

AN EXPLORATION OF ARCHITECTURAL INNOVATION IN
PROFESSIONAL SERVICE FIRMS

by

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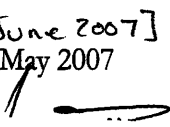

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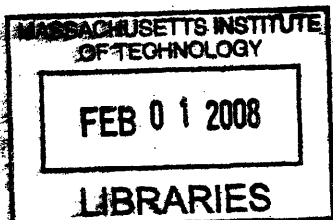
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ARCHIVES

Abstract

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Architectural innovation is achieved using architectural knowledge to reconfigure an established system to link together components in a new way that provides a competitive advantage.

Components in professional service firms are the expertise areas in which the firms have developed proficiency or those in which they plan to develop it. Competitive advantage in professional service firms is related to the capacity of the firm to add continuing value to a dynamic set of clients and to itself.

In order to add value, professional service firms, being knowledge intensive, must develop capabilities that enhance the knowledge capital they possess, which is valuable to both its clients and to the professionals they employ. This knowledge capital can be classified into Human Knowledge, Relational Knowledge and Structural Knowledge. The first two types are comprised mainly of tacit knowledge, while the third one consists of explicit knowledge.

Architectural innovation modes result from the reconfiguration of these knowledge types in ways that enhance the value creation processes of professional service firms. This work explores the ways professional services firms achieve these reconfigurations and offers insights into the key characteristics of successful practices.

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I also want to thank the staff at SDM and the many friends in the 05, 06 and 07 cohorts that made the time I spent at MIT one of the best experiences I've had.

MOTIVATION

The topic of innovation has always been of great interest to me; the way new ideas about products, processes and services are generated and then brought to reality is one of the key activities any successful organization should execute to survive and thrive.

During the coursework covered in the System Design and Management program at MIT I became acquainted with some of the research being done around innovation in technology and product design and found it exciting and, in some cases, extensible to other industries and sectors.

Another topic that was consistently discussed in several courses had to do with the increasing relevance of knowledge as a key asset for innovating and competing in a more global environment. A recurring argument was often made on how innovation is becoming more and more dependent on the appropriate management of different types of knowledge.

Having a personal background working in consulting firms, part of a broader industry now called that of *professional service firms*, or also *knowledge intensive business services*, I found it interesting to explore if there was also a strong stream of innovation research regarding this type of organizations. To my surprise I found very little work on the topic, compared to what has been researched on manufacturing and technology focused innovation, so it became interesting for me to explore the ways professional service firms (PSF's) innovate to gain competitive advantage.

THESIS STRUCTURE

This thesis is structured as follows:

In chapter one, some elements of the now quite generalized concept of “the knowledge economy” are discussed, along with the effect these concepts have had on the industry of professional service firms.

Chapter two defines what professional service firms are and mentions some of the relevant characteristics these organizations have, which make them fundamentally different from other more traditional enterprises and which are relevant for the purposes of this research.

Chapter three presents some of the relevant findings for this exploratory work from research done on innovation in services. It then describes the concept of architectural innovation and its original framework. Finally it explains why innovation in professional service firms fits the framework, and why architectural innovation in professional service firms revolves around the key issue of knowledge creation and management.

Chapter four develops the structure of the exploratory research used to understand architectural innovation in professional service firms (PSF's), the knowledge capital components of PSF's and the modes of knowledge architecture reconfiguration within PSF's.

Chapter five presents the analysis of relevant characteristics of the companies and professionals that are part of the study and the knowledge management dynamics of professional service firms using a system dynamics conceptual model.

Chapter six presents the main mechanisms for knowledge based architectural innovation that the firms in the study use and the insights derived from the study.

Chapter seven discusses the implications derived from the study for the successful management of knowledge and innovation in professional service firms and suggests further research that can be done to extend the knowledge of architectural innovation in this type of organizations.

Chapter 1

THE KNOWLEDGE ECONOMY AND PROFESSIONAL SERVICE FIRMS

The knowledge economy

Over 40 years ago, in his book *The Effective Executive*, published in 1966, Peter Drucker introduced the concept of the knowledge worker as an attempt to differentiate between those who produce something tangible by using their hands and those who work with their heads and produce knowledge, information and ideas.

Since then, the concept of the knowledge based economy has been increasingly embraced to explain how knowledge is being recognized as the primary driver of productivity and growth in developed nations, effectively transforming all other dimensions of economic life everywhere.

In understanding the nature and effect of the shift to a knowledge economy it is important to recognize what are its major drivers and the systemic way in which they interact.

The first driver is the **exponential growth in computing capacity** and the corresponding decrease in cost that has been experienced during the last few decades. This capacity to process information has enabled the acceleration of scientific discoveries in a variety of fields, opening a wide variety of growth possibilities that many societies are now exploiting.

A second driver, the **exponential growth in connectivity and communications capacity**, which is a direct result of the first driver mentioned above, has enabled the sharing of ideas, information and knowledge beyond the limits that were previously set by distance.

Currently, information sharing can be instantaneous between any two points on the planet. Collaboration among people in different locations around the world is now common, which means that more people are being exposed to new cultures and ideas, and the work that once took months to complete due to restrictions caused by distance, now takes days or less.

As it has been widely published, knowledge is a renewable resource that grows and is enriched with use and this acceleration in communication capabilities has produced a corresponding acceleration in knowledge creation and valuation.

A third driver is **the trend towards globalization**. As cultures begin to interact more, beneficial economic opportunities are found and the legal frameworks for exploiting them are agreed upon. As we become more capable of processing information and more communicated with the rest of the world it becomes easier to identify opportunities in which different parties can benefit from collaboration.

In the broadest sense of the concept we find free trade agreements signed among groups of nations. In the more narrow sense, thanks to intellectual property agreements and international patent protection legislation, groups of researchers can now share data on experiments and findings and gain more insight than would be realized by working in isolation, effectively accelerating the speed of their research.

Due to the number and diversity of interests involved in the globalization process, this has undoubtedly been the slowest driver to evolve in relation to the knowledge economy and also the most controversial, since cultural diversity is greatly valued in concept but in practice there are natural human barriers to be overcome.

No better examples of this trend can be found than the migration of manual work activities to countries with cheap labor, which is a cost reduction imperative in a competitive economy and which has a reinforcing effect in the refocusing of developed countries into knowledge based work.

A fourth driver is the reinforcing loop that forms among the previous three drivers, which accelerates the speed of the system and causes an **increase in the economic value and intensity of knowledge being generated and transferred**. This has resulted in a higher percentage of the economy and population in developed countries to move towards knowledge generating activities as their primary occupation.

This has important implications, for example, under the rules of this new economy, countries that lack a plentiful supply of natural resources (which in the past practically meant economic stagnation) but that had a good understanding of the opportunities presented by this shift to a knowledge economy and displayed the political will to pursue them now generate more economic value than many countries with many more resources than the first one.

Those countries that saw this reinforcing loop in the system early enough were able to use that knowledge to their advantage. A good example is the case of Mexico and Taiwan in the last fifty years. In the late fifties, a Mexican citizen was producing twice as much as a Taiwanese one in terms of per capita GDP. By the

mid seventies they were producing the same, but while Taiwan had “...*imposed brutal university entrance examinations and emphasized scientific literacy... [causing] the industrial plant to grow, as well as exports and competitiveness...*”¹ Mexico had a national university system plagued with corrupt, politically active student unions that undermined its day to day activities.

The national focus of the Mexican government was on how to manage the wealth that the vast amounts of oil that had been discovered in the gulf region would bring. By the early nineties, a Taiwanese citizen was already producing four times as much as a Mexican one.

Today, Mexico is still underdeveloped and now debating ways to save its obsolete oil industry in the face of diminishing reserves. In this case, knowledge management appears to have been much more important than oil in the end.

Now that the main drivers of the knowledge economy have been presented, the next section will discuss the part that professional service firms play in it.

The role of professional service firms in the knowledge economy

As the processes discussed previously permeate the economy, competition became more intense, pushing a great number of companies to follow a trend towards specialization. This trend drove them to focus on their “core competences” in order to compete effectively. This in consequence increased the amount of work that companies outsourced both in terms of the supply of tangible goods and also in terms of the services they required.

These trends caused a surge in the number of suppliers of particular types of products and services that companies no longer wished or could sustain to keep in-house in order to compete effectively.

Today it is hard to think of a major corporation that doesn't rely to some extent on a mix of executive search firms, marketing agencies, supply chain experts, information technology providers, product design experts and of course an array of management consultants, causing an explosive growth on a global scale in the number of firms that supply these services. In 1980 less than five consulting firms with more than 1,000 consultants operated world wide. By 1997 there were more than 30 that met this criterion².

This growth in business for PSF's is reflected in their global revenue over the last decades (See figure 1).

In 1980 PSF's generated \$107 billion in revenue world wide, this increased to \$390 billion by 1990 and to \$911 Billion by 2000³.

This 11% compound annual growth over 20 years is impressive compared with the US GDP growth of 3.7% that was achieved over the same period⁴.

Forecasts estimate the global consulting industry compounded annual growth rate from 2005 to 2009 at 7.8%⁵.

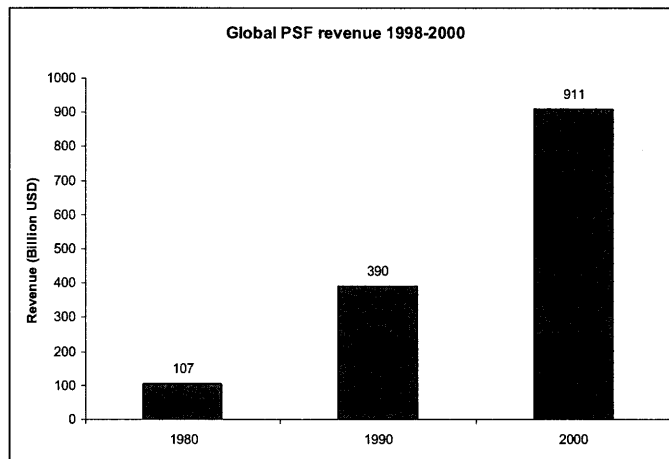


Figure 1. Global Revenue for PSF's 1998-2000. (Adapted from Lorsch and Tierney 2002.)

Examples of these firms are the accounting unit of PricewaterhouseCoopers, which employs 130,000 people in nearly 150 countries, with revenue of \$20 billion last year, which makes it larger than some Fortune 500 companies, such as Oracle and McDonald's. The largest consulting firm today, Accenture, is itself a Fortune 500 firm. Goldman Sachs, the financial services company is in the top 100 of the Fortune rankings.

Professional services became so attractive that even traditional companies started entering the sector. HP tried and failed to purchase the PricewaterhouseCoopers consulting unit, which was finally bought by IBM Global Services, making it one of the largest consulting firms in the world. This unit of IBM produced 40% of its revenues in 2000 and 53% in 2006⁶. EDS bought A.T. Kearney in 1995 (even though in 2006 it was made private again).

Currently, there is a strong trend towards consolidation in the industry, some types of firms are more likely to derive competitive advantages from merging or acquiring competing firms than others, depending on the main differentiating criteria in each firm's particular niche (see figure 2).

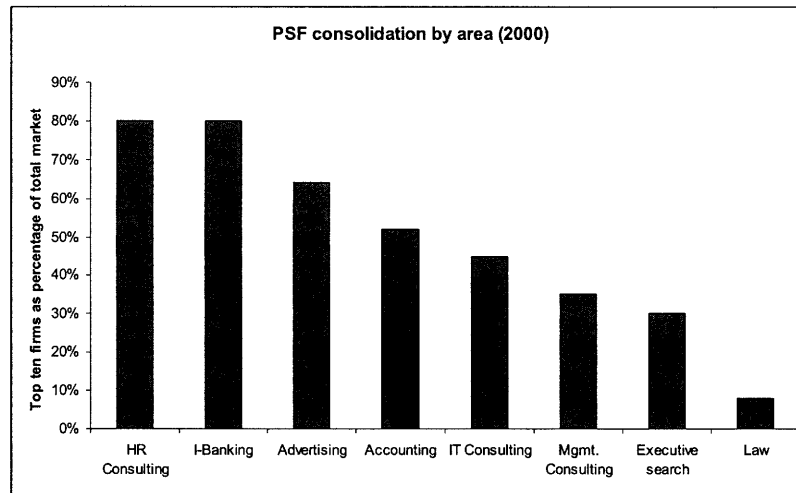


Figure 2. PSF Consolidation (adapted from Lorsch and Tierney 2002)

One of the most interesting characteristics of this industry is that the professionals it employs are its most important asset. This is far from the usual corporate rhetoric heard in other industries, in the case of PSF's hiring, training and retaining the right people is indeed critical to a successful practice.

The nature of the work of PSF's typically requires them to provide high value services to decision makers in established medium to large companies. Given the circumstances, hiring bright (and expensive) professionals is a prerequisite to compete.

PSF's are the top recruiters in graduate schools from top universities. In fact, this has driven some companies in other industries to completely stop trying to recruit talent at some schools due to their incapacity to pay competitive salaries. In their book "*Aligning the stars: How to compete when professionals drive results*" Tom Tierney and Jay Lorsch comment:

"...65% of top MBAs from top graduate business schools begin their careers in professional services. This compares with less than 20% who enter manufacturing.

At Stanford Business School, companies such as Intel, Dell Computer, and Circuit City Stores have stopped recruiting altogether, in part due to their inability to compete with consulting, investment banking and private equity firms... Corporations face a challenge competing effectively for talent against their professional service providers..."

It is no surprise that as profits in the highest growing industries become more dependent on the value that knowledge workers create, and as the corporations in these industries outsource what they can't produce as fast and cheap as others, including brainpower, PSF's are now thriving in the marketplace⁷, however, a more subtle but important concept is that as companies rely more on the value added by their PSF suppliers, these firms are more influential on the success of the companies that hire them than they were before⁸, and this cycle appears, at least in theory, to be self reinforcing.

DEFINITION OF PROFESSIONAL SERVICE FIRMS

Services and professional services

What does it mean to produce a service? An insightful answer is provided by Gadrey et al⁹:

“...to produce a service [...] is to organize a solution to a problem (a treatment, an operation) which does not principally involve supplying a good. It is to place a bundle of capabilities and competences (human, technological, organizational) at the disposal of a client and to organize a solution, which may be given to varying degrees of precision”.

This definition is applicable to those services provided by professionals in the context of a PSF, complementing it with the definition of professional service proposed by Hill and Neely, as “one where the client is significantly dependent on the provider to define the problem and give appropriate advice”¹⁰, we can arrive to a definition of a professional service firm as:

“One that applies specialized technical knowledge and experience to the proper identification of a problem a client faces and to the subsequent design and execution of customized solutions to the problem, using the experience, capabilities and competences at the disposal of the firm.”

This seems a rather broad definition; however, a more precise one becomes difficult for several reasons. The term ‘profession’ is contested within the

academic literature, so too by implication is the term professional service firm. Literature defines profession as¹¹:

- A vocation founded in a body of knowledge, typically a higher education
- A vocation concentrated on the application of this knowledge, combined with experience
- A vocational organization based on a common code of ethics, where self control is supported by peer reviews

Before the growth experienced by the PSF industry, which was explained in the previous chapter, the term “professional” was usually assigned to describe individuals that provided services within formally regulated social structures, such as law firms, architectural design firms and accounting firms, which are aligned with the definitions of profession.

As the industry of PSF’s started to grow, more occupations sought to be recognized as professions in order to gain higher status and esteem in society, causing the term to be used to describe a broader base of firms, including investment management, consulting, advertising and executive search firms, to name a few, but these new occupations failed to meet the characteristics posited in the definition of profession mentioned above.

In the case of management consulting firms, for example, there is no body of knowledge established for its type of consultants, which typically are also members of a set of diverse professions, mainly engineering. There is no licensing body for management consultants and no organization of peers designed to supervise and sanction their operation. These situations led to a negative reputation forming on this activity during a period of years due to a

surge in “consulting” firms that were opportunistically trying to ride the growth wave^{12 13} without setting and respecting the high set of standards that reputable firms still uphold.

Recent research into PSF’s argues that using the traditional definition of professions, PSF’s efforts to formally professionalize will never be successful, but in practice a new broadly acceptable definition of professionalism is emerging with more emphasis on experience, teamwork, flexibility, broad training and project oriented work in groups that change membership from one engagement to the next¹⁴.

For the purpose of this exploratory work, the fact that there is no established profession doesn’t mean that bright and highly educated people cannot deliver services deemed professional by their clients, while following general professional rules of conduct. For these reasons, it is more meaningful to define professional service firms broadly and then focus on identifying their particular characteristics.

Characteristics of professional service firms

PSF’s regardless of size, geographic coverage or expertise areas have surprisingly similar definitions of their missions. In general PSF’s aim to:

“...deliver outstanding client service; to provide fulfilling careers and professional satisfaction for our people; and to achieve financial success so that we can reward ourselves and grow...”¹⁵

This mission statement pattern identifies the main objectives of most professional service firms¹⁶:

1. Provide high value services to clients with exceptional execution
2. Provide high satisfaction careers to firm members
3. Make a sustained profit

In the fulfillment of this mission, PSF's operate in ways that are distinctive from most organizations in the following three key aspects:

The first key aspect is organizational structure: PSF's are generally privately owned. Very seldom a PSF goes public, mainly because one of the most important principles in the management of PSF's is that the client always comes first, this means that when facing a choice between satisfying a valid client demand and the market pressure for earnings, most PSF's recognize that long term sustainability and growth depend on their capacity to choose to maintain the trust of the client over making a higher profit in any one specific engagement. In going public a firm will experience situations where the needs of its clients and those of its shareholders will often present opposing requirements.

The larger professional service firms are global in reach and have thousands of professionals in their employment. The vast majority of these firms function as a federation of smaller firms or offices that have a territory (often a country, more seldom a region comprising several countries) within which they operate, sharing resources and best practices, and often sharing professionals for particular engagements, according to need and availability.

The majority of PSF's have –with different names and spans of control- three main hierarchical levels: Partners (top level), Managers (middle level) and Analysts (entry level). This organizational arrangement is quite standard across firms.

PSF's are typically governed in a partnership structure which provides for more flexibility than other conventional bureaucratic structures. Each of the partners has a particular weight in decisions depending on several factors like the number of years the partner has been with the firm, the track record and amount of sales the partner brings into the firm, the number of professionals for whom the partner is responsible, the strategic importance of the accounts the partner handles and the effect on the firm if the partner was to leave, among the most important ones; so key decisions are generally made by arriving to consensus. Typically, each partner retains the right to vote on key management decisions and to elect representatives from among their group to perform management roles on a fixed-term basis.

These professional partnerships have attracted attention from organizational theorists and financial economists. Both focus on how partnerships represent a solution to the challenges relative to the management of professionals. In a partnership, ownership is confined to a small elite group within the firm and partners share unlimited personal liability for their actions and those of their colleagues.

Partnerships emphasize informal practices of mutual and self-monitoring that on top of unlimited personal liability create an environment of interdependence and trust.

The middle level of a PSF organization is formed by experienced managers that are capable of managing one or more engagements with clients in parallel, depending on the nature of each project.

They are responsible for keeping the project on track, managing assignments and workloads; maintaining an operational relationship with the client during the course of the project and making sure the results of the engagement meet the expectations of the client.

Managers have extensive experience working in a project configuration within the industry of the client company or in the particular areas of expertise required by the needs of the client, preferably both. They also typically have formal education and experience managing complex project based engagements and a team of bright technical and managerial people.

The base of the PSF pyramid is formed of analysts, the entry level professional who is responsible for performing the basic tasks in an engagement, generally doing research, processing information and carrying out analyses with the support of other more senior members of the project team.

There is a well known pattern of attrition in PSF's. Depending on the particular industry and size of each firm, there are expected percentages of entry level professionals and managers that are supposed to be promoted to managers and partners, as well as an average lifetime of a professional in those particular levels.

If the firm is to retain the top talent in each of the levels it has, it must be able to identify top performers and award them with increasing responsibility and compensation, and in the PSF operating model, it must get rid of the rest so that

a new set of professionals can come in and then the new top performers can be identified.

Indeed, the best performing PSF's are known for having a higher attrition index than the industry, meaning they are able to capture more profits on lower level professionals that the firm will ultimately not "repay" with a promotion.

This organic growth pattern provides the lowest two levels in the PSF with an aspiration to get promoted or leave, however when a professional is promoted to a partner position, which brings with it a share of the profits, the rest of the partners see their profits diluted unless the new partner is capable of bringing in enough business to pay for himself and provide a marginal increase on per partner profits.

Typically, this results in a mature PSF's main growth drivers not being related to per partner profits, so when a PSF reaches the point where promoting more partners results in no profit increase per partner, new sources of profit increase must be sought¹⁷, this is where innovation comes strongly into play.

The second key aspect is the resource base: PSF's have very little physical resources; their major source of value is the expertise, knowledge and experience of their professionals.

This means that for PSF's the management of knowledge plays a key role in their competitiveness, including the particular issues that arise from managing the knowledge professionals themselves.

Several characteristics of the kind of professional that is attracted to work in PSF's make this particularly challenging as they are highly trained and educated, mobile individuals, inclined towards constantly taking new and more difficult challenges over time, giving high value to gaining new experiences and knowledge, developing strong networks of professional contacts, including contacts with decision makers in client companies that often try to recruit them¹⁸.

These knowledge workers like autonomy and require a level of motivation that goes beyond the economic compensation they receive for their work, the most important ramification from this fact is that they need to have some influence as to the work they do, the clients they work with and how they carry out their work. One particular type of motivation that is of great relevance in PSF's is the motivation that professionals have to share their knowledge with their peers; knowledge is all that these professionals have, it's their means of succeeding and standing out and it's then natural that they have difficulty sharing this knowledge in a way that leaves them perceiving their value to the firm was diluted.

These professionals bring to the firm their expertise, experience, skills, relationship building and maintaining capacity, reputations and networks of current relationships with clients and potential clients.

All of these are strategic assets to a PSF, but they are also to a very large degree owned and controlled not by the PSF, but by each individual professional in it¹⁹.

Clearly recruiting, nurturing and retaining this kind of people is of paramount importance for a PSF.

The third key aspect is the nature of a PSF's interaction with its clients:

The working relationship between PSF's and their clients is highly interactive and very close. It has short term components (projects) that together develop a long term relationship of trust between PSF's and client firms.

In professional services, clients participate in the problem definition, in the development of alternative solutions, in the process by which the best alternative is chosen and in the implementation of the solution²⁰.

This interaction involves a learning process that presents a fundamental problem for PSF's. As the firm sells the expertise of its professional employees, it can't resell the same expertise to the same client if the client company is involved (and it generally is) in the learning process. Therefore, the PSF must constantly generate capabilities to maintain the knowledge gap between itself and the client at a level that permits it to continue working with it.

In the context of a knowledge intensive business, this means consciously managing knowledge creation and feedback capacity in every engagement to continue creating value for the client.

The value creation capacity of a PSF can be summarized in three key processes²¹.

- The first one is the capacity of the firm to sell a credible promise to a client, which depends on the nature of the client and its relationship to the firm. The more radical and innovative the promise, and the larger the knowledge gap between the firm and the client, the more difficult this process becomes. The reputation of the particular group

of professionals to be assigned to a project, as well as the capacity of the firm to document previous successful engagements of similar nature and produce meaningful references about them are important to manage this process.

- The second process is the management of client interaction and expectations to deliver on the promise. This process is meant to secure that the client receives what is expected with a level of effort that is acceptable to the PSF. This last requirement, to “deliver a service efficiently”, is strongly related to the investment the PSF has made in generating a modular set of solutions and methodologies that keep the level of effort required in a given engagement as low as possible, while retaining the capacity of the firm to adapt to different client idiosyncrasies and produce uniquely appropriate results.
- The third process is how to learn and institutionalize what was learned in an engagement so that the firm as a whole can increase its competitive capacity in the future. This requires the solution to two particular problems, one of them involves convincing the client that the knowledge acquired is going to be used ethically and not sold to a competitor, and the second requires convincing the professionals within the firm to invest time in documenting and disseminating the knowledge gained in the engagement, while knowing that sharing it will dilute their relative value within the peer group. This represents a complex management challenge in PSF’s because the professional’s technical and client-related knowledge represents their primary source of value to the firm. Documenting and sharing this knowledge throughout the firm potentially diminishes the power it confers upon any one individual.

Professional service firms have now been defined for the purpose of this work and their relevant characteristics as well as the key processes necessary for creating value for clients have been pointed out.

The next chapter discusses some research in innovation within services, defines the architectural innovation framework to be used in this research and states why it is appropriate to study professional service firms in which knowledge plays a predominant part of their value adding capacity.

Chapter 3

INNOVATION IN SERVICES, ARCHITECTURAL INNOVATION AND PROFESSIONAL SERVICE FIRMS

Innovation and innovation research in PSF's

For a long time the capacity to innovate has been recognized as a necessity for the creation and sustainability of any organization. Already in 1954, Peter Drucker wrote that the sole purpose of a business is to *create a customer*, and therefore a business has two, and only two basic functions: Marketing and Innovation²².

Evidently, for PSF's innovation can provide an advantage when it enables the firm to enter a new market or gain ground in any of a variety of value adding dimensions, such as improved performance, the capacity to command higher fees, reductions in operating cost, capacity to attract top talent, among many others. In the knowledge economy, the relevance of innovation to the success of any organization becomes even more important and particularly so for PSF's.

Interestingly, despite the growth of the industry and the higher relevance and influence it has on the world's major corporations, research into the operation of PSF's is quite scarce.

Additionally, research on innovation is mostly focused on organizations that concentrate in technology and product development, mainly manufacturing industries that have high technology content in their product and/or processes.

The differences these organizations have with PSF's make the mainstream innovation research have a poor fit when applied to services in general and professional services in particular.

Innovation in services

Research on the services sector started developing massively until the late sixties²³, before that it was a general conception to regard services as a tertiary or residual economic sector while manufacturing was considered the sole driver of economic growth.

The initial focus of services research was on the consequences of industrialized nations exporting their manufacturing infrastructure to cheaper labor regions.

The research on innovation in services is relatively recent, for a long time there were almost no challenges to the contention that services were generally non innovative.

In the early eighties Gershuny and Miles²⁴ started working on research regarding the impact of new technology (particularly information technology) on services efficiency, quality and innovation, and Barras²⁵ on theories to understand technology influence in services innovation by drawing parallels from manufacturing related innovation, he introduced the phrase "reverse product cycle" to describe the process of IT based service innovation.

Sundbo²⁶ argues that innovations in services are more rapidly implemented and copied than in the manufacturing sector, therefore the capacity to keep an innovation process continually running in the service firm is critical for its

survival. Also, his research found that usually innovations in services are part of a general strategy as opposed to being discretionary processes.

These two conclusions point to innovation in services as having less of a radical nature and being more of a systematic learning cycle based on trial and error processes.

More recently, some innovation in services and in particular in knowledge intensive services has been argued to follow a model of *architectural innovation*, also known in the literature as *recombinant innovation*, with a strong emphasis on the design and development of organizational formulas²⁷.

PSF's fit the definition of dynamic communities that exhibit the organizational characteristics for architectural innovation according to Galunic and Eisenhardt²⁸:

- **Corporate structure that displays modularity (diversity in resources), yet also displays relatedness (facilitates recombination).** This is observed in the typical modular decomposition of major PSF practice areas across two vectors: industry orientation and expertise domain. In the particular case of management consulting firms these are termed “verticals” (pharma, telecom, retail, etc.) and “horizontal” (supply chain management, strategy, marketing, finance, etc.). The professionals in these divisions are free (and in some cases encouraged) to change (recombine) areas after a number of engagements.
- **A corporate culture that combines competitive internal markets for assignments with cooperative buffers against the harsher consequences of that competition.** The internal competition among professionals in PSF's for the most challenging projects and clients, as

well as the mechanisms to keep the competition healthy are self evident and documented in research^{29,30}.

- **Dynamic capabilities that are guided by simple rules that embody both economic and social logics.** Dynamic capabilities are the organizational and strategic routines by which PSF's acquire and shed resources, integrate and recombine them to generate new value-creating strategies³¹. They are guided by simple rules that encompass the balance among the three components of a PSF, clients, partners and professionals³²
- **Leaders of practice acting as entrepreneurs and serving as architects of divisional context and guardians of culture.** Particularly in PSF's, practice leaders and professionals in general are given freedom to guide the growth pattern of the firm, determining the next practice to develop, the cultural fit of the new hires and the industries the firm will enter next³³.

Before continuing the discussion of the applicability of the architectural innovation framework to professional services firms, it is necessary to define architectural innovation sufficiently.

Definition of architectural innovation

For the purpose of this work, architectural innovation is defined using the framework developed by Henderson and Clark³⁴ in their paper "Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms".

The reason for choosing this framework, as detailed above, is that it explicitly identifies important characteristics of innovation in professional services even though it was designed with a scope on manufacturing firms.

Henderson and Clark argue that the traditional classification of innovation in terms of radical or incremental innovations falls short of explaining the effects that these types of innovation have on established organizations.

In particular, they study a type of innovation that under the previous classification would fall under the “incremental” category, yet under certain circumstances, drives the organization into the kind of challenges previously thought only associated with radical innovation.

Radical and incremental innovations have different competitive consequences due to the different organizational capabilities required for effectively managing them, it’s important to keep in mind the traditional difficulties and required time associated with developing and adjusting capabilities in an organization.

It has been argued that incremental innovation usually reinforces the existing capabilities in an established organization, while radical innovation forces it to adapt and change its capabilities, sometimes rapidly in order to keep competitive.

To explain why some innovations that are not considered radical have such dramatic effects on organizational capabilities, the authors develop a conceptual framework that incorporates two additional elements present in the organization and that are key to the success of a PSF and of knowledge intensive firms in general: Component knowledge and architectural knowledge.

The characteristics of these types of knowledge are the fundamental reason this framework applies to PSF's.

Architectural innovation is defined as changes made in the configuration of the system that for the most part leave the component knowledge in the firm the same, while changing the way the components are “architected” or linked together.

This type of innovation would still not qualify as radical innovation, since most of the component knowledge remains the same, but it will destroy the usefulness of the architectural knowledge the firm has, thus forcing it to adapt.

For the purpose of this work, architectural innovation can occur by proactively using architectural knowledge to alter the architecture of the PSF's operating system or by analyzing innovations to add value to the firm by enriching its architectural knowledge.

This definition demands a distinction between the system as a whole and the system as a set of subsystems or components. Under the latter, it becomes obvious that the firm must understand both types of knowledge (architectural and modular) in order to successfully adapt and succeed.

Henderson and Clark provide the following matrix to help understand the relationship among radical, incremental, modular and architectural innovations (see figure 1).

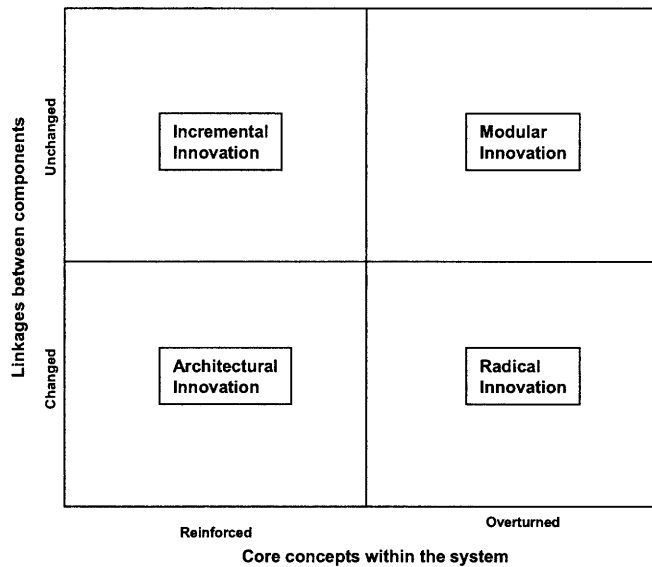


Figure 3. Architectural innovation framework (adapted from Henderson and Clark 1990).

Typically, a technology based innovation cycle starts with the emergence of a new technology: In this phase, competing firms are struggling to make sense of how the new technology can be best utilized for competitive advantage through different product architectures and designs³⁵.

Different and creative ways to harness the technology are pursued by different firms until the industry converges on what is typically called a dominant design³⁶.

In the case of PSF's, this would be the equivalent to the emergence of a new area of opportunity to serve clients, whether current or potential.

This can be caused by technology enabling agents (such as ERP or CRM systems, etc.), changes in regulation (such as new tax legislation, SEC requirements, etc.), changes in competition patterns (global supply demands, emergence of consumer trends, etc.) or even the emergence of entire new industries derived from technological advances (genetic therapies, nanotechnology, etc.).

When a dominant design is found in technological innovation, the focus on innovation among competing firms is shifted from finding new radical designs to perfecting the dominant design in what typically constitute incremental innovations, generally modular in nature.

During this stage, which tends to be relatively long lasting, the firms mature their architectural knowledge of the product along with several organizational mechanisms to focus on problem solving under stable product architecture, namely communication channels, information filters and problem solving strategies. In the case of professional service firms, there is a pattern of discovery and experimentation on possible solution methodologies to the related set of new problems faced by the clients.

This is where the architectural knowledge of the professional service firm must be altered to account for the experience acquired by the professionals involved in solving the problems to capitalize on both their tacit and explicit new knowledge.

As in the case of technological innovation, architectural innovation in professional services is affected by formal and informal *communication channels* within the organization, which become critical for the build-up of architectural knowledge. This is evident from the analysis of the formation of social networks in any type of organization^{37,38}.

As people in the firm absorb and internalize the architecture of the system or solution sets, they begin to *filter information* through interpretation systems in their day to day activities so the members of the different teams can focus on the most relevant issues depending on their interpretation of relevancy³⁹. These filtering mechanisms are also known as schemas⁴⁰.

As the team dynamic sets in around specific system or solution architectures, communication channels and information filters become part of a collective knowledge base that is used to *solve problems* related to the function of each module in the design or methodology in the solution set.

This is backed up by extensive research that clearly demonstrates the intimate relationship between organizational structure and the organization's problem solving capacity⁴¹.

For the reasons explained above, it becomes extremely critical for the professional service firm to induce architectural innovation that capitalizes on knowledge acquired by its professionals.

The process is similar to the concept of double loop learning posed by Argyris and Schön, and faces some of the same problems they found in executing this type of learning, which typically goes against human nature, and is therefore a source of potential problems for the firm^{42,43}.

Architectural innovation has also been addressed by Foray and Freeman⁴⁴ under the name of "recombinant" innovation.

Under this perspective, an organization proactively decides to change the way the product or service is architected while the product modules retain all the known characteristics of the previous version but now can add new desired characteristics that provide an advantage gain.

This model of innovation rewards the systematic reuse of components, a key process for value creation in PSF's.

Knowledge management as base for architectural innovation in PSF's

As mentioned previously, PSF's main value adding resources are its professionals. It is argued that their knowledge and experience, along with the interaction with their clients in each engagement provide the elements that linked together can produce architectural innovation.

Whether the innovation is considered structural (organizational and internal to the firm) or ad hoc⁴⁵ (regarding the elements within the scope of an engagement with a client), PSF's rely heavily on professional knowledge, i.e. knowledge or expertise related to a specific technical discipline or functional domain to produce services that are knowledge based⁴⁶.

Knowledge has been traditionally classified into two general types, tacit and explicit⁴⁷.

Explicit knowledge can be considered a tangible asset that can be articulated and stored or codified in knowledge repositories, formal rules, tools and processes; it can be built upon and maintained regardless of employee turnover or attrition.

Tacit knowledge is human centered, dynamic, intangible and specific to a particular context and time, it is what a person knows but cannot explain⁴⁸. Using a set of rules to determine the appropriate inventory level in a warehouse is using explicit knowledge. Assessing the potential of an individual during a job interview requires tacit knowledge on the part of the interviewer.

Knowledge in organizations exists at the individual, group, organizational and inter-organizational levels. Research into the creation and management of

knowledge identifies three distinct but interactive types of knowledge⁴⁹ that comprise the knowledge capital of a professional service firm:

- **Human knowledge:** This type of knowledge constitutes what individuals know or know how to do. It is manifested in experience, schemas, knowledge and skills mastered by individuals. A high level of human knowledge in an individual is considered the basis for what is called “veterancy” within organizations⁵⁰. Human knowledge is tacit.
- **Relationship knowledge:** This type of knowledge exists in relationships among individuals and groups that have worked together, adding value to the activities of the network they belong to. Relationship knowledge is largely tacit and composed of cultural norms and the capacity to work together and establish a level of trust among the members of a working group.
- **Structural knowledge:** This type of knowledge is embedded in the systems of the organization as processes, methodologies, tools, routines, etc. It is rule based and exists and is built upon independently of the permanency of members of the organization. Evidently, this type of knowledge is explicit.

In a professional services firm, the creation and conversion of knowledge in and between these three distinct types is essential to successful architectural innovation.

Chapter 4

RESEARCH STRUCTURE

The PSF's Knowledge Capital Structure

In PSF's, human knowledge serves as the base for what is called the firm's Human Capital (HC), which is defined as the sum of competences, compliances and commitments⁵¹ formed from human knowledge, skills and attitudes that may serve the productive purposes of the firm⁵².

The proper development of human capital is important to PSF's because a firm's professionals are the foundation of its performance.

It has been posited that the professional's skills, expertise and ability to influence client's expectations and perceptions in addition to performing their required knowledge intensive activities are a function of the professional's personal qualities⁵³.

In addition to this, generation of new ideas derived through the recombination of knowledge types in a firm require the motivation and deep knowledge and experience of the members of a PSF⁵⁴, therefore the capacity to innovate in the firm is highly dependent on human capital.

The proper development of HC is also necessary to effectively transfer individual knowledge into structural knowledge.

Relationship knowledge also serves as the foundation of the PSF's Relationship Capital structure (RC), which is defined as the sets of relationships between the firm and its clients, the knowledge of effective market channels and the understanding of the impact and relevance of government regulations and industry associations on the firm's performance⁵⁵ and how the firm can derive value from these external connections.

The interactions between the members of the firm and the extended network of clients and peers also develop and leverage the professional's skills and knowledge⁵⁶, representing important resources for PSF's⁵⁷.

Relationship capital plays an important role in innovation in organizations, particularly architectural types of innovation⁵⁸ and it also influences the choice of clients to be serviced, which in turn influences the development of the professionals within the firm, in other words the firm's HC.

Similarly, structural knowledge is part of the firm's Structural Capital (SC) which we define as the systems the firm has developed in order to capture, codify, manage and share knowledge.

This type of capital is found in the form of methodologies, processes, norms, rules, cases or presentations that a PSF develops and maintains to help professionals achieve top performance in the service of the firm's clients and in its own growth strategies.

It is important for PSF's to formalize the use and generation of structural knowledge capital by embedding it in their day to day operations.

Relationship Capital allows PSF's to find opportunities in the marketplace to serve clients and to use the references of successful past accomplishments to increase their client base. It also allows PSF's to become known to the pool of job applicants that hold the characteristics the firm desires.

Human Capital is a key factor in accomplishing the mission of PSF's, adding value to clients by bundling their expertise, experience and skills and therefore architecting innovative solutions for them.

Structural Capital is the means by which PSF's capture the knowledge that is produced in each interaction with clients and diffuse it so that the learning cycle of the professionals employed by the firm is shortened and made more robust.

Knowledge transformation framework for architectural innovation in PSF's

In order to analyze the knowledge capital driven architectural innovations used by PSF's an adaptation of the SECI model developed by Nonaka and Takeuchi⁵⁹ will be used.

The SECI model draws on the distinction between tacit and explicit knowledge types⁶⁰. Nonaka distinguishes also between individual knowledge, which is possessed by the professionals themselves and organizational knowledge, which includes both the knowledge of the individuals and also the explicit knowledge constructs of the firm. He argues that knowledge generation is directly related to the level of interaction between individual and organizational types of knowledge.

The SECI acronym stands for the four modes of knowledge conversion identified in the model (see Figure 2):

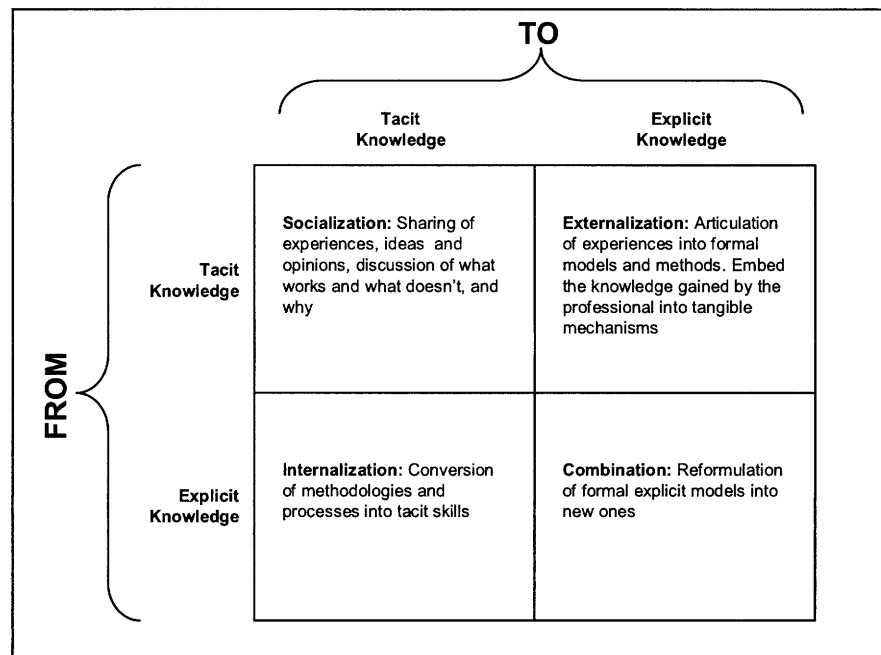


Figure 4. Knowledge transfer modes. Adapted from Nonaka and Takeuchi (1995).

- **Socialization:** The development of tacit knowledge from tacit knowledge. This is a process of sharing experiences among professionals and therefore creating tacit knowledge. In many situations, a professional can develop this type of knowledge through observation, imitation and practice without resorting to formal instructional activities.
- **Externalization:** The development of explicit knowledge from tacit knowledge. This process involves the rationalization of tacit knowledge and its codification into formal mechanisms for sharing it. This is the typical process by which knowledge is created in society, where it is transformed to explicit concepts, models, metaphors, analogies, etc.

- **Combination:** The development of explicit knowledge from explicit knowledge. This requires the transformation from one set of formalized concepts into another one by a systematic process, involving sorting, adding, combining, categorizing and diffusing explicit knowledge.
- **Internalization:** the development of tacit knowledge from explicit knowledge. This transformation happens when explicit knowledge is converted into specific know-how that is applied in a particular context. This is related to learning by doing.

The SECI model is dynamic in nature; initially a socialization mode is established with the emergence of a field of interaction among the members of a firm so they may share their experiences in a social setting.

After this, by means of dialogue and reflection the externalization phase begins, where team members articulate tacit knowledge that otherwise would be difficult to share and communicate.

Consequently, the combination mode is triggered in a networking process incorporating newly created knowledge and existing knowledge from the same or other areas of the firm, effectively turning them into a new set of solutions or systems.

When the members of the firm are exposed to the results of the combination phase and put that knowledge into practice, the internalization process takes place.

This dynamic process occurs in an environment that is adequate for knowledge creation and conversion both at the individual and the organizational levels.

Research process

The exploratory research that was undertaken in this work follows the view that architectural innovation in PSF's largely influenced by the social environment prevailing in the firm and that the professionals' motivation to use the systems for knowledge management and knowledge transfer can't be generalized in a way that enables prediction of their actions.

Considering these issues, this exploration work presents the result of primary and secondary research. The secondary research involved reviewing the literature on innovation, architectural innovation, dynamic capabilities, services, professional service firms and knowledge management and transfer. The primary research involved conducting content analysis over qualitative data obtained from interviews with professionals at the consultant, manager and partner levels working for 3 large PSF's in the area of management consulting.

It is acknowledged that a limitation of this approach is the level to which conclusions can be generalized to a broader population. This exploratory research addresses this limitation by adopting the framework set by Robert K. Yin⁶¹ regarding its results being generalized into theory instead of generalized into the wider PSF population.

The firms considered in the research were chosen based on the following criteria: They have global presence, are privately owned by the officers of the firm, have over 500 active consultants and have more than 20 years of history and ultimately, the firms must be in the management consulting business.

The requirement of global presence was set to insure that cultural adaptation was part of the opportunities and challenges that the firm faces.

The requirement of private ownership was set to insure that the firm's mission and day to day operations were not influenced by earnings pressures.

The number of consultants was set arbitrarily to insure that the firms that were considered approach the different knowledge transformation mechanisms with systematic procedures as opposed to non structured actions, in order to achieve successful architectural innovation.

The twenty year history requirement was set so that the firms studied were no longer coping with the particular difficulties of a start up practice and that they were recognized in the market.

The particular industry of management consulting was chosen arbitrarily due to the nature and the scope of their work, due to their business model, these firms interact with the highest decision makers of the client organization, at the Board, CEO or VP levels, thus insuring that the work the firm performs, the relationships it develops and the knowledge of the client company it accesses are of the highest relevance to both the PSF and the client.

The interviewees held positions in all three of the main hierarchical levels in PSF's, managing partners, engagement managers and associates. This reduces the risk of results being biased towards a particular perspective within each of the firms. Their experience in consulting ranges from 3 to 17 years, all of them hold advanced degrees.

A semi-structured interview process was used in which the interviewed individual was presented with a summary of the background secondary research conducted as an introduction to the topic, then an open discussion of the mechanisms used by their firms for architectural innovation followed. A summary of the key issues covered during the interviews was made and finally the interviewees were asked for additional information that was relevant to the topic but might have been left out during the discussion. The questions posed to the interviewees address two main research issues:

- First, how do PSF's adequately deploy strategies for knowledge creation and transformation that result in architectural innovation?
- Second, how do PSF's adequately motivate their professionals to engage in the activities required by the strategies mentioned above?

Chapter 5

ANALYSIS

Company profiles

Due to confidentiality agreements the three firms that were included in the study will be referred to as Firms A, B and C.

The individuals interviewed collaborated with these firms in offices located in the United States, Mexico and Spain.

Profile of Firm A

Firm A was founded in the United States in the late 1940's. It is privately owned by the partners. It has operated with international offices for the last 40 years. Currently it has approximately 50 offices in over 30 countries, with a staff of 2,500 people of which around 1,700 are consulting professionals.

Firm A focuses mainly on 13 industry groups and 6 functional areas of expertise. Current yearly revenue estimates for this firm are in the order of \$800 Million USD.

The firm is recognized as part of the top 10 worldwide management consulting firms, is focused on general management consulting but stands out in particular in the areas of supply chain management, procurement and enterprise integration technologies.

Profile of Firm B

Firm B was founded in the United States in the late 1920's. It is formally incorporated but functions as a partnership. It is considered among the top 5 management consultancies worldwide.

This firm opened international offices by 1960. Currently, it has over 90 offices in 50 countries; it has a staff of approximately 7,500 people out of which around 6,000 are consulting professionals.

The firm has developed expertise in 17 industries and 6 functional practices. Current estimated yearly revenue is approximately \$3.5 Billion USD. This firm is particularly recognized for their practice in strategy and operations management.

Profile of Firm C

Firm C was founded in the United States in the early 1960's. It is privately owned by the partners. It has operated with international offices for the last 40 years. Currently it has approximately 60 offices in nearly 40 countries, with a staff of 4,000 people of which around 3,200 are consulting professionals.

Firm C focuses on 12 industry groups and 9 functional areas of expertise. The firm is focused on general management consulting but is widely recognized by their strategy practice. Current yearly revenue is estimated at around \$ 1.8 Billion USD.

All three firms share common hiring practices. All are well known for hiring at top business graduate schools and only rarely do they hire experienced people

from industry. In the past decade there has been a generalized trend to recruit recent graduates from other disciplines than business, in an effort to integrate different points of view into the analyses they perform for clients and also due to the increasing role of technology as a business enabler in a great majority of industries as well as ethical concerns derived from the corporate scandals that have plagued the accounting and consulting industries in the last few years.

All three firms now hold specific recruiting events for PhD and Masters level graduates at top humanities and engineering schools.

The following table summarizes the key facts about the three firms in the study.

	Firm A	Firm B	Firm C
Number of offices worldwide	50	90	60
Number of countries where present	30	50	40
Number of offices outside the US	40	70	50
Staff	2,500	7,500	4,000
Estimated Yearly Revenue (in millions of USD)	800	3,500	1,800

Table 1. Comparison of key facts of the firms in the study

As it is customary in this type of business, large PSF's are organized into industry and functional practices. This arrangement facilitates the firms to deploy cross functional teams that can be structured according to the particular industry of the client and the relevant area of expertise the problem to be solved is centered on. The following table shows the main industries that the firms in the study have developed.

	Firm A	Firm B	Firm C
Industry	-Transportation	-Transportation	-Transportation
	-Automotive	-Automotive	-Automotive
	-Retail	-Retail	-Retail
	-Energy and utilities	-Energy and utilities	-Energy and utilities
	-Telecommunications	-Telecommunications	-Telecommunications
	-Chemical	-Chemical	-Hospitality
	-Government	-Consumer goods	-Consumer goods
	-Pharmaceutical	-Pharmaceutical	-Process industries
	-Process industries	-Health management	-Healthcare
	-Financial services	-Private equity	-Financial services
Practices	-Electronics	-Insurance	-Media and
	-Iron and steel	-Banking	Entertainment
	-Aerospace	-Oil	-Oil
	-Non Profit	-High tech	
		-Mining and metallurgy	
		-Media and entertainment	
		-Non profit	

Table 2. Main industry practices of the firms in the study

In the same way, the following table shows the main functional areas the firms in the study have developed.

	Firm A	Firm B	Firm C
Functional Practices	-Strategy -Operations management -Organizational development and transformation -Supply chain management and procurement -Financial management -IT Strategies.	-Strategy -Operations management -Organizational development and transformation -Sales and marketing -Financial management -IT strategies	-Strategy -Operations management -Organizational development and transformation -Sales and marketing -Mergers and acquisitions -Intangible assets -IT strategies -Brand management -Global operations

Table 3. Main functional practices of the firms in the study

Career paths, average tenure and formal training in the Firms studied

The Firms in the study have different specific development paths designed for their professionals, as well as expected formal training, duration of tenure in each level and a target promotion rate. The tables below present the career progression that is typical of each firm.

Firm A	Sublevels	Expected tenure	Formal training
Consultant level (lower)	Consultant level A	Hired right out of undergraduate school. 2 to 3 year tenure.	Basic skills development program: Financial analysis, industry and company research, spreadsheet, database and presentation software use. Consulting orientation program: Firm values, methods, goals, growth paths, structure and networking jumpstart
	Consultant level B	Holds advanced degree (non MBA) or has several years of professional experience. 12 to 18 months tenure.	Same as consultant level A.
	Consultant level C	Holds MBA or advanced degree; has been with firm for 1 to 3 years. 2 to 3 year tenure.	Specific training in industry and function selected. Leadership workshops. Specific training in general consulting and specific solution implementations
Manager level (middle)	Manager level A	With firm at least 3 years, completed internal training up to consultant level C. 3 to 4 year tenure.	Project management training. Coaching and mentoring skill development. Team management skills development. Firm business processes training.
Partner level (upper)	Partner level A	Has been manager for at least 3 years, has over 7 years with the firm. 3 to 5 year tenure.	Firm development training. Executive education on state of the art in industries and functions.
	Partner level B	Has been partner level A for at least 3 years, has at least 10 years in the firm. Position held until retirement.	As required by Partner.

Table 4. Typical career path, tenure per level and training for Firm A.

Firm B	Sublevels	Expected tenure	Formal training
Consultant level (lower)	Consultant level A	Hired right out of undergraduate school. 1 to 2 years tenure.	Basic consulting skills. Core business skills (economics, marketing, strategy, accounting and finance.). Problem solving skills. Use of SW tools for analysis and presentation.
	Consultant level B	Holds MBA or advanced degree.. 2 to 4 year tenure.	Leadership workshop. Project management, project leadership, Client leadership and people and communication skills workshops. Advanced strategy, accounting, finance and org. dev.
Manager level (middle)	Manager level A	With firm at least 3 years. 2 to 4 year tenure.	Training in specific industry and function selected. Coaching and mentorship skills development. Multiple project management. Knowledge generation and codification training.
	Manager level B	With firm at least 4 years. 2 to 4 year tenure.	Induction to partner responsibilities. Legal issues of the profession. Conflict management. Firm business processes and practices. Continued training in specific industry and function selected.
Partner level (upper)	Partner level A	With firm from 5 to 7 years. 6 to 7 year tenure.	Firm development training. Global firm management practices. Ethical issues in consulting profession. State of the art in industry and function selection.
	Partner level B	Has been with firm at least 12 years. Position retained until retirement	As required by Partner

Table 5. Typical career path, tenure per level and training for Firm B.

Firm C	Sublevels	Expected tenure	Formal training
Consultant level (lower)	Consultant level A	Hired from undergraduate school or some previous work experience. 2 to 3 years tenure.	Orientation on firm practices. Basic consulting skill development. Specific skill development workshops as needed.
	Consultant level B	Holds MBA, other advanced degree or several years of relevant work experience. 2 to 3 year tenure.	Team management, relationship management, client management. Advanced consulting practice area training (strategy, finance, innovation, org. dev.)
Manager level (middle)	Manager level A	Has been with the firm for 3 to 6 years. 2 to 3 year tenure in this position.	Advanced project management. Industry and function specific training.
	Manager level B	Has managed projects with the firm for at least 18 months. 1.5 to 2 years tenure in this position.	Mentorship and coaching skills. Firm business processes training. Further training on industry and functional focus areas.
Partner level (upper)	Partner level A	Has managed multiple projects with the firm for at least 18 months. Tenure in this position goes from 3 to 4 years.	Legal and ethical issues. State of the art executive training on industry and functional areas selected.
	Partner level B	Has been with the firm for at least 10 years. Position is held until retirement.	As required by Partner.

Table 6 Typical career path, tenure per level and training for Firm C.

Condensed knowledge management strategies of Firm A

According to the perspective of the professionals interviewed in Firm A, their explicit knowledge strategy is divided into the following categories:

- **Knowledge development on industry clusters:** This is a set of documents that are updated continuously and center on the competitive dynamics of each of the industries that the firm targets. The principal contributors to this codified knowledge are the current firm experts in each particular industry. The documents provide the facts a consultant at an entry level position needs to understand and be effective in projects related to that industry. Valued information from engagements in different countries is sanitized and translated to English to include in the industry knowledge databases. It is expected for new consultants to review the basic documents before any engagement with a client in the industry, however, no examination or method to guarantee this is in place. Since starting consultants have not decided yet on the industry they will focus on, these documents provide them with their first impression of the inner workings of successful companies in each industry. Web delivered courses are available to go beyond what the initial industry dossiers provide. Advanced knowledge of the industry is used in training professionals with more time in the firm.
- **Knowledge on functional areas:** This set of documents and media are designed by the firm's experts in each function. The basic modules in marketing, strategy, finance and organizational development are taught to incoming consultants in the introductory training programs. More advanced material is generated out of specific applications of functional knowledge to particular circumstances a client faced. This last type of

documentation is the basis for developing proposals to clients that may benefit from this knowledge and that are in industries that pose no conflict of interest for the firm.

- **Knowledge on firm business processes:** This knowledge base consists of the mechanisms the firm uses to manage its day to day operations, such as performance evaluation, proposal and contract generation and review, coaching and mentoring, among others. Project managers are trained on these practices and are expected to involve themselves in the day to day training of younger consultants in informal settings. Partners focus on the management of risk and liabilities in Firm A's engagements and on how to detect early and manage potential pernicious situations.
- **Knowledge on project management:** This training is mandatory for level C consultants that aspire to be promoted. According to the firm professionals interviewed, by the time a consultant is required to take the courses and examinations, enough exposure to the methodology has been logged and the course is merely considered an administrative procedure. Out of all the training materials discussed in Firm A, this is the one that is updated the least. Some of the requirements of the project management methodology are even entirely bypassed when the impact on results for the client is negligible, even though the impact for the knowledge management of the firm is not. Formal and informal incentive misalignments prevent the situation from being corrected.
- **Knowledge on relationship management:** The management of relationships is considered a key competitive capability for the firm. By the time a consultant moves into a manager position and increasingly as the manager moves into a partnership at Firm A, it becomes self evident

that poor relationship management negatively affects the bottom line with almost no delay. Basic training on how to develop and maintain relationships with top management of a client firm is taught at the partner level, however the partners agree that by the time a manager is promoted to partner, it is evident that the necessary skills to function and relate to powerful individuals are present in the promoted manager.

In order to capitalize from these types of knowledge, Firm A has several knowledge repositories (databases) with access to consultants. It also monitors processes for updating the repositories and purging obsolete information. The firm encourages its partners to publish white papers and also articles in peer reviewed journals and books, and provides funding for research that leads into these types of publishing.

Similarly, their tacit knowledge strategies are divided into the following categories:

- **Consultant interaction:** Firm A recognizes the importance of consultant interaction as a mechanism to generate and distribute tacit knowledge, besides the rotation of consultants in engagement teams, the firm holds regional meetings once a year to discuss successful engagements and the tools developed to solve that client's set of problems. World wide gatherings under this objective are also carried yearly with functional and industries focus. From the interview data, this is perceived by managers and consultants as a key element to network and learn informally who is the expert or merely knowledgeable in any industry or functional area. Before projects, managers and junior partners interact with senior partners to review a proposal before being turned to the client for approval. During projects, managers and consultants in Firm A also get

partners to review the basic strategy for solving the client's problems and suggest corrections or alternative paths.

- **Manager and partner interaction with outside experts:** The firm organizes events for managers and partners where they meet with outside experts from industry or academia to discuss the latest trends in any given function or industry. These events are scheduled on a case by case basis and are open to members of the firm worldwide. From the comments in the interviews, a lot of people participate in these events but they're not recognized as providing a high impact in terms of the application of the tacit knowledge acquired to a client problem, but instead as providing potential trends to be aware of for future work.
- **Mentorship and coaching activities:** Firm A assigns a mentor to each newly arrived consultant at the time of their start in the firm. This is recognized by the interviewed professionals as a very important tacit knowledge transfer mechanism in Firm A. The partners agree that the process is valuable to pass along general knowledge regarding the business and to help the newcomers solve the internal problems they may encounter. Managers and consultants regard the mentorship process in Firm A as a very important way to get to know the unwritten rules of the firm. Discrepancies of opinion were found due to the arbitrary way the mentor is assigned to a starting consultant, since the mentorship relation is permanent as long as the consultant works for Firm A, some agree that waiting for some form of affinity to become evident is necessary before assigning mentors. In practice, a poorly regarded mentor (someone with very little time for face to face meetings) will likely have a negative impact in the general perception that the consultant develops about Firm A.

- **Client relationships:** One of the most important processes in Firm A is the management of client relationships. Most of this process is handled through informal activities and little is codified. Clients and potential clients are invited to events where insights regarding the work of the firm are shared with them. A group of partners are selected to develop relationships with the client companies' decision makers at the most appropriate level. The behaviors and patterns of conduct are passed on from partner to partner. Once started, relationships are nurtured by inviting the decision makers to sporting events, social gatherings and beneficence events. Firm A documents very little regarding the relationships developed by each of their partners.

Condensed knowledge management strategies of Firm B

According to the perspective of the professionals interviewed in Firm B, their explicit knowledge strategy is divided into the following categories:

- **Knowledge development on industry clusters:** As with Firm A, this is a continuously updated set of documents around the competitive dynamics of the industries the firm targets. An important difference with Firm A is that in addition to the principal contributors to this codified knowledge being the current firm experts, outside experts are brought in to collaborate. Usually these outside experts are people with many years of experience in the particular industry and hold a perspective that ranges from basic industry knowledge to future key competitive advantage sources. As with the other two firms, the documents developed provide the necessary knowledge of the industry for entry level consultants to understand the industry and "speak the language". As is the case in the

other two Firms, it is expected for new consultants to review the basic industry documents before participating in any engagement with a client in the industry.

- **Knowledge on functional areas:** In firm B, this set of documents and media are designed by outsourced teams, usually a third party training developer that contracts university business graduate school professors for content and delivery. As with Firm A, the basic modules in marketing, strategy, finance and organizational development are taught to incoming consultants in the introductory training programs, except in the case of firm B there is a more in depth program that lasts 3 weeks of intense courses in these areas with a strong component on case methodologies and team challenges. Cases are developed in-house or bought from well known case developing graduate schools. The more advanced material is generated in house, out of specific applications of functional knowledge to particular circumstances a client faced and a strong sanitization effort is implemented so that the confidentiality of clients is guarded even among the members of Firm B.
- **Knowledge on firm business processes:** As with the other two firms in the study, this knowledge base consists of the mechanisms the firm uses to manage its day to day operations, such as performance evaluation, proposal and contract generation and review, coaching and mentoring. Firm B mainly teaches these procedures without resorting to specific training tools, even though they're available. Rather the procedures are learned on the job in an apprenticeship mode. Project managers learn by doing under more experienced managers and involve younger consultants that are targeted for promotion. As with the other Firms, partners focus on the management of risks and liabilities.

- **Knowledge on project management:** This training is mandatory for consultants that are targeted for promotion to managers. The program is focused on consulting specific project management tools and methods. A Myers-Briggs evaluation is done for each potential manager first, since a lot of the material is based on conflict management and interpersonal influencing strategies. According to the firm professionals interviewed, this is one of the most valuable training programs the firm offers. The program on project management is standardized across the entire firm. Firm B is very focused on developing standard platforms so their consultants are effective team members regardless of the location of the job. The effect of cultural shock is minimized due to this standardization, and the methodology for project management is a strong component within this strategy for Firm B.
- **Knowledge on relationship management:** The management of relationships is also considered a key competitive capability for Firm B. In this firm, interpersonal skills are taught since the entry level position and a strong encouragement is placed on consultants to develop relationships with peers and clients in every engagement. Social events are held continuously at the regional office level to provide opportunities to specifically hone in skills learned in formal training by Firm B.

Firm B has a more elaborate structure than Firm A in terms of explicit knowledge practices. In addition to knowledge management software and project knowledge codification practices, Firm B places particular effort in using firm-wide formal training to establish operating standards across every single office. This is a key enabler for Firm B's strategy to leverage its consultant base worldwide. Possibly the strongest operating focus observed in Firm B is the emphasis placed on

preparing their consultants for collaborating in multiple environments and cultures while keeping unified approaches to problem solving. Firm B also encourages its partners to publish white papers and articles in peer reviewed journals as well as management science books, and in addition to providing funding for research that leads to publication, Firm B established a number of virtual research centers, which are staffed by industry and functional experts and even though these centers do not exist tangibly (they occupy no particular buildings or offices) the output of the research is rewarded and used to train consultants, attract attention of potential clients to new methods and techniques and build brand awareness.

The tacit knowledge strategies of Firm B are divided into the following categories:

- **Consultant interaction:** The interviewees of Firm B all considered a process of apprenticeship in projects as the most important way to accumulate tacit knowledge. Strong emphasis was placed on client interaction as well. Second to the interaction directly related to projects, the socialization events at the office and regional levels were mentioned as important to foster friendship and cooperation among consultants in the same office. Regional and world wide innovation contests are held yearly, in which multi office teams develop a creative methodology to solve problems within an industry or in general consulting practice. There are elimination rounds and finalists are rewarded in terms of formal evaluations, compensation and prestige. The interactions developed during these contests are another way Firm B fosters consultant interactions. These events are also relevant sources of networking opportunities and represent a way to learn informally who in the firm is developing expertise in each industry or functional area.

- **Manager and partner interaction with outside experts:** Firm B relies very little on formal events to interact with members of academic institutions or industry experts that are not directly related to their client base. When events like these take place, the intent is perceived more as a branding and positioning event than as a socialization mechanism for tacit knowledge transfer.
- **Mentorship and coaching activities:** As is the case with all Firms in the study, Firm B assigns a mentor to each newly arrived consultant during their first or second week on the job. Again, this is recognized by the interviewed professionals as a very important tacit knowledge transfer mechanism in Firm B. Besides the perception by all levels of consultants in the Firm about mentorship as a key mechanism for tacit knowledge transfer and potential conflict identification and resolution, partners in Firm B are very aware of their role not just as facilitators and coaches, but also as being responsible for identifying young consultants that exhibit the characteristics the Firm seeks in its partners. These traits are difficult to measure by quantitative methods, so the mentoring process provides a way to identify individuals with intellectual curiosity and independence, that not only excel at their jobs but that also evidently enjoy doing it. Emotional balance and resilience are also part of the profile partners are trying to identify and develop in their protégées. As in Firm A, some discrepancies of opinion were found due to the arbitrary way the mentor is assigned to a starting consultant, but in the case of Firm B, more than the mandatory mentorship relationship is encouraged, meaning that the Firm's culture is welcoming of other mentor-like relationships forming.
- **Client relationships:** It is evident that the issue of client relationships is of the highest importance to all firms. Firm B develops relationships at

the CEO and VP levels of their clients. Firm B is more structured in the management of relational knowledge than Firm A is. Structured knowledge regarding social networks is continually updated. Firm B has what its professionals and others outside the profession regard as an excellent socialization process. Important events in the lives of the networked contacts of Firm B are considered for communication opportunities. Preferences in sports, working styles and other particulars are documented in a CRM suite and shared among the Firm's top levels.

Condensed knowledge management strategies of Firm C

According to the perspective of the professionals interviewed in Firm C, their explicit knowledge strategy is divided into the following categories:

- **Knowledge development on industry clusters:** As with the other two Firms in this study, Firm C develops materials regarding each industry it targets. The materials developed range from basic information packets to be read as introductions to the industry, specific competitive characteristics and challenges of each one of them and all the way to the state of the art in management practices within each industry. The more advanced materials are developed by groups of experts that the firm treats as part time consultants and part time high level strategists. One of the major differences between this firm and the other two is the emphasis Firm C places on developing insights by bringing experts together and providing them with time apart from client work so they can focus on top level analysis at the industry level. Aside of this top level work on knowledge development, the practices for designing and executing basic training are very similar to those used by the other two firms.

- **Knowledge on functional areas:** As in the case of Firm A, this set of documents is designed by the firm's experts in each function. The basic modules in marketing, strategy, finance and organizational development are taught to incoming consultants in the introductory training programs and a more advanced level course on each is taught at the 2 year tenure. As with knowledge in industry areas, the more advanced functional materials are developed by groups of internal experts and are completely focused on application to the consulting profession.
- **Knowledge on firm business processes:** This knowledge base consists of the mechanisms the firm uses to manage its day to day operations, such as performance evaluation, proposal and contract generation and review, coaching and mentoring, among others. As in the case of the other two firms in the study, it is standard practice to introduce these practices to project managers and keep the training process going all the way into partnership. Firm C has a few key components of formal training regarding business processes. Heavy reliance on apprenticeship is the norm.
- **Knowledge on project management:** Besides training being mandatory for consultants that aspire to be promoted to project managers, as in the case of the other firms, in Firm C there is a stronger component related to project management in the periodic performance appraisal mechanism that continuously evaluates the results and client perceptions of closed projects. This allows the partners in Firm C to remain more flexible than their counterparts in the other firms as to the training and coaching activities that are needed by younger consultants to succeed as project

managers. Again, a consultant must show adequate proficiency in the methods and tools of project management before promotion.

- **Knowledge on relationship management:** Again, Firm C also considers the management of relationships as a key competitive capability for the firm. Formal mechanisms for structuring relational knowledge similar to those used by Firm B are implemented in Firm C. A CRM system is in place and the firm essentially targets CEO and VP positions in their client companies for social and networking events.

Firm C has the strongest culture in favor of heavy documentation of their engagements and further analysis to derive general insights. Strong emphasis is placed on analytics of industry trends and competitive dynamics. In a very pronounced difference with the practices of the other two firms, Firm C recurs more to bringing experts in related fields physically together to work on solving cutting edge problems. These efforts usually yield insightful publications, books and on occasions new tools for analysis that the firm popularizes also as a branding strategy. Fast dissemination of these insights is achieved by a strong internal communication culture and systems, robust knowledge management systems and rotation patterns for consultants.

Firm C's tacit knowledge strategies are divided into the following categories:

- **Consultant interaction:** As in the case of the other two firms, Firm C recognizes the importance of consultant interaction as a mechanism to generate and distribute tacit knowledge. Firm C follows similar practices in terms of regional and firm wide meetings and networking events by industry and function. The rotation of consultants in this firm is more structured than the other two, following an apparent trend to develop a

reduced set of expert teams in key functions and deploying them where needed, this presents a difference with Firm B, that tries to develop a more local approach in generating the competencies that the region demands, compensating with outside teams in cases that merit intervention of more knowledgeable professionals.

- **Manager and partner interaction with outside experts:** The firm leverages its strategy of developing innovative analysis tools by organizing events for managers and partners to meet with outside experts from industry or academia and along with a heavy client base to discuss sanitized applications of the firm's insights. These events are considered networking opportunities to identify potential clients and introduce them to the work of the firm.
- **Mentorship and coaching activities:** Firm C assigns a mentor to each consultant entering the firm; this mentor is located at the partner level. A difference with the other two firms is the addition of a second mentor at the manager level. The reason the firm follows this strategy is due to the workload of the firm's partners and the need of newly arrived consultants to discuss and solve issues that may not require partner intervention. The firm stresses the fact that partner mentorship is always to be used when the consultant feels the need to discuss matters at the highest level. This is of course recognized by the interviewed professionals as a very important tacit knowledge transfer mechanism in Firm C. Partners also recognize the relevance of mentorship and coaching activities as part of the discovery process of new consultants with outstanding characteristics.
- **Client relationships:** Firm C uses systems for managing relationships that are similar to those of Firm B. CRM systems are in place,

documenting interaction with clients at the top and middle level. This system is used to select particular groups of clients that may be interested in current firm research or that have affinity with each other in terms of cultural, beneficence or sporting events. The firm partners try to maintain a steady contact with top client officers and aim to be retained for their services with as many clients as possible, as this provides client tie-in and reduces revenue variations, which allow for better budget discipline. Clients and potential clients are invited to events where Firm C presents insights regarding its work. Partners are assigned to clients according to industry expertise or function expertise compatibility with the path CEO's took on their way to the top office at the client company. If the CEO of a given company made a career in sales, assigning a partner with expertise in sales and operations planning is most likely to lead the relationship of the firm with that particular company.

The information gathered in the interviews makes clear that the firms in the study constantly implement processes and technology to create, preserve and transform tacit knowledge to explicit knowledge and back to tacit.

The partners at these firms agree that these processes and technologies accelerate learning by younger consultants, improve the competitive position of their firms and accelerate their capacity to adapt to the new needs their clients constantly develop.

Consultants in these firms acquire knowledge from project experience and apprenticeship interactions in the firms in the study, but also from formal education and training mechanisms.

It also becomes evident that the formation of social networks within and outside the firm is an important mechanism both to identify people that can help solve a

problem due to their prior experience and to identify clients that can benefit from the accumulated knowledge of the firms studied.

The insights derived from the interviews also make clear that structural knowledge in these firms accumulates over time but part of it also becomes obsolete as new techniques and practices are generated.

This process also affects tacit knowledge within the firms. At the partner level, the firms in the study acknowledge that managing structural knowledge in their organizations becomes difficult due to the different activities that are demanded from the firm's higher level professionals, which must simultaneously play the role of producers, managers and owners, balancing the short term profitability with the long term competitive capacity of their businesses, and also to various factors such as consultant attrition, quality of new hires, organizational changes, formal and informal incentive structures, informal social interaction patterns, among others.

With the information gathered from the interviews, a system architecture model of knowledge management in consulting firms is constructed and used to develop a conceptual system dynamics model of this processes.

Both tools contribute to the understanding of the relationships between the components of consulting firms viewed as systems and also to comprehending the dynamic nature of knowledge management practices observed in these firms.

A systems view of knowledge management architecture of the firms

studied

As mentioned above, a variety of factors affect the dynamics of knowledge management in the firms comprised in the study. Some of the key factors found to influence this dynamic process are:

- **The particular policies of each firm for managing knowledge:** Each firm has particular processes and gives particular relevancies to the execution of their training, knowledge codification and socialization activities.
- **The allocation of available time and resources to revenue generating activities and knowledge generating activities:** Each firm will react to the demands placed on them by their current project mix, their revenue goals for the quarter and year, the trends of their market and their staff occupation to determine how to allocate the time of their staff to balance the goals of growth and competency generation.
- **The characteristics of the projects the firm pursues:** This means the alignment of industry, function and relevancy, both to the client and to the firms. Challenging projects not only are important for the competitiveness of the clients, but also for the development of new insights by the professional service firms involved.
- **The availability of the adequate staff for the project:** This requires a mix of consultants with relevant expertise to insure project success and those to whom the project represents valuable apprenticeship to increase the knowledge capital of the firms.

These factors are illustrated in the architectural model (see Figure 5 in next page). As the model shows, the firm's professionals will engage in knowledge generation and transfer activities to increase the firm's knowledge capital.

This improvement in knowledge capital in turn generates increases in the productivity of the professionals in the firm and in the quality of their project work.

The amount of effort that is to be devoted to knowledge generation and transfer is determined by the balance the firm decides to pursue between their short term revenue generating activities and their long term competitive position, which is directly influenced by its knowledge capital.

This allocation balance will be heavily influenced by the firm's knowledge management practices, classified into formal training, codification of knowledge (externalization) and socialization activities (tacit knowledge generation and transfer).

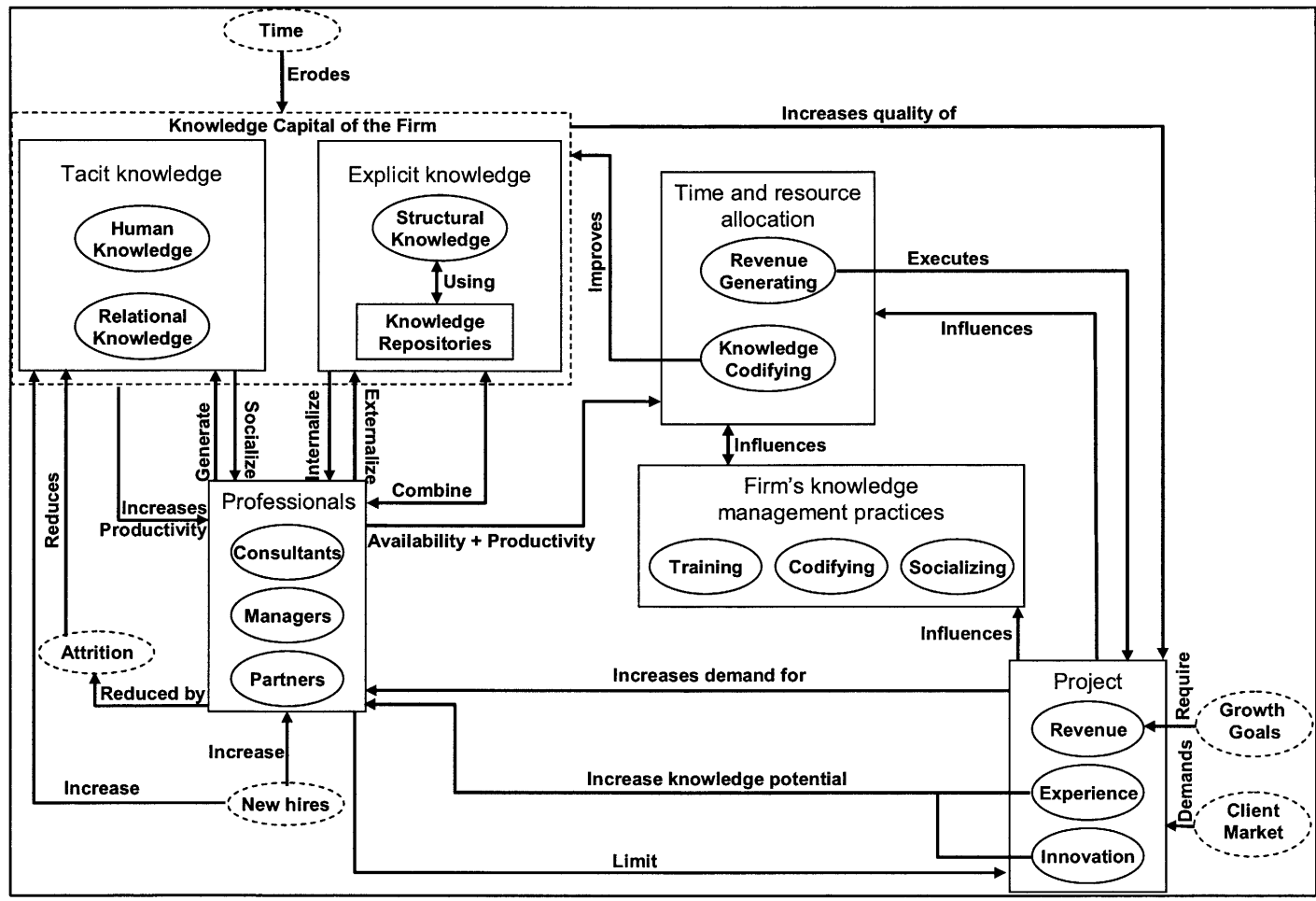


Figure 5. Architecture model of knowledge management system in studied PSF's

Growth goals and market trends will affect the amount of projects the firm will engage in, the number of professionals that are available limits the number of projects the firm can take. If the firm decides that the market allows for growth, it will hire new professionals to balance attrition and growth demands.

The process described in the architecture model is not static; it undergoes constant change according to the prevailing conditions in the firms. The best way to understand the interactions of the components is with a system dynamics representation of the conceptual model.

The system dynamics view of the knowledge management process

The system dynamics method uses two types of constructs to represent the state of a system over time. The first type of construct is a stock variable or level. This is an accumulating variable that changes over time. The second construct is a flow variable. This is a rate that affects the stocks and other flows as well.

Stocks and flows are connected in a way that represents feedback loops in the system. Positive or reinforcing feedback loops are those in which a change in flow in one direction produces a further increase in flow in the same direction after the system undergoes a full cycle. Negative or balancing loops are those in which a change in flow in one direction produces a reverse net flow after the system completes a full cycle.

Consider the example of a reinforcing loop shown in Figure 6. When the knowledge capital of the firm increases, the productivity per consultant increases as well. Since a change in the first variable produces a change in the second one in the same direction, the relationship is said to be positive, when the productivity per consultant increases, the average consultants needed per project decreases. Since in

this case a change increase in productivity per consultant produces a change decrease in average consultants needed per project, the relationship between these variables is said to be negative (hence the symbols by the arrows).

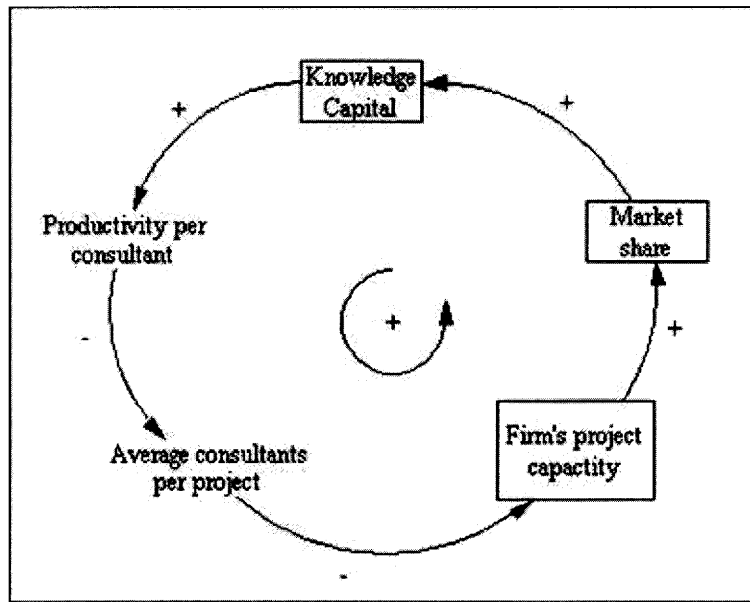


Figure 6. Example of reinforcing loops

As the average consultants needed per project decreases, the total project capacity of the firm increases, in consequence, the market share that the firm can command also increases. As the market share increases, more projects are executed and the knowledge base of the firm increases. Since the first change discussed in the loop was an increase in knowledge capital and at the end of one full cycle the resulting feedback on that same variable is in the same direction (increase) then the loop is said to be positive or reinforcing. Hence the positive symbol in the middle.

A negative or balancing loop is shown in Figure 7. In this case, an increase in the number of qualified consultants will produce an increase in the number of active projects the firm can pursue; therefore the relationship between these two variables is positive. An increase in the number of active projects means that more time will be used for project activities and less time will be available for knowledge

management activities, such as developing training materials and attending seminars.

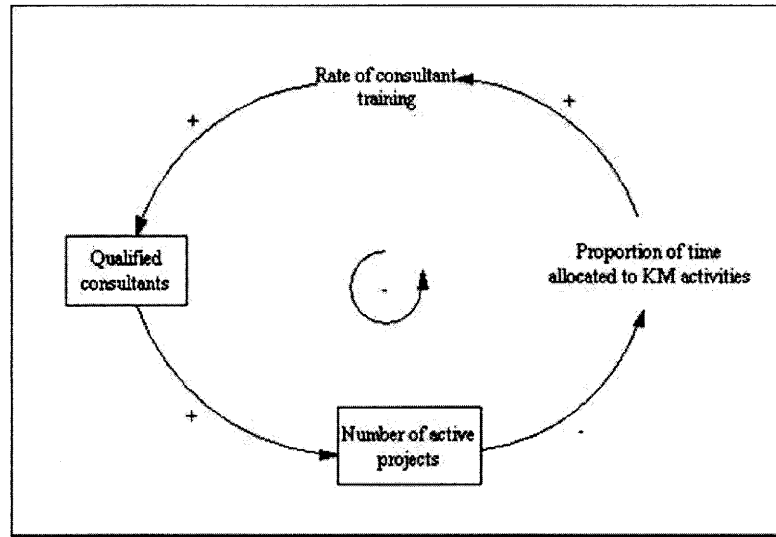


Figure 7. Example of a balancing loop.

The decrease in the proportion of time allocated to knowledge management activities produces a decrease in the rate of consultant training, and in turn this change produces a decrease in the number of qualified consultants. After a complete cycle, an increase in the number of qualified consultants produced an opposite effect on this same variable, therefore the loop is considered negative or balancing.

The dynamics of tacit knowledge creation

When a team of consultants executes projects, there is a finite level of effort that can be allocated to activities related to the current project or to knowledge capital creation. The available effort will be allocated according to the firm's policy for knowledge capital creation. The proportion of effort allocated to the project's execution will result in the completion of the project. When the project is

completed, revenue will be recognized and the tacit knowledge capital of the team will have increased due to the socialization mechanism among consultants themselves and also with the client personnel. The increase in tacit knowledge will produce a marginal increase in productivity of the members of the team. This productivity increase will affect subsequent project directed efforts, creating a reinforcing loop (See Figure 8).

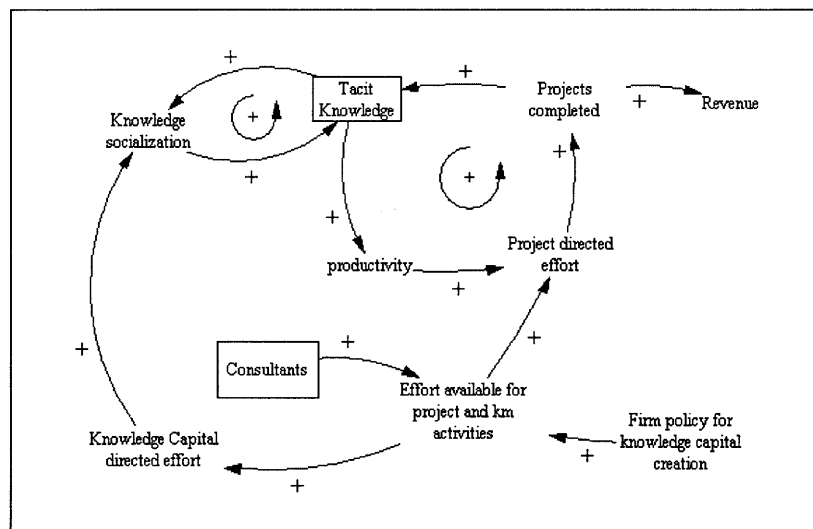


Figure 8. Tacit knowledge development dynamics.

At the same time, the proportion of effort allocated to knowledge capital creation will impact the level of socialization activities that generate more tacit knowledge, this creates a secondary reinforcing loop that contributes to the reinforcement of the first loop. The effects of this knowledge generation dynamics take years to become evident and depend on the capacity of each team member to decide the industry and function they wish to focus on.

The dynamics of explicit knowledge creation

Just as in the case of tacit knowledge creation, the consultant base provides finite effort availability for both project activities and knowledge capital creation efforts. Project directed effort contributes to the completion of current projects and this generates revenue.

When projects are completed, explicit knowledge is generated in the codified deliverables to the client. This explicit knowledge in itself constitutes a reinforcing loop that increases productivity (see figure 9).

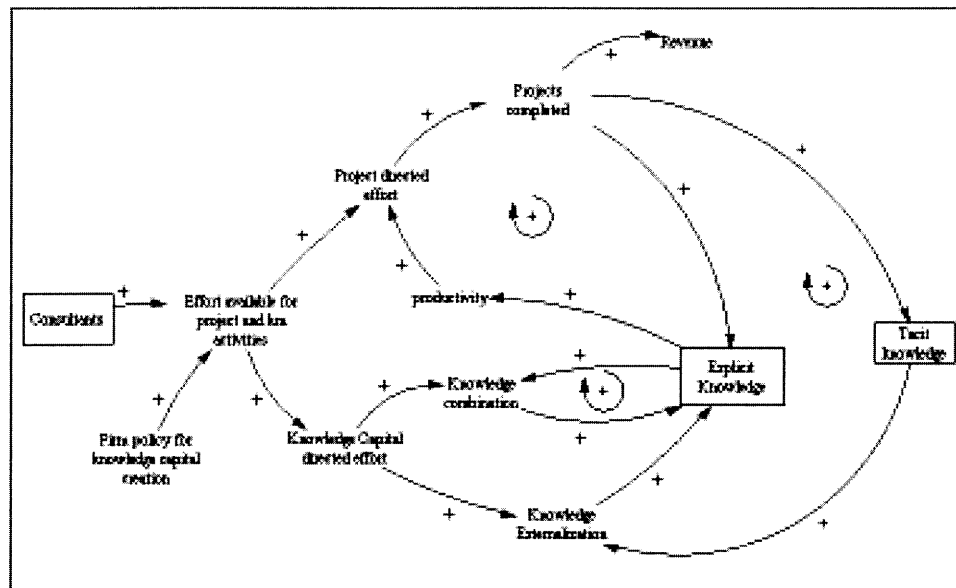


Figure 9. Explicit knowledge development dynamics

A second reinforcing loop occurs when tacit knowledge is transformed in to explicit knowledge through the externalization process, i.e. when consultants codify a new method for solving a problem.

A third reinforcing loop is caused by the knowledge combination process, when consultants dedicate time to analyzing the application of documented insights to a more general set of problems.

Some of the best known methodologies for business analysis that consulting firms have produced in the last few years are due directly to the efforts allocated to knowledge combination mechanisms.

The dynamics of balancing knowledge vs. project activities

The policy of the firms for the allocation of resources and time to the creation of knowledge capital is a controlling variable that balances the resources of the firm in alignment with changes in its competitive objectives. When the effort directed towards knowledge capital creation is increased, it naturally follows that this effort is to be subtracted from project related activities (see figure 10).

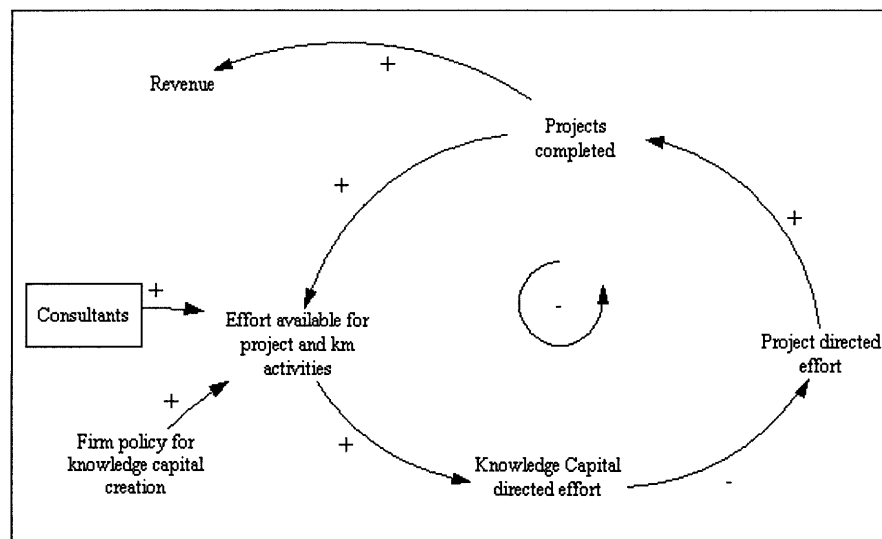


Figure 10. Balancing loop between project and knowledge creation activities.

When the effort directed towards executing projects is decreased, the rate at which the firm completes projects also decreases. This puts pressure on the firm to change policy and balance the mix of activities or hire more consultants to maintain the ratio before revenues begin to decrease. This becomes a balancing loop.

The dynamics of new hires and attrition on the Firm's knowledge base

A great amount of knowledge in PSF's is tacit and the firm will suffer from losses of experienced consultants. Typically new entrants will stay with the firm for at least two to three years, since leaving before this time hurts their marketability for other jobs. Out of those that stay, promotion to more responsibility generates a further increase in their tacit knowledge and it is here that the firm will try to control attrition more actively. In general, attrition forms a balancing loop in tacit knowledge generation and hiring reinforces it (see figure 11).

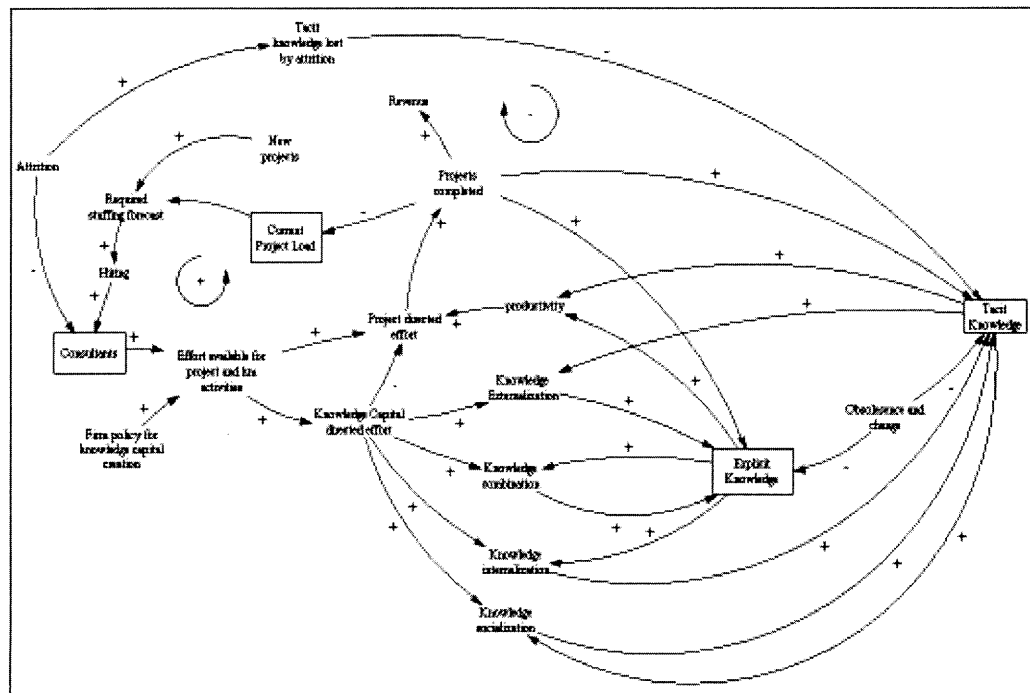


Figure 11. Staffing dynamics and tacit knowledge.

The hiring practices must balance the normal exit of consultants after the third or fourth year and must be able to compensate for the attrition rate after this point in time.

As the model illustrates, knowledge generation and management are at the core of PSF's competitiveness and productivity strategies. The development of knowledge takes time and is dependent on the policy, systems and staffing practices of each firm. In order for productivity to sustain a positive trend, PSF's must balance the activity load of their consultants into project related, revenue generating activities and knowledge generation and relationship management activities. The PSF's in the study achieve this by leveraging their knowledge base so that more junior professionals can execute a larger portion of project work and permit the more senior professionals to develop insights and manage relationship networks.

The following chapter presents the key findings of the study.

Chapter 6

RESULTS

Enabling factors for architectural innovation: Knowledge transfer in PSF's

The prevalent means for knowledge transfer in PSF's found from the exploratory interviews are presented below. Out of the many innovative mechanisms used, these are the most pervasive ones. A brief discussion of each is presented. Finally, the insights derived from this research are presented and further work to be developed is discussed.

Main knowledge transfer mechanisms found

The study identified the following successful knowledge transfer mechanisms used by the large PSF's in the study:

Knowledge management repositories: All of the firms in the study keep a memory of the results from previous projects. For some of them this is merely a collection of the key presentations made to the client at the end of the project, for others it is a set of documents that outline results, lessons learned and evaluations for each member of the intervening team.

In essence, this is the key externalization and internalization tool for all the study PSF's, since the knowledge acquired in an engagement is codified into these sets of documents and thus made explicit, and it is also a major source of reference for internalization, when consultants starting similar projects review the existing

documents in order to better understand the industry and the functions involved in the new project.

In most cases, there is a strong combination mechanism in the works as well, since each engagement with a client is unique, the teams assigned to the project use these documents in a recombination of knowledge that more often than not results in an innovative solution for the particular case they face.

The most common way of recombining and adapting knowledge using these repositories is reviewing strategies and results documented from projects in the same functional areas but in different industries than the one where the current client competes.

This is a key component of architectural innovation in PSF's.

Knowledge maps: This is another key mechanism used in all of the PSF's in the study and is relational knowledge oriented. Both externalization and internalization modes are present in its use.

In essence, a knowledge map is an index of members of the firm that are knowledgeable in particular industries or subjects. The knowledge maps can be as simple as a database with names and associated keywords regarding industries, companies and knowledge subjects (such as pricing, marketing, operations, strategy, etc.) and a "level of expertise" for each person in each key knowledge area, or they can be of a more elaborated nature, such as more formal network tracking systems that map people, relationships, knowledge areas and other attributes that allow the person that consults the system to identify members of a team that worked together

in a particular engagement, that worked in drafting particular proposals or have strong ties to industry associations.

Externalization is present when people update their experience and contacts in the systems and internalization happens when people access the system and contact other consultants that are able to help them.

This also is a key component of architectural innovation in PSF's.

Formal training mechanisms: All the firms in the study use formal training at different stages in the career progression of their professionals.

Typically there is an introductory “boot camp” for junior members when they sign up with the firm. These first set of training materials focuses on basic knowledge and skills, both technical and interpersonal. The courses cover finance, operations, human resources, strategy and other basic functional knowledge for consulting, as well as spreadsheet use, presentation design and other tools.

More than teaching these skills and knowledge, the purpose of these courses is to guarantee a standard level of proficiency in these factors across offices in the firm, in order to facilitate rotation of junior consultants across different offices with the least amount of quality related problems.

As firm members begin to reach higher levels of responsibility, they're required to attend formal training for the position they're about to assume.

Senior consultants get training in key industry trends for their particular industry of concentration, interviewing and presentation skills and advanced use of technical tools, among other topics.

Engagement managers are trained in project management and budgeting, team formation and dynamics, performance appraisal, client interaction and crisis management.

At the Partnership level, junior and senior partners are trained in global firm strategies, human resources, mentorship and knowledge management strategies, relationship development, ethical standards and liability management topics.

The design of the materials used is overseen by members of the firm in the position to which the consultant is about to be promoted to. These materials get reviewed and updated periodically, but for the most part the updating depends on the dynamic nature of each particular topic.

Although formal training is not directly involved in architectural innovation in the firms, it sets a standard knowledge base upon which innovative activities can be then carried out, thus making it indirectly relevant to the architectural innovation capacity in PSF's.

Consultant rotation patterns: Consultant teams in PSF's are usually rotated every time a project starts. This acts as a socialization mechanism focused on human and relational knowledge transfer.

In the narrow scope of the firm, a regional office will have a reduced number of consultants that eventually get to work with the rest of their office peers and share tacit knowledge by socialization.

In the broader scope, consultants from one office generally loan or borrow professionals to or from other regional offices around the world, depending on the expertise required to staff the project and the availability and willingness of professionals to move temporarily to another location.

This process is successful in sharing tacit knowledge on cultural experiences, industry and technical best practices experienced in other engagements, as well as on the contexts in which these practices were deployed.

This information is used in a particular engagement as it becomes relevant and available within the socialization process.

This mechanism is also key to architectural innovation within a firm, since in general, each member of a team assigned to a project has a different background and experience mix, and this diversity and interaction is extremely relevant, along with the interaction developed with members of the client organization for the innovation process in each project.

Mentorship programs: The firms in the study reported using varied styles of mentorship programs. In these programs, a new professional starting in the firm is paired with a more experienced manager or in some cases a partner to serve as an informal mentor to the new hire.

This also is purely a socialization mechanism focused on human knowledge transfer and appears to be very useful for “passing down” the arts of the trade to new generations of consultants, however the execution of this type of programs always presents challenges that are a function of the more senior member’s agenda availability, the personal “chemistry” between both the mentor and the entrant, the compatibility of the professional interests among both of them and the particular style of the mentor for socializing with the junior.

There appears to be a better result when the mentorship meetings are held in an informal setting, with no predetermined agenda and the mentor makes a clear and explicit compromise to keep full confidentiality of the information shared within the meetings.

One other issue that arises is that mentorship is preferred to be practiced by pairing both senior and junior members of the same gender. It was clear from the interviews that the mentorship meetings are usually focused very little on issues regarding the project that the junior member is involved in and to a large extent, they address internal issues in the firm such as the selection of industry or function that the junior member will be making as a concentration, their performance appraisals, skills development and cultural fit.

The mentorship programs are relevant to architectural innovation because they allow partners in the firm to identify particular traits in new consultants, such as the capacity to think out of the box, their emotional maturity, tolerance level for uncertainty and opposition and ultimately the potential for the new consultant to stick to consulting for a lifelong career.

Besides helping the consultant navigate the politics of the firm, what partners learn about the new entrants help them make the staffing decisions that due to the nature

of a project, have to go beyond just the expertise or industry focus of the members of the team for a particular engagement.

Some projects require solutions that will only be modifications of other already proven strategies. Other projects require fully characterizing a problem a client has been unsuccessful at diagnosing and then developing novel solutions, often under heavy scrutiny and pressure from high level officers of the client firm.

When two consultants have the expertise in the relevant industry and function, the one with more creativity and capacity to manage stress and opposition will be assigned to the latter type of project, which in turn will require more innovation capacity than the former.

Regional /global events to share best practices: All the firms in the study engage in annual or semi annual events where they send a number of consultants to present to a broader peer audience a selection of the most successful projects executed recently.

These gatherings are regional or global, and present a selection of the innovative solutions the firm has put together, divided by industry and/or functional area. Most of the time, the information presented is “sanitized” of particular data that would identify the client company and the presentation is focused solely on the architectural characteristics of the problem and solution.

One particular firm has an elimination process where the most innovative solutions applied recently are evaluated at the regional level and the best ones are sent to a global gathering where the knowledge is then diffused to the rest of the firm.

These events involve three knowledge transfer mechanisms:

Socialization occurs during the events, as firm members interact with each other and discuss their experiences, what has worked and what hasn't.

Externalization occurs while the presenting professionals transfer their tacit knowledge into documented insights that can be codified and generalized, then used for the presentation.

The successful consequence of these processes is the subsequent internalization of the knowledge learned by the audience and its use during future similar projects (therefore learning by doing).

Project knowledge interim reviews: This process consists of bringing together two or three senior members of the firm to review the early findings and problem solving strategies to pursue in a client engagement. These senior members are not part of the team executing the project.

When agendas permit it, the reviewing panel includes an expert in the client's industry, a functional expert in the main functional area that the project is focused on, and some firms include a third member, whose expertise is usually unrelated to the main issues involved in the project or that is recognized as a creative out-of-the-box thinker.

Depending on the nature of the project (ranging from highly complex, never done before to projects that involve the application of a standard solution that is only adjusted to the realities of the client's circumstances) this review is conducted in person during a day long session when the project is at the 20 to 30 percent

completion mark or can only involve sending a presentation to the reviewers around halfway through the project and then receiving a document with feedback.

This process potentially involves three of the knowledge transfer modes:

Socialization occurs when the reviewers share opinions, advice and ideas with the executing team.

Internalization and combination occur when the reviewers refer the executing team to explicit materials in the knowledge repository in order to solve a problem by adapting, combining and implementing a set of solutions that are already documented.

This process is also an important enabler of architectural innovation, centered on the experience and creativity of the senior team as complement to the documented knowledge and the combination capacity of the members of the project team.

Enabling factors for architectural innovation: Motivation for knowledge transfer among professionals in the firm

The findings derived from the exploratory interviews are consistent and also stand in contrast to the recursive argument found in the literature review about professionals being jealous of sharing the tacit knowledge that makes them particularly valuable to the firm.

When speaking to members of all three levels of the firms in this exploratory study it was evident that at least in the case of large management consultancies, there is an established culture that compensates its members for sharing knowledge. This

compensation has more to do with recognition, prestige and networking than with economic factors.

Across the board, it was found that there is an unwritten rule about responding to a request for help from a fellow consultant in the firm within the next 24 to 48 hours of receiving it.

It was also established that consultants in all levels have a clear understanding that the success of the firm resides in no small measure in its capacity to leverage its global knowledge capital, -whether human, relationship or structural knowledge types- in each local engagement with a client.

The fact that consultants in the junior levels of the firm understand and firmly believe this since their first day in the firm is a clear demonstration of the cultural fit component that goes into the recruiting process.

Far from this motivation being driven by compensation and formal performance appraisal processes, which indeed measure and reward it, it was found that the main driver for this motivation is the tendency of professionals to value recognition by their peers.

This is very similar to the motivation dynamics observed in the academic environment, and the firms in this study have been successful at creating a similar value structure.

In the junior levels of the firm, there is a sense of camaraderie that drives consultants to help others when possible, but at the more experienced levels, where the expertise of the consultant is more valuable, each request for help is seen as

another opportunity to stand out, increase the expert's network and get recognition for the his or her expertise.

Another finding of this exploratory study is that the motivation of a professional to share his or her knowledge with others is dependent of the criticality of the request from the perspective of a client engagement. In other words, when the request for knowledge sharing involves solving a client's problem, the professional will be motivated to respond faster than when the request has to do with helping draft a proposal for a potential client engagement, and in turn this would be faster than a request to document a successful case of an already finished engagement in order to populate the knowledge base system of the firm.

Chapter 7

IMPLICATIONS FOR MANAGEMENT IN PSF'S AND SUGGESTED FUTURE RESEARCH

Implications for management of PSF's

The analysis of the information derived from primary and secondary research reveals the following interesting insights:

Architectural innovation in PSF's can be divided in two types, according to the impact it has on the competitive advantage of the firm. The first type is engagement related architectural innovation and the second is sustainability related architectural innovation.

Engagement related architectural innovation occurs when consultants working in a project put to work the human, social and structural knowledge capital of the firm in order to create innovative solutions to the client's problem.

Examples of this type of innovation are seen when professionals in the firm combine explicit knowledge previously documented to build an innovative proposal for a client, in the selection of the mix of professionals with adequate expertise to form a team for a particular client engagement and in the socialization process of ongoing project reviews.

Sustainability related architectural innovation occurs when the firm uses human, social and structural knowledge capital to pursue objectives that are not directly oriented to solving a particular problem a client has but rather to creating the capabilities to keep adding value to a set of clients.

Examples of this type of innovation are the training given to professionals in the firm, particularly from the engagement manager level and up, the mentorship process, the formal documentation and diffusion of innovative solutions created in the firm via socialization events at the regional and global levels, whether focused on industry or function and also the documentation and constant updating of the knowledge databases and knowledge relationship maps of the firm.

Human knowledge is considered the key knowledge capital for successful PSF's across all the firms in the study. The interviewees repeatedly pointed out the importance of the intellectual capacity, self motivation and personal growth drive of the professionals in the firm as indispensable for increasing human knowledge capital and for adequately using and improving social and structural knowledge capitals in PSF's.

In terms of engagement related architectural innovation, human knowledge capital is ultimately what causes the creation, sale and implementation of an innovative idea within the scope of a project.

In terms of sustainability related architectural innovation, it is the human knowledge of the most senior members of the firms that drive the efforts to increase the structural knowledge base of the organization, in particular when its members have to face the pressures of balancing their current engagement requirements with their sustainability obligations.

Relationship knowledge capital in the firms studied contribute immediate value to engagement related architectural innovation, this happens by facilitating the members of a team involved in a project with the opportunity to bring in and

leverage the expertise of other professionals in the firm that may contribute to finding creative ways of solving problems.

It also contributes to firm sustainability by using and developing relationships with key people to find new clients and by obtaining references of previous successful engagements.

Structural knowledge capital is recognized as the necessary knowledge capital for firm competitiveness and sustainability. At the engagement level, this structural knowledge pays off by providing elements for recombinant innovation that has a high probability of success, but only if the sustainability effort is driven by constant enforcement of documentation and updating practices.

Several of the interviewees mentioned that even when fully aware that by not documenting newly acquired knowledge they were not contributing to the sustainability of the firms, they yielded to the pressures of a current client engagement and failed to update and build up the structural knowledge base on a regular basis.

The conclusion here is that there is a constant pressure in the firms in the study to neglect the activities that provide for sustained competitive advantage in favor of activities that provide short term (project related) advantage.

Proper systems for compliance (such as internal communications and balanced scorecards) and a sustained level of supervision and enforcement by the higher levels of the firm are required to maintain a healthy balance.

In essence, the demands of a particular project will pull knowledge from the firm, in human, relational and structural forms. The driver is the need to satisfy a client's

needs. Once the project is complete, the firm must pull knowledge from the project, also in human, relational and structural forms. The driver is the need to keep the firm competitive by learning continuously. Successful firms will master the processes that are relevant to accomplish this, the key factors of which are distilled in this exploratory work.

Suggested further research

The results of this study open up interesting questions to be pursued further:

First, research can be done into the causes that appear to distinguish management consultancies from other professional service firms regarding the motivation to share knowledge by the professionals they employ.

The relevant literature on PSF's in general is for the most part aligned in mentioning this issue as a source of management trouble, yet in the case of the firms studied, professionals show a high drive to help and share knowledge with peers in exchange for prestige and recognition as a valued expert.

One possible insight into this issue is the scale of the firms studied. Perhaps when a firm is smaller and the possibility of finding several experts in a particular topic is very low, the relative value an expert perceives as having is higher than in a large firm. This could drive the expert to try and make himself indispensable by not sharing the knowledge but instead trying to get assigned to solve the issue.

In larger firms, where the chances of finding many experts are higher, this notion of low indispensability could potentially be a driver for experts to share knowledge and build valuable prestige instead.

The second suggested research avenue regards the particular difficulties in the area of knowledge management and innovation that smaller firms go through when experiencing accelerated growth periods. The rationale for this is that as mentioned in the conclusions, when a firm lacks the management discipline to pull knowledge out of a project in favor of activities oriented to “selling the next project”, it fails to build competitive advantage.

This is evident from this study, but could this be the main factor that undermines a growing firm after the favorable market conditions have passed and competition becomes fiercer? Is this a prevailing mechanism for the failure of growing firms or can it be considered secondary?

A third area of suggested research is related to relational knowledge, and in particular the networks centered on senior members of a firm and the effect that mobility from one firm to another has on the network and on the client base of the firms involved.

All firms in the study agree on relationship management as a critical component of their revenue generation process, but the effect of client preferences following a senior partner that moves from one firm to another have not been researched sufficiently.

It was mentioned that beyond a strong relationship between partners and clients, those clients that are experienced at hiring consultants will not be influenced by the name of the firm as much as other clients, but will actually be more interested in the particular curricula and expertise of the members of the team that would be assigned to the client for an engagement.

This suggests that at the top level, mobility matters not just regarding relationships and networks, but also the tacit knowledge capital of each member of an engagement team.

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