. & Zmud, R.W. 1997. At the heart of success: organizationwide management competencies. In: C. Sauer, P.W. Yetton, & and Associates, (eds.). Steps to the future: fresh thinking on the management of IT-based organizational transformation, San Francisco, Jossey-Bass Publishers, pp. 143-163.

Sambamurthy, V. & Zmud, R.W. 1999. Arrangements for Information Technology Governance: A Theory of Multiple Contingencies, MIS Quarterly, 23, 2, pp. 261-290.

Senge, P.M. 1990. The Fifth Discipline. New York, DoubleDay.

Teece, D.J. 1998. Capturing value from knowledge assets: the new economy, markets for knowledge, and intangible assets. California Management Review, 40, 3, pp. 55-79.

Turoff, M. 1971. Delphi and its potential impact on Information Systems. AFIPS Conference, 39, pp. 317-326.

Vitale, M., Ives, B. & Beath, C. 1986. Linking information technology and corporate strategy: an organizational view. Proceedings of the Seventh International Conference on Information Systems, San Diego, pp. 265-276.

Ward, J. & Peppard, J. 2002. Strategic Planning for Information Systems, England, John Wiley & Sons Ltd.

Weill, P. & Broadbent, M. 1998. Leveraging the New Infrastructure: How Market Leaders Capitalize on Information Technology, Boston, Harvard Business School Press.