The Engineering of Success:

A Study in Strategic Social Positioning

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Abstract

This dissertation presents an empirical and longitudinal study of the nature of the organization-environment relationship.

It examines the evolution of three Consulting-Engineering firms, from their founding through periods of important social changes in their environment. The three world-leading companies, all based in the same city, are found to be managed and controlled by teams whose social backgrounds and connections have given them distinct profiles, which remained relatively stable over the past fifty to eighty years.

Thus, each firm, with its unique configuration of suppliers, customers, and influencers, seemed to evolve within a different layer of the same environment.

The research reveals that their individual social positioning has led the organizations to have different strategies and performance.

Résumé

Cette thèse présente une recherche empirique longitudinale sur les relations que les organisations entretiennent avec leur environnement.

Elle étudie trois grandes entreprises canadiennes d'ingénierie-conseil durant une période de mouvements sociaux importants. Ces entreprises étaient établies dans la même métropole, mais elles étaient gérées et contrôlées par des équipes dirigeantes provenant de milieux socioculturels différents et ayant des réseaux personnels distincts. Cette diversité a persisté durant des périodes allant de cinquante à quatre-vingts ans.

Chaque firme avait donc une configuration unique de fournisseurs, de clients et «d'influenceurs». Elle évoluait ainsi dans sa propre strate environnementale, calquée sur le profil social de ses dirigeants.

Cette étude révèle également que le positionnement social spécifique à chaque entreprise lui a permis d'avoir une stratégie et une performance particulières.

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> With all the thought that has been turned upon the unrest of the present in the literature of social reform, one finds practically no reference to formal organizations as the concrete social process by which social action is largely accomplished [...,] nor a single suggestion regarding the study of [formal organizations] as one of the important fields of scientific exploration looking toward the more apt adjustment of society to changing conditions.
>
> (Barnard, 1970:1 - 1st ed. 1938)

1.1 Introduction

This research stems from a strong interest in the economic development of nations, and from some personal conjectures regarding the possible role played by business organizations. It is most perplexing to a student of business and of history why some nations outperform others so dramatically, why their successes —more or less durable— are often limited to specific industries, and why only some organizations partake in that success, and at such different rates.

Researchers have dealt with this broad issue by circumscribing it within their respective disciplines and their own levels of analysis. Thus, macroeconomic theory has provided much insight by focusing on the resources of the nations, on their market structures, and on other environmental factors which give some nations a competitive advantage over others. Other social sciences have proposed explanations based, for example, on the geography of the nation (Huntington, 1915), the biological characteristics of its inhabitants (Fanfani, 1935), their religion (Weber, 1958), or their psychological need for achievement (McClelland, 1961). More recently, Porter (1990) attempted to explain, in *The*

Competitive Advantage of Nations a country's superior performance in terms of national *and* industrial determinants. He attributes international success to generic environmental configurations (preferably a general state of fierce competition) matched by generic firm strategy. While his approach has bridged some conceptual gaps by using the industry as a level of analysis, it too overlooks the impact of organization-specific strategies.

The rules, the games, the fields, the players are, each in turn, accounted for by the various disciplines, while the teams —the organizations— are left out, for the sake (perhaps justified) of parsimony.

Yet, clearly, the performance of nations necessarily requires that organizations play an active role, for, ultimately, goods are produced and services are rendered by organizations, not nations. Furthermore, just as puzzling as the uneven performance of nations, are the observations that within those nations some organizations fare far better than others, and that their performance may vary over time, independently of that of their home industry and nation.

This suggests that additional understanding could be gained by examining the behavior of individual organizations as well as their contribution to the overall performance of the industry and the nation in which they are situated. Certain adjustments are required, of course, since simply adding the strategies of organization to the established models would render these as complex as the reality that they purport to clarify.

Given these goals and constraints, the approach chosen in this dissertation is to study a few firms of the same industry, within one national environment. It is also felt that a new understanding of the relationship between organizations and their environment can be gained by studying high performing firms in an exceptional setting. While this raises questions of the replicability and generalizability of the findings, it has the overriding advantage of bringing into sharp relief characteristics that would go unnoticed in more ordinary circumstances, much like the biologist who studies giantism or nanism in order to understand growth among the normal population.

The main contribution to the management literature will be to enrich our understanding of the relationship between organizations and their environment, by drawing attention to and explaining factors and behaviors that are ever present, but may be indistinct because they usually come in fainter colors, or because they are such common practice. Why do some nations excel in certain industries, at certain times? What is the role played by organizations, and how differently is it played? What difference do their home environments and their own strategies have on their performance?

For practical and conceptual reasons (the proximity of the firms and the major social changes that took place in Quebec and in the rest of Canada), this research will examine the history of three Canadian consulting-engineering firms, all based in Quebec, and their relationship with that dual environment.

In order to gain an appropriate perspective, with backgrounds and foregrounds, the study will cover the last seventy-five years, with particular focus on the periods between the mid-1960s and the mid-1980s, during which these firms gained world status, and after which the largest of the three collapsed and parts of it merged with another.

The remainder of **Chapter One** reviews the concept of the organization-environment fit and of the role that managers are called upon to play. Its purpose is to highlight a major gap in the strategic literature, and explain the need to fill it.

Chapter Two presents the conceptual framework which will be used in this research and the theoretical approaches which inform it.

Chapter Three describes the method of study, the engineering firms, and the data which will be examined. As well, it defines the terminology which will be used.

Chapter Four sketches briefly the social and historical context of Quebec and of Canada during the greater part of this century, with particular emphasis on aspects which impacted on the lives of engineers and on the engineering industry. **Chapter Five** provides further understanding of the structure and idiosyncrasies of the Canadian engineering industry.

Chapters Six, Seven, and Eight narrate, successively, the histories of the three organizations which are the focus of this dissertation. In these chapters, the main purpose is to familiarize the reader with the events that marked the evolution of the three firms, reconstructed from archival research and from published sources.

Chapter Nine compares the data pertaining to the social profile and social connectedness of the focal organizations with their environment.

Chapter Ten continues the comparative analysis of the firms by revisiting their histories from three perspectives. While Chapters Six, Seven and Eight take a longitudinal perspective similar to Chandler (1962) in relating factors over time, this chapter borrows predominately from Allison (1971) by taking successive cuts, using three different models: the first two, *the economic approach* and *the managerial approach* serve to assess the performance of the firms from traditional perspectives. Third, a review of the histories of the three firms from the new vantage point of a *contextual approach* is presented and carried out.

Finally, **Chapter Eleven** examines in greater depth the theoretical implications of the contextual approach. It assesses what has been learned and the import of this new model. Its limitations, its implications for management and, finally, some possible research directions are explored.

1.2 Literature Review

The notion that an organization can survive only if it fits with its environment has nearly gained the stature of a paradigm in strategic management (Drucker, 1954; Chandler, 1962; Andrews, 1971; Miles & Snow, 1978; Porter, 1980, 1990). The issue is often treated implicitly, using a variety of terms and phrases ('co-align', 'relate', 'match with', 'reconcile with', 'congruent with'...), and, at times, quite explicitly (Mintzberg, 1990; Venkatraman & Prescott, 1990).

More than a concept, 'fit' has become a precept which defines the essential role of strategic management and its research domain: Ansoff posits that "the strategic decision area is concerned with establishing the relationship between the firm and its environment"(1969), and Porter argues that "the essence of formulating competitive strategy is relating a company to its environment" (1980:3).

The same notion has long been central to classical economics and to much of industrial organization (*e.g.* Bain, 1956); but, there, fit occurs impersonally and at random, and the organization is led by the invisible hands of the environment which selects and reigns supreme. In opposition to this 'natural selection' approach, the strategic management literature gives central consideration to the role that managers play in mediating the impact of the environment on the organization. Fit, it is argued, fosters a 'rational selection' and is accomplished by the more visible hands of managers (Chandler, 1977):

> [The natural selection approach] minimizes management's role in the alignment process [but the] rational selection approach asserts that while environmental conditions largely determine the efficacy

> of different organizational structures and processes, the managers of successful organizations efficiently select, adopt, and discard structural and process components to maintain the organization's equilibrium with its environment.
>
> (Miles & Snow, 1978:19)

Thus, the general and characteristic trend in the literature has been a pronounced interest with how managers co-align their organizations with the environment. As will be shown, however, that strategic role is diversely understood, and its extent and form remain unexplored in important ways.

1.2.1 The Features of an Elusive Concept

> The survival of an organization depends upon the maintenance of an equilibrium of complex character in a continuously fluctuating environment of physical, biological, and social materials, elements, and forces, which calls for *readjustment of processes internal to the organization*. We shall be concerned with the *nature of the external conditions* to which adjustment must be made, but the center of our interest is the processes by which it is accomplished.
>
> (Barnard 1970:6; *emphasis* added)

Although the concern with aligning the organization with its environment has not diminished since Barnard's writing, some writers have directed their attention to external conditions rather than internal processes[1]. Thus, the role of management in promoting a fit with the environment has had two main orientations:

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[1] The first part of this discussion draws, in part, from a review of the conceptualization of fit and its domains by Venkatraman & Camillus (1984), and on a similar review of the concept of fit by Van de Ven & Drazin (1985).

• **A focus on the organization's internal fitness,** which leads to transforming the components of the organization as a means of ensuring its fit with the environment. There, the managers' role is to promote the organization's efficiency, that is, in Drucker's words, to see that things are "done right" (1954), and, in Barnard's words (1970), that they satisfy organizational members as well.

• **A focus on the organization's external fit with its environment**, which seeks to identify environmental factors which foster survival, in order to select and secure favorable sub-environments (Porter, 1985:1). This second approach is more concerned with effectiveness (or "doing the right thing", Drucker 1954).

At cross-currents with these two major streams of thought, run different concepts of the very nature of the organization, such that some writers may agree on *where* to seek answers in achieving a fit with the environment, while disagreeing on *what* the organization is. In a previous work (1989) it was proposed that the literature was dominated by three concepts of the nature of the organization[2]:

• The prevalent one is that of the organization as a *rational entity*, **a concrete aggregate of individuals primarily involved in the realization of the rational goals of the organization**. This view is rooted in the "scientific rationality" espoused by Comte, who claimed that the same "positivism" that prevails in mathematics, and in the physical sciences can triumph in social sciences as well. "The mind has given over the vain search after absolute notions, the origin and destination of the universe and the causes of phenomena [...And] reasoning and observation duly combined are the means of this knowledge" (1853, vol. I.:1-2).

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[2] **This dissertation draws from and expands on unpublished papers written during the course of my doctoral studies. Because it would be cumbersome to make specific references to these papers throughout the present research, the reader is asked to refer to the bibliography for a list of these works.**

Hence, the primary role of management is to look externally and to formulate strategies based on technical and economic information about the organization and its environment.

• A second body of literature views the organization as a *subjective entity*, an **'idea' [that] members form about the concrete reality of organizational life"** (ibid:30). This perception is in line with that of Weber who bridged the concrete approach of Comte's sociological positivism with the idealism of the Kantian tradition by proposing that social organizations —though they are of a concrete nature— are not subject to universal laws and that they are knowable only through subjective interpretations (Burrell & Morgan, 1979:27; Weber, 1964). This body of literature, which views the organization in subjective terms, considers that in strategy-making, the role of the manager is shaped internally by the organization's history, structure, processes, or by the cognitive processes of its upper managers.

• A third view of the organization, as an *instrumental entity,* depicts it as the concrete 'tool' of a few members, **the artifact of one or of a few [individual(s)...] driven to serve their need for power, control and creativity.** It shares Malinowski's notion that the organization, which "first comes into being when an initial group of influencers join together to pursue a common mission" (Mintzberg, 1983:22) is necessarily built around the needs of its individual members (Burrell & Morgan, 1979:52-54). This view stresses the need to know the politics and personalities of these powerful members and their framework for decision-making, as the main bases for strategy-making.

In Table 1.1, we present a synthesis of the various positions taken in strategy literature, based on the three concepts of the organization (*rational, subjective,* and *instrumental*) and on the two concepts of fit (based on either an *internal* or an *external* orientation of strategic management). As well, we present a sample of the writers that are associated with each of the six positions that have been identified.

(1) In the first group, fit is achieved when the organization can marshal its resources and offer the product/market mix most appropriate to its environment. To that end, managers, as planners and designers of strategies, need to fine tune and optimize the organization's internal structures and processes. Naturally, writers who take that perspective tend to focus on the formal structures and processes of the organization.

(2) In the second group, the rational approach also prevails. The organization's fit with the environment occurs either at random (being at the right place, at the right time), or, (to the extent that management has any role to play), it consists in locating and defending the right place within that environment. As a result, boundary spanning is central to the manager's job.

(3) In the third group, a more 'ideational' and subjective view of the organization is taken. The organization's fit with the environment is achieved through a process of trial and error, as managers gain intimate knowledge of the particular characteristics of their organizations. In this group, as in the next, the structured approaches are abandoned in favor of more heuristic and iterative methods which involve all of the members of the upper management team.

Table 1.1

Concepts of Fit and of the Organization

Concept of the Organization

Concept of Fit	Rational Entity	Subjective Entity	Instrumental Entity
Internal Fitness	(1) Barnard (1938) Chandler (1962) Woodward (1965) Thompson (1967) Ackoff (1970) Miles & Snow (1978) Bower (1986)	(3) Lindblom (1959) March (1978) Quinn (1978) Mintzberg (passim)	(5) March & Simon (1958) Cyert & March (1963) Allison (Model III) (1971) Mintzberg (1983)
External Fit	Katz & Kahn (1966) Andrews (1971) Hannan & Freeman (1974) Hofer (1975) Pfeffer & Salancik (1978) Aldrich (1979) Bourgeois (1980) Porter (1980, 1985) Ansoff (1965, 1990) (2)	Weick (1969) Steinbruner (1970) Child (1972) Gray & al. (1985) Ketz de Vries & Miller (1989) (4)	Popular Entrepreneurial Literature Collins & Moore (1970) Miller & Friesen (1978) Miller & Toulouse (1982) (6)

The Manager's Role

Manager views fit as an issue which is primarily: / *Manager views organization as:*	...Rational Entity	...Subjective Entity	...Instrumental Entity
...Internal	(1) Responds efficiently to environment thanks to well-organized inner core.	(3) Adapts and molds actions, according to the organization's unique circumstances.	(5) Negotiates with other members based on internal framework for decision-making.
...External	•None: Organization *is* or *is not* at the right place, **or** •Finds and defends *the* right place. (2)	•Screens information on the environment. •Sees through perceptual clouds. (4)	'Right' manager sees and leads through unchartered ways. (6)

(4) In this group, the formulation of a strategy which promotes a fit of the organization with its environment is hindered by the cognitive biases of strategy makers who must look far afield. Consequently, the challenge for upper managers is to overcome their biases and perceive the environment clearly.

(5) In this perspective, a number of individuals or groups vie for control of the organization. Their personal goals co-exist and sometimes conflict with those of the organization. The purpose of management, then, is to achieve an harmonious fit among these internal forces. In this atmosphere of brokerage politics, neither the structured nor the heuristic methods can work. Instead, strategy results from a process of negotiation among members.

(6) In organizations that are small, young, or in crisis, the overriding concern is to fit with the environment in order to survive, and power becomes concentrated in the hands of a lone decision-maker. Negotiation is no longer necessary since the strategy stems from a very personal vision: s/he 'finds' the right place for her/his organization, carves it out, creates it; in this perspective, it is held that "...[b]usiness enterprise is created and managed by people. It is not managed by economic 'forces' [...which only] set limits to what management can do" (Drucker, 1954).

1.2.2 What Then Is 'Fit'?

Despite its pervasiveness, the concept of fit remains imprecise, and its definition somewhat tautological: an organization is deemed to be more fit than its competitors if it has a higher probability of surviving within a given environment

(Aldrich, 1979:109). Beyond this reaffirmation of environmental imperatives, the concept of fit becomes less certain. It can be broad, as is the case when Chandler concludes that particular organizational structures must ultimately be matched with certain environments (1962); or, it can be more focused, as when it is argued that firms which perform better are those which are well integrated (Selznick, 1957; Williams, 1989), or whose strengths match an industry's key success factors (Porter, 1980; de Sousa et al., 1989).

What is even less clear is how fit is brought about. A number of writers have suggested that it is arrived at through a process of **selection** (Child, 1972), **'interactive' enactment** (Weick, 1979), **perceptual enactment** (Miles & Snow, 1978; Pfeffer & Salancik, 1978), or **proactment** (Miller & Friesen, 1978). In the mainstream literature, Porter (1985: 482-512) has indicated that organizations can select viable niches, and defend them by erecting barriers; more recently, he has suggested that they can collectively alter the structure of a nation's market, to which, in turn, they have to adapt (1990). These developments support Dirsmith & Covaleski's conclusion that there has emerged a "blended view that organizations must be engaged in a continuous process of ***interaction*** with their environments" (1983:137; emphasis added).

1.2.3 Consensus on the Role of the Manager

No doubt, the lack of a precise definition of fit may have lessened its usefulness and robustness (Galbraith & Nathason, 1979, Van de Ven & Drazin, 1985). Currently, the concept of fit has the potential of a rich metaphor, but suffers from its limitations as well. Nonetheless, there are three important features of the manager's role about which there is a general consensus:

• Managers act (reactively, proactively, creatively...), in direct relation to the requirements of the environment;

• to that end, their actions are directed either at internal adaptation or at seeking and/or carving out new environments for the organization.

Managers can act alone or in teams. Hence, much attention is paid not only to their actions, but also to their interactions and to their roles within and on behalf of the organization.

As a result of these features, research on the manager's role has taken either one of two approaches: one approach studies managers as single actors (Mintzberg 1980; Carlson, 1972; Miller et al., 1982, Conger & Kanungo, 1987; Shirley, 1989; Guth & Ginsberg, 1990), and the other, as members of the organization qua small society (Selznick, 1957; Cyert & March, 1963; Weick, 1979; Bourgeois, 1980; Hambrick, 1987; Finkelstein et al. 1990; Eisenhardt, 1990).

The research on managers either as single actors or as team members has focused on their **behavior** (Mintzberg, 1973; Sayles 1964; Leontiades, 1982), their **functional experience** (Wright, 1974; Hofer & Davoust, 1977; Song, 1982; Kotter, 1982; Leontiades, 1982; Gupta, 1984), or, on a smaller scale, on their **personality** (Miller, Kets de Vries & Toulouse, 1982). Thus, all studies rarefy managers by viewing only their formal intra-organizational roles. "We shall usually not be concerned with how [the manager] came to be or why, except as this is directly involved with his relations to organization." (Barnard, 1970:12).

1.2.4 The Problem

The study of the manager's role in strategy lends itself to yet another approach, which consists of viewing him/her as a member of the larger society as well. However, this consideration has been of parenthetical interest to only a few writers in the mainstream. Selznick, for instance, proposes that we "draw upon what we know about natural communities" in studying organizations (1984:13); however, when he discusses such sociological issues as the creation and protection of elites, he sees them as *akin to*, but, also, *distinct from* elites of the society at large (ibid: 14-15); clearly, he fails to draw a bridge across the boundaries of the organization. That, it is thought, falls within the realm of sociologists (Perrow, 1979; Touraine, 1973).

In turn, these social scientists consider that organizations are pivotal 'decision centers' which reflect, internally, many of the conflicts that oppose various groups in the society at large. "What would it mean for a social class to be dominant, if it dominated nothing", asks Touraine (1973; author's translation). From their macro perspective, however, the single organization is 'not a primary level of analysis' (ibid). Indeed, they consider that "a great deal of the 'variance' in a firm's behavior depends on the environment [...and that] the impact of better management by itself will be limited, since so much will depend on market forces, competition, nature of the work force, available technologies and innovations, and so on." (Perrow, 1973:12).

Since these researchers afford limited importance to the role that managers can play within the organization, **we are left in a conundrum: the managerial approach ignores the extra-organizational roles of managers, while the sociological approach neglects their intra-organizational roles.**

1.2.5 Building on Supportive Literature

The need for a more holistic view of the manager's role, as a member of the organization *and* of the society at large, has not gone completely unnoticed, and, has been the object of some scant research over the past ten years.

It has been of particular interest to researchers concerned with the internal management of the organization. For our purpose, the most promising work has been that of Hambrick & Mason (1984) who proposed an "upper echelons perspective" of organization, and theorized on the relationship between managerial background characteristics (age, functional tracks, education, socioeconomic roots...) on one hand, and the strategies and performance of their organizations, on the other. However, subsequent empirical studies to validate this theoretical framework have focused on intra-team characteristics such as age, tenure, remuneration, team homogeneity, or on the personal cognitive biases and values of managers (Hambrick & al., 1984, 1989, 1991), while neglecting many of those social characteristics which relate these individuals to the outside world, such as their ethnic and linguistic backgrounds, gender, or political affiliations.

Other researchers who took up the "upper echelons" approach have shown similar restraint. Chaganti & Cambharya (1987) have operationalized Miles & Snow's typology of corporate orientations (prospector, analyzer, or defender) and studied their relationship with the outsider/functional orientation of executives. Using biographical information, executives were described as insiders or outsiders to the firms, and in terms of their functional orientations. The study indicates that *prospectors* tend to have stronger outsider and marketing orientation, while both *analyzers* and *prospectors* tend to have weaker finance orientation. Another UK. study by Norburn (1989) is also of interest to this dissertation, because it gives additional support to the "upper echelons perspective", and examines the effect of domestic influences (education and socioeconomic background...). Contrasting the educational background of CEOs with that of other upper managers, it indicates a positive relationship between attendance at an elite school and managerial achievement. These findings are similar to those found in the US. by Collins & Moore (1970) and Margerison (1983).

In the body of literature concerned with the organization's external fit, some important efforts have been made to acknowledge the importance of social and political factors alongside those of a technical or economic nature. In explaining a nation's success in a given industry, Porter (1990:71-3) constructs a model which, initially, comprises four interdependent determinants:

(1) **factor conditions** such as skilled labor and infrastructure,

(2) the nature of domestic **demand,**

(3) **related and supporting industries,**

(4) **firm strategy, structure, and rivalry,** i.e. the conditions governing how companies are created, organized, and managed.

Later (pp. 124-9), Porter introduces two extraneous variables which can influence these four determinants: ***chance*** ('discontinuities' in technology, input costs, market conditions...), and ***government*** (subsidies, fiscal and monetary policies, policies toward education...).

1.2.6 Conclusion

The literature has considered a number of dimensions along which the organization-environment fit can be achieved, while an important body has recognized the attendant role that managers play. However, the nature of that fit and of managerial roles have been rarefied, and reduced, in time and in scope, to their immediate and formal functions.

Most notably, there has been limited exploration of the social dimension of the organization-environment fit, and even less of the role played by the social characteristics of managers. Yet, as members of the organization *and* of the environment, managers bridge the two levels. It stands to reason, for example, that crucial elements of strategy-making (such as boundary spanning) depend on access to information, and that managers who are familiar with the needs and operations of key external organizations are in a better position to assess and deal with opportunities and threats as they arise. Those who are well connected may receive early warnings of what Porter has identified as 'discontinuities' (1990:73), and thus improve their organizations' odds for success. Thus, an examination of their social role may bring to light some of the factors hitherto attributed to chance, and reveal new links between the firm's strategy and its key external agents.

This research will explore these possibilities. Having explained the reasons for this undertaking, we will establish in the next two chapters the manner in which it will be carried out. First the conceptual framework, and then the methods chosen will be presented.

2. The Conceptual Framework

2.1 Ontological Considerations

There has been a marked tendency on the part of most researchers to equate level of analysis with object of analysis, and to pay attention solely to the requirements of their particular object of inquiry, the organization *or* the environment, to the neglect of the other. As Morgan & Smircich point out, the organization theorist is inclined

> ... to draw boundaries around the subject of study, elevating it in importance against the wider background. Thus the organization theorist often is concerned with the somewhat arbitrary relationship between organization and environment, structuring the research process and knowledge thus generated around this conceptualization.
>
> (1980:491)

In that frame of mind, macroeconomists, sociologists, and political scientists, who take society as their object and level of analysis, seek to explain how organizations contribute to the maintenance of the larger system, and tend to overlook the requirements of the organizations themselves. In turn, microeconomists and theorists in strategic management who take the organization as the principal object of study and frame of reference, see society as an 'ecological aggregate' and consider that a 'model of competitive struggle is more applicable' (Buckley:12-13, in Burrell & Morgan, p. 43). They assess how the structures and processes of the organization, or a choice of appropriate product/market can enable the organization to meet the requirements of its environment and survive.

The consequences of these approaches have been either to view the organization's interactions with its environment through narrow, unidirectional channels which stop at its boundaries, or to restrict their research to the confines of the organization and to its immediate periphery.

This dissertation is informed by a different view of organizations. It considers that any organization is made up of members who are affiliated with many other organizations, be they at work, at home, at school, in clubs, etc..., and that this multiplicity of affiliation precludes their full identification with any one organization.

Conversely, any one of these organizations serves the goals of different groups, each of whom uses it to achieve its own ends. Thus seen, the organization is characterized more as a confluence of common means than of common goals, and is expected to be the site of tensions and change, not of natural integration and stability. Similarly, its dealings with the environment take the form of bi-directional exchanges, not just unidirectional adaptation. This challenges the view of the organization as a goal-driven, integrated entity, and, rather, suggests that it is a theater where the transformation of society is actually played out over time.

As these propositions take us beyond the confines of the organization and back in time, for an historical perspective, much of the parsimony afforded by the traditional approaches is inevitably lost. However, this new approach can benefit from certain guideposts used —albeit marginally— in the natural sciences, which can render an inquiry manageable.

In the field of ecology, the idea that all living things are inter-dependent is not as all encompassing as it may seem, once it is considered that the organisms operate within smaller ecosystems, through hierarchical food chains, and are subject to numerical balances between preys and predators.

Similarly, the approach taken in this research is not to deny the influence that the environment has on the organization, but rather to consider that this relationship is fundamentally mutual. This concept of mutual transformation is in line with recent work in biology.

> In a new book, *The Ages of Gaia: A Biography of Our Living Earth,* Lovelock advances a thrilling possibility. He argues that life has evolved not just by adapting to its surroundings, as Darwin had it, but by remaking them. The reason the Earth is so different from Mars or Venus, he says, is that living things have taken control of it, have in effect transformed an inert chemical ball into an immense, self-sustaining organism. [...] There was, for instance, virtually no oxygen in the atmosphere until 2 billion years ago, when the ancestors of modern plants started using photosynthesis to harness the sun's energy.
>
> (Cowley, 1988:98).

In the management literature, the relevance of an ecological analogy was not missed by Bateson (1972:155):

> [I]t is possible to attempt to explain the evolution of the horse (figure) in terms of a one-sided adaptation to the nature of grassy plains (ground); however, this is to miss the point that the grassy plains have evolved along with the horse and may equally well be seen as an adaptation to the horse, as the other way around. The same is true with 'organization' and 'environment.'
>
> (in Morgan & Smircich, 1980)

Morgan & Smircich (ibid) note that "... the point is that it is *contexts* which evolve, and that an adequate understanding of the *process entails grasping the ecological nature of the context as whole*". From this perspective, we will study the organizations, using the *whole context* as our level of analysis, which encompasses both the environment *and* the organizations and which include historical factors not immediately observable.

2.2 The Conceptual Approach

The 1980s saw spectacular performance by Monenco, SNC, and particularly by Lavalin, three consulting-engineering firms, all based in Montreal, Quebec, Canada. Their meteoric rise was followed by a major shakedown in 1991, that ended with the demise of Lavalin Inc, which was absorbed, in part, by SNC.

In its last survey of the industry, done in 1988, a Canadian government study reported that "In proportion to the size of its economy, Canada exports more consulting engineering services than any country in the world," with 16.2% share of foreign billings, second only to the US. share of 25.0%[3]. The reports also noted that, in 1986, "Canada's three largest, most successful, export consulting engineering firms [were] in Quebec"; and, that Quebec-based firms accounted for 55.1% of the foreign revenues earned by all Canadian consulting-engineering companies[4].

That same year, at the height of their performance on the international scene, Lavalin, SNC, and Monenco ranked 1st, 18th and 31st respectively in the broader category of International Design Firms. This was the second consecutive year that Lavalin had ranked first.

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[3] (Industry Profile prepared by Industry, Science and Technology, 1988 #C2-5/71)

[4] (Statistics Canada, 1986:27 Cat #63-537)

This research centers on their history, and its overriding interest is to understand their performance in relation to their environment.

Thus, the conceptual framework must allow us to gain a fuller understanding of the relationship these organizations have with their home environment. But, in which part of that environment do we look for such relationships, and what exactly do we look for?

All pervasive in strategic management, "environment is a *catch-all term* that has been used in the literature to describe the general conditions that surround the organization" (Mintzberg in Quinn et. al., 1988:294). For conceptual and practical reasons, we need a more parsimonious definition that can be apprehended and operationalized.

Like Thompson (1967:27), we adopt Dill's systemic concept of the task environment (1958). In his study of two Norwegian firms, Dill found that the task environment comprised: (1) customers, (2) suppliers, (3) competitors, and (4) regulatory groups. The first three groups of actors are similar to those identified by Porter (1980; 1985), while the fourth (regulatory groups) was acknowledged in his more recent work (1990).

We can, thus, limit our investigation to the relationships that are critical in the industry, relying on the firms themselves to point us in the right direction. This argument is in line with Thompson's proposition that an organization will attend to its "most crucial dependencies" (1967:156), and seek to extend its boundaries around potentially "crucial contingencies" (1967:39) of its task environment. It is also congruent with the proposition that the survival of the organization depends on its ability to attend to and manage its external relations (Aldrich &

Pfeffer, 1976; Pfeffer & Salancik, 1978; Aldrich, 1979; McKelvey & Aldrich, 1983).

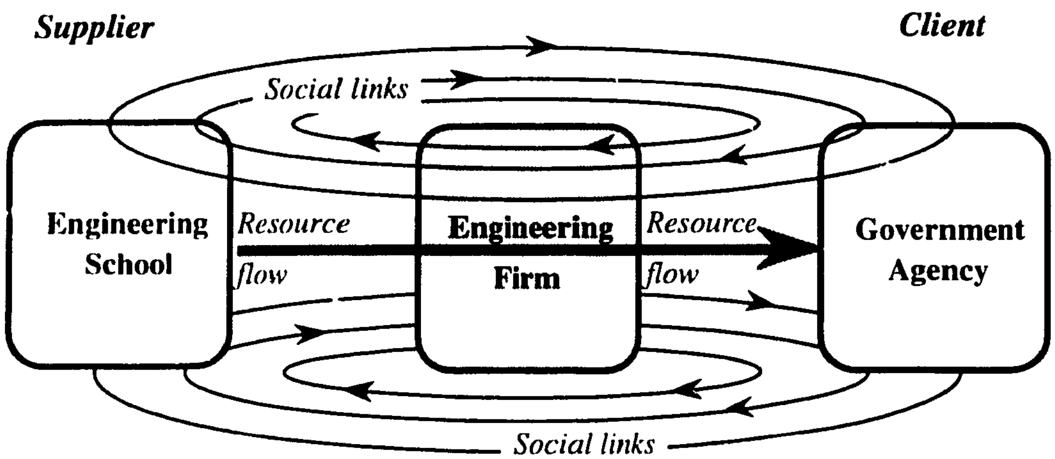
Our emphasis on the *resource dependency* of the focal organizations leads us to focus on the external fit of the organization with its key external agents (as illustrated in Figure 2.1), placing us amidst researchers who are concerned primarily with organizational effectiveness. Indeed, we will be concerned with relating the manager's formal and informal roles to organizational actions and performance, and not with his/her personal motivations.

However, we depart from the functionalist approach endorsed by Barnard (1970:12) in proposing that **the manager *is* the strategy**; thus, his/her role in strategy formation is not limited to what s/he does, but extends to what s/he is, socially. Thus, we will take into account a fuller array of the manager's personal characteristics, as we view him/her as a member of the focal organization *and* of the larger society (Andrew, 1980).

We also expect the organization to pattern its formal relationships with the same key elements of the environment after, or in contrast with, those of its leaders (upper managers and board members). Together, the personal and institutional links will add to the perspective of the firm's relationship with its environment.

Fig 2.1

Social Links of Managers and the Firm
with Key Organizations in their Environment



2.3 Research Premises

The main argument of this thesis is that the social links of individual managers contribute significantly to the strategic fit of a firm with its external environment. Further, it is argued:

- that these social links are evidenced by observable characteristics of the background of individual managers which can be studied meaningfully, as Weick argued, without having to "explain the actions psychologically" (1969: 196).

- that the social links of individual managers forge, collectively, a composite and distinctive social profile of the management team of the organization.

- that these organizations may legitimize and reinforce the personal links that their managers have with outside organizations by establishing congruent links at the inter-organizational level. Together, these personal and inter-organizational links define the social profiles and connectedness of the organization.

- that fruitful hypotheses and theories can be inferred with regards to the relationship between the social profiles and connectedness of the organization, its strategic behavior, and its performance.

Based on these premises, the research will focus on two main questions:

- **How do organizations relate to their social context?**
- **What roles do their managers play in that relationship?**

2.4 Contribution of the Research

By taking a *contextual approach*[5], this research will account for historical and social factors which characterize the home environment and examine their influence on the behavior and performance of organizations. This entails broadening the concept of the strategy of these firms to include a social dimension, alongside the technical and economic links which exist between the organization and its environment.

- **Are there 'missing' links in the organization-environment relationship, that have not yet been discovered?**
- **Is there a social dimension to that relationship?**

---

[5] See Morgan and Smircich (1980), for a discussion of the implications of this approach

The contextual approach is not concerned with the notion of causality [because] there are always causes which cause causes to cause causes [Wilden 1972 p 39]. [It] lies in an awareness that relationships change in concert and cannot be reduced to a set of determinate laws and propositions, as positivist epistemology would have it

The research will also shed light on the form and the extent of these social relationships, and on their effect on organizational behavior and performance.

- **Is the social dimension relevant to the strategy of the firm?**
- **If so, how, and how much?**

Although sociological considerations are expected to be central to this research, the inductive approach which is taken allows the examination of other avenues as they arise. Thus, it will also shed light on the success factors hitherto attributed to chance.

- **Do some organizations simply 'get lucky', or is their luck tractable?**

For the benefit of future research, it proposes and operationalizes a theoretical framework within which the social dimensions of other organizations can be understood and studied. It is of interest to consider that the Canadian setting —with its much larger share of state participation in the economy (Time Magazine, 1981:48)— may be more politicized than that of the US, from where Canadians borrow most of their technoeconomic models.

- **Can the contextual approach be used to study other organizations?**

In addition, this research may shed some light on the strategies of adhocracies and of professional bureaucracies, the study of which has been —in the first instance— very limited, and —in the second instance— focused almost exclusively on not-for-profit organizations (e.g. universities and hospitals). Based on Mintzberg's classifications (1979), the three consulting-engineering firms can be characterized as adhocracies, since, in the main, their work was unique and complex. At times and in certain domains, however, when their environment was stable, and their work became repetitive, they took on characteristics of professional bureaucracies, opting for functional *or* product structures, *not both*, as do adhocracies with their matrix structures.

2.5 Conclusion

The approach taken in this dissertation takes an important departure from those that are taken in the mainstream literature. Although it subscribes to the proposition that the organization is related systemically to its environment, it stresses that since these links are historically and socially grounded, they cannot be understood solely in contemporary terms, nor be limited to their technical and economic dimensions.

This conceptual framework is parsimonious to the extent that it tells us where to look, but it is also exacting and eclectic, because of its sociohistorical perspective. "A view of social reality as a contextual field carries with it distinctive requirements as to what constitutes an adequate epistemology." (Morgan & Smircich, 1980). Thus, we need methods which are congruent with this theoretical perspective and which correspond with the ontological perception of the organization as an instrument of social groups, and a theater of social transformation. The type of data, analysis, and the presentation chosen will be explained in the following chapter.

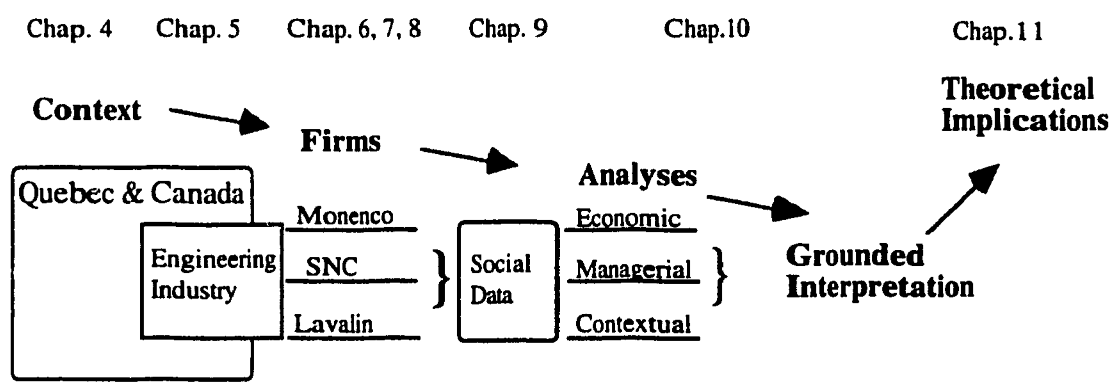
3. Methodology and Research Design

3.1 General Research Approach

The process involved in presenting and analyzing the data, first described in the Introduction to this dissertation, is presented schematically in Figure 3.1. The aim is to be increasingly "incisive" and "closer to the ground," and, at the end, "inferential" (Geertz, 1973:25, 24, 26).

The data will be presented primarily in narrative form, in order to help us gain familiarity and 'intimate knowledge', of, first, the general setting, and, second, of each firm (Chapters 4-7).

Figure 3.1



It is important to state, quite early, our position vis-à-vis the poles which are used traditionally to delineate the field of research in strategic management. This task is somewhat complicated by the contextual approach, whose hybrid nature renders standard methods inadequate or, at the very least, requires that they be adapted before they can be used.

Almost all of the data is either archival or secondary. The main advantage of these two forms of data is that they are unobtrusive, and not subject to retrospective interpretation by the actors or other observers. Because the stories, the events and the interviews were recorded at different periods, they have not been edited by time or by personal memories.

The main drawback, especially when the research's own approach is comparative, is that the data rarely comes in forms that permit direct comparison. The information recorded by each firm is different, and these differences are further exacerbated by the fact that the researcher's access and luck vary widely from one setting to another.

This situation is akin to that of an archaeologist who sets out to compare the lifestyles of different societies. In her first excavation, she finds pottery whose designs suggest that one society had reached an advanced state of technology, had a rigid class structure, led a sedentary lifestyle, etc... Naturally, she hopes to find more pottery from the other societies. Chances are that, instead, she will uncover burial grounds, weapons, or human bones. While these artifacts and remains cannot be directly compared to the pottery, the archaeologist would be foolish to ignore them, since they too can provide information on the society's technological advancement, class structures, on how its members lived and died. The goal of her research, after all, is to compare lifestyles, not pottery.

Qualitative or Quantitative Methods?

We will thus present the findings of each site in its own right. But, we will endeavor, if and whenever possible, to present the data in quantitative or graphic form to permit meaningful comparisons over time and across organizations. One firm may have, at one point, a higher percentage of Francophones, of engineers, of foreign nationals, former public servants, than other firms or than it used to have. These indices will allow us to draw periodic profiles of the firms and make intra- and inter- organizational comparisons.

> Qualitative methodology and quantitative methodology are not mutually exclusive. [...] Qualitative investigators tend [...] to describe the unfolding of social processes rather than the social structures that are often the focus of quantitative researchers.
>
> ....
>
> That such contextual understandings and empathetic objectives are unlikely to be achieved without direct, firsthand, and more or less intimate knowledge of a research setting is a most practical assumption that underlies and guides most qualitative study.
>
> (Van Maanen, 1979)

3.2 The Focal Organizations

The research focuses on three Canadian engineering firms (Lavalin, Monenco and SNC), headquartered in the province of Quebec, with consulting contracts and operations worldwide. The choice of these particular engineering firms present some important advantages:

1. A priori, the upper managers of each firm can be expected to have more say in strategy-making than their counterparts in other organizational structures. Each engineering firm can have strategies which "represent the cumulative

effect over time of the projects, or strategic 'initiatives' that its members are able to convince it to undertake" (Mintzberg 1979: 364).

2. The choice of three firms within one industry eliminates the need to control for inter-industry variations.

3. Since, together, they form the total population of very large engineering firms in Quebec[6], questions regarding sample size are circumvented.

4. On the other hand, these firms display some important differences which are of value to this research:

   - Their performance has been uneven. Lavalin, originally the smallest of the three, far outpaced its two competitors in the mid-1980s, but went bankrupt a few years later.

   - Monenco is reputed to be Anglophone; Lavalin, Francophone; and SNC, mixed. This spread is important, since we are interested in the social make-up of their management.

   - The ownership structures of the firm have evolved and, also, have been quite different from one another. The shares of Monenco have been sold publicly since the early 1970s, and, in the late 1980s, an American company bought controlling shares. SNC, has been owned by its upper managers. Despite its size, Lavalin has always remained privately owned, and reputedly run entrepreneurially.

6. As indicated earlier, the fact that three world-leading firms are found in a single province raises the possibility that the latter might offer favorable environmental factors. On the other hand, the uneven performance of these

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[6] "Analyse de la situation du génie-conseil québecois et axes d'orientations, Association des Ingénieurs-conseils du Québec (Juin 1990).

three firms suggests the likely import of factors or behaviors which are organization specific. (Industry Profile: 1988 #C2-5/71; Statistics Canada, 1986:27, Cat #63-537).

3.3 The Time Period

Our examination spans thirty years, between 1960-1990, a period of recognized societal change in Quebec, with increasing Francophone visibility and intervention of governments in the social and economic life of the province. Hence, the import of the 'social connectedness' of organizational members will be brought to light.

The research will focus on three specific periods within that time frame. No doubt, the social profiles of these firms may have shifted between the periods that we will study, and, we may miss part of the picture. Thus, we will aim at describing the structure, and not always the process, of the social profiles of these engineering firms. (As we see it, a structure is a process at a given time). Nonetheless, some insights as to the process can be gained by comparing the profiles of the firms over time.

It was important that we carefully select the time periods in order to increase the comparative value of the information. Based on our previous study of the industry, we have identified the following periods:

• **mid-1960's,** at the start of the Quiet Revolution which profoundly transformed Quebec Society: a period of extensive construction[7], by the private sector, and,

[7] Engineering activity rose from $1,993 millions in 1961 to $3,161 millions in the middle of the decade (1981 constant dollars) [Source: Annuaire(s) statistique(s) du Quebec].

increasingly, by the public sector as well. The Quebec government undertook social projects of an unprecedented scale: new CEGEPS, expanded universities, expanded road network, cultural centers, hydroelectric projects (such as Manic 5), the Montreal metro and Expo 67. This was a period of increasing politicization of the industry.

• **mid-1970's:** this period was dominated by mega projects, which, initially, surpassed the capacities of the engineering firms. Such a project was the James Bay hydro-electric plant, a 10-year, $15 billion 'project of the century', led by the provincial government. Eventually, all three engineering firms participated in various capacities. As a result of these mega projects, construction engineering firms became 'big business', and began to face issues of concerns to large business firms: capital markets, organizational structures, etc...

• **mid-1980's:** a period of decline in domestic activity and reorientation in international markets, in which the federal government, through its international development agencies, played an active role as promoter, regulator and financier.

3.4 The Research Boundaries

The conceptual framework suggests that we study the relationships between the engineering firms and the agents of their task environment with whom they are systemically related, namely: the *suppliers* from whom they acquire their inputs, the *clients* to whom they sell their outputs, and the *regulators* of that process of exchange.

3.5 The Key External Agents

From our initial survey of the industry, two sets of key external agents have been identified in the task environment:

(1) Universities, and in particular, Engineering Schools, as suppliers of the firm's "raw material".

(2) Agencies of the provincial and federal governments which play a dual role: one as major clients of the engineering firms; and the other, as regulators and financial intermediaries of the industry.

3.6 Strategic Behavior and Performance

The dependent variables are the strategic behavior and the performance of the firms. Since the firms were chosen for their size, performance will be measured in the same terms, using revenues and number of employees. Strategy and performance will be tracked through a scaled down adaptation of the McGill Approach (Mintzberg & Waters 1982, 1984), which will allow us to draw inferences, gain understanding, and theorize in the following areas:

• *Patterns and Rate of geographic growth* (e.g.: Is there a relationship between a firm's primary language, and the Canadian regions and the foreign countries in which it expands?. Is there a relationship between a firm's social 'connectedness' and the rate at which it expands in various Canadian regions and foreign countries?)

• *Patterns of market growth* (e.g. Is there a relationship between a firm's social 'connectedness' and the sources of its business: municipal government, provincial. government, federal government, industrial).

• *Patterns and rate of functional growth* (e.g. Is there a relationship between a firm's social 'connectedness' and the functional areas in which it expands?)

• *Patterns of congruence* between the social connections of upper managers and the formal links that their firms establish with other organizations.

As noted earlier, a key index of performance will be the average number of permanent employees of each firm, at different time periods. The use of this proxy in lieu of financial data is necessary at times, because the shares of Lavalin, one of the three firms, were privately held.

Nonetheless, average number of employees per time period can be an acceptable, and, in some aspects, a superior index of performance, because:

• The engineering industry is labor intensive. Since it operates on a contractual basis in many countries, with different wage structures, its level of activity may be reflected more accurately by its number of employees than by its income fees.

• A firm may act as a sub-contractor and earn a higher profit margin than if it were acting as the managing firm of a turn key project. In such a case, the number of employees may be a better indicator of the level of its activity than income fees.

3.7 Research Stages

• Stage 1 : Preliminary Survey

Familiarity with the operation of the largest firm, the industry and its socioeconomic context over the past 50 years was gained from preliminary research, reported in a previous paper (Saint-Macary, 1990). A great number of published and unpublished materials have been obtained from the engineering firms and from public sources.

• Stage 2 : Data Collection and Interpretation

The bulk of our sources is archival, but it is supported by other primary data (special reports and interviews) and by some secondary data. Serendipity and perseverance have resulted in the gathering of a large amount of information, produced at various times by individuals who held different positions within the firms. They include, in particular four unpublished personal manuscripts, over a dozen interviews of key officials conducted at different time periods and kept in the archives of the companies.

Later, in this chapter, we present an overview of the type and quality of that data; but, for ease and flow of exposition, specific details pertaining to its size and treatment, will be presented, along with the data itself, in the early parts of chapter nine.

• Stage 3: Confirmatory Interviews

This part of our research is based on primary sources of information. It is used to clarify our understanding of the social context and the operations of the engineering firms, as well as that of the institutions with which they interact.

• We interviewed informally from two to four members in each organization, and the librarians in all three firms.

• We also conducted a round table conference with four Quebec professionals who attended university in the 1960s, in order to gain a personal understanding of the period (J-J Bourque, M.D., and three others who wish to remain anonymous).

• In that line, we conducted in the middle of our research, a more formal and structured interview with Roland Doré, the principal and former director of the École Polytechnique de Montréal. We also wanted to understand further the nature of the relationship of the engineering firms with his and other universities, as was suggested by the number of grants, scholarships, honorary degrees, and graduates hired.

3.8 Data Sources

3.8.1 Social Profiles and Connections of Managers

An important tool of our research has been to examine the resumes of the upper managers and board members. This allows us to establish each firm's profile in terms of the educational, functional and sociodemographic backgrounds of its leaders, and each firm's links with key external organizations (engineering schools, government agencies, business clubs). Most of the resumes were provided by the three firms; other information was compiled from other sources, as described later.

The information thus obtained is mostly self-reported, but it is one which is expected to be factual with regards to the issues of interest in this study:

sociodemographic background, current and previous employment, and formal affiliations.

Over all, usable biographical data ('resumes') was collected for 80% of people at Monenco, 72% at SNC, and 93% at Lavalin (see breakdown in Table 9.1). This raised concern over whether the unavailability of some resumes was random or systemic. Apparently, recent association with the firms was not a factor, since higher than average data was collected from the mid-1960s. It did not appear, either, that we had had greater access to a particular linguistic group, based on visual inspection of the names for whom resumes were not obtained. Nonetheless, it was reasonable to expect that biographical data was more likely to be available from published sources for individuals with a high public profile. However, the fact that usable biographical data for Monenco —a firm with almost no high profile individuals— was at mid-range between the others leads us to conclude that any bias in failing to collect resumes must have been mitigated, to a large extent, by other random factors.

Another concern emerged over the possible omission of data from the resumes. There, the use of multiple sources to triangulate the self-reported data, and the fact that the managers expose themselves to scrutiny by their employers and the public, have limited this potential problem.

The *ethnic* and *linguistic* backgrounds of the individuals were determined by the order of languages declared on their resumes, their first and last names, the schools they attended, their place of birth, by inquiries with the companies, and by consulting a variety of Canadian genealogical and biographical sources. In almost all cases, the information was consistent; when it was not, the individuals' ethnic and linguistic backgrounds were classified as 'undetermined'.

Similarly, other information was confirmed from appropriate sources (such as directory of engineers, and list of club membership). Thus, a few omissions were corrected, but no errors of any consequence were found.

The social profiles and connections of the leadership of the firms was established as follows:

- Unpublished lists and documents (such as Annual Reports, internal memoranda) and published directorate lists (such as in the Financial Post) served to establish a list of the upper management team and board of the three firms, at the three relevant time periods.

  Since the firms were not well-known in the mid-1960s, these early lists were compiled strictly from company documents. In compiling the lists, 'mid-1960s', for instance, was strictly defined as the years 1964-1966, and the same was used for the mid-1970s and the mid-1980s. Using a three-year range for each period provided a data base which was large enough and yet remained manageable. It also allowed fair comparisons among the three companies despite the fact that they used different year-ends in their reports.

- Resumes were collected from the firms, as explained above.

- Who's Who in Canada, and equivalent publications in French and in English (listed in the bibliography), membership directory and other publications by the *Ordre des Ingénieurs du Québec* served to confirm and provide additional sociodemographic and background information.

- Appointment notices and newspaper articles, especially those available in computerized data bases (such as *La Presse*) provided additional information on the backgrounds, memberships and connections of the individuals with external organizations.

3.8.2 Context of Quebec, Canada, and the Engineering Industry.

Although space precludes that we produce an exhaustive list in the body of this dissertation, the following key sources of information are particularly worthy of mention:

- A report of all engineering projects sponsored by the Canadian International Development Agency (CIDA) between 1965 to 1992, in which the three firms were involved. The report was produced by that agency especially for this research.
- *Analyse de la situation du génie-conseil québécois et axes d'orientations*, by Stratem Inc.; (an in-house report prepared by a consulting firm for the association des ingénieurs-conseils du Québec), 1990.
- Personal interview with Roland Doré, principal of the École Polytechnique de Montréal.
- Books and reports from public and private sources, including one by Bourassa (1985), former and current premier of Quebec, and one by Trudeau (1968), former prime minister of Canada, both in power during much of the period under study.

3.8.3 Monenco

- Contract files: all contracts drawn by the firm, from the mid-60s to the mid-1980s, were perused by the researcher. These documents included a variety of topics, such as building dams in Asia and Africa, renting office space, and hiring foreign representatives.

- *Monenco: The First 75 Years*, by J. Sexton (former Vice-President of that firm) (1982).

- *G.V. Eckenfelder's Story*, by G.V. Eckenfelder (former Vice-President of that Firm) (A thirty-page appendix to the book by J. Sexton, as a personal version of the history of the firm)

- Untitled "*Personal Memoirs*", by R. Smith former employee of Monenco (Unpublished - circa 1988)

- Annual Reports (1969-1989)

3.8.4 SNC

- *SNC: Engineering Beyond Frontiers* - (80th Anniversary edition) by S. Lalande, 1992, Libre Expression.

- Published and Unpublished speeches and messages from various CEOs.

- *History of SNC Enterprises - 1911-1979* by R.A. Surveyer (Unpublished notes and memoirs by the son of the founder, and former partner of the firm), 1979.

- *Pen Portraits of Leaders of the Firm*, by R.A. Surveyer (Unpublished) (1979).

- *My Days with S.N.C. - A Brief Personal Memoir*, by R.B. Robertson, former employee from 1946-1977; he began as draftsman and retired as middle manager (Unpublished - circa 1977).

- Annual Reports (1975-1990)

3.8.5 Lavalin:

Lavalin Fiftieth Anniversary: 1936-1986 (Undated - Circa 1988) Unpublished Draft; includes recent and old interviews of the founders and of some family members.

Activity Reports (1982-1988); and *Lavalin Magazine* - (1979-1988 - in lieu of Annual Reports, since the shares of the firm were privately held).

Les Ficelles du Pouvoir, 1991 by C.M. Allard

3.8.6 Strategies and Performance of the Firms

Data pertaining to each firm and to the industry was collected, primarily, from the following sources:

- Company Publications: Financial Statements of SNC and Monenco, Annual Activity Reports of privately-owned Lavalin; and various internal publications of each engineering firm.
- Government sources: Statistics Canada (including periodic special reports on the Consulting Engineering Industry); Dominion Bureau of Statistics; Statistiques Québec.
- Trade publications: in particular ENR (formerly Engineering News Report); and other publications such as Canadian Engineering News.
- In-house publications by two related associations: Association des Ingénieurs-conseils du Québec, and Association des Ingénieurs-conseils du Canada.

3.9 Conclusion

This section has provided an overview of what we seek to understand —the impact of social relationships on the strategy of firms— and the tools that we intend to use. Thus, in the next two chapters, we begin our journey of discovery, by familiarizing ourselves with the general context of Quebec and Canada, and, later, we will focus on the engineering industry.

4. A Canadian Style Revolution[8]

In this chapter, we sketch the social and historical context against which the evolution of the three consulting engineering firms will be examined. The strategic courses taken by the focal organizations must be understood "in context", given that we want to examine, in part, the relevance of the social background of their managers. Since this is only an overview, we focus on the social and economic forces which had the greatest impact on professional engineers, and on the Canadian engineering industry.

4.1 The Age of Engineering in Canada[9]

Canada entered the 20th century in a state of rapid industrial expansion. It was the beginning of the mass production of motor cars, electric lights, telephones and heavier-than-air machines, of gramophones and radios. "Canada's century" as Prime Minister Sir Wilfrid Laurier called it, saw major changes...

> ... [in a] broad range of industrial, social, and economic activities [...]; for example, the expanding mining and pulp and paper industries; the mass marketing of the motor vehicle, with the subsequent road building programs; the increase in urban planning; the invention of the snowmobile; the growth of public works during the Depression; and the emergence of industrial engineering.
>
> (Ball, 1987:69)

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[8] Parts of this chapter expand on an earlier work: Saint-Macary, 1990. *Back to the Future: Studying the "High Performance Firm" -The Case of Lavalin Inc.*, Unpublished Theory Paper, Concordia University, Montreal.

[9] This section draws principally from: • Annuaire du Québec (1955-1988) • Canada Yearbook (various years).

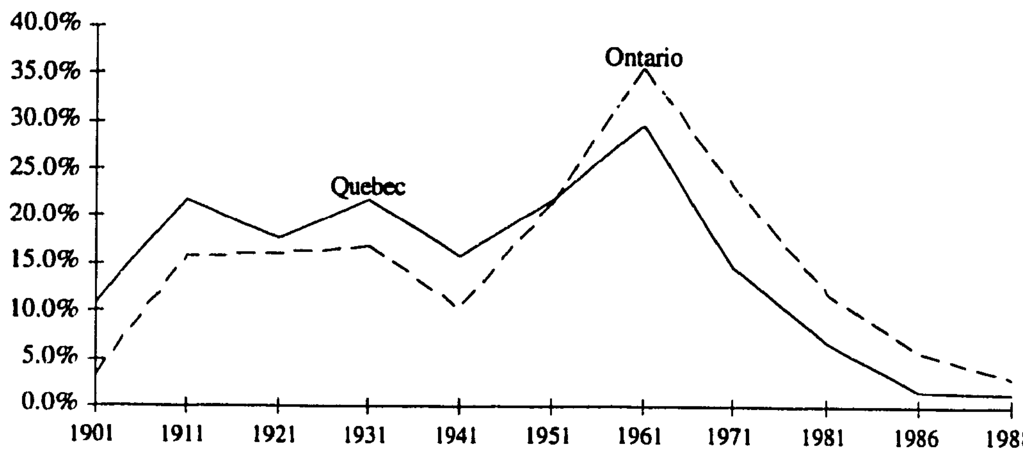
In this new age of industrialization, the value of Canadian manufacturing more than doubled from $214.5 million to $564.5 million between 1900 and 1910 alone (1981 constant dollars). In Quebec, where industrialization began somewhat later, the changes were even more dramatic, as the share of manufacturing in the economy of the province climbed from 4% to 38% during the first twenty years of this century (Hamelin, 1976:417).

It was also an age of rapid population increase. Throughout most of this century, the population of Canada and of Quebec doubled every forty years, thanks to increased immigration, high birth rates and decreasing mortality rates, creating great demand for public infrastructures.

Not surprisingly, demographic and economic changes fed upon each other, and began to alter the very fabric of Canadian and Quebec societies. We focus on Quebec in the remainder of this section, using Canada and Ontario as bases of comparison.

Figure 4.1

Populations of Quebec and Ontario - Change from Previous Census



Source: Statistics Canada

Table 4.1

Populations of Quebec, Ontario, and Canada (in thousands)

	1891	*1901	1911	1921	1931	1941	*1951	1961	1971	1981	1986	1988
Quebec	1489	1649	2006	2361	2875	3332	4056	5259	6028	6438	6540	6619
Ontario	2114	2183	2527	2934	3432	3788	4598	6236	7703	8625	9114	9373
Canada*	4833	5371	7207	8788	10377	11507	14009	18238	21568	24343	25354	25796
	*Saskatchewan & Alberta joined in 1901 Newfoundland joined in 1951					Source. Statistics Canada						

4.2 From Farms to Factories : Quebec 1900 - 1938

Industrial growth in Quebec was financed largely by American, British and English Canadian investments. This growth created a new relationship between the Francophone majority and the Anglophones of the province: Francophone Quebeckers flocked to urban areas seeking jobs in new factories, swelling the ranks of the working class in the employ of Anglophone bosses[10].

Essentially, life in the province was drawn along linguistic and religious lines. By law and religious tradition, the Quebec government faced many limitations in administering the physical, institutional and social infrastructures of the province. For example, they faced perennial disputes with the federal government over the construction of national highways, seaways and bridges in Quebec. Furthermore, many of the institutional and social infrastructures of Quebec society were administered and jealously guarded by the Catholic Church. Thus,

---

[10] Percentage of Quebeckers living in Urban Areas:

Table 4.2

1901	1911	1921	1931	1941	1951	1961	1971
36.1	44.5	51.8	59.5	61.2	66 8	74 3	80.6

(Source: Statistics Canada)

while the Francophone elite held the reins of political power, Protestant, Anglophone businessmen ran the factories, and the Francophone Catholic clergy ran the schools, universities, hospitals, and even the unions[11].

Each group endeavored to steer the province in a different direction. To investors, modernization was the natural course of progress; to the church, it spelled assimilation and the loss of traditional Catholic values; to the government, it seemed to be the only way to stem the tide of emigration to the U.S. and to English Canada. As the economy moved from an agricultural to an industrial base, one nationalist movement called for the return of Francophones to the land and promoted the "colonization" of remote regions of the province, while the government continued to encourage industrialization fueled by foreign investment.

4.3 Quebec vs. Canada: 1939 - 1944

The growing differences found within the province were soon replicated in Quebec's relationship with the rest of the country. Quebec —concerned with protecting and insulating its French Catholic character— stood in radical opposition to the English-speaking Protestant provinces with regard to the country's involvement in WWII alongside Great Britain. The issue came to a head in the federal referendum of April 27, 1942, which pitted the federal government against Quebec provincial and municipal politicians: 85% of English Canadians voted in favor of military draft, while 90% of French Canadians voted against it (Black, 1977:411-6). Canada went to war.

[11] The first union was founded in Chicoutimi by His Eminence Monsignor Lapointe, in 1907. By 1935, Catholic unions comprised 75% of all unionized workers. Their lack of militancy was so notorious, that three years later their membership had fallen to 41%.(Hamelin, 1976, p.445).

In such a context, it is not surprising that Quebec had a lesser share of Canada's war production. With few federal projects carried out locally, especially after 1942, the Quebec construction industry had an uneven performance for most of the period between 1939 and 1946, as indicated in Table 4.3.

Table 4.3

Total Construction Work in Quebec during WWII

(in $ 000 000)

	1939	1940	1941	1942	1943	1944	1945	1946
Current $	56	45	54	77	51	45	42	49
Constant 1981 $	434	331	370	503	323	276	251	283

Sources: Annuaire statistique du Québec (1955)

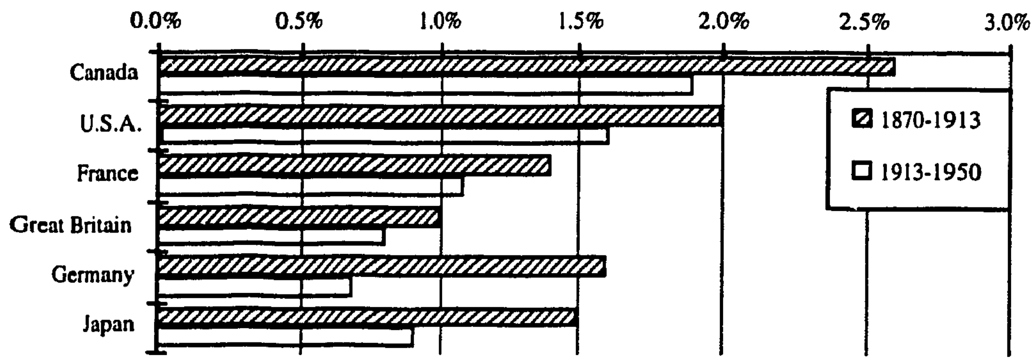
In the meantime, the construction industry witnessed an unprecedented boom in the rest of Canada. "The outbreak of the war in 1939 stimulated construction activity and, in reality, forced Canada to become a highly industrialized nation" (Dominion Bureau of Statistics, 1967:197-8). The federal government undertook extensive wartime projects such as the Alaska Highway, which was built in collaboration with the U.S. in 1942 at an estimated cost of $135 million (Ibid).

4.4 After the War

The post-war period saw further population growth in almost every region of the country, and possibly the fastest rate of urban growth among countries in the Western world. As well, real average annual growth per capita continued to surpass that of other industrialized nations (see Figure 4.2 and Table 4.4). Many of the industries that require engineering services, showed signs of superior performance. Already a world leader in pulp and paper production, Canada's mining potential was confirmed by war-time exploration. This country became the largest exporter of minerals and a major refiner of non-ferrous metals (Economic Council of Canada, *in* Brewis, 1969:13).

Figure 4.2

Real Average Economic Growth per Capita: 1870-1950



Source: Maddison, Angus Phase of Capitalist Development, Oxford U. Press, 1982; The World Economy in the 20th Century, OECB, Paris, 1989, for latest years.

Between 1945 and 1960, total engineering activity in Quebec grew at an effervescent rate, from $276 million to $2,202 million (1981 constant dollars), starting from a low of 1.5% of Quebec's GDP, peaking at 7.6% in 1958, and finishing at 6.5% in 1960 (see Figure 4.5).

4.5 Engineering Comes Into Its Own

This sustained high level of engineering activity —since 1930 in Canada, and since 1945 in Quebec— had favorable consequences for the well-being and the status of engineers across the country. Prior to the depression, "whereas medicine and law were regarded as acceptable professions for the upper classes,

Table 4.4

Comparative Economic Growth During the Twentieth Century
(Real average annual growth per capita)

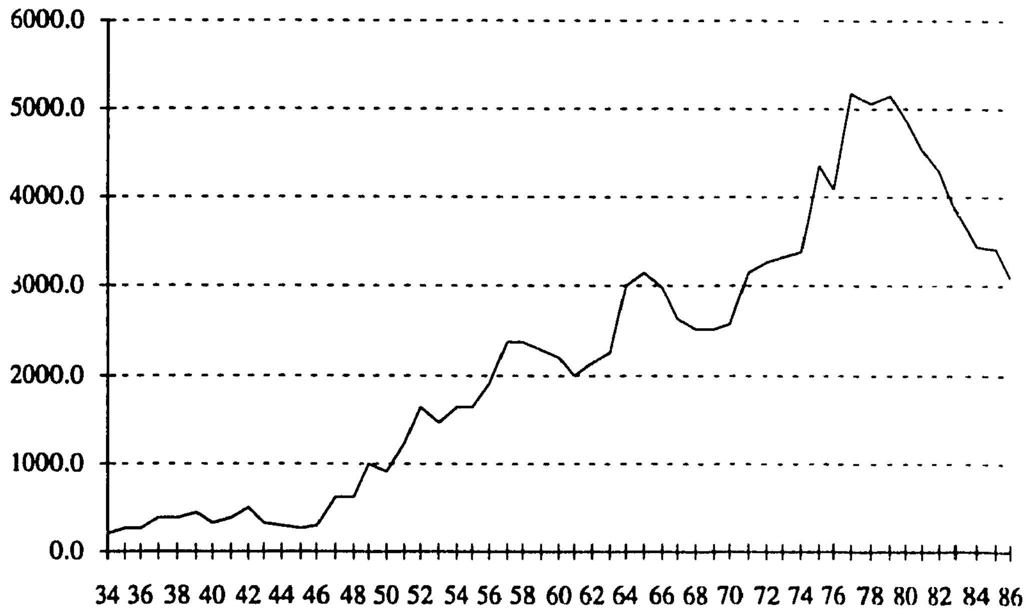
	1870-1913	1913-1950	1950-1973	1973-1987
Canada	2.6%	1.9%	2.2%	2.2%
U.S.A.	2.0%	1.6%	2.2%	2.4%
France	1.4%	1.1%	4.1%	1.7%
Great Britain	1.0%	0.8%	2.5%	1.5%
Germany	1.6%	0.7%	4.9%	2.0%
Japan	1.5%	0.9%	8.0%	2.8%

Source: Maddison, Angus Phase of Capitalist Development, Oxford U. Press, 1982; The World Economy in the 20th Century, OECB, Paris, 1989, for latest years.

Figure 4.3

Engineering Activity in Quebec (1934 - 1986)

(Constant 1981 $ 000)

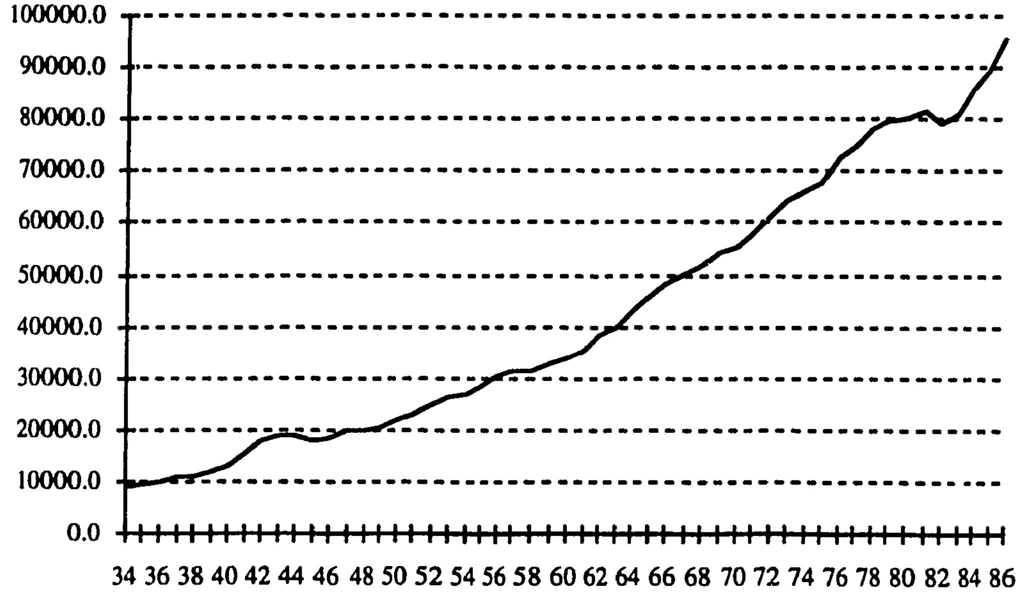


Source: Annuaire(s) statistique(s) du Québec 1955 to 1988

Figure 4.4

Quebec Gross Domestic Product (1934 - 1986)

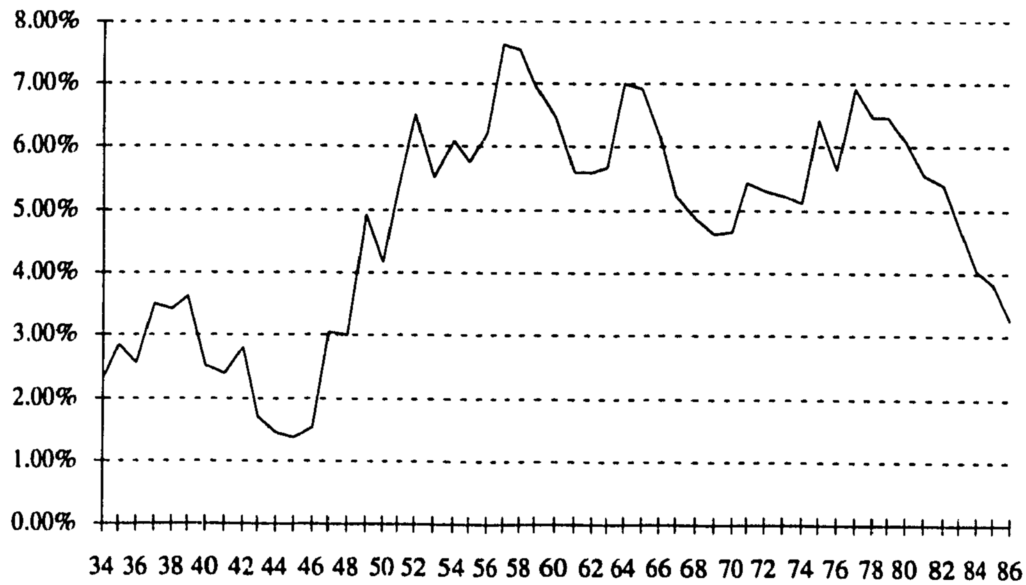
(Constant 1981 $ 000)



Source: Annuaire(s) statistique(s) du Québec 1955 to 1988

Figure 4.5

Engineering as % of GDP (Quebec: 1934-1986)



Source: Annuaire(s) statistique(s) du Québec 1955 to 1988 engineering was viewed [in Canada] as somewhat of a trade and was largely filled from the ranks of farmers, small merchants, and tradesmen" (Ball, 1987:19). Overall, Canadian and Quebec engineers managed relatively well during the 1930's, and the profession emerged from the post-crash period looking more attractive than before. "All professionals fared well in comparison with non-professional workers [...] The average earnings of the engineering and applied science groups were well above the average for all professionals, which was in turn more than double the amount for non-professionals" (Dominion Bureau of Statistics, Survey of Higher Education in Canada, 1936-38:28).

This resulted in a growing interest in professional education throughout the land. In Quebec, it drew attention to a profession that had long been ignored and even frowned upon by the middle class. This helped create a new class of professionals, alongside, but separate from, the members of the elite who shunned business and business-related careers, preferring to embrace the liberal professions or to join the civil service and "wrest from the Quebec government salaries that were among the highest in the land" (Trudeau, 1968).

Children from the lower middle class followed educational paths that were quite distinct from that of those above them. While successful members of the elite attended classical schools, which led to traditional liberal professions, lower middle class children attended secondary schools which led to 'dismal careers' in commerce and trade (from a round table interview with three Francophone professionals).

After the war, students from the lower middle class wishing to become professionals, turned to accounting and engineering. Thus, not only did engineering emerge as a profession with a growing status throughout Canada, but in Quebec, it became a major venue of upward social mobility for lower middle class Francophones.

> When I was in school, there were two avenues open to the working class: become an engineer or an accountant. If my memory is correct, (...) at the start of the 50's in Quebec, or at least in the Montreal region, there were 6 secondary schools of 500 students each, thus 3,000 for Quebec.
>
> Therefore, if you did not have a degree from the [more prestigious] 'classical schools', law and medicine were out of the question. The only "democratic" avenues open to the working classes, at that time, were HEC and the "Poly", to become an accountant or an engineer.
>
> (Interview with Doré, principal of École Polytechnique 1992).

Table 4.5

Social Origin of Polytechnique Graduates (1948 - 1960)

Father's Occupation	Number	Percentage
Farmer	79	7.0%
Worker	399	35.2%
Small businessman	157	13.9%
Civil Servant	77	6.8%
Traditional Liberal Profession	45	4.0%
Teacher	38	3.4%
New Profession	153	13.5%
White Collar	154	13.6%
Industrialist	31	2.7%
Total	**1133**	**100.0%**

Source: Gagnon (1991, p. 322) (Author's translation)

4.6 Increasing Role of the Provincial Government

This growing class of new urban Francophone professionals found strong support in the party and the man who ruled the province for nearly twenty years (1936-39; 1944-59). Maurice Duplessis, head of the populist Union Nationale is remembered —like his American contemporary, Joseph McCarthy— for his heavy-handed approach to politics, strong nationalism, anti-communism, and a deep mistrust of traditional urban elites. His constituency was strongest among the rural-based, conservative, Catholic Francophones, the very milieu of which the new engineers and accountants were a product.

In a speech delivered at the École Polytechnique, shortly after Duplessis' party assumed power in 1936, his Minister of Land and Forests "summoned..., not asked" major corporations to hire more Francophones, who are the "owners" of the province's natural resources (#1:1.1; author's translation)[12]. Shortly thereafter, the government allocated "$50 million for the construction of roads and bridges, primarily in the Montreal area... " (#2:1). This was a considerable sum for the government, given that the total value of construction work in Quebec stood at $40 million two years earlier, only 10% of which was funded by the provincial and federal governments (versus 31% for both Ontario and the rest of Canada) (Dominion Bureau of Statistics - The Canada Yearbook, 1936:473-7).

As a result of these projects, the provincial government continued to be a major employer of Francophones during the first Duplessis mandates; a trend which had begun under Gouin (1905-1920) and Taschereau (1920-1936). For example, in 1913, 5% of the École Polytechnique graduates went to work for the provincial government, and 22% joined the federal government; by 1947, these figures were reversed, with 22% working at the provincial level and only 6.1% at the federal level. Employment rates for engineering graduates by the municipal government remained stable (14.2% and 15.6%, respectively).

---

[12] In French *"Ce n'est pas une prière que je fais, c'est un avis que je donne. Si ces messieurs ne comprennent pas, nous leur signiefierons un ordre formel, et nous prendrons les mesures de le faire respecter (sic) Les ressources naturelles nous appartenants"* (Oscar Drouin, Minister of Lands and Forests, toasting François Joseph Leduc, fellow Minister of Roads in the new Duplessis government at a reception given in his honor at the École Polytechnique, #1, p.1).

The agenda of the Union Nationale was altered during the war when the party was voted out of office in 1939. Duplessis came back to win the 1944 election, and during the next sixteen years his new government "built 2,702 bridges, and built or upgraded 33,157 km of roads"; the network of paved roads more than doubled from 7,000 km to over 18,000 km, creating tremendous work opportunities for *local engineering firms* (#2:23, 26-87), while the rate of engineers actually employed by the provincial government declined (see Table 4.6). As well, the government began to assume a greater role in the administration of the institutional and social infrastructures of the province, although still in close collaboration with the church. Thus, 4,500 schools were built between 1948 and 1960.

Table 4.6

Employment of Francophone and Canadian Engineers - By Sector

	Francophone Engineers 1959-1960	**Canadian Engineers 1961**
Federal	6.5%	n/av
Provincial	14.3%	n/av
Municipal	10.7%	n/av
Total Public Sector	31.5%	11.3%
Teacher	4.4%	2.8%
Total Private Sector	64.1%	85.9%
TOTAL	**100.0%**	**100.0%**

Sources: in Gagnon (1991:336) (Author's translation)

These socioeconomic shifts —albeit pregnant in future consequences for the whole society— were, during that period, momentous for a relatively small number of new Francophone engineers, who were primarily members of the lower middle class. Their initial achievement was to gain employment in the private sector, not ownership or control as Duplessis had promised. During nearly twenty years of Union Nationale rule, each sociolinguistic group remained basically entrenched in its traditional role.

By 1960, there were still very few Francophones in decision-making positions in Quebec corporations; Anglophones, who represented 20% of the Quebec population, accounted for 80% of middle-managers. In senior executive offices Francophones appeared to fare somewhat better, representing 40% of this group, mainly because they filled positions in internal and public relations, where knowledge of French was necessary. Indeed, among the 60% of the Anglophone executives, only 14% spoke French (Fraser, 1987:71-2).

In retrospect, the net consequence of Duplessis' political actions appears to have been to contain and skillfully channel, rather than to foster, social change. Carefully pitting Quebec's 'little people' against a Francophone urban elite, which he mistrusted, Duplessis rarely extended the friendly hand that he extended to English tycoons to the few French-speaking businessmen (Fraser, 1987:35). Perhaps Duplessis' policies —focused on protection and survival— caused the forces of changes to dam up; for, when they began to flow, after his death, they were of such magnitude that they were termed 'revolutionary'.

4.7 The Surge of Francophone Power in Quebec: 1961 - 1970 [13]

In 1960, one year after the passing of their of leader, the Union Nationale was voted out of office. The newly elected provincial liberals took little time in implementing their campaign slogan that "it was time for things to change". And change they did, for the economy, the society, and —by way of consequence— for the engineering industry as well. By change, the new government clearly meant an era of growing Francophone control —not just employment— in the economy of the province. It was also clear to Jean Lesage, the new premier, that the government was the chosen instrument of these changes:

> Quebeckers have only one powerful institution: their government. And now, they want to use this instrument to build a new era which they could not have otherwise aspired to.
>
> (Le Devoir, October 10, 1963:8 - author's translation).

The provincial government was determined to get the most leverage from the tools at hand, while trying to increase its jurisdiction. Under the federal system, it had a greater say and spending power in certain areas, namely education, social affairs, and natural resources. In the next few years, it made extensive use of these powers to promote its policy.

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[13] The general historical events related in this section, unless specifically referenced, are derived principally from the following sources:

- Annuaire du Québec (various years)
- Canada Yearbook (various years)
- Gagnon, A (ed) (1984) *Quebec, State and Society*, Methuen Publications, Agincourt, On, Canada.
- Hamelin, J. (ed) (1976) *Histoire du Québec*, Edisem Inc., St-Hyacinthe, Que., Canada.
- Dion, L. (1976) *Quebec. The Unfinished Revolution*, McGill-Queen's University Press, Montreal, Canada.

It was, in the area of education that the government found the best venue for change. In February 1960, a long-standing dispute with the federal government over funds for higher education was settled, thereby reinforcing the province's jurisdiction over education. This ultimately gave the Quebec government a major instrument of social and economic change that it was seeking. The following year, a number of laws known as "la Grande charte" made education compulsory for all children in Quebec until the age of fifteen. The government also formed the Ministry of Education which assumed the tasks previously performed by the clergy. The provincial budget for education nearly quadrupled in six years, from $127 million in 1959 to $480 million in 1965.

A seven-year plan aimed at upgrading the qualifications of university teachers and at expanding universities was put into place. New administrative structures for education were created in the province. A new level of education, *le Collège d'enseignement général et professionnel* or *CEGEP*, was created to provide professional and technical education, and prepare students for university.

The Ministry of Social Affairs and the *Office de la langue française* were established in 1961 to promote the French language and culture. Between 1960 and 1965, the government adopted and later strengthened the Quebec Hospital Insurance Act which provided increasingly greater health insurance coverage to the whole population, and laid the foundations of socialized medicine in the province.

If the aim of these government policies —the promotion of Francophones and of the French language— was sociocultural in nature and appeared multifaceted, the means that they used to concretize their goals always involved a tangible and single denominator: *construction*. Engineering projects were undertaken on a scale never seen before, ranging from the construction of new schools to the expansion of universities, hospitals, cultural centers, and road networks.

Overall, the engineering industry performed well during the 1960's. After a decline in 1960, engineering activity gained momentum in 1961 reaching $1,993 million, peaked at $3,161 million in the mid-1960's and leveled off at $2,579 million at the end of the decade (1981 constant dollars). That performance mirrored not only a growing economy but, more specifically, the government's socioeconomic policy.

4.8 The Era of Mega-Projects: 1970 - 1986

The Canadian engineering industry grew with the Canadian economy between 1970 and 1986, but suffered from the worldwide inflation of the mid-1970's, and took a dramatic downturn during the recession of 1981-82. During these years, the performance of the Quebec engineering industry was further exacerbated by political scene in Quebec which appeared volatile and uncertain. The Union Nationale, plagued by scandals, disappeared from the political scene. The Parti Quebecois, bent on leading the province to independence, assumed power from 1976 to 1985, but failed to convince Quebeckers to separate from Canada in 1980, allowing the provincial —but pro-federalist— liberal party to regain power in 1985. The two provincial parties which held the reins during that period disagreed about many things, but neither swayed from the policy of concretizing the concept that Francophones were to assume ownership, becoming "Maîtres chez nous" (masters of our own home). That policy —to the extent permitted by economic circumstances— translated into government-sponsored construction.

Thus, important projects were carried out during this period, including the Montreal Olympic Park of 1976, Mirabel Airport, and the Ville-Marie Expressway. But, for the province and the industry, the 1970's were dominated by Hydro-Quebec's James Bay hydro-electric project.

In the early 1960's, the Quebec government had nationalized all the electric utilities through Hydro-Quebec, a state-owned corporation created in 1944. The supporters of the nationalization program, headed by the pro-independence future premier, Réné Levesque —then Liberal Minister of Natural Resources— had made it clear that it was an effort to bring the province's greatest natural asset under Francophone control. But its potential as a formidable source of socioeconomic change was yet to be fully tapped.

The $15-billion, 10-year "project of the century" which began in 1971 was largely financed by private U.S. funds. To reconcile the interests of these investors, as well as the social and political aspirations of the provincial government, its management was entrusted to two firms, Bechtel Québec Limitée —a subsidiary of an American company which received $36 million— and to Lavalin, a medium size Quebec firm which received $15,6 million (#2:3.06-08). Unlike its counterpart in Ontario, Hydro-Quebec had to follow its government's policy of "faire-faire" (contracting out) most of its projects (I.S.T., Canada, 1988:2; Bourassa, 1985:121-5). Thus, a number of other Quebec firms, principally SNC, were also involved in the execution of the project.

4.9 Conclusion

The phenomenon of Francophone entrepreneurship so characteristic of Quebec from the 1960s onward, bore little resemblance to the state of the province in the previous decades..

By constraint or by choice, few French-speaking Quebeckers were active in business prior to 1960. In a poll conducted by Laval University, in 1959, 54% of French Canadian parents wanted their child to join the priesthood, as compared to only 6% who opted for a business career (Fraser, 1987:73).

Between 1961 and 1987, the percentage of Francophone "control" over the province's economy rose from 47% to 61%, and became especially strong in the areas of public utilities (97%), finance and real estate (66%), and trade (58%) (Le Devoir, March 24, 1990:B 1-2). By 1987, the "Quiet Revolution", which had been quite noisy at times, had resulted in major attitudinal and behavioral shifts towards business among Quebeckers. A 1967 survey conducted by the Quebec Securities Commission found that 14% of the population owned stocks, up threefold from 4.4% only ten years earlier (Fraser, 1987:96). While this rate was still below the Canadian and U.S. levels (18% and 26%, respectively), it was a clear indication that the Weberian spirit of capitalism had taken hold in Quebec.

5. Notes on the Canadian Engineering Industry[14]

The study of individual engineering firms also requires an understanding of the industry in which they operate. As a conceptual framework, we use the systemic model put forth in Chapter Two (Figure 2.1), which proposes that we identify and become acquainted with the role played by the **suppliers** of the industry —in particular, the universities where engineers are trained and research is generated—; the **firms** which comprise the industry; the **clients,** in the private and public sectors; and the **government** agencies which act as financial intermediaries between the firms and international clients, by way of aid, loans and guarantees.

5.1 Suppliers: Universities, and the Making of an Engineer

Engineers in Canada can trace the roots of their profession to the creation of the Canadian Society of Civil Engineers, in 1887. Evidently, they have an even longer history of carving, building, linking and cementing an immense and sparsely populated country known for its rugged topography and harsh climate.

In the words of the founder of the country's leading engineering firm, an engineer is "skilled in transforming an idea into a reality. From the idea he will create a concept, following engineering laws and principles and express it in drawings and specifications which builders transform into completed products, which may be as large as Manicouagan 5 and as small as a computer memory bit,

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[14] Parts of this chapter expand on an earlier work: Saint-Macary, 1990. *Back to the Future. Studying the High Performance Firm" -The Case of Lavalin Inc.*, Unpublished Theory Paper, Concordia University, Montreal.

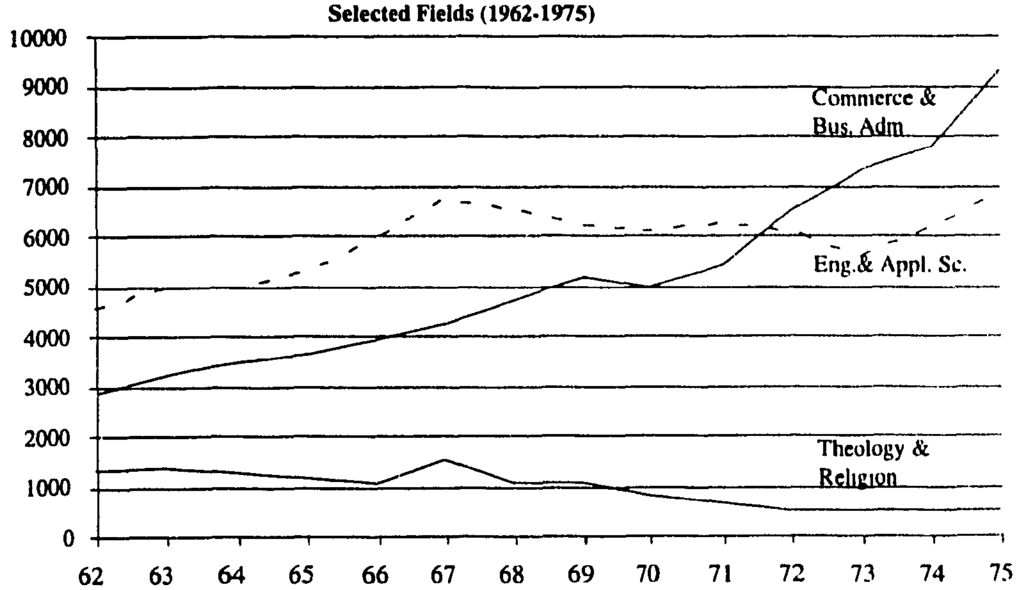
as complex as a nuclear plant, as utilitarian as a truck, or as fascinating as a moon vehicle or an orbiting station." (Surveyer, 1979). Throughout, the engineer is guided by principles of safety, economy and esthetics.

As in any service, know-how constitutes the industry's most important input. Its supply, measured by the number and quality of engineers, has increased steadily since 1887, fostered during the first half of this century by immigration and, ever since, by a high number of Canadian graduates.

Engineers from abroad —principally the U.K., and to a lesser extent Germany, Switzerland, France and India— added not only to the supply, but also to the variety of skills, languages, and perspectives available to Canadian firms. Immigration from these countries plays an important role in meeting the deficiencies that continually emerge as the needs of customers change faster than universities can adapt.

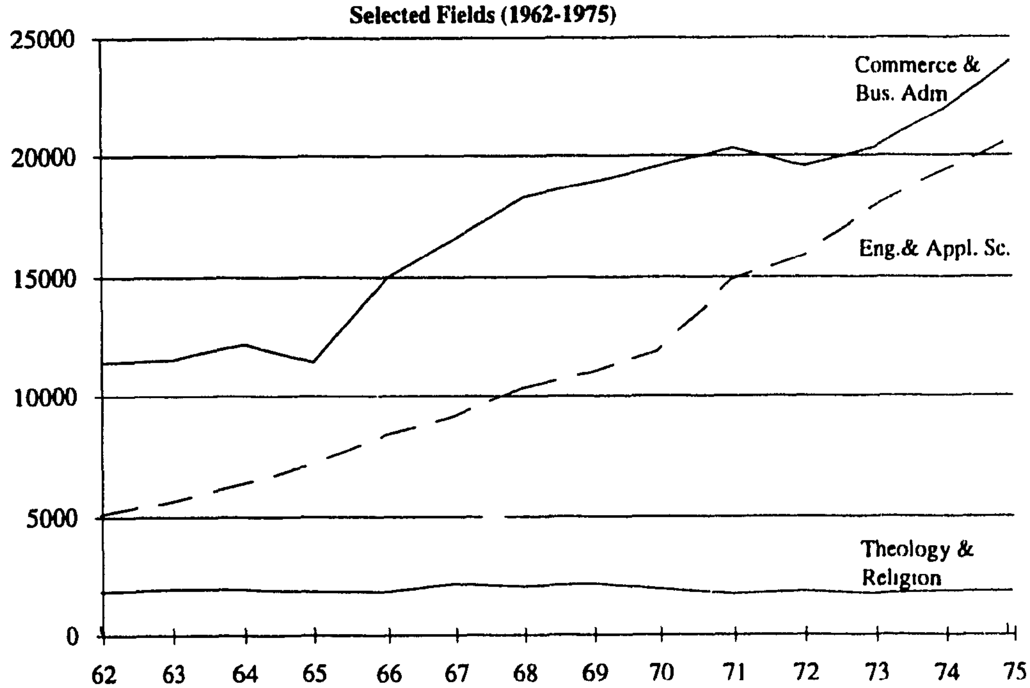
The most notable changes in the supply of Canadian-trained engineers occurred over a twenty year period which spanned the 1930's and included WWII. Between 1931 and 1950, the number of university graduates in Applied Science and Engineering increased by a factor of 8.0 times in Canada, (8.2 in Quebec, 6.7 in Ontario), while total university enrollment merely doubled in each of these regions (Dominion Bureau of Statistics- Survey of Higher Education in Canada, 1950-52:67-71; also, see Tables 5.1 and 5.2).

Figure 5.1
Full-Time Undergraduate University Enrolment - Quebec
Selected Fields (1962-1975)



Source: Statistics Canada Cat #81-568 (1975)

Figure 5.2
Full-Time Undergraduate University Enrolment
The Rest of Canada (excl. Que.)
Selected Fields (1962-1975)



Source: Statistics Canada Cat #81-568 (1975)

Do Canadian universities and technical schools turn out qualified engineers in sufficient numbers? According to a former president of SNC, it is an endless process of adjustment:

> An engineer should be involved in the conceptual end, in economics and the details of the location of a project.... No, we don't have problems finding French-speaking engineers for civil engineering and, nowadays, in mechanical and electrical. But they have only recently gotten into the industrial end.
>
> (C. Dagenais, in Gibbens 1975:2)

The ability of universities to respond to the changing needs of the market remain hindered by three factors: the universities' budget constraints, the long delay required to set up new programs, and train teachers (Stratem, 1991:82-83). In Quebec, the École Polytechnique, the University of Sherbrooke and Concordia University have addressed the last problem by using experts from the industry to teach.

> Since the founding of the school [Polytechnique], the teachers have been professionals working part-time as professors and part-time in the industry. Thus, we do not have the *chargés de cours* [part-time lecturers] that we find at the University of Montreal. The idea of unionized *chargés de cours* would be hard to conceive. They are professionals. Even those who are teachers by profession are involved in research which keep them very closely linked with engineering firms.
>
> (Interview with Doré, 1992)

Canadian universities have responded to the first two issues by instituting joint programs among themselves —mostly at the graduate level—, and by involving the engineering firms themselves.

> Nowadays, cooperation between the school [École Polytechnique] and engineering firms includes other schools. At the end of the 80's, when we had to introduce a specialized masters program to respond to the specific needs of the industry (aeronautics), we did it in collaboration with McGill University.
>
> (Ibid, 1992)

But, universities and immigration can only fill the needs of the industry to a certain extent. Consulting-engineering firms continually upgrade their technological know-how by integrating new techniques —such as on-site and off-site construction methods, use of conventional and new materials— into their work (Dominion Bureau of Statistics, Canada Yearbook, 1967:202), and also by becoming familiar with the changing needs of their commercial and industrial clients (Verreault & Polese, 1989). Thus, a great deal of the training is done on the job. Generally speaking, based on years from graduation, one can observe the following development in a consultant's career path (Monenco Contract Files, 1979):

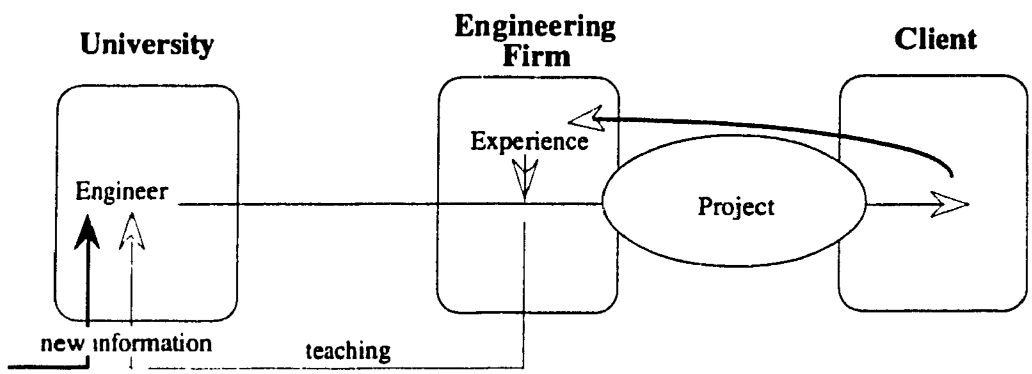
- from year 0 to year 2 — junior engineer
- from year 3 to year 5 — intermediate engineer
- from year 6 to year 8 — senior engineer

The knowledge that consulting engineers acquire is not proprietary and is of practical use only to those who experience it (as shown in Fig. 5.3). This contrasts with other situations, such as those found in the pharmaceutical industry for instance, where products can be patented and their formulas sold to other firms. Engineering is learning by doing, two activities which are inseparable from one another.

> ...[I]t is generally considered that know-how is a product of experience more than of research. In the case of consulting-engineering services, experience is both a source of know-how and

> of new information. Thus, the more varied the problems the engineering firm has to confront, the more its technological base will tend to increase.
>
> (Verreault & Polese, 1989:16; author's translation)

Figure 5.3



Nonetheless, that technological base —the accumulation of knowledge and experience— remains elusive. "[C]onsulting has been described as the only business in which your assets walk out of the door in the evening, and, hopefully, return the following morning" (Arthur Newman, 1967, in a brief to the Royal Commission on Corporate Concentration). As a consequence of its special circumstances, the industry has developed certain idiosyncrasies:

• Firstly, the industry extols the engineer as the expert. And, as a result, his or her personal relationship with the client is seen as a guarantee of quality and as a means of control. "Interpersonal relations play an important role in the choice of a firm, the contracts previously managed by an engineering consulting firm being more related to the expert who had responsibility for the project rather than the firm itself" (Stratem - Association des ingénieurs-conseils du Québec, 1990:31).

• Secondly, technology transfer —a by-product of many projects— is often an integral part of the services clients seek, particularly in developing countries. Technology transfer is achieved by hiring local staff, or, more formally, through training provided to indigenous staff, here, in Canada The preamble to a contract with the government of a developing country stresses, for instance, that "the consultant has: experience in the utilization of local labor[...], and the capability of training local staff in the most appropriate way necessary, and is willing to work with indigenous consultancy firms." (Monenco, #620, 1989).

• Thirdly, engineering firms have often found that they can only broaden their technological base by hiring and retaining engineers with the desired experience. This means seeking out contracts to gain experience or just to keep the engineers occupied, creating —with the ebb and flows of the business— a built-in mechanism for personnel growth.

5.2 Engineering Firms, Small and Large

As firms bid for and undertake larger and ever more complex projects, they too become bigger and more complex. This has resulted in a higher concentration of engineering firms during and after the boom of the early 1970's. The share of revenues earned by every group of consulting engineering firms, small, medium and large, has decreased, while the very large firms doubled their share from a quarter to half of the market.

Table 5.1

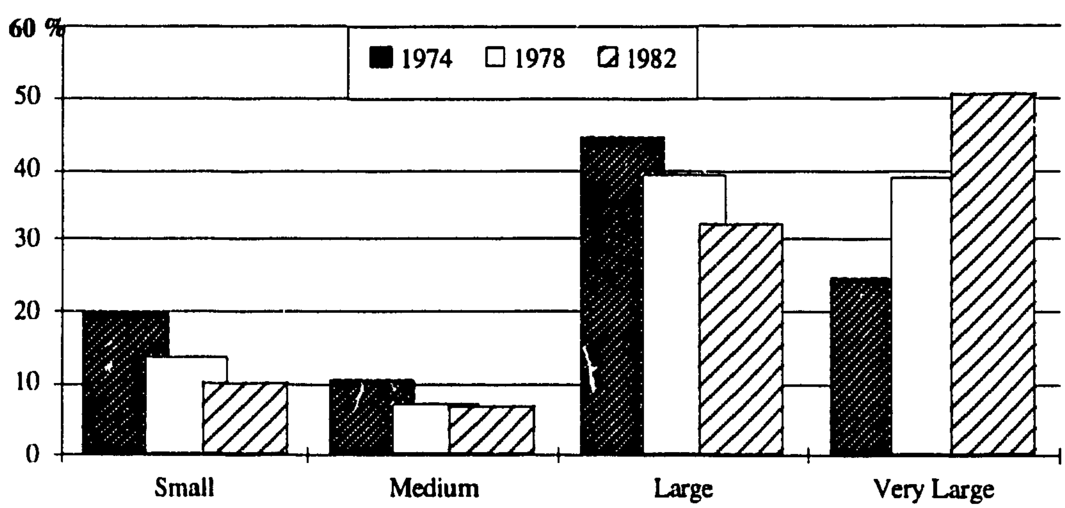
Percentage of Firms and Distribution of Revenues among Canadian Consulting Engineering Firms

	% of Firms			% of Total Revenues		
Revenues	1974	1978	1982	1974	1978	1982
< 499 999	81.0	80.0	76.6	20.0	14.0	10.2
500 000 - 999 999	8.0	7.7	10.0	10.7	7.4	7.0
1 000 000-9 999 999	10.2	10.9	11.9	44.4	39.5	32.3
> 9 999 999	.8	1.3	1.5	24.9	39.1	50.5
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Statistics Canada, #63-528 & 63-537

Figure 5.4

Market Share of Consulting Engineering Firms of Various Sizes



Source: Statistics Canada, #63-528 & 63-537

The industry concentration is particularly high in Quebec, which ranks only fourth among Canadian provinces in terms of number of engineering firms but second in market share (respectively 13% and 31% in 1986) (Stratem, 1990:5 and later). As indicated in Table 5.2 below, Quebec and Ontario differ markedly in terms of the number of Consulting-Engineering firms, although each of these provinces employ nearly the same number of people and earn similar revenues in that industry.

Table 5.2

Distribution of Firms, Revenues and People among Consulting-Engineering Firms in Quebec and in Ontario

	Number of Firms	Revenues ($ billion)	Number of people employed
Quebec	569	1,02	17,132
Ontario	1,474	1,07	18,849

Source: Stratem, 1990:3

The breakdowns in Table 5.1 and in Figure 5.4 use the industry's standards to distinguish firms of various sizes. Characteristically, the scope of their work and their clientele can be broken down as follows (Stratem, 1990 - also see Table 5.3 for breakdown of their clientele):

• **Small firms** (1 to 24 employees) are primarily involved in building construction and, to a lesser extent, in small-scale municipal and industrial work. They usually include one or two associates and as many junior engineers who work —in Mintzberg's classification— in a simple structure.

• **Medium size firms** (25 to 149 employees) are also involved in municipal and industrial work, but of a larger scale, such as bridges, wharves, and tunnels. They may also be involved in some industrial engineering and environmental work. Typically, there are two or more associates who structure their work around the projects in progress, in a simple structure with characteristics of an adhocracy.

• **Large firms** (150 to 499 employees) in consulting-engineering are very diversified, having moved in that direction faster than any other group between 1980 and 1988. In order of importance, large firms are involved in industrial engineering (designing and setting up manufacturing plants); environmental analysis and waste treatment; water purification; hydro-electricity and energy; agriculture and forestry; laboratories and materials. Their structure generally takes the form of an adhocracy, with a large support staff and technical core.

• **Very large firms** (over 500 employees) are involved in the same fields as large firms, but they offer a wider range of integrated services, on a larger scale, and in more markets nationally and abroad. Their structure blends elements of two of Mintzberg's types —adhocracy and professional bureaucracy. At Lavalin in 1987, about one-third of the 4,050 people employed in consulting-engineering were professionals. At SNC, which was less diversified in other industries, that proportion was 50% in March 1990, as outlined in Table 5.3 (Source: Coté, M. 1991:571, 914).

Table 5.3

Distribution of People employed at SNC

Executives	2%
Engineers	24%
All other professionals	26%
Technicians	26%
Administration and Support Staff	26%
	100%

In view of the complexity of the field, civil engineering —that is, non-military— is divided into the broad divisions of structural, electrical, mechanical, municipal, automation, chemical, and construction. A consulting engineering firm offers its clients an array of services which cut across these divisions. Typically, they carry a project from conception to construction in three stages:

1- **engineering and design**, which involve feasibility studies, detailed drawings, traffic flow analyses, and equipment specifications;

2- **procurement** of the necessary materials and equipment;

3- **construction management,** which involves planning, supervising, and administering the field work.

In the past, consulting-engineers entered the picture *after* the architects and *before* the contractors; but, over time, their role has evolved to include some of the work of the architect, and more and more of the latter stages of the process, formerly reserved to builders and contractors.

When a firm undertakes a capital project on a consulting/project management basis it is heavily involved in the earlier stages of the project, but only supervises its actual execution. The firm is then paid on the basis of incurred costs. Such contracts are awarded to the bidding firm which can offer a combination of attractive price, proven track record in that area, and the right experts.

Since the late 1970's, there has been a growing trend to hire consulting engineering firms on a "turnkey" construction basis (also called engineering-procurement-construction or EPC). In such cases, the firm handles all aspects and phases of construction and guarantees delivery of a project in working order —key in hand— at a price usually set in advance. In addition to cost and know-how, the firm's own finances and their ability to arrange financing for their client come into play. In some instances, the consulting-firm may become part owner of the project. Since turnkey projects involve substantial financial outlays, they are undertaken only by large integrated engineering firms (I.S.T., Canada, 1988:1). Contrary to their European counterparts, North American consulting-engineering firms rarely own their own manufacturing and construction concerns. While this allows them to stake more credible claims at being impartial in their assessments and recommendations, it also means that they have lower levels of capitalization and that they are highly vulnerable to economic cycles.

5.3 Clients and Contracts

In Canada, the demand for consulting-engineering services stems equally from two major sources (see Table 5.2 for Quebec Firms). First, consulting-engineering is a support industry for the mining and manufacturing sectors which require large-scale structures and have levels of capital expenditures which are directly linked to levels of economic activity (I.S.T., Canada, 1988:1-3). These industries are typically private, are largely under foreign control —mostly American— and either their own engineering departments manage their sundry construction projects, or they use the services of engineering firms from their home countries for larger scale projects (Niosi & al., 1988:13-4).

The second group of buyers come from the public and parapublic sectors which require various forms of infrastructure in fields such as transportation, health, and education. Their demands reflect the policies of federal, provincial, and municipal governments. When they require external services, they tend to turn to independent firms in their respective constituencies.

Table 5.3

Distribution of Revenues of Quebec Consulting Engineering Firms - By Size

	Small Firms : Less than $499 999		Medium : $500 000- $999 999		Large : $1000 000-9 999 999		Very Large : Over $9 999 999	
	1980	1988	1980	1988	1980	1988	1980	1988
Private	61.8	64.0	44.7	44.1	41.7	41.8	14.0	21.0
Municipalities	11.9	11.1	28.7	31.2	24.2	24.1	33.0	31.0
Quebec Govt.	12.0	11.7	18.3	15.6	22.7	24.2	42.0	39.0
Federal Govt.	10.3	7.9	7.3	6.9	10.3	9.4	10.0	8.0
Other Eng. Firms	4.1	5.3	1.2	2.1	1.1	0.5	0.0	1.0

Source: Analyse de la situation du génie-conseil Québécois, Stratem Inc (1990)
(N.B. Columns may not add to 100% due to rounding)

5.4 The Role of Governments

In Canada, roughly half of all engineering work is sponsored by the three levels of government: federal, provincial, and municipal. Thus, the level of maintenance work and of new construction in a given year reflects partly the general state of the economy, but also the discretionary policies and orientations of the governments in power.

At the *municipal* level, large cities such as Toronto, Montreal, and Calgary have undertaken discretionary projects costing hundreds of millions of dollars for the construction of sports complexes, international expositions, and public transportation.

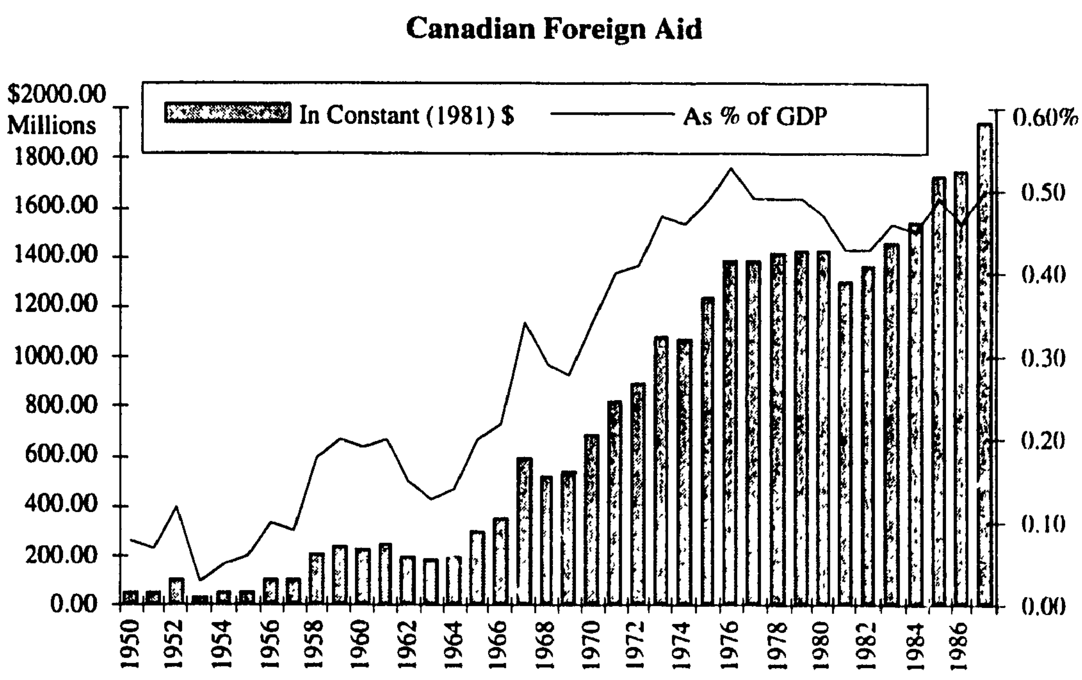
The *provincial* governments have acted in their own areas of jurisdiction, financing construction related to health, education and natural resources, including many large projects related to public utilities. There, and in the administration of government-controlled corporations, they have reflected their individual policy orientations. For instance, Hydro-Quebec's policy of contracting out many of its projects has favored the growth of independent engineering firms in Quebec (I.S.T., Canada, 1988:2; Bourassa: 121-5).

At the end of the 19th century, and through the first half of the 20th, the federal government undertook nationwide mega projects, in which independent engineering firms participated: the transcontinental railway in 1885; the war-related industrial production; the Trans-Canada highway; and the construction of various airports, bridges and ports to stimulate regional expansion. While in the latter part of this century its role as a source of revenue has decreased domestically, it has played an important financial role which has enabled engineering firms to sell their services on the international market.

After WWII, a number of financing agencies were formed in industrialized countries to channel foreign aid to the newly independent and/or less developed countries of Africa and Asia. Canada's participation began with the British-led Colombo Plan, which was directed at the commonwealth members of Asia. Its involvement grew considerably in the 1960's and 1970's, after a number of African countries became independent. In 1961, it extended its programs to include Francophone Africa. In 1968, the Canadian International Development Agency (CIDA) was formed to replace and increase the activities previously coordinated by the External Aid Office (Source: CIDA, The First Generation, 1988).

Canada was particularly well positioned to sell such services in Africa, because it had not been a colonial power, Quebec engineers could work in both English and French, and they offered state-of-the-art North American technology. As Camille Dagenais, former CEO of SNC put it: "they like us because we speak French, but we're not from France" (Fraser, 1987:172).

Figure 5.5



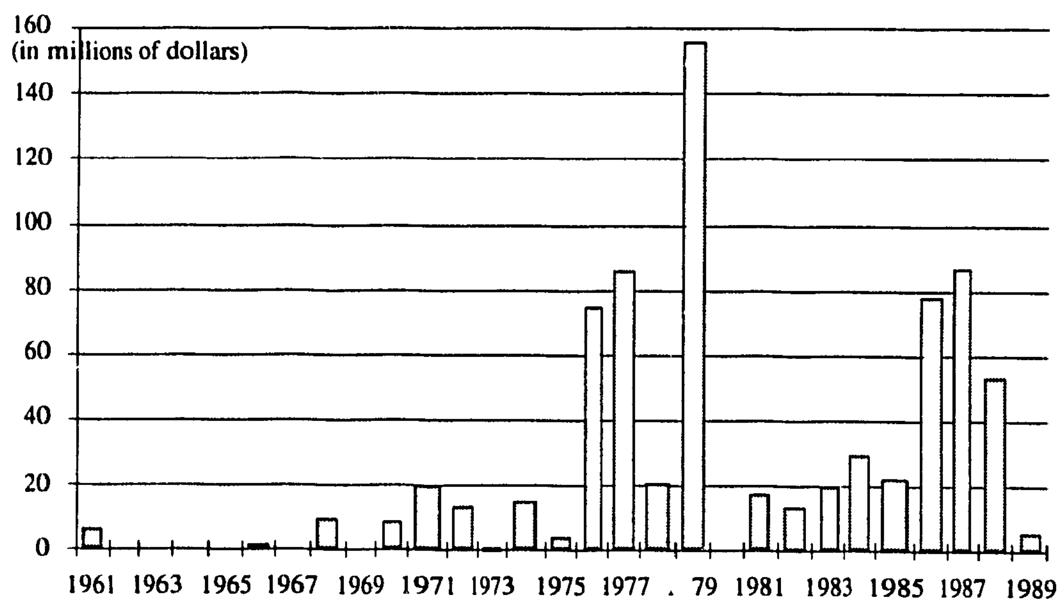
Sources: Statistics Canada - (Adjusted for inflation)

The volume of foreign aid continued to increase throughout the 1970's, in absolute and in relative terms, but tapered off with the inflation of the mid-1970's and the subsequent recession of 1982 (see Figure 5.5). Financing of engineering projects followed the same general trend, though it tended to be much more volatile (see Figure 5.6).

Two federal government agencies are particularly active in fostering Canadian exports of goods and services. CIDA is responsible for delivering about 75% of this country's foreign assistance; the remainder is channeled mainly through crown corporations, and international agencies such as the World Bank. CIDA's focus is on facilitating exports to the poorest regions of the world.

Figure 5.6

CIDA Financing of Engineering Projects*



Source: Special Report produced by CIDA for this research, 1992.
(*) Includes all projects in which an Engineering Firm acted as Primary Executing Agent..

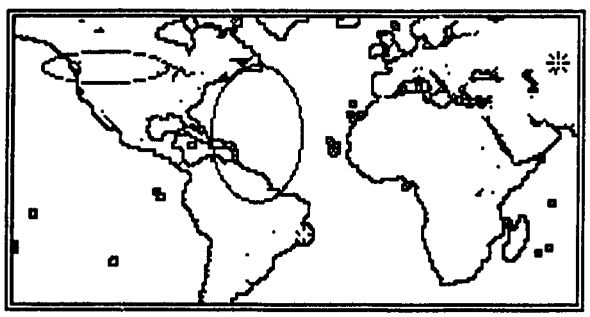
The Export Development Corporation (EDC), and its forerunner the Exports Credits Insurance Corporation, is also active in promoting exports, but it caters to a different clientele. As the country's official export credit agency, it helps Canadian companies compete more effectively in international markets by insuring their export sales against business and political risks. It also helps by offering loans to foreign buyers of Canadian goods and services, and by providing foreign investment insurance. Contrary to CIDA, however, EDC is a for-profit crown corporation, and is more active in developing and industrialized countries than in undeveloped countries. Between 1961 and 1982, EDC granted $11,776 million in the form of loans, related guarantees and confirmed letters of credit. Of that amount, nearly one-third served exports destined for Europe (18.8%) and to the U.S.A. (13.7%).

5.5 Conclusion

In just a century, Canadian engineering grew from a local trade with local concerns, to a profession serving international markets. In that changing environment, three Quebec firms, Monenco, SNC, and Lavalin, came to dominate the landscape and rose to world prominence. The next three chapters tell their individual stories.

6. Monenco [15]

W.M. Aitken incorporated Montreal Engineering under a Quebec charter, in 1907, to provide services to the electric and transportation utilities owned by the Royal Securities Corporation. Through his Halifax-based investment firm, this wealthy entrepreneur financed and operated several utilities in Canada and in the Caribbean, an area with which Nova Scotia traded considerably, exporting salt fish and importing sugar, molasses, and rum. This new engineering firm was to investigate and appraise the prospects in which he was interested, as well as operate and manage his existing properties



Spheres of Activities of The Royal Securities

The in-house role of the former engineering department of Royal Securities was clearly confirmed in its letterhead of 1911. "The stock of the company is owned by the companies for which it acts." The list of shareholders of Montreal Engineering comprised ten electric and public transportation utilities owned by Mr. Aitken through Royal Securities (see Table 6.1).

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[15] The company has operated under a variety of names. Since it has been known as Montreal Engineering throughout most of its history and, more recently as Monenco, only these two names will be used in the text, tables and graphs.

Table 6.1

Montreal Eng. Shareholders (1911)	Location	Utility
1. Calgary Power Company, Ltd.	Canada (AL)	Electricity
2. Western Canada Power Company, Ltd.	" " (BC)	Electricity
3. The Dartmouth Electric Company, Ltd.	" " (NS)	Electricity
4. The Demerara Electric Company, Ltd.	British Guyana	Electricity
5. Porto Rico Power & Light Company	Porto Rico	Electricity
6. San Juan Light & Transit Company	Porto Rico	Electr & Trans
7. The Porto Rico Railways Company, Ltd.	Canada	Transport
8. The Camaguey Electric Company, Ltd.	Cuba	Electricity
9. The Camaguey Transport Company, Ltd.	Cuba	Transport
10. Caguas Tramway Company	Trinidad	Transport

(Source. Sexton, 1982.9-18)

It may have seemed fitting for an international investment firm to own its engineering firm but, for years, Montreal Engineering was more active on paper than in the field. The book of minutes of the first decade indicate that the company underwent many legal changes, moving its head office from Montreal to Toronto in 1912, only to return to Montreal six months later. During that period, the list of shareholders changed sixteen times, and that of its officers changed ten times.

Those shifts did not have significant impact on the company, however, since Montreal Engineering, still inactive, changed neither in purpose, nor in actual ownership. It remained under the primary control of W.M. Aitken, a law school drop-out and former bonds and shares salesman. Thanks to his strong connections in the banking world, he had just managed the merger and the takeover of all thirteen cement companies outside British Columbia. He then disposed of his other interests in Montreal Trust Company in order to concentrate in the financing and management of public utilities and of primary industries. Another letterhead of Montreal Engineering company, confirmed that its (eventual) specialties were to serve Mr. Aitken's more recent acquisitions: "hydroelectric plants, water, power, tramways, railroads, pulp and paper mills, timber cruises, etc."

Moving the company's headquarters between Montreal and Toronto, but not to Halifax or Calgary where the utilities were located, reflected the fact that financing, not operations, was at the core of Aitken's success and growth. Through his business office in London, England, he had considerable success in raising funds for his capital intensive ventures. He took up residence in that city in 1910, became a Member of Parliament only five months later, was knighted within a few years, and was raised to the peerage of Baron Beaverbrook of Beaverbrook in 1917 (Sexton, 1982:20-30).

His involvement in British politics and the outbreak of the First World War curtailed further expansions of Royal Securities and the activities of its newly formed engineering subsidiary. Until 1919, Montreal Engineering had only three employees, and had performed little engineering work (Sexton, 1982:29). That year, Aitken sold his controlling shares in Royal Securities, Calgary Power, and Montreal Engineering, to a younger entrepreneur named I. W. Killam, who assumed the presidency of the engineering firm until 1933, and effective control until 1955.

6.1 The First Steps

With new leadership and the strong business climate of the 1920's, came a renewed interest in growth. Soon after being purchased, Montreal Engineering undertook its first recorded engineering activity by investigating the potential for hydro projects on the Gatineau River in Quebec and at Chat Falls. These projects required complicated negotiations with two provincial governments, and resulted in the acquisition of water and lands rights from Quebec and in purchasing control of the Ottawa Electric Company. Montreal Engineering went into a partnership with Ontario Hydro and formed the Ottawa Valley Power Company Limited.

With its extremely low capital cost, the project was deemed, at first, an outstanding engineering success. However, politics turned it sour. Under the financial pressures of the depression, and in the wake of the anti-trust movement which followed in North America, the Government of Ontario canceled the Ottawa Valley contract unilaterally in 1935, and took legislative action to prevent Montreal Engineering from seeking redress in the courts. Under a threat of foreclosure from the bond holders of the Ottawa Valley Power Company Limited, Montreal Engineering was forced to accept a revised contract at lower prices. "It was an experience that left [... Mr. Killam] and his principal aides with a measure of cynicism towards the contractual undertakings of governments" (Sexton, 1982:33).

In other fronts, expansion was continuing, however. With established bases in Western Canada and in the Capital Region, Montreal Engineering secured a major interest in the Nova Scotia Light & Power Company Limited of Halifax, and undertook the construction of Nova Scotia's first modern paper mill in 1928.

Though far less controversial than the Ottawa scheme, these industrial construction contracts were also quite complex. In order to meet the power requirements of the paper mill, for instance, two other major construction projects were carried out. Montreal Engineering installed a thermal power unit at the plant, while the Nova Scotia Power Commission undertook the development of hydro power on the Mersey River.

The activities of Montreal Engineering were not limited to construction. In the period between the two wars, they expanded into the field of management as well. In 1935, U.S. anti-trust laws allowed Royal Securities to acquire the holdings of Maritime Electric Company Limited, which operated franchises in New Brunswick and Prince Edward Island. Montreal Engineering took over the operation and management of these utilities, a responsibility which it still exercised in the 1980's.

Expansion also took place outside of Canada. Within a few years, Mr. Killam had gained controlling interest in four Central and South American companies, as well as Newfoundland Light & Power Company (considered foreign, since Newfoundland had not yet joined Confederation). In order to consolidate all of his domestic and foreign holdings under one legal entity, he formed International Power Company Limited.

These acquisitions enabled Montreal Engineering to gain considerable experience in a number of distribution systems and in many countries. Its engineers gained knowledge in the areas of hydro, wood-fired steam plants, gas engine generated power and diesel installations. Internationally, they acquired experience in tramways and telephones in Bolivia, waterworks, gas distribution systems and sewage in Mexico, as well as ice factories in El Salvador (Sexton, 1982:44-55).

6.2 A Clearer Role within Mr. Killam's Empire

As a result of this expansion, the relationships between the companies became more formal. For instance, it was agreed that Montreal Engineering would receive a management fee of 2% to 3% of gross earnings from each utility, an engineering fee of 4% to 5% of expenditures for capital account, plus additional remuneration for special services.

The administrators also began to distinguish between the operations of the "southern" and those of the "northern" properties of the Royal Securities. At the beginning, however, these divisions were more a matter of form, for the nature of their business and the scope of their activities was such that, in practice, the entire staff collaborated in the management of all of the companies.

> Here on this small floor, engineering and utility management decisions were being made for projects in the Maritimes and Western Canada, as well as several countries of Central and South America. Senior management decisions in the operation of the power utilities in the Royal Securities group were made in the same building and the efficiency and quality of the total work could not be repeated in today's environment. Here were the owners of the power companies making quick decisions on major project questions such as purchase of major equipment, schedule changes, economic studies for designs, and all with the major advantage of feedback from the operations of these utilities.
>
> (Smith, c.1988:3)

The company employed from two to three dozen people (ibid:81), and the proportion of senior managers to middle and first-line employees was relatively high. "[A]t this time, there were probably as many senior engineers as junior engineers and draftsmen in the office" (ibid:66).

The Depression adversely affected senior and junior managers alike. Staff and salaries were cut, as was the case in many firms and in many industries. By the mid-1930's, however, a number of the "southern" countries in which Montreal Engineering operated began to recover, earlier than the more industrialized "northern" economies.

This recovery, after such difficult economic conditions, meant a recrudescence of business at Montreal Engineering. Consequently, a dozen new engineers were hired; at that time, there was no shortage of qualified engineers, with formal education or apprenticeship training, seeking employment. In the past, the company had recruited from McGill University in Montreal; but, those who joined after 1930 came primarily from Alberta and from the Maritimes, regions of the country where Royal Securities had a strong presence. In addition, the firm began to hire engineers from overseas, especially from the UK, where unemployment was high and where there were more engineers trained in mechanical engineering (see Tables 6.2).

Table 6.2

Engineers Recruited Between 1920 and 1946 - By Region[16]

Year	Senior Engineers (18)	From Quebec (6)	From Central Canada (1)	From Western Canada (6)	From The Maritimes (1)	From Europe (2)	From Calgary Power Co.* (6)	Specialty •Civil (1) •Elec (9) •Mech (3)
1920's	Stairs							
1923	McLaren	McGill					....	Mech
1925	Allen	McGill						Elec
	Farmer	McGill						Elec
1926	Puttman	McGill						Civil
1929	Blanchard	McGill						Elec
1930	Angus					U.K.		Mech
1934	Sexton						....	
1935	Bell			Alberta			....	Elec
1936	Goodwin					U.K.		Mech
	Davis			Calgary			....	Draftsman
1937	Kazakoff	McGill						Elec
1940	Ritchie			Alberta			....	
	Howard		Toronto				....	
1941	Archilbald				N.S.T.C.			Elec
1946	Hurdle			Alberta			....	Elec
	Caruthers			Alberta				Elec
	Eckenfelder			Alberta			....	Elec

Legend for Universities: •University of Alberta ; •McGill University; •Nova Scotia Technical College (NSTC); •Queens University; •University of Toronto; •University of British Columbia (UBC); •University of New Brunswick (UNB); •Overseas : Location of Univ. or of Training.

Source: Biographical Notes- Sexton (1982), pp. 65-78

Unfortunately, as wartime activities abated, the conditions that had justified hiring new engineers deteriorated. A general movement toward nationalization arose, fueled in Canada by the bitter experiences of the Great Depression, and in the British Caribbean, by the imminent change to self government. "Mr. Killam's

[16] Notes concerning the column "*From Calgary Power Co.*": During the depression, this affiliate of Montreal Engineering hired young university graduates at "nominal salaries" and offered them training in its 'Apprentice Engineering Program'.

empire of electric utilities in Latin America had begun to shrink" (Sexton, 1982:58). Between the second world war and 1963, expansion tapered off and the only property that was acquired was the small Barbados Light & Power Company Limited (ibid:106).

6.3 Stepping Out: The First Outside Assignments[17]

In an effort to keep its employees occupied after WWII, Montreal Engineering began to seek outside consulting work (Sexton, 1982:84). In Canada, government-sponsored public works were, by and large, the only construction projects taking place. The distinguished wartime service of some senior members, while they were on leave from the organization, turned out to be invaluable in helping the company win public contracts. Though Montreal Engineering was involved with governments again, now, its managers dealt with known officials, not unfamiliar institutions.

It appears that two of the company's senior officers, Messieurs Symington and Stairs, were instrumental in motivating the Minister of Munitions and Supply, the

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[17] The sections dealing with Monenco projects are based on three main sources, each dealing with events from different perspectives:

- A factual account of the events is offered by Sexton, 1982;

- A more personal account is offered in the unpublished manuscript ("Memoirs"- 75 pages), written by Smith, circa 1988, in which he recorded his "personal reactions to situations" (p.1). Smith was associated with the firm for forty years. He was a Senior Manager and Director of Monenco, a Board Member of Calgary Power, President of the Canadian Nuclear Association, and Chairman of Canatom

- A number of legal documents and correspondence contained in the company's Contract Files were reviewed. For the period between 1969-1990, all the Contracts that were available in their files were read.

Honorable C.D. Howe, to turn to Montreal Engineering[18]. Mr. Stairs (of Montreal Engineering) and Mr. Symington (Killam's right hand man and general counsel of Royal Securities) had held the top two positions of War Time Controllers of Electric Power. After the war, Mr. Symington became president of Trans Canada Airlines (forerunner of Air Canada) (Sexton, 1982:84). Thanks to their personal reputations and their wartime association with the Minister, the first outside assignments of the company were solicited, apparently, rather than sought (Sexton, 1982:84).

In 1943, the first contract was carried under the code name of Habbakuk (sic)[19]. This top secret war project was as strange as its biblical name; it consisted in studying the feasibility of carving large sheets of ice from the Arctic ice cap, towing them to the war zone, and using them as aircraft landing fields. The idea was the brainchild of Geoffrey Nathaniel Pyke, an eccentric Britisher who worked under Lord Mountbatten. Reportedly, the idea had come to Mr. Pyke during one of his many stays in a mental hospital. Lord Mountbatten became enthused by the idea, and, in turn, convinced Churchill to test it, despite the reluctance of the British Admiralty.

After the American government declined becoming officially involved in this extraordinary venture, the British turned to Canada, as a member of the *Empire* and because of its cold climate. The project involved university and government

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[18] C.D. Howe, "arguably the most influential engineer in Canadian history", was responsible for organizing Canada's wartime production. (Ball, 1987, pp. 94-96).

[19] An apparent reference to the Old Testament Book of Habakkuk. Chapter 1, verse 5: "Keep watching the nations around, and you will be astonished at what you see. I am going to do something that you will not believe when you hear about it" (The Bible in Today's Version, American Bible Society, 1976).

experts from the UK., the U.S., and the Universities of Manitoba, Saskatchewan, and Alberta, in Western Canada (Sexton, 1982:84, 85-89).

Withstanding pressure from all sides, the role of Montreal Engineering was to evaluate the project over a three month period, and warn against its apocalyptic consequences. As the project manager wrote later, "The company likes to think that it made a significant contribution to the war effort, although in a negative way, by helping lay this fantasy to rest before it could do serious harm" (Sexton, 1982:91). The company received several letters of appreciation from the National Research Council and from the British Admiralty.

That same year, Montreal Engineering's second and only other wartime outside assignment originated from the Commonwealth. And, once again, the company was its client's second choice: the fact that their usual British consultant was not available opened the door for Montreal Engineering. It was a project more in line with the company's traditional type of work, since it involved "preliminary engineering investigations, final design, field supervision, and purchasing for a hydroelectric development" in Jamaica. This led to other assignments in that country over the next decades, and, eventually, to the formation of Montreal Engineering Jamaica Limited in 1971 (Sexton, 1982: 144, 204).

In 1946, the Canadian Department of Mines and Resources called upon Montreal Engineering to construct a low-cost hydro facility on the Snare River in the Northwest Territories that would supply electricity to two mines. Although these mines were privately owned, the federal government played a key financial role as the promoter of Northern Development. The state was clearly becoming a force to be reckoned with in the engineering industry.

Many of the future paths that Montreal Engineering was to take over the next half century were laid with these first outside assignments. As a senior manager of the company noted "one of the major success stories of [Montreal Engineering] is repeat contracts from clients, both in the public and private power sector" (Smith, 1988:13). The importance of such long term relationships is illustrated by a letter from the director of the Jamaica Public Service Company Limited, their second external client. The letter is dated in 1984, nearly 40 years after their first assignment with that utility:

> [Jamaica Public Service Company (JPS)] appreciates that you were able to proceed with work on the Study *before a Contract Agreement was put into force* so as to complete the task in the shortest possible time. This is indicative of a good mutual relationship between JPS and Monenco, and we trust that this situation will continue throughout the duration of the study[20].
>
> (Source: Monenco Contract Files; *emphasis* added)

Similarly, the venture in the Northwest Territories led to a lasting association with the power industry in that region, and allowed the company to build a reputation of expertise in Arctic power development, in which harsh climatic conditions pose unusual technical and logistical problems (Sexton, 1982:94). Indeed, during the course of that project, the Federal Department of Mines and Resources created the Northwest Territories Power Commission to build and operate more plants. Over the next few years, Montreal Engineering was called upon to perform the preliminary investigation, project design and supervision of construction of a series of hydroelectric projects: the Mayo River in the Yukon,

[20] Source: Monenco Contract Files #438.

The Whitehorse Rapids, the Twin Falls on the Talson River, and the Snare Rapid plants.

Abroad, it next venture was to investigate four hydroelectric sites in China. The project, partly financed by the Canadian government, was awarded to Montreal Engineering thanks, again, to the "high regard in which the Hon. C.D. Howe held the company" (Sexton, 1982:97). Between 1946 and 1950, a few other outside consulting ventures were carried out in a variety of locations, for clients both in the private and public sectors:

- In 1946: Design engineering, purchasing and construction supervision for the New Brunswick Power Company.

- In 1946, in the Caribbean, Grenada, St. Vincent, St. Lucia and Dominica: Investigation of the hydro possibilities of the four Windward Islands (Ibid:105).

- In 1947: Replacement of a dam for a company in which Mr. Killam was a shareholder, but with which Montreal Engineering dealt at arm's length for many years afterwards (Ibid:1102-4).

- From 1947 to 1949, in Canada: Two other assignments, including a boiler and turbogenerator for the Maccan Plant in Nova Scotia and another in which the company acted as an expert witness in the expropriation of the West Canadian Hydroelectric Corporation Limited in British Columbia.

A few years later, the industry experienced another upsurge in business. Six major projects were carried out in the early 1950's:

• In the private sector, the Menihek Power Project for the Iron Ore Company, marking the beginning of hydroelectric power in Labrador, was completed in 1954 (Sexton, 1982:108). It was "an exceptional challenge at working in the North. This was a competence which [Montreal Engineering] developed decades before projects like James Bay...]" (Smith, 1988:11).

• A municipal steam generating station at Medicine Hat commissioned by the municipal government. This contract was probably gained through its affiliate, Calgary Power Limited, which agreed to buy the surplus power.

• An industrial plant on the Lachine Canal in Montreal.

• In 1952, the company undertook its first contract in the U.S. with the appraisal of hydroelectric potential in Pennsylvania.

• In 1954, "Mr. Stairs [of Montreal Engineering], who was regarded in Ottawa as a top engineer in the hydroelectric field, was asked to undertake" a project in East India, under the Colombo Plan. The Canadian Commercial Corporation, which was in charge of procurement during the war, was now the department through which equipment was purchased (Smith, 1988:17).

• Still in 1954, the company obtained a major contract in China, which included design, specification, purchasing and supervision of construction of a hydroelectric development. It "resulted from the confidence the Hon C.D. Howe place[d] in the senior men of the company" (Sexton, 1982:111). Again, the equipment and engineering services were supplied by the government under the Canadian Colombo Plan. Subsequently, the company undertook several projects financed under that plan.

Gradually, albeit haphazardly, Montreal Engineering began to establish itself as a general consulting-engineering firm, with a growing track record in selected fields, here and abroad. With no new acquisitions, and few new construction projects in sight, its in-house role was limited to the day-to-day management of the utilities of Killam's stable empire. These routine activities required little managerial attention, unlike the occasional external projects that it carried out.

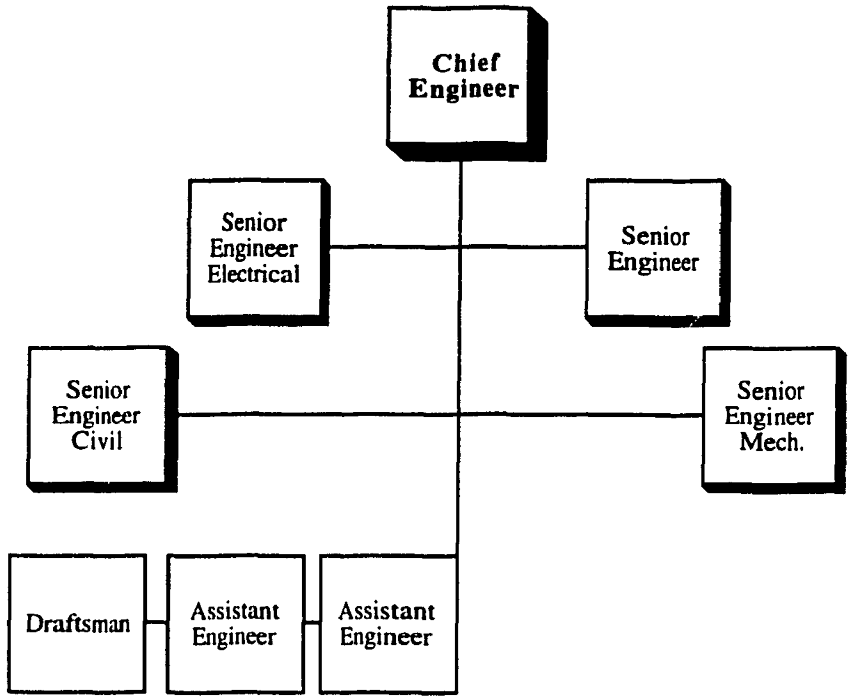
6.4 Growth and Structure: The Shift to Professional Management

The undertaking of complex consulting-engineering projects had a profound effect on the organizational structure and management of the company. Prior to 1950, the company had few support staff, and the senior engineers did almost all the work required by Mr. Killam's utilities. "[The organization] comprised a Chief Engineer assisted by a group of relatively senior engineers in the civil, electrical, and mechanical disciplines. In addition, there were two or three assistant engineers, and one draftsman, all reporting directly to the Chief Engineer. There was no delegation of authority" (Sexton, 1982:114, 64-66; for illustration, see Figure 6.1).

This simple, centralized organizational structure was no longer suitable for the volume and nature of the company's activities. By 1950, Montreal Engineering evolved toward a "pyramidal command structure, divided into specialized sections in which senior engineers supervised growing numbers of younger men through successive delegations of responsibility in accordance with experience and ability" (Sexton, 1982:106-107) (see Figure 6.2).

Figure 6.1

Montreal Engineering - Organizational Structure prior to 1950



Source: Adapted from descriptive notes in Sexton (1982), Chapters 4 and pp. 114-5.

The new structure, which was drawn along functional lines, permitted successive delegation of authority, from "the Head, through the Chief Engineers of each engineering discipline and respective supervisors, to the individual engineers, technicians and draftsmen on detailed assignments" (Sexton, 1982:116). Thereafter, Mr. Killam, the entrepreneur, exercised his authority, not directly, but through the senior managers, who were engineers. This new situation allowed the senior engineers to increase their control over the daily affairs of the company.

Thus, the new structure of the company was shaped by the growing volume and the changing nature of its activities, as well as by the shift in leadership, from the owner to the managers of the firm. Like his predecessor, Mr. Killam paid little attention to Montreal Engineering, and preferred to focus on the operations of his utilities and on new prospects. The management of the engineering arm of the Royal Securities was left to a team of four senior managers, two of whom were primarily interested in managing the utilities. The thrust into outside activities was fueled by the other two members who seemed better placed to instill the small firm with a sense of new direction: Stairs, who had served outside the company during the war, and Thompson, who had acceded only recently to a senior position with the company (Sexton, 1982:106-8; 269-71).

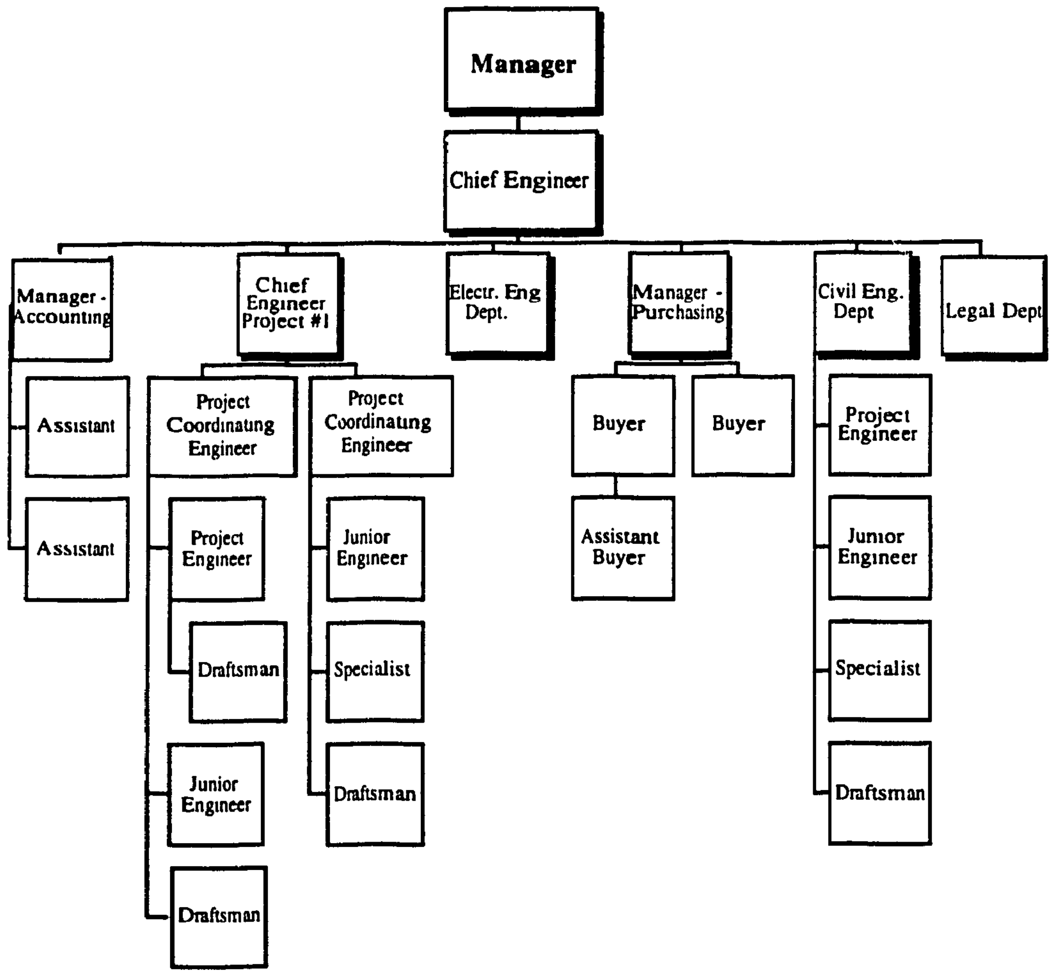
6.5 A Shortage of Labor

With the general increase in economic activity of the post-war period, Montreal Engineering found itself in the unusual situation of having to compete for qualified graduates, in sharp contrast with previous years. The measures which were taken to deal with that shortage, along with other developments, brought the firm closer to certain universities and resulted in a small influx of engineers from the U.K. (see Figure 6.3 and Table 6.3):

- Calgary Power, an affiliate and former shareholder of Montreal Engineering, had regular occasion to call on the University of Alberta for its in-house Engineer Apprentice Program and for other aspects of its business.

Figure 6.2

Montreal Engineering
Organizational Structure Circa 1950



Source: Based on descriptive notes in Sexton, (1982), Chapters 5 and 6 and p. 162.

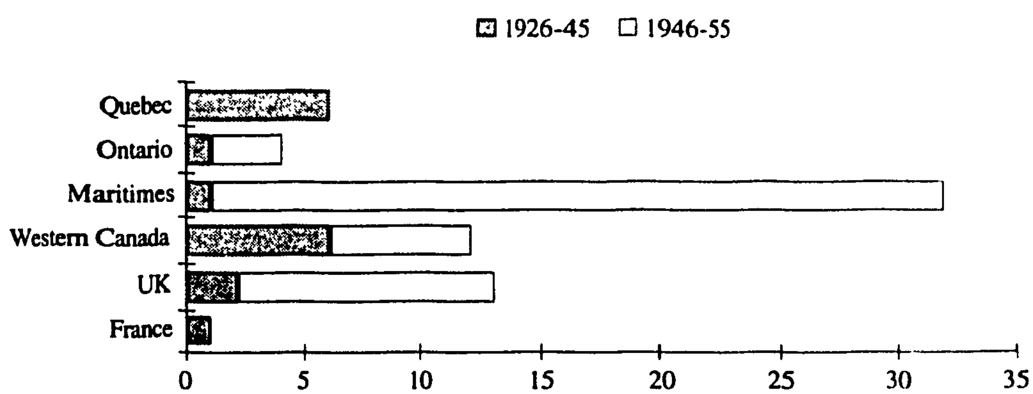
Thus, it formed a close relationship with that university, from which it recruited several graduates. Furthermore, the higher corporate taxes that were introduced during the war were accompanied by a number of exemptions for donations and scholarships to universities. In choosing to endow the University of Calgary, Calgary Power cemented a special relationship that would serve it and its affiliates as well.

• Similarly, Montreal Engineering enjoyed a close professional relationship with some faculty members of the University of New Brunswick (UNB), in particular, and also with the Nova Scotia Technical College (NSTC). These institutions provided, over the years, a "steady flow of young engineering talent". Some of the graduates from UNB later rose to top positions in the f.rm.

• The dearth of Canadian graduates in mechanical engineering propelled the company to actively recruit in the UK. in 1952. With the influx of British nationals, the company was able to build its strength in civil and electrical, as well as in mechanical engineering.

Figure 6.3

Recruits by Period and by Region



Source: Compiled from tables 6.2 and 6.3

Table 6.3

Year	Name (51)	From Que-bec (0)	From Central Canada (4)	From Western Canada (6)	From The Maritimes (31)	From Overseas (10)	Trans-f'd from Int'l Power (2)	Specialty •Civil (31) •Elec (15) •Mech (5)
1946	Rivington		Queens					Elec
	Smith		Queens					Elec
	Foster				NSTC			Elec
	Gerrish				UNB			Elec
	Mulherin				UNB			Civil
1947	Cameron				UNB			Civil
	Demers				UNB			Civil
	Rutledge			Alberta				Civil
1948	Alexander				UNB			Civil
	Henderson				NSTC			Elec
	Mallory				UNB			Civil
	Smith				UNB			Elec
	Williams				•Acadia			Civil
	Barron					U.K.		Elec
	Murchison					Scotland		Civil
1949	Boomhower				UNB			Elec
	Wright				NSTC		....	Mech
	Carey				UNB			Civil
1950	Halme		Queens				....	Civil
	Templeton				NSTC			Civil
	Gander				UNB			Civil
	Randle			Alberta				Civil
1951	Neville			Manitoba	NSTC			Elec
	Purves				UNB			Civil
	Atwell				NSTC			Elec
	Leblanc				NSTC			Civil
	Grandy				UNB			Civil
	Hannah				UNB			Civil
	Howard				UNB			Civil
	Veinot				NSTC			Civil
	Duguid					Scotland		Elec
	Evans			Alberta				Civil
1952	Campbell				NSTC			Mech
	Coles				NSTC			Civil
	Power				UNB			Civil
	Robertson				UNB			Civil
	Vassolo				NSTC			Civil
	Myles				UNB			Civil
	Howard				UNB			Civil
	Richard				UNB			Elec
	Dobson					.. ..		Mech
	Foulkes					Birmingham		Elec
	Gordon					Aberdeen		Civil
	Henkin					U.K.		Civil
	Holman					U.K.		Mech
	Marica					France		Civil
	Watson					U.K.		Civil
	Badzloch			Alberta				Elec
	Armstrong			UBC				Elec
1953	Winnicki					U.K.		Civil
1955	Kolisnyk		....					Mech

Legend of Universities: •University of **Alberta**, •**McGill** University, •Nova Scotia Technical College (**NSTC**); •**Queens** University; •University of **Toronto**; •University of British Columbia (**UBC**); •University of New Brunswick (**UNB**) •**Overseas**. Location of University or of Training.

Source: Adapted from: Sexton (1982) pp. 120-2.

The growth in size and in the complexity of its structure created greater differentiation among the departments of Montreal Engineering. The firm also began to differentiate itself from its affiliates. The latter changes were gradually propelled by those taking place in its parent company.

As a result of increases in its own staff, Royal Securities needed more office space, and, gradually, some of the personnel of Montreal Engineering were moved out of 244 St. James Street. This began in 1947, a year after the company's shares were transferred to another of Killam's businesses. The engineering firm was carried out, piece by piece, department by department, through 1961. Every time a manager physically moved from out of 244 and into 277 James Street, he became more distinctly a Montreal Engineering man[21] (Sexton, 1982:114-6). With every move, the engineering firm further emphasized its own identity.

6.6 The Shift to Self-Management

As he approached his seventieth year, Mr. Killam began to prepare for retirement. In effect, if not formally, he had already turned the management of Montreal Engineering to the top executives of the company: Messrs. Gaherty, Stairs,

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[21] Given the industry and the time period covered in this thesis, (1908-1988), the use of "man" and of masculine pronouns refer, quite literally, to members of the male gender.

By 1987, women represented 16% of engineering students, but only 2% of the professional population (Ball, 1987, p..153). It should be noted that there have been a number of remarkable achievements by individual women engineers, such as Elsie McGill (University of Toronto, 1927) who became chief aeronautical engineer for Canadian Car & Foundry Co.. There, she designed airplanes and was in charge of 4,500 workers during the second World War (Ball, 1987, pp. 95-97).

Thompson and Krug. What these men saw happening in the affiliates must have made it quite plain that Killam's electric empire was about to break up. In 1953, for instance, he sold the shares of Royal Securities to its senior employees, essentially removing himself as the formal link between the two companies.

It must have also been clear to the senior team that if Montreal Engineering was to stand alone, it needed to find its own avenues of growth. In that vein, they supported the formation of Atomic Energy of Canada Limited (AECL), by seconding key employees to that crown corporation[22]. Since 1953, senior managers have served on the board of AECL and one has served as president. This association provided the company with an early entry into the nuclear power field, winning their first nuclear project in India, in 1963. Their faith in nuclear power, and early success in this field, propelled Montreal Engineering to play, ten years later, a leading role in the formation of Canatom, in a joint venture with SNC and Shawinigan Engineering. In this venture, Montreal Engineering was responsible for research and development work, study design, project management and construction in the area of nuclear fusion (Contract Files N°222)[23].

The firm broke away into its independent course in 1955, when Mr. Killam finally sold the company to its senior engineers. Since they could not afford to pay its full price, many assets were transferred to Mr. Killam's personal estate. Such

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[22] These secondments involved a temporary loan of senior managers to AECL, on a cost sharing basis, as indicated by this correspondence between the Presidents of the two firms:

> *Thank you for your letter of [] concerning the secondment of Mr.[ ] to AECL to act as your senior representative in []. [Montreal Engineering].will retain Mr. [] on his normal company pension and insurance benefits, while paying the company portion of such benefits, AECL will also pay to Montreal Eng., to pay to Mr. [], a bonus at the end of the assignment.*

[23] Shawinigan was subsequently purchased by Lavalin in 1982 (Monenco Contract File #482).

were the terms of the final sale, that the new owners acquired only "a going concern with good connections to a number of electric utility companies, and two pulp and paper companies, but with few financial assets" (Sexton, 1982:134). The transfers proved to be timely, for Mr. Killam died later that year; the 500 shares of the company were divided amongst its twenty-seven senior employees, each holding between ten and fifty shares. Mr. Gaherty, who was president of Calgary Power, assumed the presidency of Montreal Engineering as well[24].

Despite the change in ownership, Montreal Engineering continued to deal at arm's length with Royal Securities, until the latter was purchased and became Merrill Lynch Royal Securities Limited, in 1969. It also continued to sell its services and maintain managerial ties with some of its former affiliates, namely Calgary Power, Ottawa Valley Power, Maritime Electric, and Newfoundland Light and Power (Sexton, 1982:145-136), and, for nearly fifteen years, with the International Power Company, which had inherited the "southern" properties. These ties were based on their managerial expertise, not ownership. Although the four senior managers each owned only 10% of Montreal Engineering, and owned none of its affiliates, they held formal positions as either president or members of the board of Calgary Power, and as managers of some of the other electric utilities.

Since the senior team had been exercising effective control for some time, they made few apparent changes after officially taking over. Yet, Montreal Engineering's new circumstances were fundamentally different. Up until that

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[24] Mr. Gaherty was also one of the original members of Atomic Energy of Canada Limited.

point, it had been part of a small empire; now, like many of the "southern" countries that recently assumed self-rule, they were on their own. The firm could no longer enjoy the benefits of being a subsidiary and a member of a family of companies. It no longer had a captive market of affiliates, to and from which money and staff could be transferred, nor was it any longer backed by a wealthy financier. As assets were drained during the stock transfer, it was financially a shadow of its former self. Thus, the company needed its own strategy, based on human and professional skills, not financial assets and captive markets.

One of Mr. Gaherty's first decisions, as President, was to try to enlist the cooperation of all staff members. To that end, employee ownership was broadened by instituting a profit sharing plan which included all permanent staff (Sexton, 1982:144-5).

Shortly thereafter, the company was awarded its third Colombo assignment, this time in the state of Madras, in Southern India. It involved the design and supervision of the installation of three hydroelectric plants, as well as the specification and purchase of the necessary equipment.

As in the days of Mr. Killam's electric utilities, the ability to finance a project proved to be at least as important as the technical ability to carry it out. There are strong indications that the involvement of the Canadians was solicited precisely for financial reasons. "The scheme had been well studied by the engineers of the Madras Electricity Board and, after analysis of their data, the company was able to recommend the undertaking to the Canadian Government with little modification" (Sexton, 1982:146)[25].

Thirteen major outside contracts where carried out during the first decade of employee ownership. They are described below only in summary form (see Table 6.4). Characteristically, they were larger in scope than those of earlier periods, but they were all in the electric power field, and many were carried out for a known client. Seven were large-scale overseas assignments, lasting several years, that were sponsored by one of the financial agencies formed, here and abroad, after World War II.

By far, the most important project of this period was the Power Study in South Central Brazil. As the largest study of its kind ever carried out by the World Bank, it involved the investigation of 1.1 million square kilometers (an area twice the size of France), and the assessment of the demand for power through 1980. It was seen as a recognition of the experience that the firm had accumulated in Latin America and through the Colombo Plan assignments.

While continuing to serve the utilities of its former parent company, Montreal Engineering was successful in expanding its client base, the scope of its services, and, mainly, the size and technical complexity of its projects. But, since this growth was restricted to the electric power industry, the company remained prisoner of that industry's cyclical variations. (Many senior members could still remember the cuts in staff and salaries that they had suffered in the 1930s.) The

[25] Personal recognition and appreciation often came to the engineers from the governments of countries in which these projects were carried out. In the State of Madras, India, three new towns located in the Kundah development area were named after Messrs. Stairs, Thompson and Ross; similarly, the Study Director in the Brazilian project was decorated by the government of that country.

only diversification had been into the nuclear field. When Mr. Gaherty died in August 1964, their entry into that field had not yet borne fruit. The decade of his presidency had been characterized by a more focused growth than he had planned.

6.7 The Matrix Structure

A month after Mr. Gaherty's death, Mr. Ritchie, who had been General Manager, was nominated as President, and Mr. Stairs became Chairman of the Board. Mr. Ritchie quickly introduced a matrix structure on which he had been working for some time. The functional structure that was in place since the 50's was appropriate for the efficient administration of the utilities, but it fell short of delivering the effective and adaptive response required by new projects, which, in contrast, were temporary, unique, and complex. In particular, coordination among individuals and among departments had become difficult. When the firm

Table 6.4

Major Outside Contracts Awarded between 1955 and 1965

Location	Financed By Foreign Aid Agency (7)	• Private (5) or • Public Sector (8)	• New (7), or • Related (6) to Former Projects	Nature of Project
Canada, PQ		Private	New	Elec
" PQ		Private	New	Elec
" NS		Private	New	Elec
" SK		Private	New	Elec
" Labrador		Private	Related	Elec
" AL/SK/PQ		Public	New	Elec
Bolivia	World Bk	Public	Related	Elec
" "	World Bk	Public	Related	Elec
Brazil	World Bk	Public	Related	Elec
Burma	Colombo	Public	New	Elec
India	Colombo	Public	Related	Elec
" "	Colombo	Public	New	Elec
Sri Lanka	Colombo	Public	Related	Elec.

Sources: Sexton, 1982:146-156

was smaller, this deficiency was compensated by personal and frequent communications, and by direct intervention on the part of managers and supervisors. As the number of engineers increased, and projects got bigger and more complex, the need for communication grew exponentially. Competition for authority also arose, in part because the relative importance of the various engineering disciplines shifted over the long life of a project (Sexton, 1982:162). Adjustments proved difficult. The structure that had worked rather well seemed no longer adequate.

> I think of the 50's mainly as of the development into managing total projects. We developed project management in our own style, even though we did not call it that. We had loosely "Coordinating Engineers" and we had various meetings between the Directors of the various departments who never really agreed on anything, but ultimately made some exceptionally wise decisions. Suffice it to say, we were a tightly knit group on the same floor and, to some degree or other, we all knew what each other was doing. The serious gap between departments and areas of a project never really developed. Years later, it was these gaps which became one of the most important problems in Project Management.
>
> (Smith, 1988:11).

The new structure was deemed necessary "in view of a continually expanding work load and diversification"[26]. It was supposed to "facilitate project management and coordination, and improve customer liaison [...,] project execution, [and offer] opportunities for specialist training" (Monenco Gleanings, Fall issue, 1964, in Sexton, 1982:163). It was "based on the principle of decentralization [which is] responsible for the success of La Cosa Nostra".

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[26] President's memo to the staff, dated October 6, 1964.

Personnel were subdivided vertically into departments (by discipline such as Accounting, Business Development., etc...), and horizontally into divisions (Nuclear, Hydro, Industrial, Thermal, and Special Projects) according to project applications. Not surprisingly, the implementation of this complex structure proved difficult. In a confidential memo, the President reflected that "it was not altogether clear to all of us how the Divisions and Departments would relate to each other."[27]

6.8 The Push Toward Diversification

With the new structure in place, or at least set in motion, the managers resumed the drive to diversify the activities of the company, seeking to expand into new engineering specialties, not unrelated activities. The challenge was nonetheless awesome, because of the competition already present.

The senior managers identified four measures that they could take to enter into new engineering specialties (Sexton, 1982:164-6):

1) make a capital investment by acquiring and developing competent staff.
2) enter into a joint venture with another company already specialized in the desired field.
3) purchase a financial interest in another engineering company already established in that field.
4) purchase a company with another specialty.

[27] Page 1, circa 1965. "Project management", undated confidential memo from the President.. The content of the text clearly suggests that it was written some time after October, 1964.

Although all four avenues were explored with some degree of success, they proved to be, by and large, more a wish list than a shopping list, since opportunities for hiring experienced staff and for business ventures were infrequent and complex. In time, these four 'measures' ceased to be the basis for top-down, systematic planning and came to define, in broad terms, the kind of opportunities the firm would welcome.

The first specialty that was considered was the engineering of oil and gas transmission facilities in Western Canada, a part of the country where the company was well established thanks to its continuing connection with Calgary Power. However, they met with limited success, because the large oil companies preferred to deal with firms that could handle both the design and the construction of the projects.

Clearly, the company needed to be of a size and complexity commensurate with the large-scale projects they hoped to undertake. They negotiated with Peter Lougheed (future premier of the province, then at the employ of a local construction company), to form a joint venture which could execute design/construct projects in the petrochemical industry. This led to the formation of Mon-Max in 1961 and it was formally incorporated in 1963. Thus began the growth of Montreal Engineering's own family of some twenty-seven companies, incorporated or acquired over a period of fourteen years, between 1955 and 1969 (see Table 6.5).

Table 6.5
Growth of the Monenco Family - 1907 to 1969
(Exclusive of Unincorporated Joint Ventures & Subs. of Associated CO's)

	Company/Head Office Location	Inc.	Participation	%	Area of Operation	Service Performed
1	Mtl Engineering Company, Ltd.- Mtl, PQ	1907	Same		World	Power, Mining, Env. & Industrial
2	Wade Reprod Services Inc.- Mtl, PQ	1962	Same	45%	Canada	Printing & Reproduction
3	Smelter Power Corporation PQ	1960	1962-1969	33%	Quebec	Generation of Electric Power
4	Canambra Engineering, Nassau Bahamas	1963	1963-1974	39%	Brazil	Power Studies
5	Monenco Services Ltd (now Monenco LTD) Calgary, Al	19(3	Same	see N°26	World	Holding Co (Parent Co)
6	Mon-Max Services Ltd - Calgary, Al	1963	Same	100%	Canada	Eng & Constr. for Petrochemical Ind.
7	Western Fly Ash Ltd.- Edmonton AL	1963		45%	Western Canada	Mkting of light fly ash of Calgary Power Ltd.
8	Mtl Engineering (Eastern Ltd., St John's, NFLD	1964	Same	100%	India	Holding Co for interest in Mtl Eng. Int'l Ltd.
9	Mtl Engineering International Ltd - Bombay, India	1964	Same	36%	India	Eng & Inspection Services for Rajasthan Atomic Proj.
10	Shawmont Newfoundland Ltd., St John's, NFLD	1964	Same	50%	NFLD	Consulting Engineering & Management
11	Mtl Engineering (Overseas) Ltd Nassau Bahamas	1964	Same	100%	World	Engineering for Overseas Project
12	Montec Ltd , Mtl, PQ	1965	1965-1979	100%	World	Holding for non-professional Eng. co's.
13	Teshmont Consultants Inc - Winnipeg, Manitoba	1965	Same	33%	World	Engineering for EHV & HVDC Transmission
14	Rust Engineering Company (Canada) Ltd , Calgary, AL	1965	1965-1968	33%	Canada	Consulting engineering for the pulp & paper industry
15	Tidal Power Consultants Ltd - Mtl, PQ	1967	Same	45%	Canada	Consulting engineering for Tidal Power
16	Canatom Inc , Mtl PQ	1967	Same	33%	World	Consulting Mgt. Eng. for Nuclear Power
17	Victus Consultants Ltd., Alta	1967	Same	100%	World	Food Processing Eng.
18	R M Hardy & Associates Ltd - Edmonton, AL	1951	1967	20%	World	Specialization in Soils & Rock Mechanics & in Materials Testing
19	Saskmont Eng Co. Ltd., Sk	1968	Same	49%	Saskatch	General Engineering
20	Hoyles Niblock Int'l Ltd , Burnaby, BC	1968	Same	45%	World	Telecommunications Engineering
21	Carlson & Seatt Monenco, NY,	1968	Same	100%	World	General Engineering
22	Sheppard T Powell Consultants Ltd.- Toronto, ON	1968	1980	100%	Canada	Pollution Control, Water Treat. & Waste Disposal Eng
23	Monenco Mid-East Ltd (Now Monenco Japan Inc)- Mtl, PQ	1968	Same	100%	Far East	General engineering & inspection
24	Monenco Consultants - AL	1968	Same	100%	Alberta	General engineering
25	Monenco Computing Services Ltd Mtl, PQ	19 [illegible]	Same	100%	World	Computer applications
26	Monenco Ltd -Calgary AL	1963	Same	Public	World	Present Parent Company
27	Monenco Holdings Ltd - Calgary, AL	1969	Same	100%	World	Holding for shares of owned by engineers
	Source: Compiled from data in Sexton, 1982 168-173					

The way these companies were formed illustrates how a good deal of corporate strategy actually developed in Montreal Engineering, during that period. Although it is not possible to detail the formation of each company, an overview of the founding of key firms will provide a global picture of Montreal Engineering's evolution.

• Wade Reproduction Company, Ltd. (N°2 on Table 6.5) was formed by purchasing 45% of the shares of the firm which for years had done most of their blueprinting and other reproduction work.

• Canambra Engineering (N°4) was formed in 1963, and Atomic Power Project in India (N°9) in 1964, each in association with an international consortium. In Canada, Shawmont Newfoundland Limited (N°10) and Teshmont Consultants (N°13) were also formed in association with other companies. In all four cases, these companies "resulted from external pressures encountered in competing for engineering assignments" to have local representation or to be able to deliver a large package of services. They outlived their initial purpose and were kept on, because they were found to offer either a presence in a province, or the opportunity to acquire new skills in a given field. For example, Shawmont Newfoundland made it possible to obtain and carry out many projects in the province of Newfoundland.

• Western Fly Ash (N°7) Limited was incorporated to convert the fly ash that was removed from the gases at the coal-fired steam power plant of Calgary Power Ltd. into a concrete additive which was sold to the construction industry.

• Another company (N°11) was formed in Nassau to supervise the construction of one hotel and two apartment buildings in the Bahamas. After the project, the ad hoc company was kept for tax reasons, and because of lower operational costs. It has since been used as a base for a variety of projects worldwide.

• In the cases of Rust Engineering (N°14) and Tidal Power Consultants (N°15), Montreal Engineering found itself at the receiving end when U S. companies were seeking Canadian partners in order to serve, in the first case, the pulp and paper industry and, in the second, tidal power prospects in Manitoba. Montreal Engineering agreed, in both cases, since they offered the opportunity to diversify into areas which, like the petrochemical industry, had proved inaccessible for them on their own. In the case of Tidal Power Consultants, they were joined by Shawinigan Engineering Company Limited, the same Canadian engineering firm with which they had formed Shawmont Newfoundland Limited (N°10).

• Another opportunity arose, this time in the nuclear field, when Hydro-Quebec approached AECL to obtain a nuclear power plant in Gentilly, Quebec. This project was awarded to SNC, with the specific proviso that Montreal Engineering be brought in. This joint venture, imposed by the clients, led to the formation of Canatom (N°16), with SNC and Shawinigan as partners. Mr. Ritchie, of Montreal Engineering, became Canatom's first president.

• Victus Consultants Limited (N°17) represented a more diversified venture, food processing. It was proposed bv a fellow university graduate of one of the senior members of the company, and was taken with the view of diversifying the work load of the Calgary office.

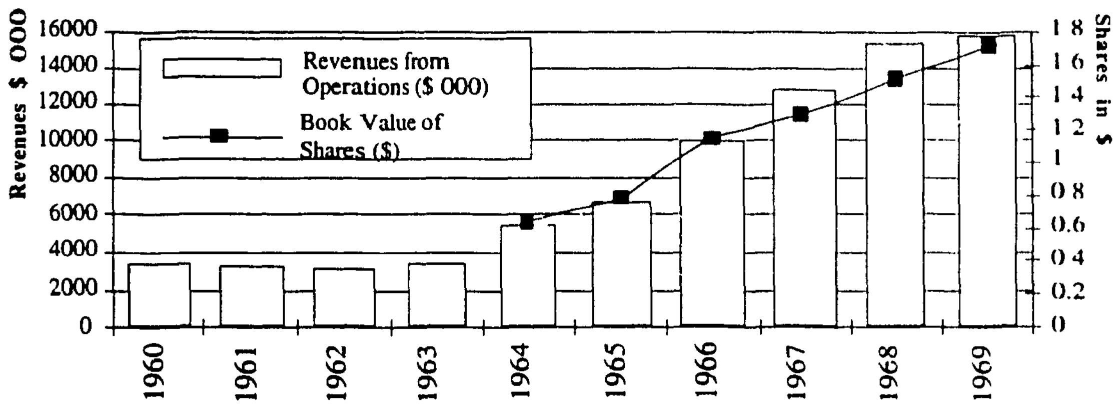
Under Ritchie's presidency, the new owners/managers finally experienced prosperous times. The company's revenues and the book value of their shares grew steadily, and both nearly tripled between 1964 and 1969 (see Figure 6.4). These improvements helped to rebuild the company's assets, which had been depleted prior to the stock transfer of 1955.

6.9 A Public Company

In January 1969, H.G. Acres and Company, a major engineering firm based in Ontario, went public. Its unprecedented move surprised the industry in general, but caught the attention at Montreal Engineering. The idea seemed to make sense to its seventy five managers/owners. First, nearly twenty of them were about to retire and were hoping to sell their shares; unfortunately, "an orderly transfer of ownership to younger employees could not easily be achieved", since

Figure 6.4

Montreal Engineering:
Revenues from Operation and Book Value of Shares



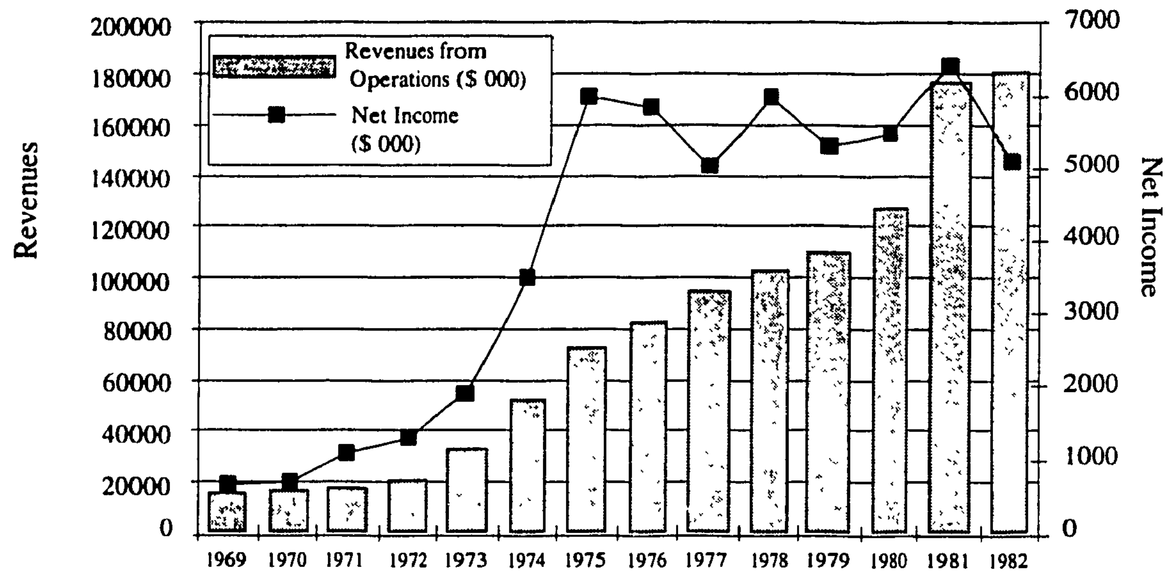
Sources - Book Value: Sexton, 1982, p. 243.
Revenues: Annual Reports.

the junior managers could ill afford to pay what the shares were worth at that time. Secondly, pending federal legislation aimed at greater capital gains tax made an early move desirable. Finally, raising more capital could allow the company to grow even more vigorously (Annual Report, 1969).

Within months, the sale was executed, and Montreal Engineering, renamed **Monenco**, became a public company with over 1000 new shareholders. Control of the company remained in the hands of engineers, however, through a class of special common shares (Annual Report, 1969). Such were the prospects of the firm, that the new shares were sold at four times their book value, at a price/earning ratio of about 20 (Sexton: 195-198).

Figure 6.5

Montreal Engineering - Revenues and Net Income from Operations



Source: Annual Reports

"We started into the 70's with our sights aimed high and a good solid foundation of experience working nationally and internationally, primarily in the power field (Smith, 1988:41)". All eyes were on Monenco "the principal operating company" of a growing family of firms. The public offering had boasted of its impressive track record: more than 50 hydro-electric power plants, three nuclear plants, 30 conventional thermal plants, 26 diesel and 7 gas turbine plants (Source: Public Offering Prospectus). While all eyes were set on engineering activity, a serious blow was struck to its traditional business of utility administration. Within months of the public sale of shares, Monenco learned that

Canadian International Power, facing problems of its own, was terminating their lucrative contracts[28].

By *force majeure*, the focus now was completely on consulting. With more funds available from public trading, the company pursued a strategy of rapid geographic and technological diversification, forming 49 companies between 1969 and 1981 (see Table 6.6; see also Figure 6.5). While space precludes a detailed account of these acquisitions, it is worth noting some new patterns which emerged, while a few old ones persisted:

- In 1969, Monenco acquired 30% of Crippen Engineering (N°1) to gain access to the BC market. However, little came of that transaction because, soon after, BC Hydro adopted the policy of doing its engineering work in house. Consequently, Monenco's business in that province remained negligible (see Figure 6.6).

- The formation of Shawmont Limited (N°5) in a joint undertaking with Shawinigan Engineering was suggested by CIDA. The project led to the formation of one local (N°21) and one international company (N°24) to carry out future projects in India. Similarly, Monenco Asia (Pte) Ltd. was formed in 1971 for the engineering of a Thermal Plant in Singapore. At the end of the project, the local staff stayed and carried on the company, serving countries in Southeast Asia.

[28] CIP's market declined over the next eight years, and its assets were distributed to its shareholders in 1977.

Table 6.6

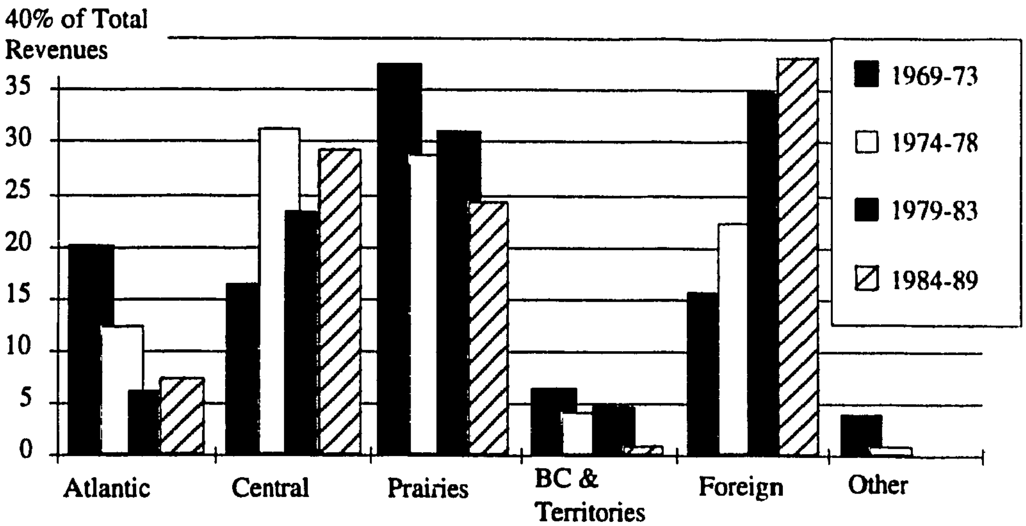
List of Moncenco Family of Companies

	Company/HO Location	Date of Inc.	Date of Participation	% Owned	Area Of Operation	Service Performed
1	Crippen, BC	1963	1969	30	World	Holding for Crippen
2	Professional Painting Services, BC	1963	1969	100	BC	General engineering
3	Edmunde Newhall Associates, ON	1970	1980	100	Canada	Electronic research and consulting
4	Hermes Electronics Ltd, NS	1970	same	3	World	Manufacture electronics
5	Shawmont Ltd , PQ	1970	same	50	Nigeria	General Engineering
6	E & B Cowan Ltd, PQ	1966	1969	30	World	Eng for pulp & paper
7	Larmont Mill Process Consultants Ltd, AL	1969	1980	50	World	Eng for feed milling industry
8	International Corporate Mgt Ltd, ON	1969	1978	31.25	World	Engineering consulting and mgt
9	Banmont Sociedad Anonima Consultora, Argentina	1970	same		Argentina	General engineering
10	Hatch Associates Ltd, ON	1961	70-80	25	World	Rapid transit
11	Hallmark Eng Ltd, BC	1964	1970	45	World	Eng for forest industry
12	La Société d'Ing Cartier, PQ	1949	1970	46	Franco.world	General engineering
13	Monenco Overseas Ltd, England	1971	same	100	Eur/Asia/Afric	General engineering
14	Monenco Jamaica Ltd, Jamaica	1971	same	100	Jamaica	General engineering
15	Monasa Consultoria E Projetos Ltda, Brazil	1971	1980	39	Brazil	General engineering
16	Monenco Asia, Singapore	1971	same	100	SE Asia	General engineering
17	Canadian International Project mgrs Ltd, PQ	1972	1976	25	E Eur & China	Eng & construction of off-shore projects
18	Northern Eng Services Co, AL	1973	same	9 25	W Cana	Pipeline consult & eng
19	Monenco Iran Ltd , Iran	1973	same	49	Iran	General engineering
20	MHG International Ltd, AL	1973	same	45	Canada	Process plant design
21	ShawMont Nigeria Ltd, Nigeria	1973	same	30	Nigeria	Eng. for power projects
22	CANAP Canadian Energy Projects Ltd, PQ	1974	1981	36	World	Consulting eng. for oil & gas industries
23	Papachase Developments, AL	1974	same	17 1	Alberta	Holding for R.M Hardy
24	ShawMont Inter'l,Bahamas	1960	1974	50	Nigeria	Staffing for projects
25	Monenco Consulting Eng, Sask	1974	1979	100	SW USA	Avoid withholding tax
26	London Monenco Consult , ON	1974	same	50	Ontario	Eng for thermal power
27	Monenco Pipeline Consult , PQ	1974	same	100	World	Pipeline consult eng
28	Staff Corrosion Eng. Ltd , AL	1975	same	100	World	Corrosion engineering
29	Baymont Eng Co, Florida	1975	same	100	SE USA	General engineering
30	J S Mgt & Ship-building, PQ	1976	76-81	45	World	Naval & marine eng
31	Rohm Consultants (Jersey) Ltd, Channel Islands	1976	same	49	Iran	Staffing of projects in Iran
32	Monenco Project Services, NY	1976	same	100	World	Mgt. of building constr
33	Monenco Inc , Delaware	1976	same	100	USA	Holding for Amer. co's
34	Manecon Assoc Ltd, AL	1976	same	33 33	World	Consulting services
35	Anthony Priest & Partners Inter'l Ltd, Channel Islands	1975	77-81	30	World, not UK	Chemical engineering
36	Petro-Metals Recovery Systems Ltd, AL	1977	same	100	World	Ion exchange technology
37	Montreal Eng Co , Nigeria	1978	same	60	Nigeria	Consulting for power
38	Monenco Pipeline Int'l Ltd (now Cartier Eng), Bahamas	1978	same	46	World	Pipeline engineering
39	Monenco Ireland Ltd, Eire	1978	same	100	World	General consulting
40	Monenco Engineering B V , Netherlands	1978	same	100	World	General consulting & inspection
41	Monenco Ontario Ltd, ON	1978	same	100	Ontario	Hydro & thermal proj's
42	Kaiser Eng Power Corp, Calif	1978	same	20	World	Thermal power plants
43	Martec Ltd, Nova Scotia	1973	1979	30	World	Ocean engineering
44	Canamont Construction Inc, PQ	1978	1979	40	Franco. world	General consulting
45	Both Belle Robb Ltd, PQ	1973	1980	33 33	World	Construction projects
46	Hoyles Niblock Overseas Ltd, Bahamas	1968	1980	100	Oversea	Telecommunications
47	Systemshouse Ltd, Channel Islands	1976	1980	100	Oversea	Staffing of engineering projects
48	McCullough Assoc's, Tennessee	1975	1981	100	USA	Wastewater disposal
49	Mon-O-Tech Inc, PQ	1981	same	57 5	Canada	Wastewater/sewage

(Compiled from data in Sexton, 1982)

Figure 6.6

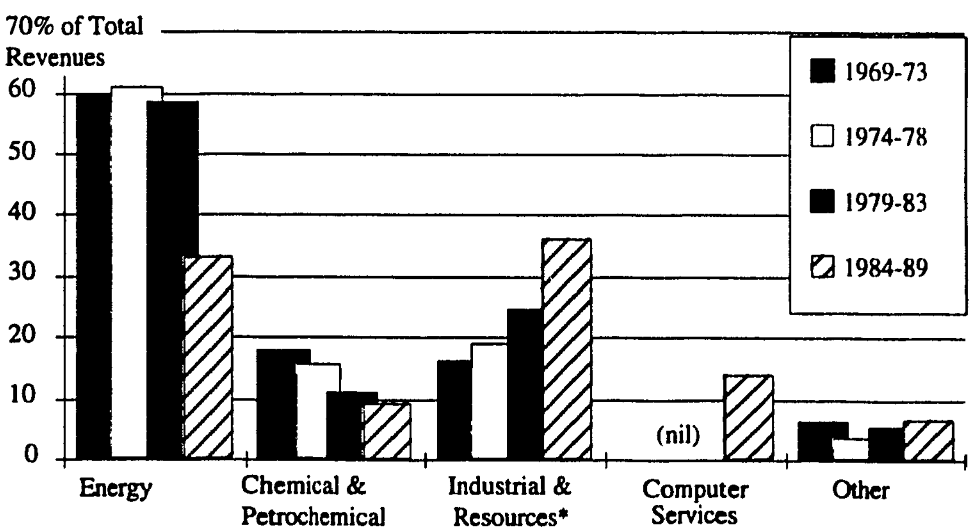
Source of Monenco Revenues - By Geographic Areas



Source: Annual Reports

Figure 6.7

Monenco Revenues - By Type of Service



Source: Annual Reports

*Includes, by order of importance, Pulp & Paper, Metallurgical, Food, Mining, Telecommunications,

• While Monenco had gained entry into many parts of Canada and of the world, they still lacked a strong foothold in Quebec, their own backyard. To improve that situation, they proceeded as they had in other regions, by acquiring a local firm: *La Société d'ingénierie Cartier Limitée* (N°12) a dormant company, originally founded by an Italian family and legally controlled by a friend of the president of Monenco. Its name was not only French, but it also contained the word "Ingénierie", which —by new provincial legislation aimed at making engineers personally responsible for their work— was no longer available to companies in Québec. The new acquisition "provided Montreal Engineering with an active participation in Quebec and the Francophone world, including participation on the great James Bay Project" (Sexton: 216).

• The political risk of doing business in foreign countries hit home when the assets of the company's subsidiary (N°19) where seized by the revolutionary government of Iran.

6.10 Branch Openings

These new companies reflected the company's efforts to enter new markets and to diversify into new fields of activities. In parallel, Monenco opened six offices in Canada to sustain its traditional lines of business and its established markets.

Most notably, it opened an office in Ottawa, in 1970, to liaise with the branches of the federal government. In particular, it was interested in the prospects offered through the Canadian International Development Agency and the Export Development Corporation. It had, after all, performed works under such schemes, notably in Brazil, under the auspices of the World Bank, and it was currently involved in the construction of a major nuclear plant in India, which was financed by the Export Corporation Insurance (forerunner of the Export Development Corporation- EDC)[29].

Total revenues from overseas work, which comprised less than 15% of the company's total revenues in 1970, amounted to more than 20% five years later, and represented nearly 40% by the mid-80's (see Figure 6.6), with Gross Margins of around 32%, in both instances (source: Annual Reports).

6.11 "Attacking" Foreign Markets

Over time, a pattern emerged in the company's strategy of diversification and growth: *diversify at home and sell abroad.* It gained experience in Canada through acquisitions and new undertakings, and sold its acquired skills in new markets at home and abroad.

Clearly, Monenco was most successful at selling its expertise in the power generating field, an experience acquired in the design and construction of small to large projects, from the Equator to the Arctic, using steam and hydro power.

> If we assumed that the growth in our work in Canada would more or less follow the industry growth, our only chance for additional growth in the company in this field was in the international market.
>
> (Smith, 1988:42)

---

29 In 1969, the former was dissolved and was replaced by Export Development Insurance, a profit making, semi-independent crown corporation..

The problem remained that the company had a poor record in marketing. Until 1969, it principally served a captive market of affiliates. Although outside contracts were welcome, they were, in the 50's, a departure from its normal mandate, and, in the 60's, a complement to its core business. "It had no staff devoted to new business promotion. In fact, the company made no particular efforts to sell its services [...]. Montreal Engineering Company was invited to submit proposals" for its services, "an eloquent testimony" to the reputation of its leaders (Sexton, 1982: 112), as its managers saw it. In the 70's, things changed. In the words of another vice-president, gone were the days when "contracts were primarily won by having quality engineering to offer and [...]past performance in similar situations". He was now...

> ... becoming aware of the fact that it was necessary to have one's company recognized by departments of government, both in Canada and overseas, and to have contacts and friends in the overseas countries so that your name would be recognized when promotional work was being carried out or when bids were being assessed. Unfortunately, it developed later in this decade [70's] and much more so in the 80's that contracts were obtained by influence of the monetary kind and, to a large degree, I feel, prostituted our engineering profession.
>
> (Smith, 1988:49).

Given these circumstances, "the question was how to attack the overseas market" (Ibid:42). One of the earliest means considered was to retain the services of local "consultants" to act as the company's representatives. Their role was to "provide advance and reliable information to keep Monenco appraised of projects in [ABC Land] before an official publication. [... And] provide information needed to help Monenco structure a competitive and responsive proposal." These contracts were usually drawn for less than year, and involved limited flat fees to the representatives and a percentage of the contracts that they might obtain for the company. Typically, the representatives were hired "for six months, at $500 p.m., plus out of pocket expenses (maximum $1000), with automatic renewal for six month periods, unless canceled". This formal method of dealing with the informal side of getting foreign contracts met with limited success. It 'peaked' in the mid 70's —between 1973 and 1977— when it was used six times (out of a total of 12 for the period between 1969 and 1990, involving thirteen different countries)[30].

The mid-1970's was a period of even faster growth internationally than nationally. The rapid climb in earnings led to a two-for-one stock split in 1976. That year, Monenco acquired full ownership of a Florida-based consulting firm, a move which initiated other acquisitions and a trend of fast growth in the U.S. (see Figure 6.9).

Its international growth was not linked to Canadian foreign aid programs, since Monenco did not sustain a regular flow of contracts from EDC and even less from CIDA —which dealt with poorer countries— even though the activities of these agencies grew in the late 70's and throughout the 80's (see Figures 5.6 and 6.8). As a result of these trends, the composition of Monenco's foreign work shifted to richer countries. Thus, in the Caribbean and Latin America, business dwindled to a trickle, despite the company's past history in the area; in Africa, it remained focused on Nigeria —which had some oil reserves—. In Asia, it shifted from India to the fast developing Southeastern countries in that continent. In the U.S., business grew to the point of surpassing all other regions.

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[30] Source: From the company's contract files.

6.12 A Transnational Firm

In 1985, the company put into place a new structure which comprised four major groups of companies, and reflected the growing importance of the U.S. market: one group of companies provides engineering consulting services worldwide; the other, construction services; the third, high technology investments such as computer consulting services; and the fourth, the full range of Monenco services in the U.S..

The major losses sustained after 1982 led the company to reduce salaries and benefits, and ultimately, to retain the services of Merrill Lynch Canada Inc., in 1986, to assist in seeking equity funds (Annual Report of 1986:5). Breaking from a tradition that dated back to 1969, the company's 1986 Annual Report no longer stressed that "its senior staff retain control"; instead, it emphasized that the company sought to maintain a high level of professionalism, and that the new funds would enable them "to maintain an unbiased and independent approach to the company's activities on behalf of its clients". The following year, Perini Corporation, a U.S. company, made an equity investment of $12, 000, 000 in the company through its Canadian subsidiary (Annual Report of 1986)..

Thereafter, the company's annual reports reflected the change in ownership and the shift toward the U.S. They described Monenco as a family of "subsidiaries and associated companies in Canada, the United States and abroad" and stressed —instead of its former employee ownership— that the company would "strive to be a responsible corporate citizen wherever it operates, to ensure an appropriate return for its shareholders..."

6.13 Conclusion - Monenco: An Engineer's Engineering Firm

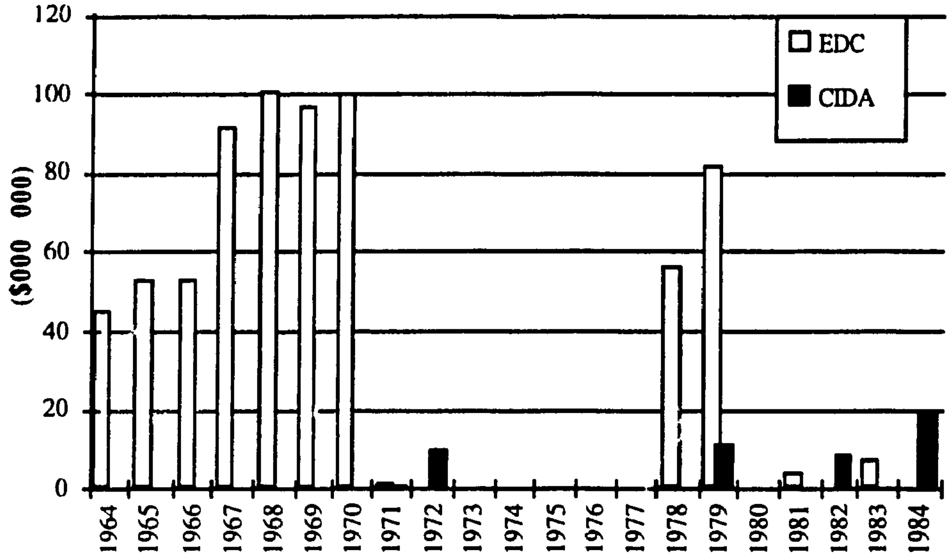
Founded to build and administer electric plants in remote places, Monenco did not have to sell its services. For most of its history, it remained an expertise-based professional firm that knew how to make better mouse traps, anywhere and under any circumstances, and expected clients to beat a path to its doors. As its traditional energy market shrunk, its expertise shifted to industrial construction and computer services; Monenco, the pioneer, turned colonizer, and it sought international clients in more developed parts of the world and in the more stable part of the country, in central Canada.

Throughout its history, it faced changes in true professional form by relating to its environment on the basis of its technological expertise, and by focusing on the tasks at hand. Showing limited concern for the province *where* it had its home base, it allowed *what* it knew to define *who* it was. It recruited its engineers and marketed its services primarily outside of Quebec, whether its "growth vector" (Ansoff, 1965) was *market development* —seeking new markets for its products up until the early 1960s— or *product development* —replacing old products, as it did, after 1960.

Although Monenco, SNC and Lavalin all succeeded remarkably well, each firm related quite differently to their common environment. Our journey takes us next to SNC.

Figure 6.8

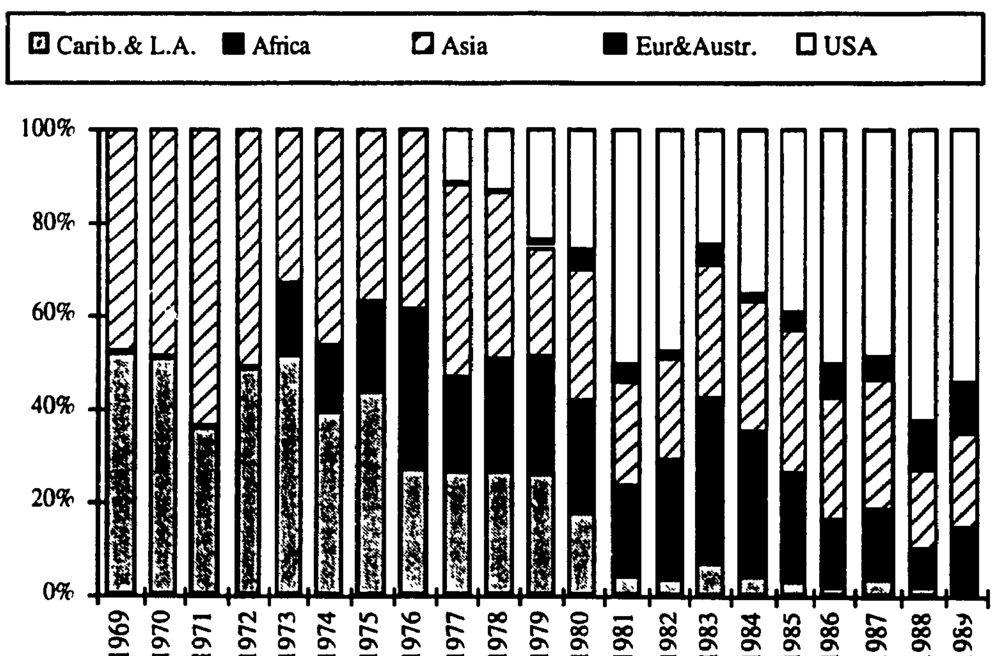
Monenco:
Financing of Projects Overseas by Crown Corporations



Sources: •EDC Annual Reports and Statistical Reviews
•From data produced by CIDA for this research. June 1992.

Figure 6.9

Source of Monenco Foreign Revenues



Source: Annual Reports

7. S.N.C. [31]

7.1 Montreal: A City of Two Tales

Just a few blocks away from the office of the Royal Securities Corporation on St. James Street, barely ten years before Monenco was formed, a young Quebecker named Arthur Surveyer finally decided to become an engineer. Thus began another chapter in Quebec's success story of world leading consulting-engineering firms.

His grandfather —who was the son of a French officer in Lafayette's army— emigrated to Canada after studying medicine at Rutgers; his mother was a poet, and though of more modest origin, she was known to be related to the mayor of Montreal, to an archbishop, and to a Canadian ambassador to France. Arthur's parents, quite naturally, first hoped that their son would become a lawyer, like his older brother Édouard. But since the young man was so shy, they thought that, perhaps, they could make a notary out of him, a respectable liberal profession for such a cultured, successful Francophone family at the turn of the century.

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[31] Information on SNC and its employees comes primarily from the following sources:

• Surveyer, R.A. *History of SNC Enterprises Ltd., 1911 - 1979*, including *Pen Portraits of the Three Founders and of Four Presidents of the Company*. Unpublished Manuscript, dated February, 1979.

• Lalande, S. *SNC Engineering Beyond Frontiers: 1911-1991*, Éditions Libres expressions, Montreal, Canada, 1992.

• Annual Reports, speeches delivered by the President and other internal documents.

• Memoirs written by a former draftsman, unsigned, dated circa 1980.

St. Laurent Boulevard —the dividing line between the eastern and western parts of the city, between its Francophone and Anglophone residents— was supposed to keep him and his French-speaking friends east of La Gauchetière Boulevard, sheltered from the pursuit of gold and pleasure of those "less idealistic races" who worked on St James Street, who delved in "feverish mercantilism and the crude naturalism that binds them to matter"[32].

Yet, much in young Arthur's background may have predisposed him to set his own path, taking him across to the other side of town. First, there was his father's own business orientation, as the owner of a large hardware store; right on the great divide that was St. Laurent Boulevard. Then again, there were the English lessons before school, which started the boys' day at five in the morning, followed a few years later by courses in English elocution. Or, maybe it was simply that Arthur, studious and intelligent, but slim, almost frail, and remarkably shy, did not relish the idea that lawyers had to speak in public.

After graduating from the École Polytechnique (Poly), he completed his postgraduate studies in Belgium. His next career move was more in line with those of his fellow graduates from the Poly (Gagnon, 1991:86): he went to work for the federal government's Department of Public Works. Though he began his career as a federal civil servant, he nurtured his own sense of ethnic nationalism, which he made evident in the speeches that he delivered (noblesse oblige) throughout his career. Embracing the views of leading social scientists in Quebec (Hamelin, 1976:449), Surveyer believed that nationalism could assert itself only through the economic growth of the private sector. "Every French

[32] Excerpt from a graduation speech delivered by Mr. Paquet at Laval University, quoted in Lalande, 1992, p.14.

Canadian has a duty to become rich and powerful... [,] therefore, our engineers must have, beyond their scientific training, solid commercial abilities. They must be promoters and developers of business, in the best sense of the word" (Surveyer, 1917:55).

His government post took him to small towns in Ontario. In 1911, bored, and upon the advice of his wife, he decided to return to Montreal and put these words into practice.

7.2 A Renaissance Man Opens Shop

Like many of the engineers who had attended the Poly at the turn of the century (Gagnon, 1991:70), Surveyer had first received a classical arts education. His books and essays, written in French and English on a variety of subjects, bore witness to the breath of his education. His writings, such as *l'Ingénieur et le développement du Canada* (1916), *The French Parliament Under the Third Republic* (1933), *Le rôle de l'inconscient dans le travail intellectuel* (1936), *Canada's War Effort* (1941), and *Electricity from the Atom*, reflected a global approach to issues.

Thus, his firm featured five disciplines under one roof, an unusual arrangement at a time when consultants specialized in only one. In 1912, he engaged in a short-lived business association with his life-long friend Augustin Frigon, who went on to teach, and subsequently became the director and the principal of the Poly. Surveyer worked hard at enlarging his experience and his network of contacts; he became involved with numerous municipal, provincial, national and international associations, and founded a journal, *L'ingénieur canadien*. He was an active board member of the Poly, the Quebec branch of the Canadian Society of Civil Engineers, and the prestigious National Research Council of Canada. In 1920, he and some friends founded the *Corporation of Professional Engineers of Quebec*, the forerunner of the *Order of Engineers of Quebec*. Between 1917 and 1924, he was a member of the Canadian Council for Industrial and Scientific Research, and, between 1924 and 1925, the President of the Engineering Institute of Canada. Through his connections in the English business world, he joined his brother and became a member of the Canadian Club (Lalande, 1992:45). He achieved some international recognition when he was awarded an honorary Doctorate by the New York Rensselaer Polytechnic Institute of Troy, in 1924.

In 1912, his connections with his former employer at the federal government landed him two major assignments. These projects, and those that followed, were remarkably diversified geographically, but focused on cost analyses and evaluations, as sampled below:

• Department of Public Works (1913): Study and report on the effect of the Chicago Drainage Canal diversion on water levels from Montreal to deep water.

• Quebec Streams Commission (1917-18): Design and report on the foundation of a storage dam at the outlet of Lake Jacques Cartier, Quebec

• British Columbia Electric Railway (1920): Financial study and report on the proposed acquisition the Western Power Company of Canada by the British Columbia Electric Railway Company.

7.3 Entry into the World of Private Business

Surveyer was dissatisfied with these contracts since they came from government and other public organizations. Indeed, his own benchmark of success was to enter into the world of industrial engineering. That break came in 1922 with an offer to look into the construction of a kraft paper mill in Washington State. It was a huge contract, and Surveyer had every reason to be optimistic for he certainly had the necessary expertise in hydraulic engineering. A meeting was scheduled to take place in his office.

That office, his wife pointed out to his dismay, was a disaster! She promised to fix things. Unbeknownst to him, she ordered a complete set of furniture from one of the city's major stores— filing cabinets, book cases, curtains and lamps. With his wife improvising as secretary, the stage was set to impress their visitor from Vancouver. It worked... and it cost nothing, for the next day everything was returned to the store! At the age of 43, owing to more than his technical abilities, Surveyer landed the biggest contract of his new career. And, it was in private industry... with an English firm... in a foreign country. His appetite for diversity was wetted. His hard work was beginning to pay off.

7.4 And Then They Were Three Partners

In 1923, the U.S. contract completed, he teamed up temporarily with a young architect, and set out to enter the lucrative field of institutional and commercial construction. (Lalande, 1992:42). Shortly thereafter, with two new major contracts in hand —a warehouse and the expansion of Dupuis Frères Department Store— he set out to hire two employees. His friend and former associate Frigon, now principal of the Polytechnique, had a strong but somewhat curious recommendation: Chênevert. The young French-Canadian engineer was quite different from his future boss: tall, self-assured and outspoken, he came from a family of builders of Quebec City. Attracted perhaps by the difference with his own personality, Surveyer hired him.

His next employee, hired a few weeks, later, had an even more different background. The bespectacled Nenniger —a newly arrived German-Swiss immigrant— was a meticulous, short-tempered, hard working, industrial engineer, with a keen eye for detail, who spoke little English, and could —to Chênevert's amazement— draw with his right hand while adding figures with his left.

With these choices, Surveyer planted the seeds from which the firm grew over the years. With such diverse personalities and backgrounds, the three men who lent their initials to SNC and shaped their company's strategy formed a symbiotic, though strained, and at times, explosive team, which periodically tested the senior partner's mediation skills.

Surveyer continued to cultivate his connections in the world of finance, through his brother and his father. In the mid 1920's, he set up an investment company which became the Quebec correspondent of Crédit Foncier, a large French concern interested in Canadian investments (Lalande, 1992:46). In 1927, he landed a first contract with Alcan, then an American subsidiary, to study the possibility of producing artificial silk.

His diverse interests ultimately saved him from the crash that sent so many companies —including his personal investment firm— into bankruptcy. In the spring of 1930, Surveyer, now fifty years old, with an uneven record of success, but well traveled and with good relations in the English establishment, was asked to take charge of International Bond and Share. A few months after the crash, with no other business prospects in sight, it was an offer that he did not refuse.

He moved into the Dominion Square Building, in Montreal, to be in the same building with his new "boss" and with Alcan, a recent source of engineering contracts. His two employees stayed on, despite the low level of business activity. Chênevert, who had a flair for municipal politics, gradually took over what was left of commercial, institutional, and municipal operations, while Nenniger took charge of industries, or at least any prospect in that area.

By 1936, the firm's situation was shaky (see Table 7.1). The economy sagged, as the G.D.P. dropped from nearly $4 billion in 1929 to less than $2 billion in 1933, with few signs of recovery (Annuaire(s) statistiques du Québec, 1955). Surveyer lived off his salary as managing director of International Bond and Share. Nenniger and Chênevert, whose livelihood depended fully on engineering work, made overtures for a partnership. Surveyer, now 56 years old, finally agreed to make them both junior partners, giving them each a 30% share.

A subsequent decision, worthy of King Solomon, was whose name should follow his own? Should the firm now be known as Surveyer, **Chênevert** and Nenniger, or should it be Surveyer, **Nenniger** and Chênevert? Each man wanted recognition for what he felt was his greater contribution. Surveyer took ten years to decide. In 1947, the firm became known as **Surveyer, Nenniger and Chênevert**. Did Surveyer value the contribution made by Nenniger's hard work over the contracts brought in through Chênevert's contacts? Did he just flip a coin? One thing was for certain, his decision did not reflect ethnic allegiance.

Table 7.1

Income Fees Prior to the Partnership - Selected Years

	Fees in $
1918	5551.29
1925	44939.44
1930	45669.21
1935	29459.79
1937	17218.04

Source: Surveyer, R.A. *History of SNC Enterprises Ltd., 1911 - 1979.* Unpublished Manuscript, dated Feb. 1979.

7.5 The War and After: Recovery

While the war caused a boom in most sectors of the Canadian economy, it had less of an impact in Quebec, especially for companies that relied on federal government contracts. Because SNC was well diversified, it was able to draw some benefit out of the economic upsurge. In 1941, its earnings rose to $79,133, stayed above $50,000 throughout the war years, and reached $93,274 in 1945. After a short period of adjustment to peace-time life, economic expansion became more widespread. The firm won an unprecedented number of metallurgical studies and projects in Canada and the U.S. In its early years, SNC's workload had consisted principally of municipal and hydraulic work, the design of water and sewage facilities, and hydro-electric developments; but, all that changed during the 30's and 40's when it turned to technical and financial investigations as well as the engineering of complex industrial plants in the metal and chemical industries.

Doctor Surveyer received national recognition from both the public and private sectors. After the 1940's, he served on five more Federal Commissions and sat on the board of directors of five companies, including three in the financial industry, one utility, and one mining firm. In 1941, thirty years after its founding, SNC became the first French-Canadian firm to win a contract in industrial construction when they were asked to build a smelter installation for Chromium Mining and Smelting Corporation, in Sault Ste. Marie. Thereafter, that company became a major source of business for Surveyer and his junior partners.

The loyalty of the partners and their perseverance paid off during the postwar years. As the private sector of the economy began to recover, particularly in industries with a strong U.S. presence, so did SNC. After years of drought, the partners began to reap the fruit of their wide experience in industrial work, and of their marketing efforts during the war. Thanks to SNC's reputation and diversified personnel, the firm won contracts from European and American clients. Its traditional line of jobs in light and heavy industry, hydraulics, municipal and buildings grew in size, complexity, and in repeat business:

- Aluminum of Canada: eight projects, ranging from an office building in Toronto, aluminum plants in Jamaica, to a rolling mill in Brazil.

- Chromium Mining & Smelting Corp.: Ten different contracts, highly technical in nature, involving novel processes.

- Canadian International Paper Co.: Construction of a plywood plant and office building (1945), industrial and research laboratory (1945), and an extension of a bleachery at Kipawa Mill (1958).

- Hydro-Quebec: A number of engineering studies, surveys and reports.

• RCA Victor: three, two year contracts in Ontario between 1951 and 1955.

• Repeat contracts with industrial clients such as Abbott Laboratories of Chicago, Rolland Paper Company, and American Metal Climax, meant a growing expertise in asbestos, metals, and manufacturing.

7.6 Two Pronged Growth

The firm's openness toward foreigners made it a haven for many competent European war refugees. Mr. Nenniger, in particular, continued the practice of hiring European immigrants, who brought with them not only many languages and cultures, but also new technological know-how unavailable from Canadian schools. Nenniger picked a German-Swiss immigrant as his right hand man, while Chênevert chose a French Canadian. With these two seminal choices, they began a pattern that was perpetuated over the years.

In response to the growth in business, the partnership was expanded to include Dagenais, Hahn, Turcke and Provost, who joined after WWII. Their diverse ethnic backgrounds were a legacy of Surveyer's choice of original partners. As if to keep the two sides in balance, then, in 1957, and in 1963, an equal number of French and non-French Canadian partners were chosen:

• E.W. John Turcke, a German-Swiss civil engineer from Zurich, joined the company at the age of 24. Hired by Nenniger, he became a Vice-President, Personnel and Services, a partner in 1959, and, in 1975, he succeeded Dagenais as President.

• Jack Hahn, a German Jewish refugee, was a McGill graduate in electrical engineering. Hired by Nenniger, he became a Vice-President in charge of development and a partner in 1959.

• R.J. Balfour, an electrical engineer from McGill University, became a Vice-President in charge of construction management and a partner.

• Roger Provost was a structural engineer on the Chênevert team and became a partner in 1959.

• Camille A. Dagenais, 38, future president of the firm, Chairman and CEO, graduated from the École Polytechnique. He had been engineer-in-charge of many studies for Hydro-Quebec. Hired by Chênevert, he became a partner in 1959, and the president of SNC in 1965.

• Jean-Paul Goudreau was a graduate of Laval University, École Polytechnique and Harvard University. Hired by Chênevert in 1961 from the Quebec Provincial Health Department, he became Vice-President, Operations, and a partner.

• Roméo Filiatrault, earned a B.A. Science from the École Polytechnique thanks to a student bursary. Part of the Chênevert wing, he became a partner in 1963.

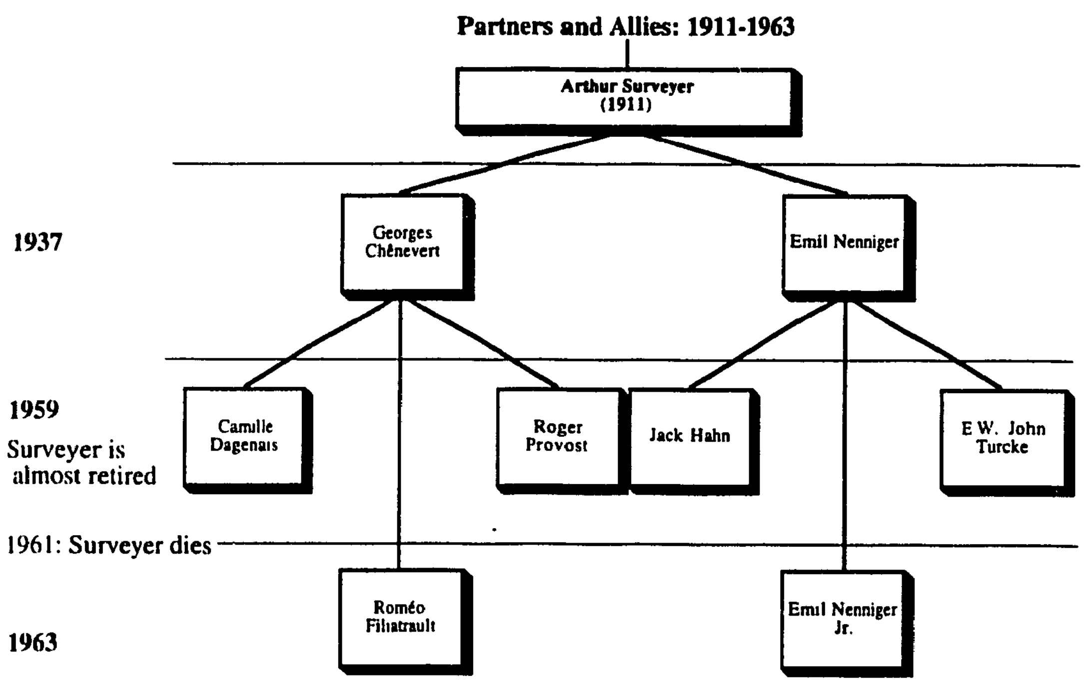
Over the years, the sons of the three original partners joined the firms, in various capacities:

• Paul Chênevert, son of Georges Chênevert, joined the firm in 1957, but did not complete his engineering degree.

• Emil Nenniger Jr., was the first non-engineer to become a partner, in 1963, at the same time as Filiatrault. Young Nenniger worked for the firm until 1967.

• Raymond Surveyer, an engineer graduate from the Rensselaer Polytechnic Institute, joined the firm in 1961 after his father's death, partly with the view of allowing the partnership to carry on under the same name.

Figure 7.1



Source: Based on information provided in Lalande, 1992

Each group, one headed by Chênevert and the other by Nenniger, occupied a different wing of the office. With reference to Montreal demographic distribution, they referred to each other as the "East Block" —made up primarily of Francophones— and the "West Block" —comprising immigrants and

English-speaking Canadians—, separated by the "iron curtain", symbolized by St. Laurent Boulevard. The rivalry extended to the smallest details, from deciding on the location of joint meetings to the color of the drafting paper they used (Lalande, 1992:91). Surveyer, who was 78 years old by 1955, had to intervene regularly to settle disputes between his aging younger partners.

To make matters worse, the two "blocks" also experienced different growth patterns during the 1950's. The early part of the decade was more favorable to Nenniger's "West Block", who undertook extensive work in chemical and industrial engineering, the specialties of Turcke and of Hahn. The department grew to account for nearly two-thirds of the thirty-odd employees of the firm.

Beginning in 1954, however, Chênevert's construction department began to perform much better. They won a major study of the Megiscan, Manicouagan and Outardes Rivers, executed jointly with the Ontario firm of H.G. Acres and Company, for Hydro-Quebec. Raymond Latreille, a commissioner and soon-to-be chairman of Hydro-Quebec, as well as a close friend of Chênevert, convinced the utility to break from tradition and award at least part of the contract to a firm not from the U.S. or from Ontario. Soon, Chênevert's department required staff transfers from the "West Block". In October 1959, a few months after Duplessis' death, Hydro-Quebec, with Raymond Latreille as Chairman, awarded SNC a $136 million design contract for a dam and power station at the Manic 5 Site, the revised name of the Duplessis Dam[33] (Lalande, 1992:109-110). There were promises of even larger contracts to come.

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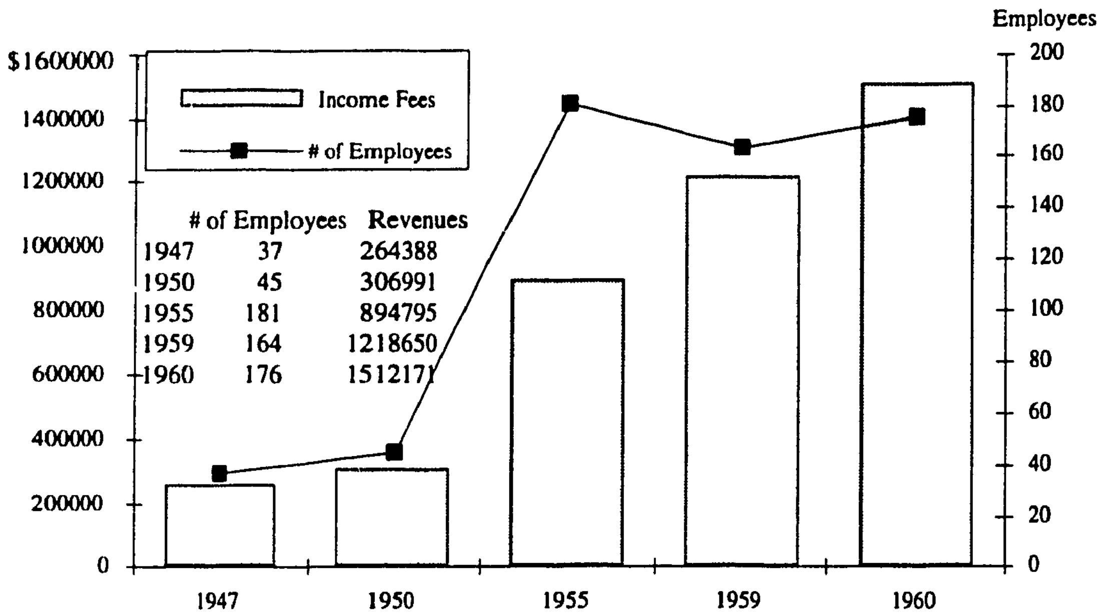
[33] Raymond Latreille, text of press conference, August 19, 1960.

Figure 7.2

Revenues (in $) and # of Employees 1947-1960,

Selected Years



Source: Surveyer, 1979.

7.7 More New Partners

The firm was doing far better on the outside than it was inside. The increase in staff, in volume and in the complexity of the projects exacerbated the tensions between the East and West "blocks" to such intensity that they could no longer be diffused by Surveyer, who was eighty years old and all but retired from the daily affairs of the firm.

He and his "younger" partners, now in their sixties, decided first to enlarge and rejuvenate the leadership of the firm. In 1959, the partnership agreement was re-opened to welcome four new junior partners: two from the "East Block", Dagenais and Provost, and two from Nenniger's team, Hahn and Turcke. Each was given a 9.6% share of the firm. Surveyer, the senior partner, and the two "intermediate" partners, Nenniger and Chênevert shared the remaining 68 percent equally. But, these changes did little to alleviate the internal problems. "No one recognized the need for change in the organization more than the partners, but the question was in which direction" (Fenton, 1967). They decided to seek outside consulting.

The American firm that was called in proposed a reorganization scheme which created two branches of power: one for Nenniger, the other for Chênevert. This structure afforded each side a say in the other's realm of activities. It was a complex arrangement based on separation of power, and checks and balances between "internal" operations and "external" developments:

- Surveyer remained the symbolic head, responsible "for the general conduct of the firm".

- Nenniger became the head of Operations, assisted by Turcke (form his block) and by Provost (from the "East Block");

- Chênevert became of head of Development and Promotion, assisted by Dagenais (his man) and Hahn (from the "West Block");

Bolstered by his new status as a junior partner and the responsibilities for development, Hahn immediately sought new growth opportunities for the firm and went on to create several new subsidiaries, in which SNC was usually the sole shareholder (see Table 7.2).

Table 7.2

Period	Subsidiaries	Associated Companies	Total
1959-1967	8	1	9
1967-1977	14	9	23

Source: Compiled from Lalande (1992).

The senior partners "allowed" the formation of these companies in order to accommodate young executives eager to champion new projects, and to keep them from setting off on their own. Growth became more opportunistic and less centrally planned, often reflecting that Hahn or another manager recognized that the firm had stumbled into a fertile area.

- Hahn formed the first subsidiary in 1959, Ozal —later renamed **Reprotech**— to handle the firm's internal printing and publishing needs. It was hardly a daring move, but one which his older partners resisted, arguing that it was better for the firm to concentrate on what it knew best.

- A year earlier, the company had become the first Canadian engineering firm to use computers. In 1959, **Sores** (an acronym for Systems, Operations Research and Economic Studies) was formed —in the spirit of Doctor Surveyer's philosophy— with the general idea of applying scientific methods from various disciplines to the solution of practical problems.

- **Terratech** Ltd. was founded in 1960 to provide complete soil mechanics and foundation engineering services. An equal number of shares went to SNC and to Senneville, a young engineer who had Hahn's backing.

- That same year, **SNC International** was incorporated in New Jersey, U.S.A.

• **SNC Computation** was formed in association with Engineering Associates of Toronto as an extension of SNC's own computer needs.

• **SNC-Filer,** Ltd., formed in 1965 by SNC and W.A.H. Filer, a principal in a consulting engineering firm: structural engineering, plant design and supervision of construction and industrial programs.

7.8 Seven Heads in Search of Direction

This unbridled development met with resistance from Nenniger and Turcke, who felt that it interfered with daily operations, and raised Surveyer's concern over its negative impact on the quality of service provided to clients (Lalande, 1992:120-1). There arose the need to agree on the general course that the firm should take. Interpersonal tensions were unpalatable. Something needed to be done. A change in the organization's structure, perhaps. Once again, they decided to turn to an outside consultant.

The American consultant saw the great number of partners and the freedom of policy action that each enjoyed, and concluded that SNC had become a seven-headed monster. Communications and tension were so bad, he argued, that they would eventually cause the firm's demise. "The problem was not the structure of the firm", Russel told them, "but in the almost complete lack of communication." (Lalande, 1992:122). The partners were taken aback. He had held up a mirror in front of them, and they dreaded what they saw. Although they did not heed his warning and took no remedial steps, many knew that he was no Cassandra.

Fate struck at the very heart of the partnership with the death of Surveyer a week after the consultant's arrival. Unable to choose a leader amongst themselves, they 'agreed' not to decide and passed the torch, back and forth between Chênevert and Nenniger, for the next four years.

Still unable or unwilling to address the chronic tensions among themselves, the remaining partners sought to contain its deleterious effects by instituting a company-wide profit sharing plan, and a social club to "create, on the basis of social and sports activities... an atmosphere of courteousness and civility among employees of Surveyer, Nenniger and Chênevert and its subsidiaries" (Lalande, 1992: 129). These palliative measures and the firm's continued success in the market place allowed them to postpone dealing more directly with their internal problems.

By 1963, Manic 5 was progressing well. The experience gained in the Québec taiga soon opened the way for a major contract in Southeast India. A consultant from Vancouver who had established excellent contacts for a projected dam across the Idukki gorge in Kerala State, sought out SNC and put them in touch with the "right people" in New Delhi, against a 2% commission of the spin-off. He also had excellent relations at CIDA, who was financing part of the project. With his guidance, SNC submitted tenders and emerged victorious over Monenco. The initial surveying contract of a mere $15,000 was accompanied by a letter in which Dagenais suggested that the firm could start working immediately on detailed plans of the dam (estimated cost $137.2 million, with CIDA contributing $27.9 million) and that his firm "would be extremely happy to be of use in this respect" (Lalande, 1992.:132). The project was accepted. It lasted eleven years.

Meanwhile, internal tensions continued to mount. There was growth, but still no direction, as leadership alternated between Chênevert and Nenniger. The partnership, reduced to six members after Surveyer's death, was enlarged, in 1963, to include two members, one from each 'block', as usual: Filiatrault, from Chênevert's group, and Emil Nenniger Jr., from Nenniger's team.

Another consultant was brought in. His report reflected the same unpleasant reality: the monster did not need more heads, it needed a heart. What he proposed to the partners —Training Groups and Development Groups— may have been fashionable at the time, but it enthused no one. It meant airing their feelings in public. At first, they recoiled. However, the alternative of doing nothing and allowing the situation to deteriorate seemed worse.

7.9 Choosing a New Leader

In the summer of 1964, the partners, excepting Chênevert and Nenniger who could not be convinced to participate, met first at the Signiory Club in Montebello, and later at the Mont Gabriel Inn, for week-long sessions of T-Groups. During the course of these sessions, they were encouraged to express their emotions and expose their inner vulnerability to their peers. During a third and final session held in the Tom Wheeler Club at Lac Ouimet, they were joined by the twenty department heads. Each group met in a different room.

Six partners (Chênevert and Nenniger still abstaining) met on the first floor. A triangle was drawn on an easel, with each corner illustrating one type of leadership: *Friendly Helper* at the top, *Tough Battler* at the lower left point, *Logical Thinker* at the bottom right point. Each partner was asked to place the sticker where it best described each colleague. In most instances, there was a high level of consensus; furthermore, it concurred largely with each man's self-image. The exercise was extended the next day to include the department heads.

Overall, Roger Provost and Roméo Filiatrault were seen as *Friendly Helpers*; John Turcke and Emil Nenniger Jr. were deemed *Logical Thinkers*; Camille Dagenais and Jack Hahn were perceived as *Tough Battlers*. Jean-Paul Goudreau, a department head who had joined SNC only three years earlier, was unanimously viewed as a *Tough Battler.*

In February 1965, after a year-long process, the partners unanimously chose Camille Dagenais as their leader. Dagenais, a six foot tall, 45 year old, *Tough Battler* grew up "rubbing elbows and fists"[34] in the multiethnic neighborhood of St-Henri. Jean-Paul Goudreau, 40 years old, another *Tough Battler* from a middle-class Quebec City family who had chosen Harvard over the priesthood, became his right hand man and heir apparent, as Vice President in charge of Operations (Lalande, 1992:137).

7.10 The Changing of the Guards

Eager to fill a power vacuum that had lasted four years, the younger partners, headed by Dagenais, made a series of legal and organizational changes aimed at centralizing policy-making and providing a focus to the firm's activities. First, they convinced the two senior partners to agree to the formation of an incorporated company *Surveyer, Chênevert and Nenniger Inc.*, to take charge of all cur-

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[34] Surveyer, R.A., 1979.

rent and future contracts outside Quebec. They argued that incorporation allowed for more effective distribution of project responsibilities, a better tax position, continuity of leadership, as well as the possibility of increasing the number of shareholders, hence, better protection of their equity (Dagenais, 1967) Since the Quebec Corporation of Engineers no longer allowed companies to use the title of "engineer", the letterhead of the new company bore the mention "a company owned and operated by engineers".

This was only the beginning of the shift in power. Shortly after his formal appointment as President of the firm, Dagenais undertook a tough battle with the senior partners to convince them not to renew the old partnership agreement scheduled to lapse at the end of 1966, and to pursue all operations under the banner of the recently incorporated company. When he finally succeeded, after an adjudicator and lawyers from both sides were brought in, the grip of the elders over the direction of the firm was seriously weakened.

7.11 Structured for Change

The sensitivity training had been a most revealing exercise. It brought to light, as never before, the nature of the relationship between executives, managers and senior staff, and the differences between managerial and technical talents. There was a new understanding of the nature of the firm. Thus, while this battle for control of the company was being fought, Dagenais embarked on a search for yet a new structure which would reconcile those characteristics and needs of the company that had been made apparent (Surveyer, 1979:10-11):

• Construction-engineering was a business that changed continually, in terms of volume, content and scope of work, with cycles of feasts and famines;

• SNC needed to improve client service;

• SNC needed to offer an environment that would foster the growth of different employees, while integrating their individual objectives with those of the company.

• Finally, they needed to achieve proper central control.

Several types of structures used by competitors and industries, namely Bechtel and United Engineers, were studied. Dagenais opted for restructuring the company along product lines (industrial, commercial, hydroelectric) to replace the former structure based on engineering disciplines (mechanical, structural, and electrical).

Nine areas were acknowledged to represent the firm's markets: thermal & nuclear, hydro, public works, industrial, municipal, institutional, commercial, mining and metallurgical, and chemical. Each of these markets became a department headed by a manager, who had one or more project engineers under his direction. The departments were supported by any of the six service centers in the corporation, each headed by a vice-president: quality assurance, engineering operations, construction management, financial administration, development and personnel services. Chief engineers were no longer in charge of the engineers; instead, they worked across the product oriented departments as technically oriented staff capable of handling problems of structural, mechanical and electrical engineering.

7.12 The Beginning of Formal Planning

In order to consecrate this new course, Dagenais, Turcke, Hahn, Filiatrault, and Goudreau, drew up a document, which came to be known as 'the Bible'. The document outlined the mission of the firm, provided a credo as a basis for planning, a code of ethics to clarify the responsibilities of top management, a profile of future shareholders, and put forth the first of what became the firm's five year-plans. Finally, 'the Bible' explained the restructuring of the SNC family in a holding company, called SNC Enterprises Ltd. (Lalande, 1992:141-3; Surveyer, 1979:11).

It acquired full equity in Terratech and Sorès, and brought in new team members with little equity. Four senior partners controlled 60% of the shares of the holding: Dagenais, Hahn and Turcke each held 192,000 shares, and Filiatrault 84,000. The top forty employees of the firms were given a total of 15% of the shares, based on individual ability and loyalty.

The effectiveness of these changes had yet to be tested, for even though the reputation of SNC was riding to new heights, its meager backlog left little doubt that difficult times loomed ahead. In 1968, Manic 5, the highest multiple-arch dam in the world and one of the great symbols of the "Quiet Revolution" in Quebec, was completed; as was a large contract for the design of six steel mills, obtained thanks to SNC's European expertise in industrial design. A number of other projects, aside from Manic 5, were also nearing completion.

7.13 Now, Which Way?

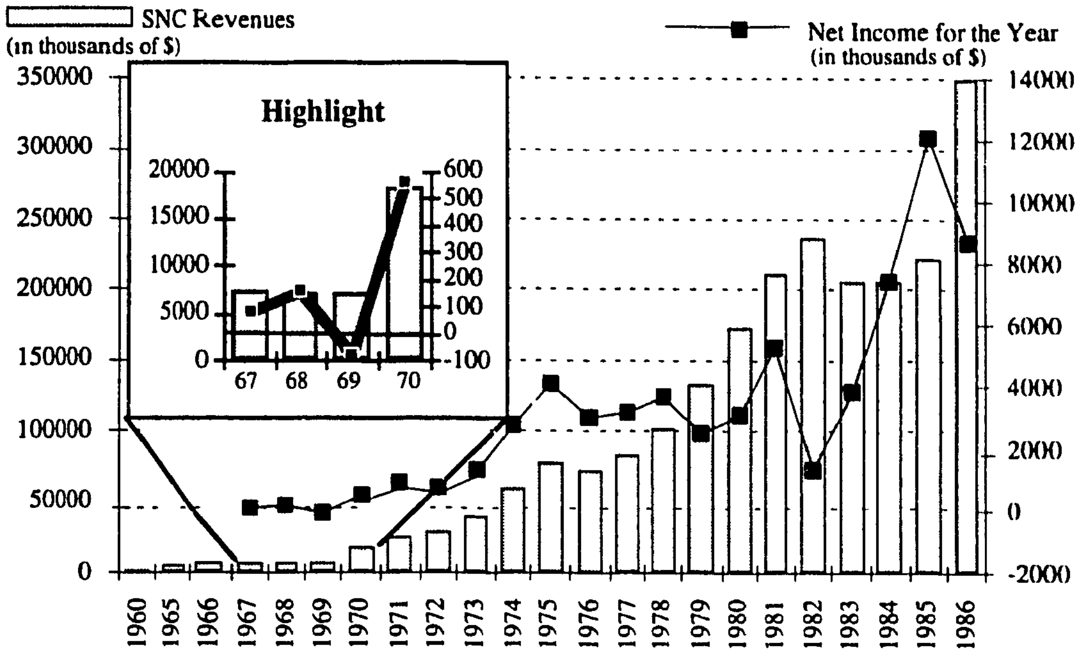
In search of new venues, the leaders revived one of Arthur Surveyer's old dreams: the construction of a nuclear power plant in Quebec (Surveyer, 1948). They turned their attention to a reactor designed by Atomic Energy of Canada Ltd. (AECL), by helping to conduct a few studies in cooperation with Monenco. As a result, AECL joined SNC and Shawinigan Engineering —another Quebec company— to form Canatom. These initial undertakings brought limited success, as only one nuclear project was completed by 1972. The Canatom consortium built a CANDU reactor in Gentilly 2, which was sold to Hydro-Quebec, and went on to export Canadian know-how to Argentina and South Korea (Lalande, 1992:146).

Although the firm showed its first losses only in 1969, it had long been clear to the fifty shareholders of SNC Inc.— who had voted to distribute no dividends in 1968— that a turnaround required a break with the past solutions and strong measures to increase business and cut costs (see Figure 7.3). At the third general meeting held on March 2, 1970, Dagenais began his speech to the shareholders with a collective *mea culpa:*:

> "Obviously, the market had something to do with our situation. However, we must point to a lack of marketing aggressiveness and care, the absence of planning, the sloppy character of our work, and the poor timing of executive decisions".
>
> (Lalande, 1992:150).

Figure 7.3

SNC: Revenues and Net Income - 1960 - 1986



Source: Annual Reports - 1965-1986

He left no doubt that, henceforth, financial results —not status or rank— would be the new benchmark of performance.

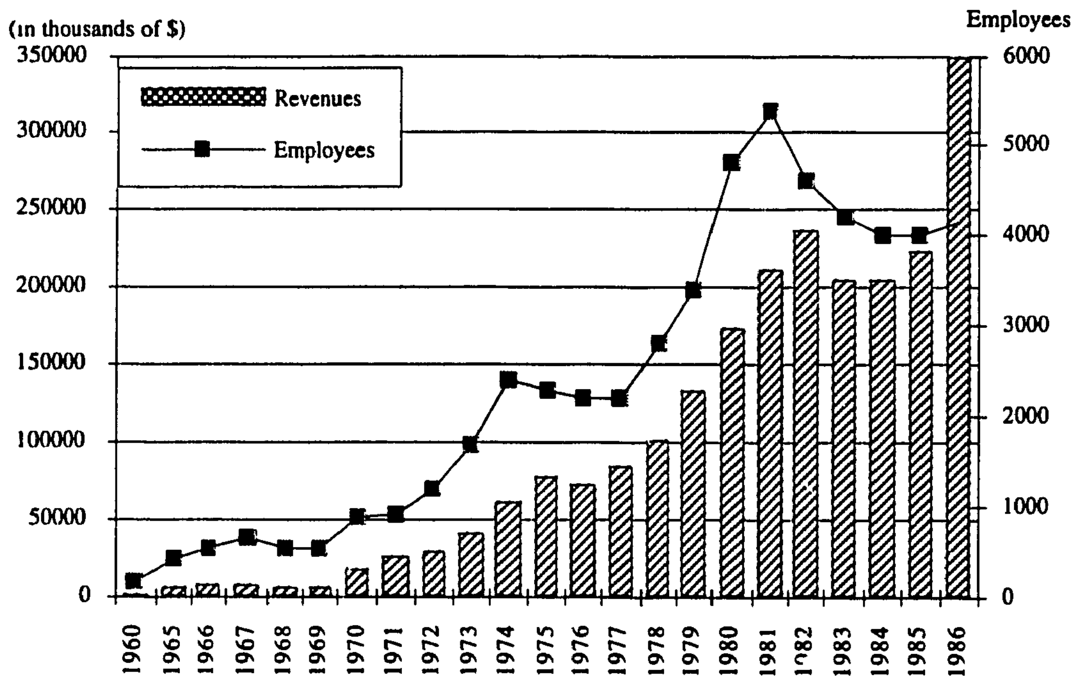
> "[...] When we reorganized SNC three years ago, we quite rightly gave those already in positions of responsibility the chance to improve the company's performance. Now we are in 1970. We have paid off our honour debts, but the past too often has been an excuse for a poor performance. [...S]hareholders have a right to expect better results than we have had over the last three years.
>
> The choices are these. Each member of the group, in decreasing order of importance from the President down, works to the utmost of his abilities; or failing that, there will be a merger or liquidation of subsidiaries, or a change in upper management." (Lalande, 1992:150).

7.14 E Pluribus Unum

A swift and radical rationalization of operations followed. By year-end, the number of personnel had decreased (see Figure 7.4), there were some changes in the upper management of operations, and two manager-owners —Filer and Ingledow— were forced off the board of directors of the companies that they had founded.

Figure 7.4

SNC: Revenues and # of Employees (1960-1986)



Source: Annual reports 1965-1986

One of the most significant changes in the new structure was the larger scope given to the construction management group, by featuring an integrated approach including procurement, estimating, construction planning and accounting. Now, the firm had the technological know-how and the managerial structure to handle "engineer-procure-construct" (EPC) work domestically and abroad. The following projects, carried out during the decade from 1967-1977, tested its capabilities (Surveyer, 1979:15-17; Engineering Journal, January, 1979; Lalande, 1992:151).

There were three major turnkey projects in the first half of the 1970's. In important ways, they represented new challenges for SNC: they were among the largest ever undertaken by the firm; two were carried out on foreign soil, under the banner of SNC International, relatively inactive until then; finally, they allowed the company to tap into its vast array of technological and human resources and deliver complex projects on time, and even ahead of schedule. Yet, at the same time, because these projects were apolitical —as they involved no government participation— they were more indicative of the past than of the new realities of the 1970's. These major turnkey projects dominated the period and brought the company out of its slump:

- The Mirabel Airport in Montreal was the largest assignment in which SNC, acting as primary project manager, coordinated the work of other engineering firms. This $450 million project —which ran between 1970 and 1975— involved 50 consultants, 200 contractors, and over 3000 people at peak periods. It placed SNC as the leader in project management in Quebec. The firm was awarded over $1 million bonus for completing the project on time and within budgetary limits.

- The Meftah cement plant in Algeria was their second major international project —after the one in India— and the first one executed without government backing. It involved a large number of expatriate employees, on site, throughout the design, construction and start-up stages. SNC did not succeed in involving the Canadian government, but the project was finally undertaken and completed on schedule.

• The third turnkey project was also conducted abroad, in Turkey. The $70 million zinc complex was won despite stiff competition from American, German, British, French, Belgian, Canadian, and East European firms.

Another notable project of the period was the construction of a $25 million building dome for the Canada-France-Hawaii Telescope. Located at an altitude of 4,200 meters, the project required that site workers set camp at 2,800 meters for proper body adjustment, which allowed them to increase their production rate from a low of 50% —due to lack of oxygen— to over 100% within a few weeks. To maintain the observation floor at a constant low temperature, they applied principles tested in Canadian hockey arenas.

Like Monenco, SNC continued to plan its growth around purchasing or creating companies alone —a more difficult but more autonomous route— or in association with others. The tendency during the previous decade had been, eight to one, to act alone. During the 1967-1977 period, Dagenais' team showed a willingness to grow by increasing the number of new companies, and by associating themselves with other firms (in one-third of the cases) (see Table 7.2).

7.15 The Project That Wasn't

The firm's improved performance in the early 1970's reflected the soundness of its technological and managerial capabilities —the very basis of its first formal plan. Thus, Dagenais and the other shareholders, during the self-congratulatory meeting of shareholders held in March 1971, showed confidence in their new approach (Lalande, 1992: 153). But, with all its hits, that strategy also had one resounding miss: the failure to win the project management of James Bay. This was a major blow for Dagenais, since SNC, by then the largest Quebec firm, was initially part of a consortium set up and scheduled to handle the project. That SNC ultimately failed to win this well-deserved contract brought to light deficiencies in the way management perceived and, therefore, dealt with its environment. And, reciprocally, it highlighted problems in the way the firm was perceived and dealt with by its environment.

The story of how the James Bay contract was awarded rightly belongs in the next chapter on Lavalin, the smaller engineering firm that emerged victorious[35]. But, to the extent that a firm's strategy is also concerned with what did not happen, it is also part of SNC's saga. SNC's leaders, and Dagenais as chief strategist in particular, appeared to have been unaware of the social and political dimensions of the project negotiations.

7.16 The Seen and the Unseen

The degree to which individuals may be differently attuned to the hidden dimensions of projects of that nature —the implementation of social policies, among others, in this case— is evidenced by the way two protagonists assessed the

[35] The "management" of the project was split between the project manager, Bechtel Québec Limitée --a subsidiary of an American company-- and Lavalin. SNC had vied for the position of project manager.

> "Put it this way, to SNC the political aspect of the business has never been as important as it has to others"

situation. The first quote is one in which Dagenais, with the benefit of hindsight, reflects back on the deal:

(in Gibbens 1975).

The second quote is from Guy St-Pierre, current CEO of SNC, then Minister of Industry and Commerce. He was heavily involved in the negotiations that led to awarding the James Bay contract, and fought to have Quebeckers run the project. His comments were made *before* the deal was finally struck:

> "It may very well be that the best solution from the point of view of hydroelectricity, namely the ability to produce electricity at the lowest cost, *may not be the best solution in the light of criteria other than the production of energy*"[36]
>
> (Le Devoir, July 15, 1971, *emphasis* added).

Having failed to win the overall management of the James Bay project, Dagenais' assessment was that they had been beaten by Bechtel because of Quebeckers' lack of self confidence[37]. He also recognized that they had failed to assuage the financial concerns of American investors, despite SNC's near perfect record of profitability. Their banker, Earl McLaughlin of the Royal Bank of Canada, suggested they publish annual statements and polish the public image of the company, as a way of dealing with the issue.

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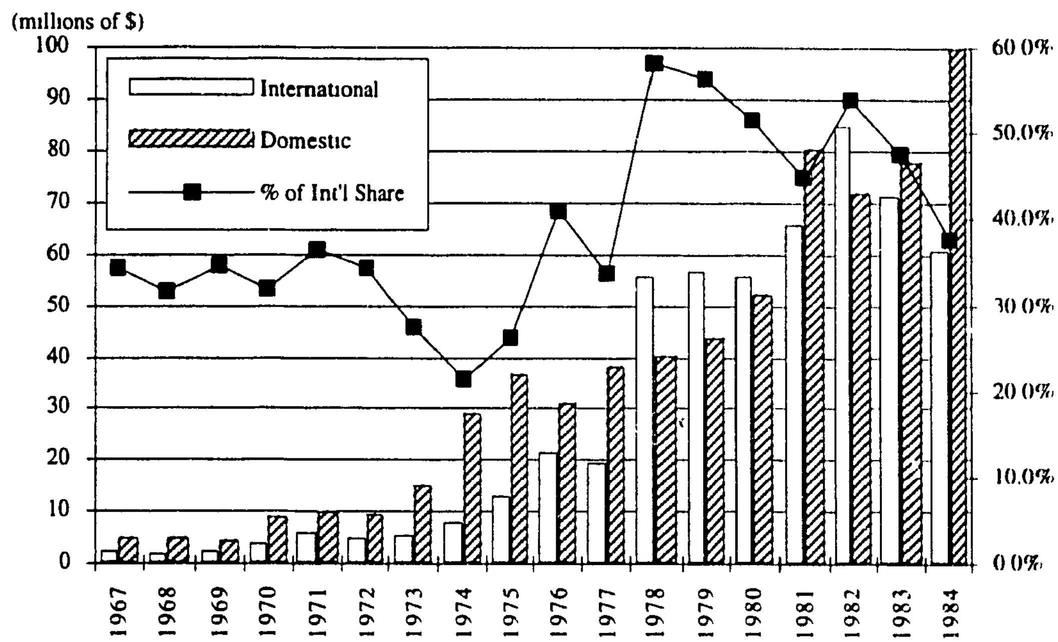
[36] The original French quote is as follows: "*Il est peut-être possible que la meilleure solution sur le plan hydro-électrique, c'est-à-dire de pouvoir produire de l'électricité au coût le moindre, ne soit pas nécessairement la meilleure solution **si on tient compte de critères additionnels autres que des critères de production d'énergie*** (emphasis added)." (Lesage, G. Le Devoir, July 15, 1971).

[37] He is reported to have publically complained several times that Quebeckers had been "victims of their chronic lack of self-confidence in believing that a local firm could not do as well as an outside one" (Lalande, 1992, p.162).

By 1974, SNC's first published annual report showed that it had over 1,500 employees, thirty subsidiaries, and revenues in excess of $40 million, of which 21% came from international business. Among the subsidiaries formed in the early 1970's, three dealt with countries overseas: SNC-Rust, a partnership with an American company; SNC Nigeria, involved in development work; and, in 1973, Deka was formed for the construction of a pipeline in Germany. With these assets, the firm began to make important inroads abroad (see Figure 7.5).

Figure 7.5

Domestic and International Revenues (Consulting Only) 1967 - 1984

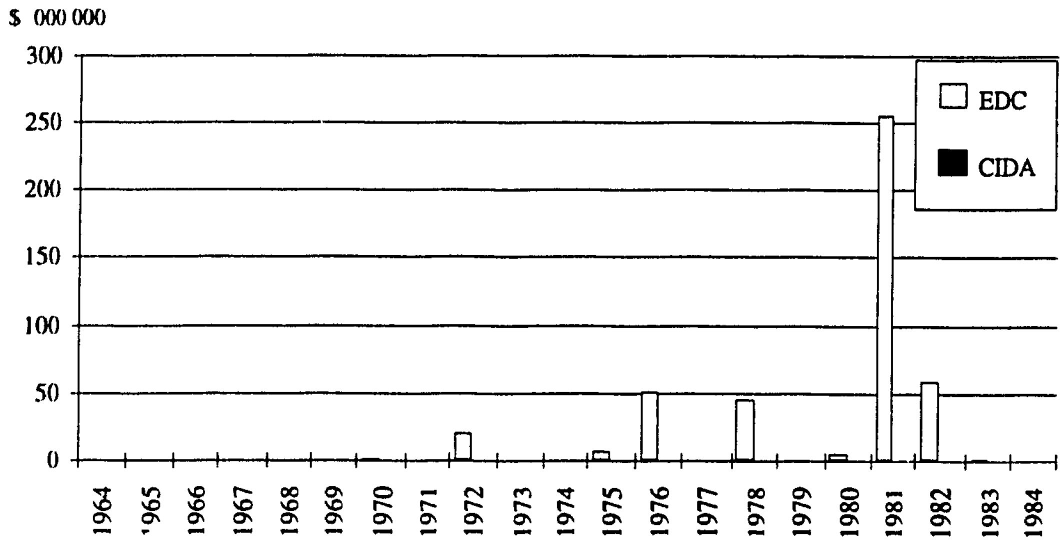


Source: Estimated from Graphs in Annual Reports (1965-1986)

A turnkey project of $167 million to design and construct a foundry for Renault trucks in Algeria brought the firm over $40 million in revenues. This contract was won after three years of competition against one French and two other international firms. Like Monenco, SNC was firmly present on the world market and competing with its biggest players, with a strategy that was very much its own.

Figure 7.6

SNC - Amount of Financing by EDC and CIDA of Projects Overseas



Sources •EDC Annual Reports and Statistical Reviews (1964-1991)
• From data provided by CIDA, especially for this research, June 1992.

Table 7.3

SNC Projects Financed by EDC.

Country	Project	$000 000	Year
Greece	Hydro-Electric Devt	3	1970
Turkey	Lead & Zinc Smelter	21	1972
Turkey	Lead And Zinc Smelter	8	1975
Algeria	Iron Foundry	26	1976
Ecuador	Cement Plant Construction	25.5	1976
Argentina	Kraft Pulp & Paper Mill	34	1978
Chili	Chemical Pulp Plant	12.8	1978
Algeria	Iron Foundry	7	1980
Peru	Copper Mining	255	1981
Ivory Coast	Engineering Services	60	1982
Tunisia	Conceptual Engineering Services	2.6	1983
Algeria	Services & Training For Salt Refinery	1.2	1984

- Sources: EDC Annual Reports and Statistical Reviews (1964-1991)
- *In the report produced by CIDA for this research, there were, as of June 1992,* no projects *in which SNC had acted as a primary executing agent.*

7.17 Conclusion - SNC: Growth through Diversity

Throughout its history, SNC's strategy was defined by *who* its leaders were; and they, in turn, were as varied as its environment. Thus, under concurrent leaderships, the firm grew, simultaneously, in many directions, as its strategy reflected many of the irreconcilable characteristics of its home base. Since it was a truer representative sample of that environment, its performance mirrored that of the local industry perhaps more closely than did Monenco and Lavalin.

After Monenco and SNC, we turn our attention to Lavalin, to witness how the youngest of the three firms related in yet a different way to their common environment.

8. Lavalin[38]

On the surface, the environment of 1936 seemed particularly inhospitable to engineering firms, still hurting from the aftershocks of the Great Depression. Izaak Killam of Monenco, for example, was in the midst of a losing battle with the Ontario government over the fate of the Ottawa Valley Project, and Arthur Surveyer was struggling with the problem of how to retain his key people at SNC, in light of falling revenues. Yet, it was that very year, and in the same environment, that Jean-Paul Lalonde and Roméo Valois heeded the call from their fellow Poly graduate, the new Quebec Minister of Roads, and decided that "the time was ripe for a new engineering firm" (#2: 14; #1:1.3).

There were some undercurrents, imperceptible perhaps to those already in the industry, that seemed to favor their move. Business activities, including construction contracts, were improving from the low levels experienced after the crash of 1929 (DBS, Canada - One Hundred Years, 1967:196). It was also evident that Quebec lacked the basic infrastructures to meet the needs of its growing urban population. But, above all, the overt nationalist policies of the newly elected Union Nationale government of Maurice Duplessis (1936-39; 1944-59) seemed to announce brighter prospects for Francophones.

Roughly of the same age, and both of modest origin, Roméo Valois (30) and Jean-Paul Lalonde (32) had complementary talents that made them "ideal

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[38] As was done with the other two firms, only one name --Lavalin-- will be used to designate the company, throughout its history.

partners" (#2:13, 42). Thanks to a scholarship from the Government of Quebec, Valois had earned a Master's degree from MIT (1932), and was teaching finance at the École Polytechnique while working for the Catholic School Board of Montreal. There, he had built an extensive network of contacts at the municipal and provincial levels (#2: 13-15). Lalonde had ten years of practice, including managerial and technical experience as chief engineer in a Montreal consulting-engineering firm. "Mr. Valois excelled at obtaining contracts and my father [Mr. Lalonde] at carrying them out and motivating the staff" (Interview with Louise [Lalonde] Lamarre, #2:43). Compared to their contemporaries, both seemed to march to a different tune.

> At the time [of the company's founding], engineers who were fresh out of university had to choose between the civil service or a large company. My friend Lalonde and I wanted to work for a company, but we wanted it to be our own.
>
> (Interview with R. Valois, #2:13)

8.1 A Strong Start : 1936-1939

At first, they relied primarily on local government for work, as did all small engineering firms active in the construction of public infrastructures (#2:1). Like the owners of Monenco and of SNC before them, Lalonde and Valois obtained these first contracts through their political connections.

> Mr. Leduc [Quebec Minister of Roads under Duplessis, and fellow graduate of the Poly] was an engineer. He knew us, had confidence in us and awarded us several important contracts.
>
> (Interview with Lalonde, #1)

During their first year of operation, Lavalin executed 50 contracts stemming primarily from provincial public works. They worked with architects to study foundations and plans for reinforced concrete structures for buildings —schools, churches, hospitals— and public infrastructures —roads, bridges and tunnels (#2:1-2).

A year later (1937), Lalonde and Valois formed *National Boring and Sounding Inc.*, Montreal's first geotechnical company, to address technical issues related to the bearing capacity of soils, a problem made particularly acute by the cold climatic conditions of the country (#2:2). The new firm allowed them to participate as a specialized subcontractor when a project was too large for Lavalin.

8.2 Of War and National Politics: 1940 - 1944

By 1939, Lalonde and Valois employed a total of 90 permanent and temporary staff. Their strong take-off came to a near halt at the outbreak of WWII when the country's national resources were redirected toward the war effort. While corporations and regions of the country involved in 'strategic industries' grew rapidly during the war (Ball, 1987:108-9), no similar spurt of construction activities was experienced in Quebec (Table 4.3).

To make matters worse for Lavalin, the Union Nationale, which had played a seminal role in the formation of the firm and was its primary source of contracts, also lost the election in 1939, and did not regain power until 1944. Not surprisingly, the firm's annals depict a bleak picture of that period. "World War II would soon curtail [our] initial expansion and the firm would lay off employees temporarily". As construction dropped off, Mr. Valois sought salaried employment —like Arthur Surveyer did during the same period— and "found himself working partly at his firm's office and partly at a military supply company" (#2:2).

8.3 Recovering: 1944 - 1960:

Lavalin's fortune rebounded when the Union Nationale returned to power in 1944. Two years before most Quebec firms, Lavalin showed signs of renewed optimism as business "pick[ed] up slowly, increasing steadily until the end of the decade. At the same time, the construction industry moved back into full swing" (#2:2). The liberal government was beginning to take charge of electric production in the province through Hydro-Quebec; it also began to assume administration of education, health, social affairs and culture, domains still jealously guarded by the Catholic Church. These measures, which were implemented after the war, resulted in the construction of more roads, bridges, schools, and hospitals. Lavalin worked on more than 200 school projects, 35 hospitals, some institutional and commercial construction, but most importantly, in highway construction, where the government could act unimpeded, and grant contracts strictly along partisan lines (Fraser, 1987).

During their next sixteen years in government, the Union Nationale undertook extensive construction of public infrastructure, and, between 1945 and 1960, engineering activity in Quebec grew at an extraordinary rate (Chapter Four: Figures 4.3 - 4.5).

During its second term in office, however, the provincial government ceased to a providential source of business for the firm. Lavalin's growth, measured by the number of permanent staff of engineers and non-engineers, appears to have been important, but less spectacular than that of the industry: the staff grew from around 20 employees in the beginning of that period, to 50 employees at the end of the 1950's.

8.4 Broadening its Source of Business

Unlike Monenco and SNC, Lavalin continued to rely upon the provincial government —and the Union Nationale in particular— for its business. Although this arrangement had been most beneficial until then, much had changed in their environment, since their founding: François Leduc, their main contact, was no longer in government (Allard, 1990:54); the Union Nationale, once beaten, had widened its political base; there were more engineering firms vying for provincial contracts; and, furthermore, the federal government was becoming more active in the economy of the province. Lavalin endeavored, in the 1950's, to adapt to these changes, and finally succeeded in winning some federal contracts, a move which broadened their source of revenues, and, later gained them entry into the other provinces of Canada.

Their first federal contract came in the early part of the decade when their subsidiary, National Boring and Sounding, acted as consulting engineers in the construction of the Lachine Canal, which was completed in 1954 (#1:2)..But, the St. Lawrence Seaway project was Lavalin's most noteworthy achievement, for that colossal contract was won despite the fact that the firm was closely associated with the provincial government. This *tour de force* —given the acrimony between the provincial and the federal governments of the time— exposed the firm to large-scale projects for the first time.

The St. Lawrence Seaway was a U.S.-Canadian mega-project aimed at making the St. Lawrence Seaway accessible to high-tonnage ocean-going vessels (#2:26-87). It was an old and controversial idea which Jacques Cartier had tried and failed in 1536, and which had been supported by successive governments in Ottawa, and systematically opposed by those of Quebec and of Montreal. The federal government was eager to gain easier access to the ocean, while Quebec feared that the project would undermine Montreal and the whole province, as "ships [would] pass right by our ports and go straight to the Great Lakes" (Duplessis, quoted in Le Devoir, January 29, 1941). During the fight between Quebec and Ottawa regarding the country's participation in WWII, the project took on added dimensions. The Canadian government considered it to be of strategic significance, while it became a matter of national pride for Quebec to resist what seemed to be another federal foray into their territory.

The political battle was also fought with a number of technical and economic studies. Arthur Surveyer, of SNC, was called upon as a known expert in such studies[39], and also because he had earned credibility outside of Quebec, namely in the U.S.. His conclusion came down, unequivocally, on the province's side: Surveyer was strongly and publicly opposed to the project and argued, in his *Brief on the St. Lawrence Seaway,* that it was too costly —at least one billion dollars— and that it would "paralyze industrial production" (Le Devoir, January 17, 1941).

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[39] As early as 1912, Arthur Surveyer had co-authored a report to the federal government, in which he argued that the construction of a Calumet-Sag canal would have adverse effects on water levels. As a direct result of his *Rapport à Shipping Federation of Canada,* the Secretary of War Henry Stimson turned down the project, saying that it was "manifestly harmful to Canada" (SNC archives, microfilm 47, in SL, p.23).

When the project resurfaced in 1954, it had the financial backing of the U.S. government. Both Chênevert and Nenniger, who rarely agreed on anything, urged Surveyer to use his influence with his friend Canadian Prime Minister Louis Saint-Laurent to secure a share of the work. For a long time, Surveyer resisted, sticking to his principles. In the end, he yielded but the firm obtained only 'residual work' stemming from the Seaway project. This missed opportunity was not too sorely felt because, the same year, SNC won a preliminary study that led to the Manic hydro-electric project.

What would have been the source of modest contracts for SNC, was a stroke of good fortune for a firm the size of Lavalin, in terms of revenues, opportunity for learning and because it freed the firm from its economic dependency on provincial projects. It also gave Lavalin exposure to construction management and project coordination, which involved "establishing the functional and technical aspect of construction projects" (#2:4). Thereafter, Lavalin and its subsidiary participated in "all the major national projects, including the Trans-Canada Highway and a number of bridges spanning the St. Lawrence River" such as the Honoré-Mercier Bridge (provincially-owned) and the Champlain Bridge, owned by the federal government (#2: 2-3, 29). In the latter project, Lavalin was retained to design *and* supervise its construction (#2: 29-30).

8.5 A Belief in Concrete

The use of prestressed concrete piers, and the fact that nearly the entire surface of the five kilometer long (including access roads), six lane-wide Champlain Bridge was made of concrete, were advanced techniques for the time. Later, the mastery of concrete became a basis of product diversification for the firm. It began as a personal matter for Jean-Paul Lalonde, for whom that material held a "*special attraction*" (Interview with Bernard Lamarre, #2:49).

> In the field of construction, for example, [...my father, Jean-Paul Lalonde] advanced the study of concrete significantly. The English preferred to use steel, but he began using concrete for his structures. He had a great deal of confidence in that material. If you saw his house in Sainte-Adèle, you'd understand.
>
> (#2:43; Interview with Louise Lamarre, *daughter of Jean-Paul Lalonde, and wife of Bernard Lamarre*)

Specializing in concrete at a time when the trend was to use steel may have allowed the firm to survive the depressed industry in Quebec during WWII when metals were strictly rationed (#1:1.5). Later, in 1967, Lavalin was one of the major participants in the construction of the Lafontaine Bridge-Tunnel, then "the largest prestressed concrete structure in the world" (#2:89). In the construction of Place Bonaventure, Lavalin used "an unheard-of quantity of 170,000 cubic yards of concrete" (#2:49). When it entered international markets in the 1970's, concrete was found to be "the ideal material for developing countries [being] both economical and flexible." (#2:50). The seeds for these future developments were planted in the late 1950's, nurtured partly by the personal inclinations of Lalonde and of his new chief engineer and son-in-law, Bernard Lamarre, and, partly by the circumstances of their work.

8.6 Changing Gears: 1960 - 1972

By 1960, the company had 29 professional engineers, whose expertise covered most areas of civil engineering: studies, consulting, reports, plans and specifications, estimates and, most importantly, construction supervision. That year, the Quebec political scene changed radically as a consequence of the death of Maurice Duplessis. The traditionalist Union Nationale —leaderless and plagued by scandals— lost power and was replaced, within a few months, by the Liberals who vowed to bring about social and economic changes designed to bring Quebec into the modern world.

> The current economic situation has forced us to rethink our traditional views. We need powerful means, not only to take up the inevitable challenges we will face in coming years., but also to bring French Canadians into step with the times.
>
> (Liberal Premier Jean Lesage, in #2:87)

The 'powerful means' were sorely lacking, however. As a result of the former government's preoccupation with preserving Quebec's French Catholic core by shielding it from "progress" and from outsiders, the province had a relatively small and inexperienced Public Works Department. Consequently, the new liberal government had little choice but to "to call upon private enterprise to execute the engineering components of its social reforms", a policy that gave local engineering firms "a boost not enjoyed by their counterparts in the other provinces" (#2:5).

> Quebec was playing catch-up and it had to build many things at the same time —highways, hospitals and schools— even though the public sector did not have the expertise. That's why the government turned to private firms.
>
> (B. Lamarre, #2:31)

The change of government in Quebec also enabled the quick resolution of a long-standing contentious issue regarding the construction of the Quebec section of the Trans-Canada Highway. This large-scale project necessitated a great number of access routes be built. Lavalin, who had already managed the difficult feat of working with both levels of government, was in a strategically enviable position. It was one of the three firms commissioned to undertake major segments of the project, such as the Lafontaine Bridge-Tunnel. Lavalin also "took the initiative of completing the plans for the Turcot-Saint-Denis [Ville-Marie Expressway] section using its own data so that it could immediately respond to [and win] the government's calls for tenders" (#2:92).

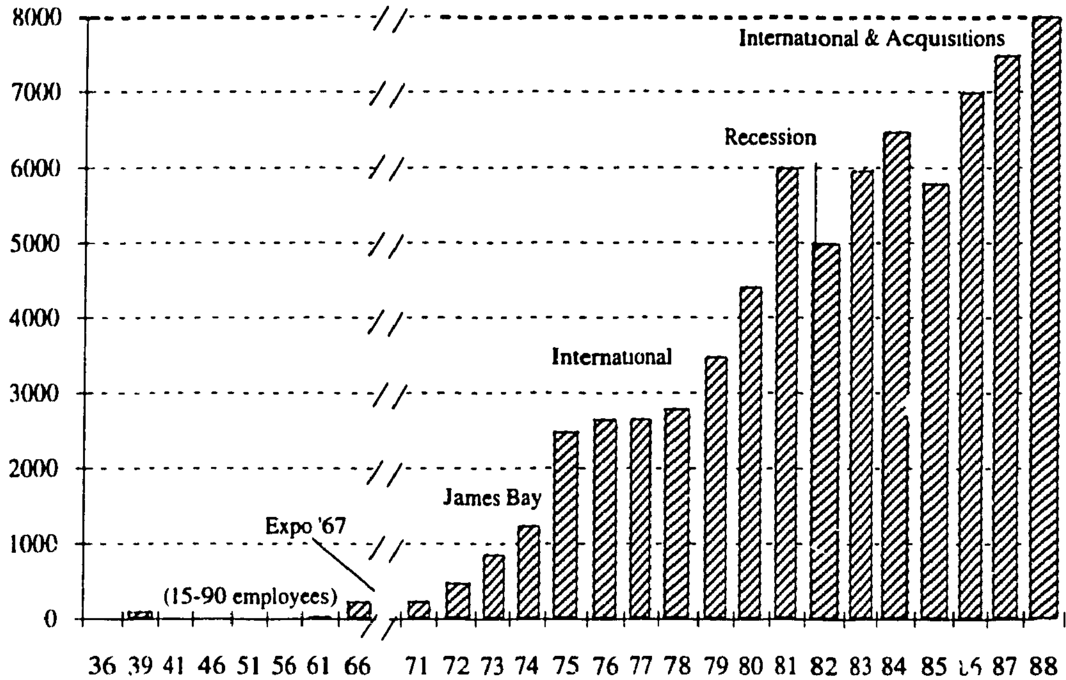
Lavalin also maintained a good relationship with Paul Gérin-Lajoie, the new Minister of Education (called the Minister of Youth until 1964). His government's three point-plan for education (• end the church's control over education; • implement free education up to the twelfth grade; • build larger schools for greater efficiency) spelled wonders for local engineering firms. To implement his plan, the Minister set up regional school boards and undertook the construction of 225 "polyvalent" schools throughout the province. In 1962, Lavalin signed a contract with Gérin-Lajoie's department to manage the construction of the "polyvalent" schools (Lalande, 1992: 55-59).

The return to power of the Union Nationale in mid-1966 dampened Lavalin's performance during the second half of the 1960s, except in the area of education where Valois and Lamarre found a new ally in the Union Nationale Minister of Education, Marcel Masse. He also endorsed Lamarre's view that the construction of the schools was better handled by engineers than by state administrators, who were not technically trained and required life-long employment. Thanks to his support, Lavalin was in the enviable position to loan its employees and consolidate its ties at the ministry. Lamarre, the new partner at Lavalin, showed that he had the necessary skills to deal successfully with the intricacies of the construction industry (Lalande, 1992: 55-59).

Figure 8.1

Permanent Staff at Lavalin

(Selected Years: 1936-1988)



Sources: (1936-1981): • Co. Publications; • Lavalin Communications Dept.
(1982-1988): • Annual Reports ; • Les Affaires, Cahier Spécial sur l'ingénierie, April 23, S-6.

8.7 1972: The Lamarre Era Begins

Concrete Plastic Behavior was the title of the Master's thesis written by Bernard Lamarre, the man who married J.P. Lalonde's daughter Louise, and headed the company as President and Chief Executive Officer starting in 1972.

Born five years before Duplessis took power, Bernard Lamarre was well rooted in the rural Quebec that was so profoundly transformed by the Union Nationale's policy. His father Emile, a second-generation building contractor in Saguenay, and his mother, Blanche, a devout Catholic, gave their eleven children a strict upbringing based on hard work and professional careers. Among Bernard's brothers and sisters, there were three other engineers, four doctors, two lawyers, and a dietitian. Dutifully, he followed the path set by his parents and came first to Montreal to earn an Engineering degree at the École Polytechnique; from there, he went to England where he studied English and earned a Master's degree at the Imperial College of Science and Technology. A strong and determined person, he defined himself as having "only one woman, one religion, one job, and one restaurant [the Beaver Club, in Montreal's Queen Elizabeth Hotel]" where he lunched every work day (CV.; Fraser, 1987: 169-171)[40].

By contrast, his public image has been highly controversial "He is full of bullshit and he knows it", remarks Dagenais, appalled by Lamarre's way of conducting business. While the Quebec press has hailed him as a "hero", "a patron of the arts" (in reference to his private art collection and to his chairmanship of Montreal's Musée des Beaux-Arts), he has also been called a "tyrant" and "a scheming manipulator" by others (Fraser, 1987: 164, 179). The controversy surrounding Lamarre is due, in part, to his tendency to hire former provincial and federal politicians, a charge to which he readily admits: "I don't see anything wrong with attracting the talented people you can find. [...] Politicians have a lot of experience and a lot of contacts" (Fraser 1987: 166). L'Actualité[41], a major Quebec magazine, described him as a "busy beaver. [...] always building dams". That metaphor describes not only what he does, but how he does it, according to the Toronto's Globe and Mail's Report on Business, which subsequently noted

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40 Bernard Lamarre and his wife Louise [Lalonde] Lamarre had similar aspirations for their seven children They wanted three engineers, a doctor, a lawyer, an architect, and an economist. They almost got what they wanted, except that their son Jean studied business instead Apparently forgiven for his trespasses, he became a V.P. of Finance at Lavalin (Fraser, 171)

41 Actualité, Georges Hébert Germain, Feb 1987.

that "as a beaver responds to running water, [Lamarre] responds to opportunity: he immediately starts building a structure to trap it". (Fraser, 1987: 164-5).

8.8 The James Bay Contract: New Notes on the Engineering Industry?

Lamarre assumed the leadership of the firm in 1972, replacing Jean-Paul Lalonde and Roméo Valois, then 68 and 66 years old respectively (Jean-Pierre Valois, the only "son" in contention for the post, was a diagnosed manic-depressive who later took his own life) (Allard, 1990: 94). His tenure began with a master stroke, that same year, when he outmatched SNC and Monenco and secured part of the management of contracts for the James Bay hydro-electric project. A closer look at how this arrangement was reached, and at how Lavalin managed to win the race —which few knew it was running— brings into sharp relief factors that often remain hidden in contract negotiations.

8.8.1 James Bay: Cut One.

For Camille Dagenais of SNC, James Bay began a few years earlier as a campaign platform of Robert Bourassa, a young economist running for the leadership of the Liberal party, at a time when they enjoyed rising popularity, and seemed well positioned to oust the ruling Union Nationale from power. The prospect of such a huge hydro deal was enough to entice Camille Dagenais, "not known as a political gamesman", to break with tradition and make overtures to the aspiring premier of the province. Bourassa reportedly agreed that if SNC supported him in his quest for the leadership and the premiership, he would, if elected "award

SNC the management contracts on all James Bay energy projects" (Fraser, 1987: 173-4).

Soon after becoming, at age 36, the youngest premier in Quebec's history, Bourassa set up the James Bay Development Corporation, headed by Pierre Nadeau, to implement and oversee the whole project. Nadeau decided to award its management to a consortium of three Quebec-based firms led by SNC, the largest and most experienced, to be seconded by Monenco and Janin. The choice of the firms and the basis for their ranking sat well with Dagenais, who saw that events were unfolding as they should.

Not everyone was happy with these developments, of course. Feeling overshadowed by Nadeau's James Bay Development Corporation, the top managers of Hydro-Quebec sought an alternative that would exclude his tri-partite consortium and leave them a more important role to play. Seeking allies outside Nadeau's formula, they argued in favor of awarding the James Bay construction to Bechtel —an American multinational corporation— and to Acres International —an Ontario-based firm— both of which had proven their abilities in the construction of the $1 billion Churchill Falls hydro-electricity dam. It was also clear that Bechtel could exercise great political clout at different levels given that its former directors included U.S. Secretary of State George Shultz and U.S. Defense Secretary Caspar Weinberger. At that time, the worldwide conglomerate was in court for bribing New Jersey officials over a pipeline contract, a charge for which it was subsequently found guilty and fined (Allard 1990; Fraser, 1987: 175; Lalande, 1992).

The "political aspect[s] of the business" may not have been "as important" to Dagenais, until he read in the morning paper that Bechtel had been awarded the contract, with Lavalin as junior partner. Furious, Dagenais made vigorous appeals to Bourassa who deflected the complaints to his aides. Later, Dagenais met with Guy St-Pierre (then a member of Bourassa's cabinet) and enlisted his support, but to no avail (Allard 1990; Fraser, 1987: 170-7).

8.8.2 James Bay: Cut Two.

The James Bay project was, by any measure, a "boldly romantic scheme"[42] which captured the imagination of Quebeckers and struck many of the chords that made their society vibrate during the Quiet Revolution. Indeed, it was an awesome, collective challenge, which symbolized that Francophones were taking charge of their province's natural resources; it meant Quebeckers working for Quebeckers, building Quebec, and effectively becoming masters of their own home.

It soon became clear who was underwriting the mortgage, however. This 10-year, $4 billion project (progressively raised to $15 billion), was largely financed by U.S. private funds. Thus, in addition to technological requirements, there arose a need to reconcile:

- the concerns of the American private investors, by allowing them to oversee the construction closely, and,
- the social aspirations of the provincial government, by having a visible and unequivocal Francophone presence at the forefront, as a flag carrier.

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[42] Fraser, 1987: 174.

Neither side of this dilemma could be resolved by awarding the project to the consortium of SNC, Monenco and Janin. For one thing, none of the three firms was American. For another, SNC was a multiethnic "Canadian" firm, Monenco was truly English Canadian, and Janin was owned by a foreigner —a Frenchman— Henri Gautrin. (There was, evidently, an uneven distribution of Francophone engineers among the three focal organizations: Monenco had only 5.1% Francophone engineers, SNC 57%, and Lavalin 95%)[43]. Nadeau's consortium formula lacked the two key ingredients that could satisfy the economic and political realities of this project: American control and Francophone content.

Hence, Bourassa chose Paul Desrochers, his *éminence grise* and ardent supporter of Bechtel, to handle these aspects of the deal. A series of meetings which pitted Hydro-Quebec against the James Bay Development Corporation were held. Giroux (of Hydro-Quebec) seeking to secure a more important role for the state-owned corporation joined forces with Desrochers and became an objective ally of Bechtel. Lamarre was being kept abreast of these developments by Claude Rouleau, a fellow Poly graduate and Desrochers' assistant. When the time seemed propitious, Lamarre asked to meet with the president of Hydro-Quebec:

> Mr. Giroux, I think I know what you're thinking. I believe that I have found the solution to help you pull-off the "coup" of the century. *I am offering to become the "Quebecois" participant to calm public opinion.*, which would allow you to associate with Bechtel and obtain financing.
>
> (Allard, 1990: 86, *emphasis* added).

[43] Source: *Bulletin de la Corporation des ingénieurs professionnels du Québec*, 1960, in Gagnon, 1991 338 and 344.

Lamarre's unabashed but Solomonic proposal bore fruit. At the conclusion of several meetings held in Quebec and in New York, among representatives of the various parties, and from which Nadeau was later excluded, the management of the project was split in two: the lion's share went to Bechtel Québec Limitée —which received $36 million and was put at the helm— and the rest went to Lavalin which received $15.6 million (#2, pp 3.06-08).

Although Lavalin received only a quarter of the management fee, it made a lot more money on the construction work, since it had 447 workers on the site (employed on a cost plus basis), versus Betchel's 87 (on straight cost), and Hydro-Quebec's 103. (Fraser, 1987: 177). By 1977, Lavalin "loaned" 1,200 employees to the project. Ultimately, the project netted fees of $456 million for Lavalin (Allard, 1990).

Most importantly for the future, the James Bay venture gave Lavalin the opportunity to upgrade its knowledge base and build a reputation in the management of large-scale projects under the 'tutorship' of one of the world's largest engineering firms. Until then, Lavalin was a medium-sized, provincial engineering firm, specializing in highway and building construction. Henceforth, it counted itself among the bigger players in Canada.

8.9 The Unseen Environment

In addition to technological know-how and reputation, Lavalin also furthered its ability to handle the sensitive, non-engineering aspects of project management. As co-manager of the James Bay project, it was called upon to deal with the Cree and the Inuits, as well as with ecologists who were concerned with the impact of the project on the environment and on the aboriginals' way of life (#1:63-

69)..The approach taken by Lamarre's team was to reach out and co-opt, as required.

Their negotiations with the native peoples motivated Lavalin to "modify its work methods and even develop new ones" in order to satisfy their demands and respect their way of life (#1:3.12; author's translation). "Few people had ever bothered to go and see them in their own milieu and discuss things with them. The initial period was spent getting to know them" (Interview with A. Couture, President of Shawinigan Lavalin Inc., *and* Chairman of Hydro-Quebec Environmental Advisory Committee) (#1:67).

In 1971, concerns over the project's environmental impact were outlined in a report by a federal-provincial group headed by André Marsan, consultant to the Provincial Environment Minister. Two years later, he joined Lavalin and formed André Marsan & Associés Inc. (#1: 66, 81).

A number of former politicians were also appointed at Lavalin in the 1970's and the 1980's. Marcel Masse, the former Union Nationale Minister turned federal Conservative, joined Lavalin as Corporate Vice-President, Marketing and Business Development, after loosing his bid for the leadership of his party in the early 1970's[44]. Yves Bérubé, was also hired as vice-president, when he quit as Energy and Resource Minister of the separatist Parti Québecois, and after being turned down by SNC, who judged his quest inappropriate. He was joined by his fellow Parti Québecois Cultural Affairs Minister, Clément Richard, who became

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[44] Lavalin pleaded guilty to three counts of illegal contributions to Masse's electoral campaign (La Presse, January 31, 1986)

Vice-President, Communication and Marketing of the Lavalin Group (Fraser, 1987: 165-169).

The appointments of former Parti Quebecois ministers were more a reflection of Lamarre's pragmatism, than an indication that he shared their separatist views. He "was not thrilled, to say the least" by their election in 1976, which he deemed "regressive" (Interview with B. Lamarre, #2:34).

Lamarre seemed to show no party allegiance nor hold grudges, betting more on people and their future potential. The day after Guy St-Pierre —now President of SNC— failed in his bid for re-election as a Member of Parliament (against the Party Québecois), Lamarre called him up. St-Pierre was surprised, and impressed:

> I couldn't believe it [...] I had never done anything for you. In the James Bay business, I had even opposed you [...] You were the first to call, deploring what had happened to me, and giving me a choice between three firm offers. I finally went to Labatt, but I never forgot what you did.
>
> (Guy St-Pierre, in Lalande, 1992: 245).

8.10 Relationship with the Poly

As Lamarre saw it, Lavalin's critical environment also included its supplier of engineers, the École Polytechnique de Montréal. From the time of its founding, the firm maintained a "special rapport" —a form of "symbiotic" integration— with the Poly, which grew to become the second largest engineering school in Canada and the largest in Quebec.

> The growth of one has been inextricably linked to the other. [...] Perpetuating the idea that industry cannot exist in isolation from its primary source has been the cornerstone of the connection that has existed since the formation of the firm.
>
> (#2: 52).

This special relationship has been manifested in many ways. As far back as 1936, members of Lavalin —including Mr. Valois— had taught at the Poly. Bernard Lamarre, a graduate of 1952, maintained a close, personal relationship with the school and especially with his former classmates.

> His generosity towards the school knew no bounds... in fund-raising, as well as at the personal level.
>
> (Personal interview with Doré, 1992)

When asked about the role that Lamarre may have played in fostering such close links between his firm and the Poly, the President of the École Polytechnique added:

> Well, regarding Bernard Lamarre, I would say that it is due to the character of the man, himself. Bernard Lamarre is a very loyal and generous man. To illustrate. He is a '52 graduate. At every fifth anniversary of graduation (up until '77, '82, '87; now, in 1992, he cannot do it for obvious reasons)[45], he got everyone together from his class and paid for them to take a trip somewhere in the world.
>
> (Ibid, 1992)

Thus, in the 1985 fund raising campaign, Lamarre and Dagenais (of SNC) made personal contributions totaling $75,000 to the "Poly".

On an institutional level, the École Polytechnique is "indebted to Lavalin for the installation of the school on the campus of the Université de Montréal" (#2:52; #1:1.10) and for its subsequent extension in the 1980's (Gagnon, 1991). The firm

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45 At the time this interview was held, Lavalin had already collapsed, and the engineering branch of the firm had been acquired by SNC.

also took "upon itself to hire graduates of the school", as well as "financing certain master's programs", such as petrochemistry, heavy machinery, instrumentation and process control, and industry processes (Gagnon, 1991: 315, 409; #2:52; #1:1.10).

8.11 International Markets

Lamarre was eager to build on Lavalin's privileged contacts and on the experience and recognition it had gained during the construction of James Bay. He considered expanding into industrial markets in Canada and exporting their services abroad. Many factors made the latter strategy more attractive. "For one thing, the Canadian dollar took a plunge [..] which had the positive effect of [...] encouraging export. [Also] the first generation of young managers who had rushed into Quebec business schools in the early 1970's was graduating and moving into Quebec companies" (Fraser 1987: 92, see Figures 5.1 and 5.2). The international markets appeared especially accessible now, since CIDA's mandate had been broadened to include French-speaking developing countries, which were seeking the very kind of services that Lavalin could offer.

> In 1966-67 [when the Union Nationale was returned to power] we had an economic downturn and, to keep people on staff, we had to find projects. Industrial contracts were going to U.S. multinationals, so we turned to Francophone Africa.
>
> (B. Lamarre, #2:31).

The firm's earliest attempts at making inroads in the international market had begun in 1963, when it formed *Lalonde, Valois International Limité.* It was an ambitious name at the time, since its actual and "modest debut on the international scene began with a [$300,000] transportation study in Benin [in Africa] in 1968", financed by the World Bank (#5, Fall 1986:2-3).

Lavalin's ambitions to enter the international market as early as 1963 may have been premature. But, by the 1970's, the firm's increased skills in construction management and project coordination put them in a better position to serve the complex needs of the international market.

Its second overseas contract was awarded in 1970 by CIDA, now headed by Gérin-Lajoie, the first of many Francophone presidents. The project consisted of building a 400 km "Route de l'unité et de l'amitié" in Niger, West Africa. It reflected CIDA's revised mandate to build a stronger presence in Francophone countries, in line with Prime Minister Trudeau's policy of asserting Canada's bilingual character (Allard, 1990:125; CIDA 1992.

Lamarre and his colleagues maintained close relationships with a number of high ranking officials of the federal foreign aid agency. They could count on their old acquaintance from the provincial government, Gérin-Lajoie, on his private secretary Georges Proulx (who was married to Bernard Lamarre's sister), as well as on Jean-Pierre Goyer, the Federal Minister responsible for CIDA (Gagnon, 1991: 385). In 1979, Goyer left politics and joined the Board of Directors of Lavalin International. His federal successor, Charles Lapointe, was also on good terms with Lavalin, which he joined in 1984.

The ability of the firm's senior managers to deal with government institutions and their officials was long established. Over time, this trait permeated all ranks. During the James Bay project, many staff members learned to relate on a personal basis with individuals of different cultural backgrounds. These skills proved to be essential when Lavalin ventured out into international markets, initially in French-speaking Africa.

The "Route de l'unité et de l'amitié" (which many European firms had deemed *technically* impossible) clearly brought to light the *social* dimensions of Lavalin's mandate. It proved to involve more than building a road under difficult conditions. Indeed, it also involved dealing with people from different cultural backgrounds, setting up a training program for local engine conductors and mechanics, and bringing workers from Niger (on scholarships) to complete their training in topography in Canada (#1:3.06-07). Canadian firms often had to hire and train indigenous personnel both locally and in this country (#1:3.04; CIDA, 1967-68 report); hence the importance of the languages, cultures, political climate and overall attractiveness of the firm's home base.

Clearly, some of Lavalin's comparative advantages were *endogenous* to the firm (its expertise, the composition of its staff, even its reputation —which originates inside the firm). But, others were *exogenous* (Canada's history and foreign policy, Quebec's languages and cultures). Together, they facilitated Lavalin's entry, and eventual success or failure, into the world market. Initially, engineers from Quebec were more welcome than their European counterparts because:

- they had extensive experience on major projects under difficult climatic conditions;

- they originated from a country with no history of colonialism [Quebeckers could even claim to have been colonized themselves];

- they offered state-of-the-art technology (in French and English), and offered America without being Americans.

- many developing countries were trying to diversify their source of foreign aid, away from the former colonial powers.

(#2:111; #1:3.01-02)

By 1977, with a reasonable international record in hand and offices already opened in Dakar, Paris, Bogota, Manila, Port-au-Prince, Nairobi, Ryad and Algiers, Lavalin formed *Lavalin International Inc.* Operating on the international market on such a large scale tested the firm's adaptiveness, for it meant dealing with a variety of international financial backers and local governments, and surmounting numerous obstacles unrelated to engineering, such as the need to comply with local customs. Each project shaped Lavalin's staff whose way of thinking and operating was broadened by the differences they encountered and enhanced by new technical and interpersonal skills (#2:8).

It was not until the mid 1980's, however, that international projects accounted for an important part of their revenues. Revenues from international projects rose steadily, accounting for less than 15% of the firm's engineering revenues in the late 1970's, to reach one half by the end of the 1980's. It was, by then, an established pattern to expand into new markets, whenever old ones became sluggish.

> To sum up, I'd say that with Duplessis we were born, with the Quiet Revolution we grew and expanded, and with the recession we went international.
>
> (B. Lamarre, #2:31)[46]

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[46] It is not quite clear, in the context of the interview, whether Lamarre was referring to the recession of the early 1980's. What is more certain, however, is that his statement reflects the perennial challenge of finding new venues to keep the staff occupied during downward turns.

In 1983, Lavalin entered the European market by forming a new entity with Lafarge Coppée S.A., taking on four new divisions and three regional centers, in Paris, Brussels and London. It also opened a permanent liaison office in Beijing, China. Completion of the Sanctuary of the Martyr in Algeria led to a series of contracts in that country (see Table 8.1). Lavalin conducted major hydroelectric projects in Central and South America, the Caribbean and Asia. International activities, with more than 50 new projects in 35 countries, accounted for close to 50% of its overall operations.

8.12 Growth and Strategic Periods

With considerable simplification, the strategic history of Lavalin can be described in terms of the products and the markets that it that it served (Ansoff:1965):

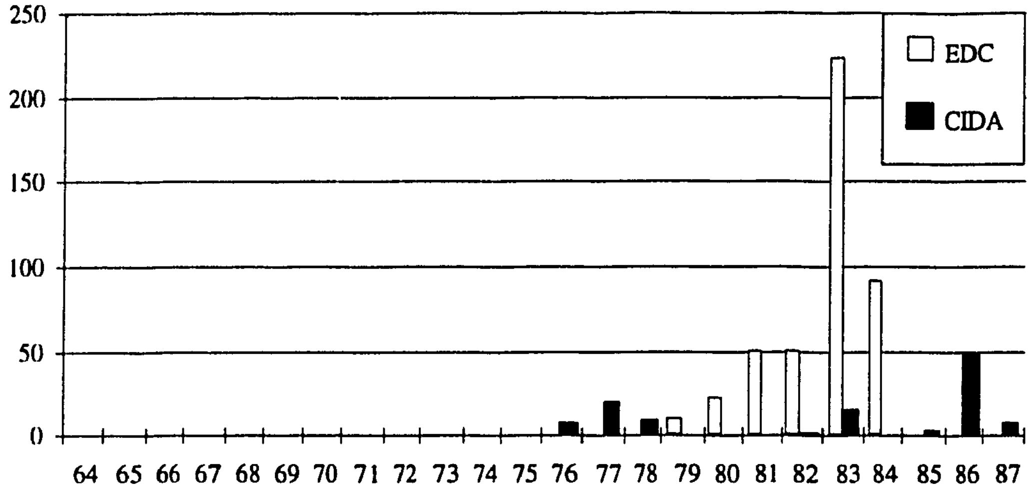
•up until the late 1960s, it was a small highway constructor, and its strategy was one of *Market penetration,* specialized in special niche of public sector work in Quebec. During that period, there were few changes in either its mission or its product, and its attempts at market development on the international scene, for example, did not succeed.

•by the early 1970s, its earlier success in the Quebec market made it rank as a medium-sized provincial firm; then, it entered the hydroelectric field, and followed a strategy of *product development,* offering new products to its traditional niche.

•by the latter part of the 1970's and through the 1980's, it ranked first as a national firm, and then as an international firm, and it pursued a strategy of *diversification*, offering *new* products —through acquisitions of specialized firms— to *new* markets, throughout Canada and the world.

Figure 8.2

Lavalin - Amount of Financing by EDC and CIDA of Projects Overseas
($000 000)



Sources: •EDC Annual Reports and Statistical Reviews (1964-1991)
•Unpublished Information provided by CIDA, June 1992.

Table 8.1

Sources: EDC Annual Reports and Statistical Reviews (1964-1991)

Lavalin Overseas Projects Financed by EDC
(1964-1987)

Country	Project	$000 000	Year
Algeria	Housing Facilities	12	79
Cameroon	Electrification System Expansion	24	80
Algeria	Engineering Services	47.6	81
Algeria	Services	3	81
Algeria	Construction	50	82
Algeria	Services	1.6	82
Algeria	Construction Services	133	83
Kenya	Construction	30	83
Algeria	Construction Services	29	83
Algeria	Construction Services	27	83
Algeria	Construction Services	5.2	83
Algeria	Cultural Centre	42	84
Algeria	Cultural Centre	26	84
Algeria	Office Building	18	84
Algeria	Hotel Construction	8	84
Algeria	Park Development	5	84

These stages of growth accompanied (sometimes preceding, sometimes following) changes in its internal and external environments. A number of events are clearly observable: formation or acquisition of companies, changes in its organizational structure and policies affecting organizational development. They constitute an important part of the organization's strategic actions and responses.

Within Quebec, growth was motivated by new projects, which required the acquisitions of firms when internal skills where lacking, or the formation of new ones to retain the needed personnel.

Outside the province the sequence was reversed, and was riskier. Since interprovincial barriers limited its ability to operate freely throughout Canada, it grew by acquiring firms in other provinces in the hope of subsequently obtaining new projects.

In Quebec and in the rest of the country, several firms were either formed, acquired or became affiliated, broadening Lavalin's geographical and technological bases and enabling it to undertake larger projects. More links were added to the chain with firms specializing in sanitary engineering and municipal works, maritime consulting, aerial photography, economic studies, ecological and environmental studies, hydrologic projects and management problems. Outside Quebec, Lavalin acquired Fenco and Geocon, a Toronto-based firm with branches and offices already established in most provinces.

International growth started in earnest in the late 1970's and became important during the 1980's. Between 1968 and 1984, Lavalin completed over 600 projects overseas, over half of which were in French-speaking Africa (Dumais, J. 1988, in Gagnon, 1991: 385). Since much of its work was financed by Canadian and international agencies, the company's bids were made almost exclusively in Ottawa and Washington in the 1960's. In the 1970's, international activities had driven the firm to set up its foreign offices primarily in French-Speaking Africa, to maintain and foster its presence there. During the 1980's, however, there was a shift of emphasis to less poor countries and to larger projects, which caused Lavalin to turn to the Export Development Corporation, and to open offices and participate in a number of consortia in the U.S.A., the Soviet Union and China.

Since Lavalin was, by then, well established throughout Canada, its domestic acquisitions were motivated by the need to gain new expertise, while those made in foreign countries were gateways to new markets: learning at home and selling abroad. Typical acquisitions of the first type include: James F. Maclaren Limited, a Toronto firm specializing in water treatment and industrial waste treatment; and, a year later, King, Murphy & Associates Ltd., a British Columbian firm specializing in engineering services for lumber mills and wood products operations (#2:9). The formation of Lafarge Coppée S.A., in 1983, to enter the European market illustrates the strategy of the second type (#2).

8.13 Growth and Structures

Throughout its history, Lavalin underwent relatively few changes in its financial and organizational structures. In 1936, it was a local firm, with a dozen employees; by 1988, it had become a very large firm which employed 8,000 people, but it remained structured and was run like a small one. The private addresses and phone numbers of its CEO and other top managers were listed in the Montreal telephone book; few offices had doors, and, often, internal memos to the president were answered in his own handwriting on the corner of the page.

After fifty-two years, it remained a highly centralized private organization, owned and controlled by two to six owners-managers[47]. Up to the early 1960s, it was owned jointly by Lalonde and Valois; by 1973, Lamarre owned 33.5% of the shares, and five other associates held 13.33% each. By the late 1980's, Lamarre owned 42% of the shares, and the rest was owned equally by his younger brother Jacques, and two long time associates, Marcel Dufour and Armand Couture (Allard, 1991, Coté, 1991).

The organizational structures that were adopted over the years paralleled this financial structure, in that they were centralized, relatively simple, with few layers of management:

- The major changes occurring in the firm's internal and external environments precipitated a first re-structuring, shortly after Lamarre became President. "[T]o adapt more easily to this fast-paced development and adequately handle major contracts, [it was] decided to group all its [seven] companies into one corporate entity called Lavalin Inc." (#2:5). The legal and administrative structure put into place in 1973 was aimed at improving efficiency by integrating the firm's internal components. By then, Lavalin had a staff of almost 1,000.

[47] The stocks of all the companies of the Lavalin Group were privately held, except for those of **Lavalintech,** which operated in the R&D sector, with assets of $11.4 million in 1988; and **Lavalin Industries**, a holding company for a petrochemical firm and a public transport company, with assets of $322 million in 1988. These two companies went public in 1985 and 1986, respectively, and performed poorly after that time.

The restructuring which took place in 1973 was followed by more domestic acquisitions in Quebec and in the other provinces. The Quebec market took a sharp turn upward in the 1970's, and Lavalin landed a number of major public contracts. It participated in the development of the Montreal International Airport at Mirabel, the Olympic Park, the Ville Marie Expressway, as well as a number of industrial, hydroelectric and environmental projects throughout Canada. By 1975, Lavalin had more than 2,500 employees in all sectors of engineering, from geography to systems analysis (#2:5).

• In 1977, international operations were regrouped under Lavalin International Inc., with offices in seven foreign countries. By then, its permanent staff numbered around 2,500 people.

• By 1981, the number of employees had risen to 6,000. The recession which began that year necessitated cutbacks in a number of programs, and of over 1,000 employees.

• At the same time, Lavalin finalized the acquisition of the Shawinigan Group, (begun before the downturn). This added over 1,000 employees to its staff, and gave rise to overlapping administrative functions. This led Fenco and Shawinigan to combine their district offices in Vancouver and Halifax. Business activities increased in 1983 and, with the acquisition of Shawinigan, the firm gained back the number of permanent staff who had been let go.

• The final restructuring, which took place in 1986-1987, reflected the increased size and variety of the firm's activities see Table 8.2. For the first time, engineering was not the center of gravity of the firm, as it gave equal importance to its newer manufacturing activities. The new structure involved the consolidation of activities in seven sectors (#4, 1987:1).

Business Sectors at Lavalin (1986-1987)

Table 8.2

Sector	Holding Company
Studies, Engineering, Construction	Lavalin Inc.
Real Estate Development	Prodevco Lavalin (1987) Inc.
Owners/managers of health care & old age institutions	Lavalin Sante Inc.
Sanitary Engineering	Sanitech Lavalin Inc.
Petrochemical Industries & Public Transportation	Lavalin Industries.
Diversified industries	Entreprises Lavalin Inc.
Electronic Communications, Editions and Expositions	Lavalin Communications Inc.

Source: #4, 1987.

By 1986, Lavalin had more than 6,000 employees, 67 divisions, 18 associate companies in Canada, and offices on all five continents and in more than 50 countries (#2:10).

With nearly all of its companies' shares held privately, the consulting-engineering firm began a major strategy of diversification: first, into the utilities sector in the U.S., then, into the urban rail transport manufacturing sector in Ontario (#2:5), and, finally, into oil refining, with the acquisition of the assets of Ultramar Canada, in Montreal East. With that last purchase into a totally new industry, supported by a complex network of cross-guarantees among its private firms, Lavalin had spread its management and its finances dangerously thin.

By the early 1990s, the financial drain caused by its petrochemical operations caused the Lavalin empire to collapse. However, its consulting-engineering arm was deemed worth salvaging. An even larger engineering-consulting firm was formed, SNC-Lavalin, representing mainly the acquisition by SNC Engineering of Lavalin's engineering assets.

8.14 Conclusion - Lavalin: The Entrepreneurial Firm

Up until the mid-1970s, when Lavalin began its take-off, its growth equaled or even lagged behind that of the Quebec engineering industry. However, during the recession of the early 1980s, while engineering activity plummeted in the province, Lavalin continued to expand, as if propelled by its own momentum. It was a firm apparently at odds with its home environment, and yet, extremely attuned to parts of it.

Lavalin's beginnings, its trials and its accomplishments embodied the aspirations of an entrepreneurial Quebec, and there is little doubt that, ultimately, the firm had fulfilled the 'mandate' formulated in 1936 by the provincial Minister of Land and Forests. Indeed, fifty years after his call, Francophone engineers were not only being hired, but they had actually gained control and were doing the hiring.

So far, our examination was carried out from two levels of analysis: at first, from that of the home environment, and then, at the organizational level of each of the focal organizations. Much of the information that was presented is unique to each level and to each firm, and cannot be directly compared. However, one of their common elements has been the engineers themselves, who are important determinants at each level and in each firm. In the next chapter, we undertake a more direct comparison of the three firms, as we use this common thread to weave their stories into their common backgrounds.

9 Social Profile of the Firms and of their Leadership

In this chapter, we undertake to characterize the social profiles of the three firms through the backgrounds and the personal networks of their upper managers and board members, as well as through the institutional links that their firms maintained.

9.1 The variables

The data collected for each of the three companies, focusing on three key periods of societal changes, included the following, interrelated variables:

- **The ethnic and linguistic backgrounds** of the upper managers and of the board members, as suggested by their ***mother tongues*** and ***places of birth***. Given the contexts in Quebec and in Canada, it is considered that ethnic and linguistic backgrounds may serve as a key basis for their social networks. The variable **other languages spoken** by these individuals is also examined, but mainly as an indication of their functional competencies.

- **The universities** that they attended, and the **institutional links** between universities and the engineering firms, as evidenced by the scholarships and programs funded by the firms, the honorary degrees granted to firm members, and the teaching positions held by them.

- **Memberships in prominent social clubs and chambers of commerce.** The *level* of membership and the *linguistic profiles* of these clubs are examined, as quantitative and qualitative indicators of the social connectedness of the engineering firms. Since club fees are usually borne by the employer, and membership is often incumbent upon certain positions, they are indicative of the links that the firm wishes to maintain with specific social groups.

• **The public profiles** of upper managers and of the board members are examined. These positions —held prior to or concurrently with their involvement with the engineering firms— also characterize the social profile of the firm, and give indications of the external network to which they have access.

9.2 Data presentation

Synchronic as well as diachronic analyses are used by linguists to *understand* —in the first instance— the structure of a language *at a given time*, and —in the second case— to *explain* its development *over time.* Similarly, we will compare the organisations to one another —*a*historically— and each organisation to itself —over time (see also template in Figure 9.1),

• First, **synchronic analyses** will permit comparisons of the profiles of the firms at each of three time periods. Such vertical analyses will enable us to determine and contrast their social profile: How was each firm socially positioned in the mid-1960s, for instance? Did the personal and institutional relationships of each firm form congruent configurations? How was the social position of each firm different from that of the others?

• Second, **diachronic analyses** will be made to study their evolution: did the social profile of each firm change over the years? If so, how and in which direction? These horizontal analyses will also allow us to assess, in the next chapter, whether the evolution of each company's profile was congruent with the societal changes highlighted in Chapters Four and Five.

Table 9.1

	Upper Managers and Board Members for whom biographical data was available *					
	mid-1960s		mid-1970s		mid-1980s	
Monenco	9/13	**69%**	28/33	**85%**	14/18	**78%**
SNC	6/6	**100%**	8/13	**61%**	17/24	**71%**
Lavalin	9/9	**100%**	11/13	**85%**	18/19	**95%**

* For example, in the mid-1970s, 33 names appear on the list of Monenco's Upper Managers and Board Members Biographical data was collected for 28 (or 85%) of them

Table 9.2

	Upper Managers and Board Members retained from the previous decade *									
	mid-1970s					mid-1980s				
	Number of Managers & Members	Carried from previous decade	% of Names carried from previous decade	Additions	Deletions	Number of Managers & Members	Carried from previous decade	% of Names carried from previous decade	Additions	Deletions
Monenco	33	7	21%	26	6	18	10	56%	8	23
SNC	13	6	46%	7	-	24	3	13%	21	10
Lavalin	13	3	23%	10	6	19	8	42%	11	5

*For example, 7 (or 21%) of the people listed as Upper Managers and Board Members of Monenco in the mid-1970s also appear on the list of the mid-1960s, 26 people were added and 6 were dropped in the mid-1970s

Table 9 3

	Long-Term Retention: Upper Managers and Board Members of the mid-1980s retained from the mid-1960s *				
	Total Number of Managers & Members	Carried from mid-1960s	% of Managers & Members carried from the mid-1960s	Additions	Deletions
Monenco	18	4	**22%**	14	9
SNC	24	2	**8%**	22	4
Lavalin	19	3	**16%**	16	6

* For example, 3 of the names (or 16%) listed as Upper Managers and Board Members of Lavalin in the mid-1980s also appear on the list of the mid-1960s; 16 new names were added and 6 were dropped in the mid-1980s

Figure 9.1

Template for Analyzing the Social Profiles of the Firms

Synchronic	Diachronic ⟶			
↓		mid-1960s	mid-1970s	mid-1980s
	SNC	•	•	•
	Monenco	•	•	•
	Lavalin	•	•	•
	Societal Context &/or Remarks	•	•	•

9.3 Languages: French, English, and the Others

Given the sociopolitical context of Canada —the country of two solitudes— language was the logical starting point for examining the social profile of the firms. As was shown in earlier chapters, this perennial Canadian issue was important and rapidly evolving during the years under study, especially in the province of Quebec. In which solitude did each firm belong?

9.3.1 Monenco : An Anglophone Firm.

From its earliest days in Halifax, through the years covered in this research, the top management and the board members of that firm remained almost exclusively English-speaking. Neither its early move to Montreal in the 1910s, nor the internationalization of its activities in the latter part of this century alter its profile appreciably.

Figure 9.2
Place of Birth - by Geographic Area

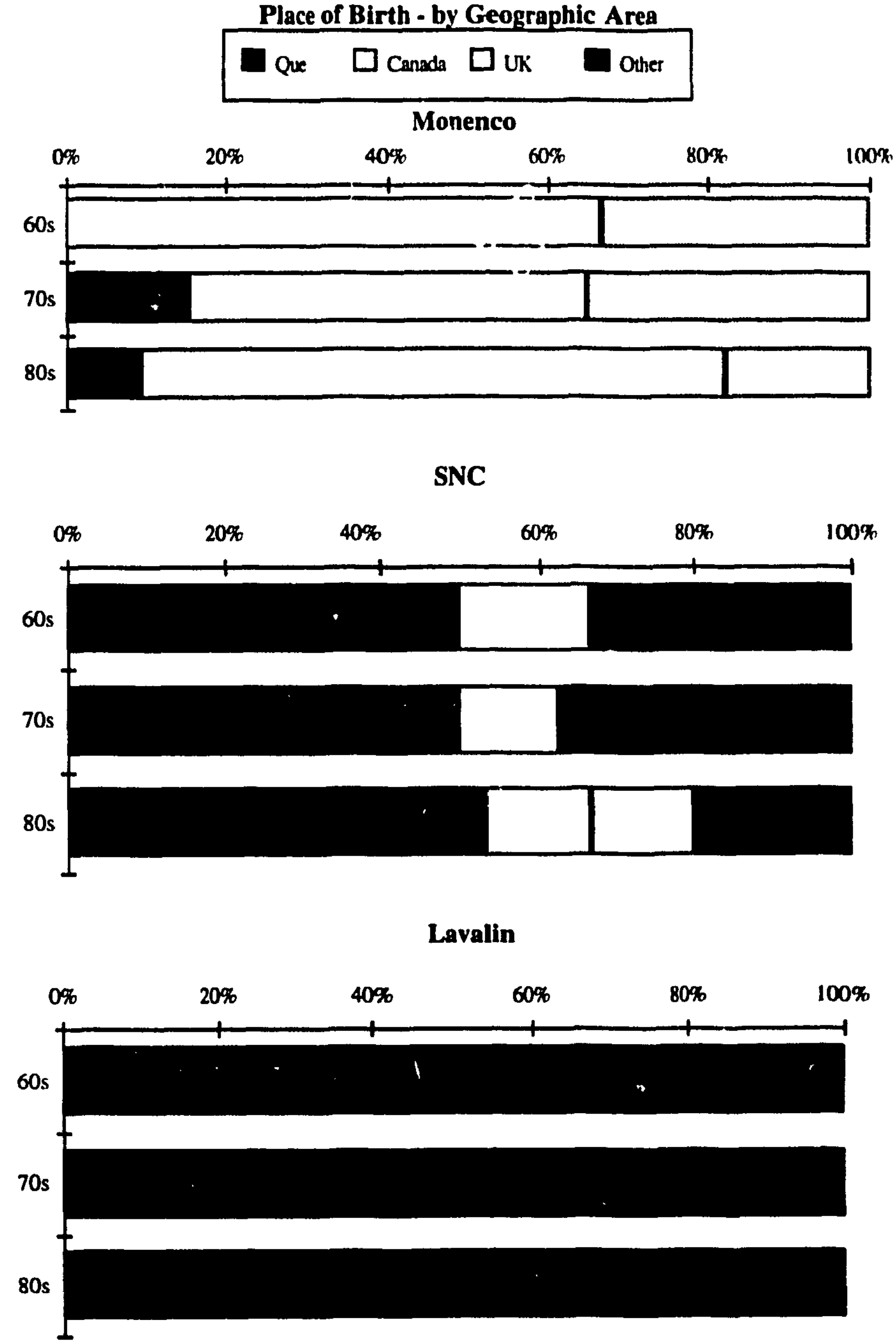


Figure 9.3

Place of Birth of Top Managers and Board Members

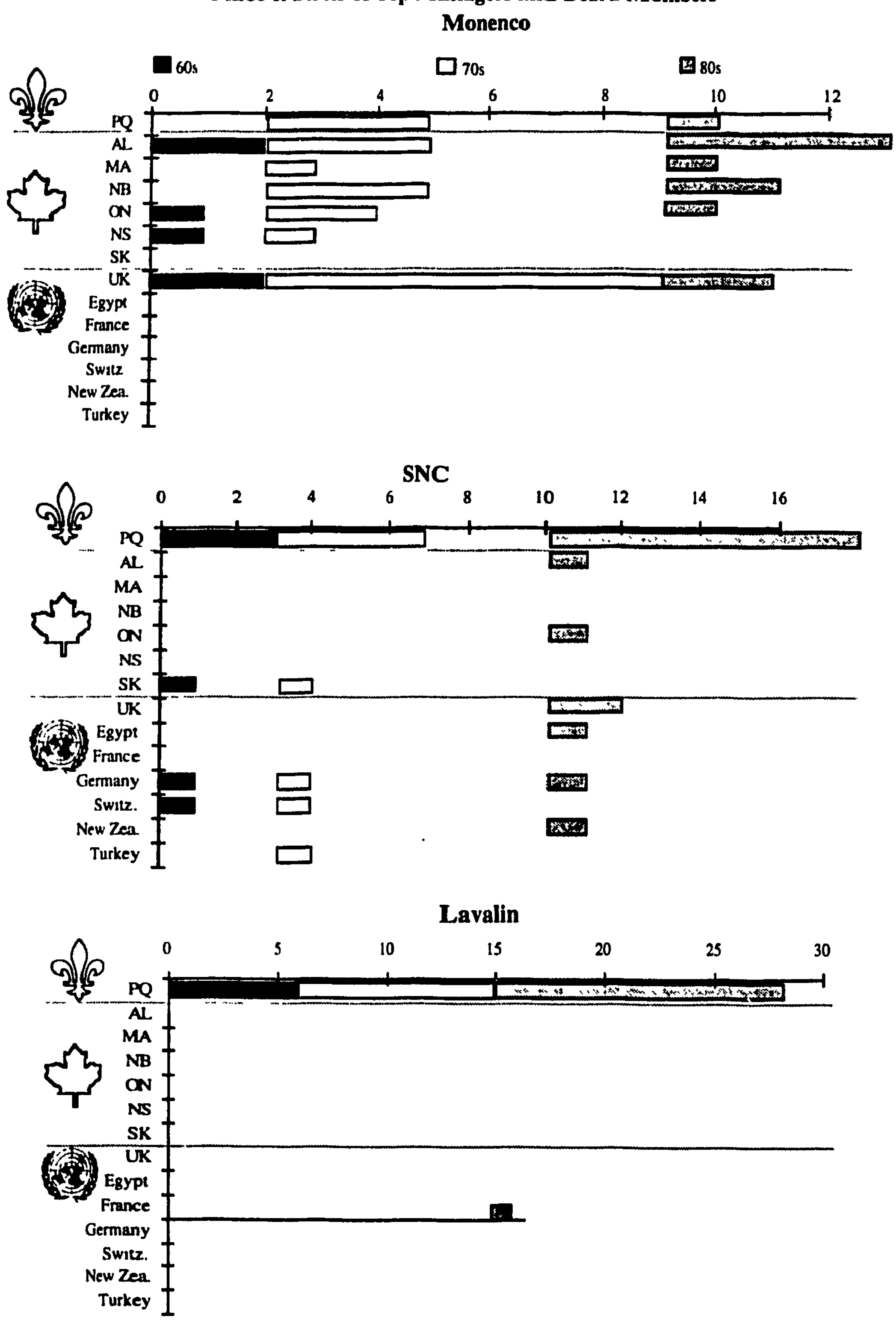


Table 9.4

Mother Tongue of Monenco's Upper Managers and Board Members

	mid-1960s	mid-1970s	mid-1980s
French	-	2	1
English	9	26	14
Other	-	-	-
Number of Managers (excluding missing data)	9	28	15

Consequently, English was and remained the language of work. These conclusions were first suggested by the data shown in Table 9.4, and were corroborated by inspection of documents on file at Monenco's headquarters[48]. The language in which these documents are drawn reflect, to a large extent, the language of internal and of external communication of the company. They were drawn primarily in English; some in Spanish, and even fewer in French. Similarly, Spanish, not French came second as the language in use in these documents. This reflected Monenco's linguistic make-up; it also reflected the fact that the firm's activities took place in parts of the world where English, and secondarily Spanish, was used.

There were no Francophones, and no Quebeckers of either major language group among the firm's upper echelons in the 1960s. In the mid-1970s, there were three Quebeckers, one bilingual Anglophone (an engineer) and two

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[48] The nature of these documents was described in Chapter 3 - Methodology and Research Design.

Francophones (the firm's lawyer and the owner of Ingénierie Cartier, recently acquired and revived by Monenco). By the mid-1980s the lawyer was the only Francophone and the only Quebecker in the group.

While mother tongue and place of birth give indications of the ethnolinguistic backgrounds of the members, *Other Languages Spoken* give additional information on their ability to communicate and work with other groups. This data proved far more difficult to assess than *First Languages,* because it is more likely to be omitted in personal resumes. In some instances, it had to be inferred from the individual's schooling (a Francophone who graduated from MIT was classified as also speaking English). Hence, the data gathered on *Other Languages Spoken* is scanty and is submitted tentatively. The breakdown for three periods are shown on Table 9.5.

The Mechanisms for Maintaining Linguistic Composition at Monenco.

Since four of the leaders whose names appeared in the roster of the mid-1960s were still at the helm in the mid-1980s, their continued presence explains only partially how Monenco remained Anglophone. The main cause lies elsewhere.

In reviewing the early history of the company, it was clear that recruitment of engineers was made, prior to 1955, from McGill (an Anglophone Quebec University), from other Anglophone universities in the rest of Canada, and from other English-speaking countries (see Figures 9.4 & 9.5). Francophone Quebec universities were noticeably absent from these lists, and, very few names appear to be of French extraction.

Table 9.5

Other languages spoken at Monenco (declared or reasonably inferred)

	mid-1960s	mid-1970s	mid-1980s
French	-	4	1
English	-	2	1
Spanish	-	2	
Portuguese	-	3	-
Irish	-	1	1
Number of Managers (N.B. One manager may speak more than one foreign language)	9	28	15

The data collected for this research —from the mid-1960s to the mid-1980s— indicates that the same pattern in the backgrounds of the top managers and board members continued to emerge. While recruiting in Quebec, the firm had access to, and could have hired some of the ethnic Francophones who attend Anglophone universities in that province, as did SNC and Lavalin. Evidently, this was not the case. However it is not possible to determine whether this was indicative of a failure to *attract* or a failure to *select* Francophones.

9.3.2 SNC : A Cosmopolitan Firm.

By contrast, SNC was ethnically very cosmopolitan and its members spoke a variety of languages: half to two-thirds had French as their mother tongue, about a quarter had English, and the rest had German or other languages (Table 9.6).

Table 9.6

Mother Tongue of SNC's Upper Managers and Board Members

	mid-1960s	mid-1970s	mid-1980s
French	3	4	9
English	2	2	6
German	1	1	1
Turkish	-	1	-
Arabic	-	-	1
Number of Managers (excluding missing data)	6	8	17

The Mechanisms for Maintaining Linguistic Composition At SNC

The linguistic balance of SNC, though more complex than that of the other two firms, was also maintained through hiring practices, as it appears that the upper managers and board members also came from a stable set of universities. What is new, in the case of SNC, is that there is strong evidence that these policies reflected with the personal inclinations of a few key managers.

The seeds of the linguistic make-up of the firm were planted with the founding members. Surveyer, an eclectic, renaissance man, was French speaking, but he showed a strong appreciation of English, which he spoke and wrote fluently, and in which he began his career. By chance or design, in choosing his first two associates, he set the course for a plurilinguistic and multiethnic firm: Nenniger was a Swiss-German who worked in English, while Chênevert was well grounded in traditional French-speaking Quebec society.

Nenniger and Chênevert consistently hired individuals of their own linguistic backgrounds: those working in Chênevert's "East Block" were French Canadians, while immigrants (primarily English speaking, with one or two German-speaking senior partners) and Anglophone Canadians were hired and worked with Nenniger, on the other side of SNC's own "iron curtain".

Table 9.7

Other languages spoken at SNC (declared or reasonably inferred)

	mid-1960s	mid-1970s	mid-1980s
French	-	-	2
English	3	5	10
German	1	1	-
Number of Managers (N.B. One manager may speak more than one foreign language)	6	8	17

9.3.3 Lavalin: A Bilingual, Quebec Firm

In the sense that its employees were French-speaking and from Quebec, Lavalin was even more ethnically homogeneous than Monenco, whose top management also comprised employees from other provinces and from other English-speaking countries. However, a far higher percentage of Lavalin's top managers and board members spoke Canada's other official language than was the case at Monenco. Thus, *ethnically* they were uniformly French Quebeckers, but, by and large, they were bilingual.

In this research, data was collected for the top management team and for board members only. However, there are indications from other research (Gagnon, 1991) and from the data collected on Monenco (Tables 6.2 and 6.3) that the ethnic and linguistic profile of the lower ranking engineers was similar to that of their superiors. Data collected by the Corporation of Professional Engineers of Quebec for 1959 (in Gagnon, 1991: 338, 344), indicate that the proportions of Francophone engineers in the three companies was close to what we found among their top managers and board members, half a decade later (see Table 9.8). These figures for lower-ranking members of the firm are also congruent with the nearly all Anglophone profile that seems to characterize the engineering recruits of Monenco between 1946 and 1955 (based on their names and institutions of higher education).

Table 9.8

Percentage of Francophone Engineers (1959)
vs Top Managers and Board Members (mid-1960s)

Company	Engineers (*) (1959)	Top Managers and Board Members (mid-1960s)
Monenco	5%	0%
SNC	57%	50%
Lavalin	95%	100%

(*) Source: Gagnon, 1991;

Table 9.9

Mother Tongue of Lavalin's Upper Managers and Board Members

	mid-1960s	mid-1970s	mid-1980s
French	9	11	17
English	-	-	1
Other	-	-	-
Number of Managers (excluding missing data)	9	11	18

Table 9.10

Other languages spoken at Lavalin (declared or reasonably inferred)

	mid-1960s	mid-1970s	mid-1980s
French	-	-	-
English	6	6	12
Number of Managers	9	11	18

The Mechanisms for Maintaining Linguistic Composition At Lavalin

The observation that Lavalin reflected, in the 1980s, the linguistic profile of its formative years, raises the question of how such profile was sustained over time. The preliminary evidence that the linguistic make-up of the firm impacted on its performance (discussed further in the next chapter) provides a rationale for *why* the firm first began as a Francophone firm and, subsequently, flourished in specific niches.

Since Lavalin's shares were held privately, its linguistic homogeneity is partly attributable to the fact that many of its leaders were members of the same family and long-term employees, a characteristic which is often found in small and entrepreneurial firms. Thus, language was maintained, along with the family name and with a stable pool of employees.

This explanation is only partial however, for as the firm became larger, family members became a minority. By the 1970s, and even more so by the 1980s, only a core of managers at Lavalin (Bernard Lamarre, his bother Jacques, his son Jean, his life-long friend Armand Couture) were long-term employees, most having joined as executives or board members after one or two decades of employment outside the firm.

This suggests that the firm's source for new members needs to be examined further. It is noted that a large number of top managers and other engineering staff, were graduates of the Poly, a characteristic that, according to other research, also prevailed at other levels of the firm (Gagnon, 1991). However, it should be noted many of its upper managers and board members had been educated in Quebec's English-speaking universities. Thus, irrespective of family ties, of university backgrounds, of individual career paths (within and outside the firm), what stands out is that upper managers and board members of Lavalin were always French-Quebeckers (with one exception).

9.4 Universities

The previous section gave indication of the role played by universities —as a source for new members— in preserving the particular linguistic profile of the firm. In this section, we will present and discuss the data in greater detail, and present new data that bear on the relationship between the universities and the firms at the institutional level. It should be noted that the data presented in this section accounts both for the *universities* where the degrees were earned and for their *geographical location*. For instance, if an individual holds both a Bachelor and a Master's degree from the University of New Brunswick, he and the firm are considered more strongly connected to that school and to that province than if he had earned a master's degree at the Poly, in which case his connectedness —and that of the firm— would have been considered to be with two institutions and with two provinces.

9.4.1 Monenco

The distribution of graduates at Monenco show a pattern similar to their ethnolinguistic background, with, in both instances, strong representation of Anglophones from the rest of Canada and from the UK. The percentage of leaders from Quebec universities was nil in the mid-1960s, and it remained under 40% up through the mid-1980s, the lowest percentage among the three Montreal-based firms (see Figures 9.4 and 9.5).

During that period, the very few Quebec graduates present among the leaders of Monenco were Anglophones from English-speaking universities. There were no graduates from Laval or Sherbrooke; not even from the Poly, even though that school was the single largest supplier for the other two firms. When queried as to why such an important Montreal-based firm had such limited contact with the Quebec's largest engineering school, Doré made a strong link with the firm's linguistic make-up: "Monenco, c'est Montreal *Engineering*! (interview, 1992 - emphasis on the English word "engineering").

By contrast, the percentage of degrees earned in Canada always exceeded 40%, and, characteristically, they reflected the firm's bases in other parts of Canada: Ontario (Queens and Toronto), Nova Scotia (NSTC), Saskatchewan, and New Brunswick. As well, UK-trained managers were always present among the upper echelons of the firms and some occupied the positions of president and chairman of the firm.

The important role played by British engineers and by the University of New Brunswick as a major source of leaders was symbolically confirmed when that university granted an honorary doctorate to Mulherin, the firm's president, who was born in the UK., and educated at UNB (see Table 9.11). In turn, Monenco granted scholarships and built important facilities at the University of New Brunswick (Sexton 1982). Another honorary doctorate was awarded by the University of Calgary, with whom Monenco and its former affiliate, Calgary Power, had maintained close and long-term relationships. No such distinctions were bestowed by universities in Quebec.

Figure 9.4

Education Background by Geography -

Monenco

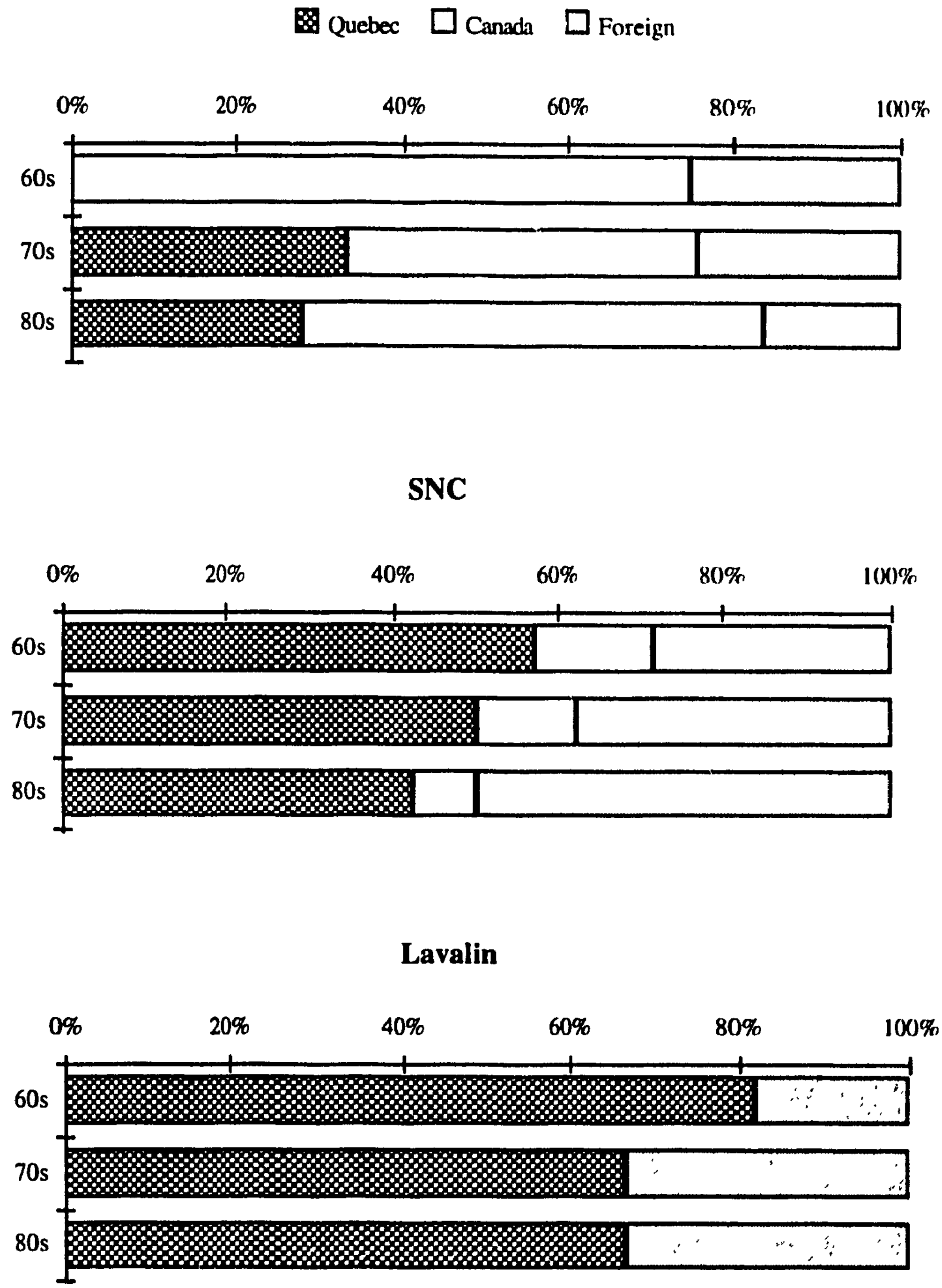


Figure 9.5

University Background - Top Managers & Board Members

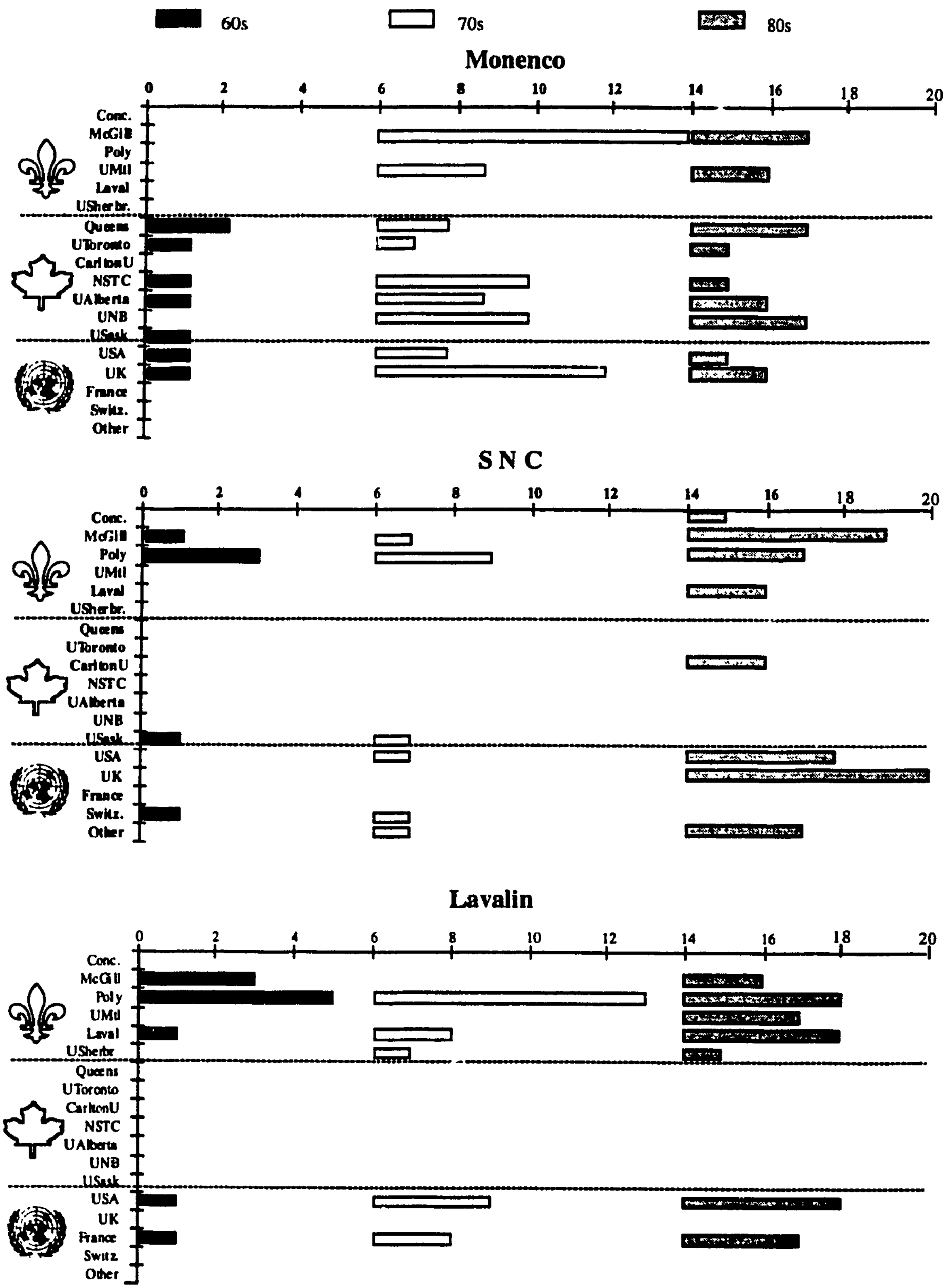


Table 9.11

Honorary doctorates granted to members of the firm (1960 to mid-1980s)

		Monenco	SNC	Lavalin
U de Montreal (affiliated with the École Polytechnique)	Quebec (French)			√
U du Québec à Montréal	" "			√ √
U de Sherbrooke	" "		√	√
U de Laval	" "		√	
Concordia	Quebec (English)		√	√
Ottawa U	Ontario			√
Waterloo U	" "			√
Queens U	" "		√	√
U of Toronto	" "		√	
Royal Military College of Calgary	Alberta		√	
U of Alberta	" "	√	√	
U of New Brunswick	New Brunswick	√		
Nova Scotia Technical College	Nova Scotia	√		
Dalhousie U	" "	√ √		
TOTAL		5	7	8

9.4.2 SNC

The most notable factor in the education base of SNC's leaders is the low representation of graduates from the rest of Canada (there were at most two at any given time, which is less than the 'American' or the 'European' representation). By contrast, between a quarter to half of the upper echelons were trained abroad, a percentage well above that of the other firms, and in line with the firm's original team, when Surveyer, Nenniger and Chênevert were at the helm.

There again, diversity typifies SNC. The educational backgrounds of its upper echelons stand mid-way between those of the other two firms in terms of representation from Quebec and from the rest of Canada; furthermore, within each of these geographical areas, its recruitment base is more balanced, since, at any time period it includes a number of university degrees from French and English Quebec Universities. SNC also stands well apart from the other two firms in terms of the level of foreign education among its top managers. This composition was renewed, rather than simply maintained, since only 8% of the names counted in the 1960s were also present in the 1980s. Not only was there more 'foreign education', but it was always more diversified: at Monenco's and at Lavalin's it was limited to two countries each, but, at SNC, it included six: the USA., UK., Switzerland, Turkey, Egypt, and New Zealand.

SNC had good connections with the Poly, where its members taught and where it sponsored training programs and contributed to fund raising, at times as much as Lavalin (Gagnon, R., 1991; Doré, 1992). Chênevert was the President of Association des Diplômés de l'École Polytechnique.

Prior to our data collection period, Surveyer was the first leader among the three firms to receive an honorary doctorate. (The fact that it was granted by an non-Canadian university was perhaps a reflection of the firm's early internationalism). In the 1970s and in the mid-1980s, SNC was led by Dagenais, who received five honorary doctorates: from Concordia University (English-speaking Quebec University), from the Universities of Sherbrooke and of Laval (French-speaking and in Quebec), from the University of Toronto, in Ontario, and from the Royal Military College of Calgary, in Alberta. To the extent that honorary degrees reflect the recognition that Universities wish to make of some citizens, the pattern of those bestowed upon members of SNC show that, with a number nearly equal to that of Lavalin, SNC had a wider public base.

9.4.3 Lavalin

Although the leaders of Lavalin were uniformly Francophone Quebeckers, their university backgrounds often included graduate studies in the US and the UK. This pattern dated back to Valois, who had studied at MIT, and was upheld by Lamarre who held a master's degree from the UK. However, the firm's 'foreign exposure' was brought about exclusively by foreign studies, not foreign nationals. In that, Lavalin stands apart from these other firms: its top managers and board members were, to the letter, Canadian, French-speaking Quebeckers, some of whom had studied abroad; none were immigrants. The percentage of foreign exposure is about two-thirds that of SNC's, and is the mirror image of that of Monenco since Lavalin included no top mangers or leaders trained in the rest of Canada.

Among all Quebec universities, the Poly was the one with which Lavalin was most closely connected. Both Lavalin and Roland Doré, principal of the École Polytechnique, described the relationship between the two institutions as "symbiotic" (# 1; Doré, 1992). These relationships were tightly woven around those that the firm's leaders and its engineering staff maintained with their alma mater. Thus, Lavalin recruited extensively from the Poly, many of its engineers lectured there, and some sat on its advisory councils. As well, the firm was a leading sponsor of training and research at the Poly (interview with Doré, 1992). In the late 1960s, when the Deschesnes Commission recommended the abolition of the Poly's charter, its leaders turned to Lavalin and to SNC who helped the school's turnaround, through funding and the setting of masters programs (Doré, 1992). Lavalin undertook the construction of some of the facilities of the Poly in the 1970s (#1; Gagnon, 1991)

The Poly joined other universities in Quebec and Ontario in bestowing personal recognition to Lamarre, who holds honorary doctorates from the University of Montreal (affiliated with the Poly), as well as from three other universities in Quebec and two in Ontario: the Universities of Sherbrooke, Quebec, and Concordia, as well as Queens and Waterloo. One other director received an honorary doctorate from the Université du Quebec.

9.5 Public Profiles and Connections

It stands to reason that individuals who are familiar with the needs and modes of operations of prospective clients may be valuable assets to an engineering firm. Indeed, the history of all three firms provided ample anecdotal and specific instances of the instrumental services rendered to the firms by individuals with privileged access to the clients. Such services may be hired on a contractual basis, for specific purposes, as identified in the following excerpt from an employment contract with a foreign representative of Monenco:

> [Mr. X] shall inform Monenco. [...] of new studies or projects being contemplated by ultimate clients, executing agencies or International Financing Institutions and shall advise Monenco on strategies related to local conditions and activities in financial institutions that will lead to successful marketing of services. Further [Mr. X] shall provide advice and assistance during execution of projects with respect to client relations in particular and government relations in general.
>
> [Names and country withheld for reasons of confidentiality]

For similar purposes, the firm may choose to hire such valuable services on a full-time and long-term basis, especially if the client may be the source of several, important contracts spread over many years. The major role played by government in sponsoring and financing projects in Canada and abroad have made their officials interesting prospects for subsequent employment with the engineering firms. In order to assess the extent of this practice, this section undertakes to evaluate the employment record of the top managers and board members as elected officials, public servants, members of Task Forces and Commissions. (Again, it should be noted that this list includes upper managers and board members who hold or had held high ranking positions in the public sector. It excludes those who held lesser positions in either sphere, and those who left the firm to work in the public sector, though they may constitute valuable contacts).

Table 9.12 presents a synoptic view of the resumes of those leaders of each firm who held high ranking positions in the public sector. It appears that the practice of formally hiring such high profile individuals gained scope in the mid-1970s and became widespread by the mid-1980s. Yet, there is ample evidence in the early history of all three firms that government officials played a decisive role in obtaining important contracts for the firm. It would then seem that prior to the mid-1970s, such relationships were kept more at arm's length.

Table 9.12
Public Sector Jobs held by Upper Managers and Board Members

Period with the Firm: (mid-)			Firm	Upper Mngr or Board Member	Fed., Prov., or Mun.	High Positions formerly or concurrently held in: Civil Service, Govt, Task Forces, Commissions.
	70s		Mon	Atwell G.C.	Nova Scotia	• Nova Scotia Power Comm (4 years)
60s	70s		SNC	Balfour R.J.	Fed	• Senator - 1979 Conservative
60s	70s	80s	SNC	Gourdeau J.P.	Que Mtl	• High ranking Civil Service (51-61); • Cons Consultatif de développement économique de Mtl
		80s	SNC	Laliberté C.	Que	• High ranking Administrator Hydro-Quebec
		80s	SNC	Paré P.	Fed	• Executive Asst to Minister of Dept of National Defence
		80s	SNC	Perrault C. H.	Fed " " " Que " "	• Member of Conseil canadien des relations ouvrières • Royal Commission of Inquiry on Fiscal Policy (Bélanger) • Economic Council of Canada • Advisor to the Minister of Industry & Commerce • Member of the Conseil d'orientation Écon. du Québec • Member of the Conseil du travail et de la main d'oeuvre • Member of Conseil pour la protection du Consommateur
		80s	SNC	Saint-Pierre G.	Que " Fed	• Minister of Education • Minister of Industry & Commerce • VP of the Council for Canadian Unity ('77)
	70s	80s	Lav	Dufour M.	Fed	• Canadian Commission for International Trade
	70s		Lav	Rouleau C.	Que "	• Commissaire des Autoroutes du Québec • Président du RIO (*Olympic Installations*)
		80s	Lav	Lafontaine R.		• Assistant to Federal Ministries (5 years)
		80s	Lav	Bérubé Y. Dr.	Que "	• Minister of Natural Ressources • Minister of Education
		80s	Lav	Charbonneau B.P	Fed " "	• Defence Prod Attaché, F.S. • Assistant Deputy Minister, Plan. & Systems • Department of Supply and Services
60s		80s	Lav	Couture A.	Fed Que	• National Harbours Bd • Comité: Société d'électricité de la Baie James
		80s	Lav	Kilburn P.M.	 Fed " "	• World Bank, Wash. • Pearson Commission • CIDA • Assistant to Minister of Manpower & Industry
		80s	Lav	Masse M.	Que Fed "	• Minister of Education / Min. of Inter-Governmental Affairs/ Minister of Planing & Development. & others; • Minister of Communications
		80s	Lav	Richard C.	Que "	• Minister of Communications • Minister of Cultural Affairs

9.5.1 Government Officials at Monenco

The practice of actually hiring high profile public servants never took hold in that firm, and the sole entry shown in Table 9.12 appears to be of a lower level than those in the other firms. Yet, inspection of the firm's file showed that it was interested in having such contacts, on the international scene. The contract files of Monenco show that extensive efforts were deployed to establish contractual relationships with well placed individuals, acting as consultants and/or representatives, in countries were the firm wished to do business. Consistently, the firm chose to do so on a contractual basis.

9.5.2 Government Officials at SNC

In its early years, SNC had been disinclined to embrace the practice. An ardent promoter of the private sector, Surveyer had publicly opposed many important projects sponsored by governments, and was reluctant to participate in their execution. As was noted earlier, his firm was noticeably late in joining into the construction work pertaining to the St-Lawrence Project because Surveyer had first argued against the project, and later had to be persuaded to call upon his friend, Canadian Prime Minister Louis Saint-Laurent.

His ideological stance was shared by Dagenais' team, who also showed reticence in mixing business with politics. When, Bérubé, then a prominent provincial minister in the PQ government seeking to leave politics approached SNC, they deemed his request inappropriate and turned him down (Allard, 1991).

Like Surveyer, Dagenais found it difficult to ignore for too long the political ramifications of their industry. His protégé and chosen successor, Goudreau, had been a high ranking civil servant at the provincial level, and St-Pierre, who succeeded Goudreau, and also had Dagenais' strong backing, had had a full-fledged political career as provincial minister, before joining SNC as CEO. With that background, he was the sort of candidate more likely to be hired at Lavalin.

9.5.3 Government Officials at Lavalin

That is precisely where St-Pierre would have landed, had he accepted Lamarre's offer, the day after he and his liberal party lost the election. For Lamarre, like Valois, had no qualms about employing public servants. When Bérubé, the PQ minister, was turned down by SNC, he found a top position at Lavalin, along side other *indépendentistes* and pro-federalists. Strong influence in Quebec City or Ottawa, not political orientations, seem to be their common characteristics.

Thus, at Lavalin, the number and the caliber of candidates are the highest: in its eighteen-person team of the mid-1980s, eight (44%) had high-profile backgrounds in public service, including three former government ministers.

9.6 Memberships in Social Clubs

As well as maintaining close relationships with their suppliers and their clients, the engineering firms also need to be in touch with the business community at large. This is done, in part, through membership in selected clubs, where business people meet for meals, sports and other semistructured activities. This section reports on the *level* and *type* of membership of top executives and directors, as indicators of the social connectedness of their engineering firms (see Figure 9.6).

9.6.1 Monenco Club Membership

From the mid-1960s up until the mid-1970s, the level of membership at Monenco reflected that firm's relative importance and was overall higher than that of its two local competitors. In that same vein, the level of membership actually declined in the mid-1980s. In general, Monenco leaders joined more local suburban country clubs than high power urban clubs; thus, membership was strong in the rest of Canada, average in Quebec Anglophone clubs of wide membership, but very low in Montreal's most prestigious clubs: St-James and Mount-Royal (Anglophone); and St-Denis (Francophone).

9.6.2 SNC Club Membership

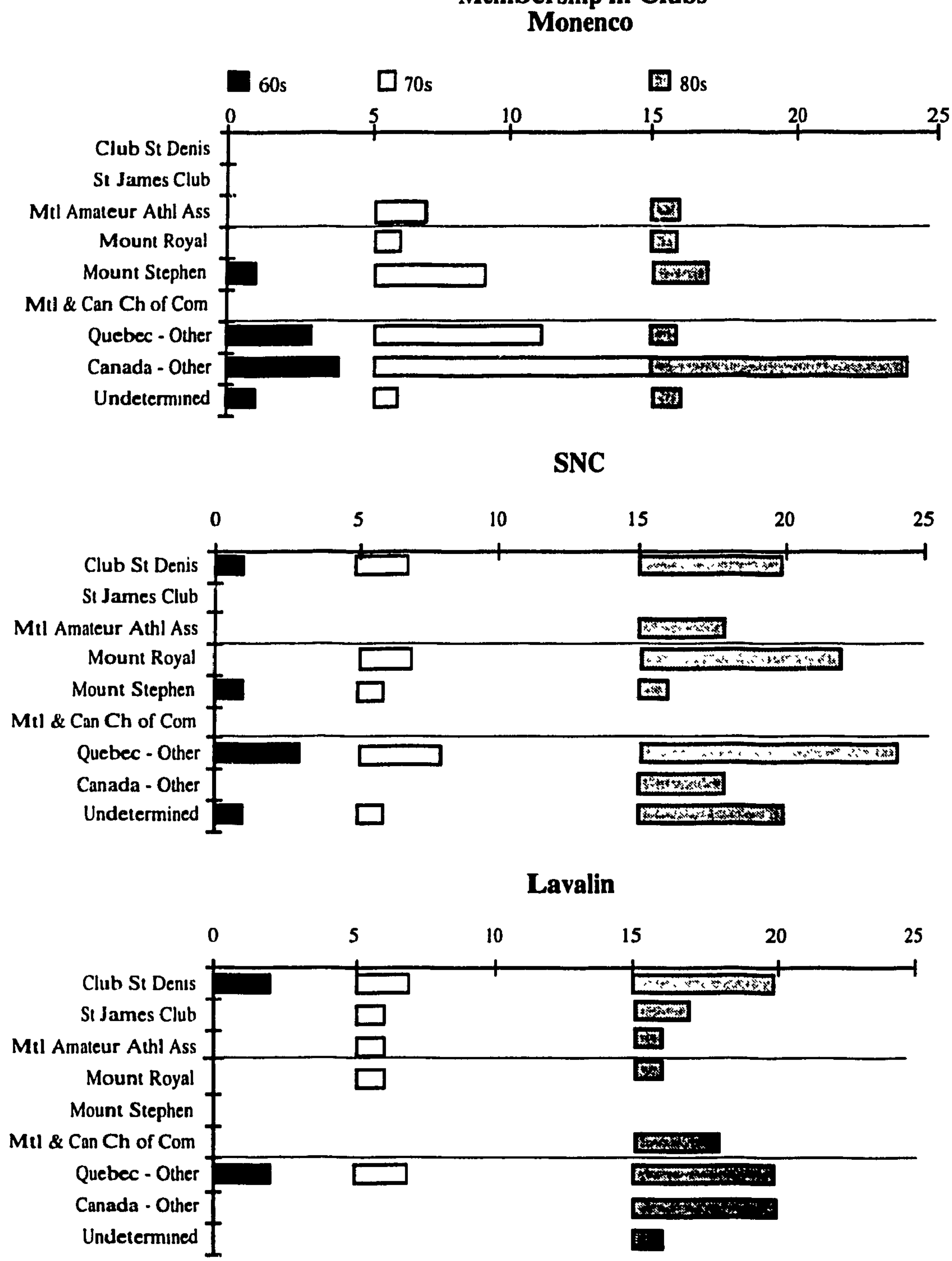
Although both Surveyer and Chênevert had been active in clubs and in public forums, club membership at SNC became important only in the mid-1980s. Typical of that firm, it was rather low in the rest of Canada, but well diversified within Quebec where it included both Anglophone and Francophone clubs, including the prestigious Mount Royal and St-Denis Clubs.

9.6.3 Lavalin Club Membership

At Lavalin, business club membership began as early as 1937 with Valois, the man who "excelled at obtaining contracts" (Interview with Louise Lamarre, #2:43). Lamarre also joined the St-Denis Club as early as 1963. But, as in the case of SNC, extensive club membership did not occur until the late 1970s, reflecting the firm's own expansion.

Figure 9.6

Membership in Clubs



Lavalin's membership network remained strong at Club St-Denis, and, by the mid-1970s, it included nominal presence at the prestigious Anglophone clubs of Montreal (Mount Royal and St-James) and Ottawa (Rideau Club and University Club). Lavalin, through its Chairman, was also a member of the Canadian and Montreal Chambers of Commerce.

9.7 Conclusion

The comparative analysis of the social characteristics of the engineering firms brings into relief that although they shared a few common characteristics, by and large, each firm had a unique profile. Over time, the social relationships of upper managers were validated and reinforced through praxis and formal links between the organization and the same external elements. Thus, as personal channels became entrenched, they were reinforced by organizational ties, and the social distinctiveness of each firm became accentuated. Unlike the linguistic and ethnic composition of the upper management of the firms which were defined quite early and remained stable, the formal organizational ties lagged and evolved, and tended to reflect the firm's size and scope at different periods.

The data also provides insight on how the ethnic and linguistic profile of each firm was preserved over the years, despite major turnover among top managers. The statistical and anecdotal evidence suggests that this profile is shaped and sustained over time by a process which involves the following factors and mechanisms (see illustration in Figure 9.7):

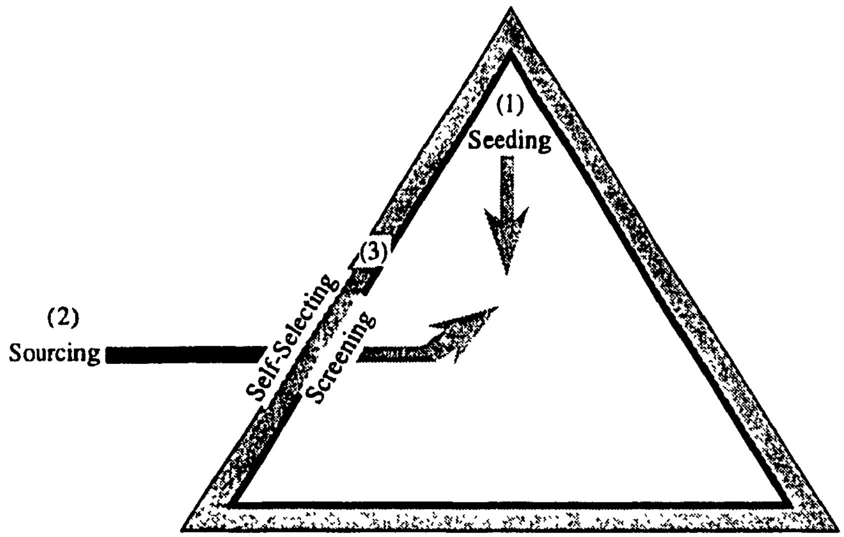
• **seeding** by the founders whose own social profiles and backgrounds cast long shadows over the history of the firm;

• **sourcing,** that is seeking out graduates from one's alma mater;

• **screening** and/or **self-selecting,** within specific geographic areas and universities, members of same ethnic and language groups.

Figure 9.7

The process of social renewal



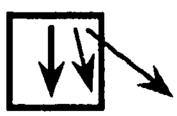
Finally, there is also some evidence (which will be explored further in chapter 10) that the social profile of each firm is congruent with that of the regions of the country and of the world where it expanded. **This confirms the relationship between the social profile of the firm and its strategy, and the appropriateness of assessing its profile through the backgrounds of its leaders and through its institutional ties.**

These findings also provide insights and raise questions regarding the process by which the environment of these organizations was defined, as well as the nature and the consequences of the relationship with its environment.

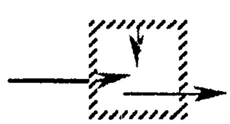
10 Organizations, Environment and Strategy

Now, we revisit the histories of Monenco, SNC, and Lavalin, and undertake to assess the evolution of these firms using three different theoretical approaches: one from the field of economics and industrial organization, another from the mainstream of the strategic management literature, and a third from a contextual perspective proposed and tested in this dissertation.

• First, the **economic approach** is presented and then used to evaluate the growth and performance of the three firms, in terms of the *external* factors prevalent in the industry and in the nation. There, the firm is treated as a black box, an entity which must fit *economically* with its environment.



• Then, we enter the black box and look within: the **managerial approach** is presented, and serves to assess the three firms from an *internal* perspective with a focus on the actions of the managers who seek to render their firms *technologically fit* by making decisions regarding its products and its markets, as well as its organizational structures and processes.



• In a third cut, the borders of the black box fade, as the organization —treated generically in the first approach, and reified in the second— is considered to be *traversed* by its environment (Touraine, 1973). In this **contextual approach**, the goals of the organization are dimmed, while those of individuals and of other groups are brought into light. In that light, the organization appears as the *nexus of common means* —an instrument— used by internal and external members pursuing diverse goals. It thus becomes the means by which the owners fulfill a dream, the political instrument to further provincial autonomy, the venue for upward mobility for individuals at large. There, the organization must be *socially fit* with its environment (these terms will be discussed in greater details in the third part of this Chapter).

10.1 The Economic Model :

National Resources and Market Structure

In classical economic theory, the level and the nature of economic activity in a nation are related to its factor endowments, which determine its overall performance as well as the specific industries in which it excels: the greater a nation's resources, the greater its overall production; furthermore, it produces more of a specific good or service than another nation if it can do so more cheaply due to its advantageous pool of human, natural, technological and financial resources. This would explain, for instance, Canada's strong export position in forest products, basic metals and minerals.

> "Whether the advantages which one country has over another, be natural or acquired, is in this respect of no consequence. As long as the one country has those advantages, and the other wants them, it will always be more advantageous for the latter, rather to buy of the former than to make".
>
> (Smith, 1776, rev. 1937:426-7).

Smith's early notion of absolute advantage suggested that a nation which is better endowed in a particular industry would necessarily produce more than another with fewer resources.

Later works by Ricardo (1817), Ohlin (1933), and more recently by Kindleberger (1973, 1974), have refined this theory by introducing the concepts of comparative advantage, based on opportunity costs rather than absolute costs.

According to these economists, even if a nation has the resources to produce Good X, it may find that it can put its resources to even more efficient use by producing more of Good Y, export some of it and import the Good X that it needs.

> Italy exports shoes to and imports machinery from the United States not because its shoe industry is necessarily more productive than that of the U.S. shoe industry. Rather, Italy exports shoes because the ratio of output per worker in Italy's shoe industry to output per worker in the machinery industry is greater than the same ratio for the US. shoe and machinery industries.
>
> (Morici, 1988:20)

Despite its common sense appeal, the macroeconomic explanation of international comparative advantage has not withstood empirical testing. A major Harvard study (Leontief, 1953, in Kolde, 1985) found that US. exports were actually more labor intensive than its imports, contrary to theoretical expectations.

Researchers in Industrial Organization have sought to improve our ability to predict the performance of product-markets by coupling these classical macro analyses with closer examinations of intra-market features (such as cost structures, mobility barriers, product differentiation, concentration and conduct of firms) (Scherer, 1970:3; Caves, in Dunning, ed., 1974). This approach, which began with a marked interest in public policy at the turn of the century, has provided a finer grained examination of the industry by drawing attention to the consequences of industry features such as supplier and buyer concentration and the availability of substitutes. These factors shape the specific configuration of the industry, determine the specific nature of competition, as well as define the conduct, the size and —along with general economic conditions— the performance of its member firms.

Because they analyze these issues at two distinct levels, the theories of macro- and industrial economics address two different sets of concerns. As a result, they do not provide different answers, but rather answers to different sets of questions.

• First, while the more traditional view in economics may attribute the growth of an industry in a particular nation solely to the optimization of its relative cost functions, the newer approach of industrial economics takes into account the structure of the nation's industry.

• Second, while macroeconomics explains the *act* of economic activity, industrial economics brings its *actors* —as groups, not individually— in somewhat greater focus. Consequently, the first field may help us understand why certain industrial activities grow or shrink, but it does not concern itself with the firms who carry out these ventures: are they small, large, specialized or integrated firms?

The two approaches, then, are complementary, as the output of macroeconomics —an evaluation of the "basic conditions" of demand and supply— serves as the input for further study in industrial organization. This relationship is illustrated Figure 10.1.

Figure 10.1

MACROECONOMICS	*INDUSTRIAL ORGANIZATION*
Basic Conditions ⟶	**Structure ⟶ Conduct ⟶ Performance**

Although variances among firms are not expressly disallowed in the macroeconomic model, their performances are treated in the aggregate and cannot be accounted for individually. Consequently, the refinements suggested by industrial economics are of interest to strategic management since they explain further the uneven conduct and performance of industries and, at least, of groups of firms within the industries.

Because of this evident complementarity, it will prove fruitful to use both approaches, as we study the evolution of the engineering firms from a perspective of economics and of industrial organization.

Macroeconomic theory is well suited to explain the performance of the engineering industry, since the latter seems to fluctuate with the general state of the economy and is particularly influenced by the level of private and public capital investment (I.S.T., Canada, 1988:1). For these reasons, econometric models of the demand for engineering services are usually based on Gross Domestic Product (GDP), and may include indices of capital investment and of return on physical assets, such as long-term interest rate (Hammes: 1988:32, 43). Indeed, over the period of interest to this study (1934-1986), the correlation between the level of engineering activity in Quebec and its Gross Domestic Product (GDP) was r=.9550, which suggests that 91.20% (r^2 = .9120; p≤ .0001) of the change in engineering activity can be "explained" by changes in the amounts of goods and services produced in the province (see Table 10.1).

Table 10.1

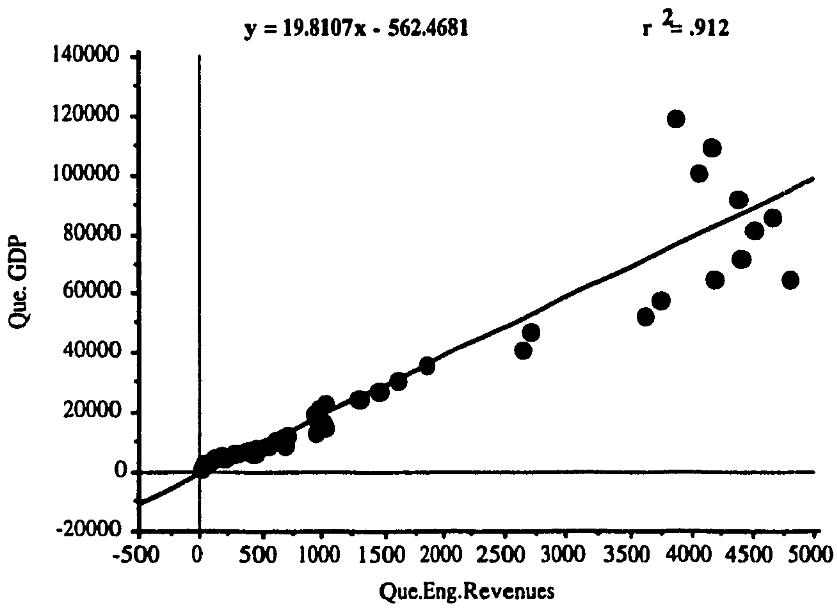
Simple Regression X $_1$: Que.Eng.Revenues Y $_1$: Que. GDP

Count:	R:	R-squared:	Adj. R-squared:	RMS Residual:
53	.955	.912	.9102	9495.3392

Analysis of Variance Table

Source	DF:	Sum Squares:	Mean Square:	F-test:
REGRESSION	1	4.7631E10	4.7631E10	528.2905
RESIDUAL	51	4.5982E9	90161466.2671	p = .0001
TOTAL	52	5.2230E10		

Figure 10.2



For shorter periods, however, such general economic conditions appear to be far less reliable indicators of engineering activity. Correlations for periods of 12 to 14 years indicate that the relationship is, at times, much weaker. The various correlations and the related scattergrams, which indicate the degree to which variations in engineering activity are related to variations in the GDP, are presented below. The correlations of the second and third periods (see scattergrams) reflect times when the correlations are very strong (1947-60; 1961-74), while those of the first and last periods (1936-46; 1975-86) reflect times when the correlations are much weaker[49] (the reasons for these variations will be discussed in the next section).

Table 10.2

Years:	1934-46	1947-60	1961-74	1975-86
r^2 =	.2072	.9592	.9161	.3832

The level of engineering activity appears to be far more volatile than that of the GDP, both in absolute and relative terms, such that the ratio of engineering over GDP has fluctuated from below 4% to above 7.5% since WWII (see Figure 4.5).

10.1.1 From the 1920s to the mid-1960s [50]

The Quebec engineering industry had a sporadic and uneven performance between the 1920s up until the mid-1960s. Also, its performance differed from

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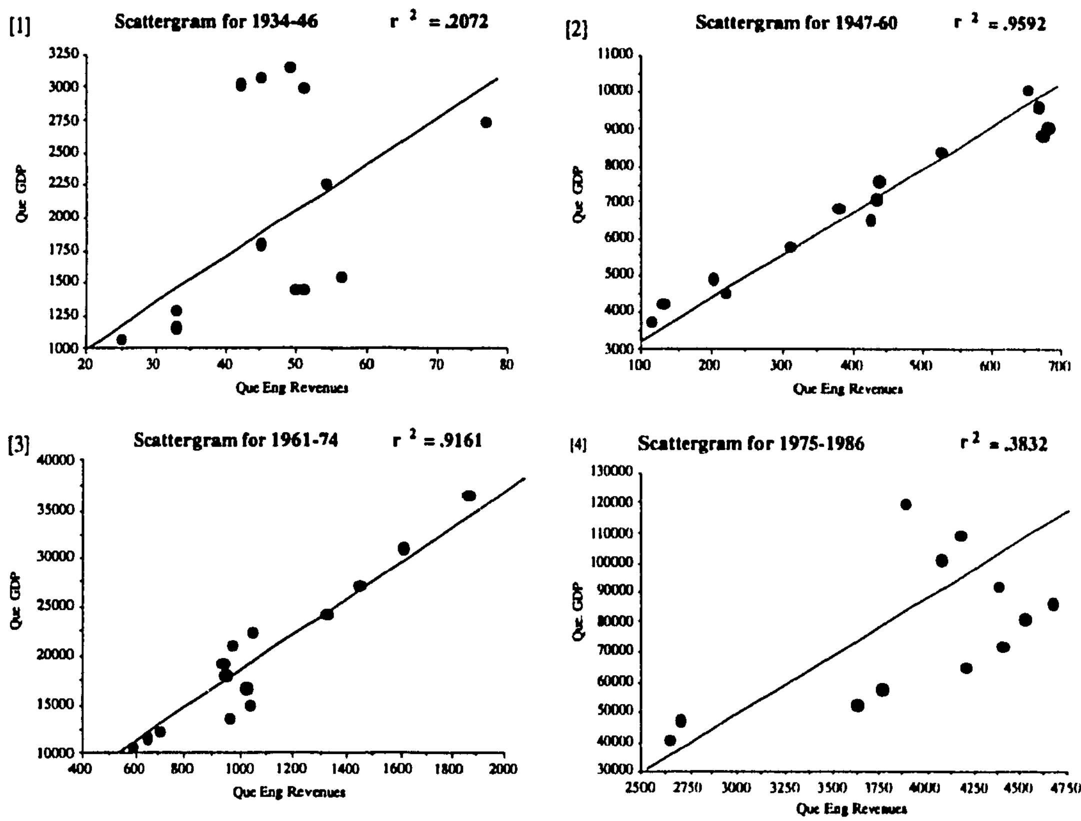
[49] Correlations of engineering activity, lagged by 1, 2, and 3 years against the GDP, were calculated for the first period. The resulting correlations were very low: .043, .1124, and .263, respectively.

[50] In this chapter, frequent references are made to the economic data and the graphs provided in Chapter IV "A Canadian Style Revolution", and to Chapter V "Notes on the Canadian Engineering Industry".

that of the general economy during times of discontinuous changes —such as the post-crash and war period (1934-46), or during the period of inflation and of recession (1975-1986)— while it tended to reflect the general economic climate during more normal times, such as between 1947-60 and 1961-1974 (see Figure 10.3, Graphs 1 to 4).

Figure 10.3



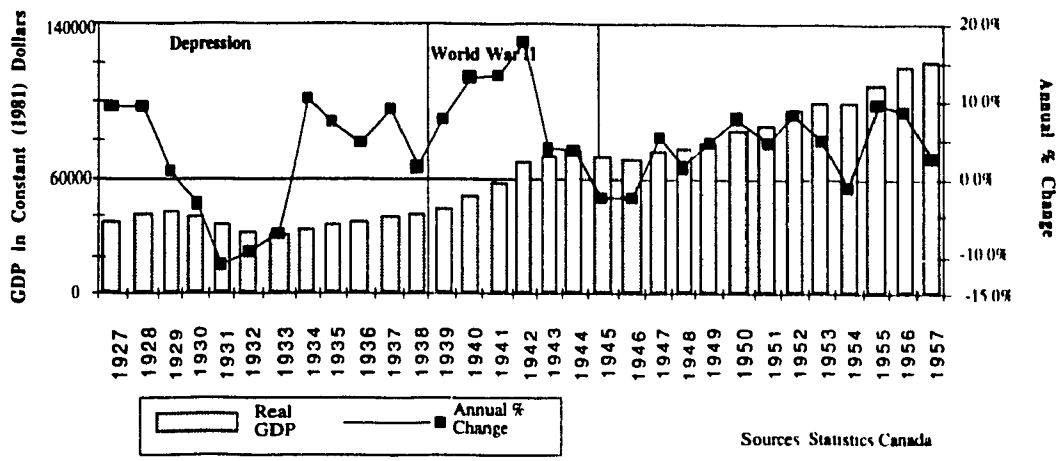
Similarly, the performance of the three focal organizations was smooth at times, and jagged at others. While, by and large, none of the three was immune to the major factors that affected the economy and their industry, their individual performance departed drastically from those of the national economy and of their industry during the same periods of discontinuities.

As predicted by the economic model, all three firms were adversely affected by the Great Depression, as the level of general economic activity plummeted in Quebec, and in the rest of Canada. So precarious was their situation that all three firms had to reduce their staff drastically, and the leaders of Lavalin and SNC had to seek outside employment. At Monenco, recovery came earlier, fueled, in the mid-1930s by that of the economies of the "southern" countries in which the company was active, and, with the outbreak of WWII, by the extensive construction required for the war effort, especially outside of Quebec. Since, during the same period, SNC was active in a few industrial projects in the rest of Canada, while Lavalin was confined to this province, the performance at SNC remained mediocre and that of Lavalin, dismal. It appears, therefore, that the three firms were responding to very different forces within the same general environment.

Their performance ranking shifted after WWII, reflecting, again, the performance of the markets with which they were most closely associated. The economic expansion that took place in Canada allowed Monenco to compensate for the contraction caused by the dismantling of the "southern" part of its empire, with the net result that its revenues plateaued after the war up until the mid-1960s. The income fees of SNC increased rapidly, during that period (see Figures 7.2 and 7.3), largely due (in the early 1950s) to the chemical and industrial construction carried out by the firm's "West Block", and (in the latter part of the decade) to construction in the public sector, which was handled by Chênevert's "East Block".

Figure 10.4

Canadian Gross Domestic Product



Since Lavalin was active only in Quebec's public sector, its recovery came only in the late 1950s, when activity resumed in that province, and the firm was able to take advantage of the construction undertaken by the provincial government, in the areas of highway construction, education and health care.

10.1.2 From the mid-1960s to the mid-1970s

This was a period of considerable growth for the Quebec economy, its engineering industry, as well as for the three focal organizations. In terms of market concentration, the industry of consulting engineering firms was closer to a situation of pure competition than it will be in latter years. Monenco, SNC and Lavalin, were in the heart of that industry, having acceded to the category of Large Firms (with yearly revenues between 1 and 10 million dollars) which comprised 44% of the Quebec market. Such a structure of intense —if not pure— competition was conducive to even performances among firms within the industry.

As will be shown below, a number of other factors brought Monenco, SNC, and Lavalin in line with other firms during that period. As 'average' and 'typical' firms, their performance was based on the prevailing macroeconomic conditions that affected the whole consulting engineering industry.

- Progressively, and especially with the termination of its major contract with Canadian International Power in 1969, Monenco became an independent company without a captive market of utilities. By the early 1970s, its new status as a public company further strengthened its mandate for reliable financial performance.

- During the late 1960s, SNC built a stronger portfolio of activities in the industrial and commercial fields, while continuing its diversification in both the private and the public sector.

- By broadening its political and technical base, Lavalin was able to grow with the general level of activity in the province, rather than be captive of a sector or of a political mentor.

10.1.3 From the mid-1970s to the mid-1980s

From an economic perspective, the internationalization of the consulting engineering industry can be explained by the lowering of trade barriers, the increase in the construction of major infrastructures throughout the world. These countries included many developing nations which, for lack of adequate resources, imported such services from industrialized countries, especially those, like Canada, which offered technical and financial assistance through its agencies. The mere size of these public mega-projects caused a corresponding increase in the private firms that were called upon to carry them.

Since the 1950s, Canada had lost its lead and fallen to third position in Comparative Economic Growth among the six largest economies (Maddison: 1982:7). However, the financial role played by EDC in the 1960s (Figures 6.8, 7.6 and 8.2), and by CIDA, from the late 1970s through the 1980s (see Figure 5.6) enabled certain firms —particularly the larger ones— to pursue aggressive strategies on the world scene, even when market conditions where less favorable at home.

In Quebec, the industry became much more concentrated. This allowed for more uneven performances among firms. All but the largest among them had seen their market share decrease, as the market became more oligopolistic. Small Consulting Engineering firms, which had a 20% of the market in 1974, saw their share halved to 10% only eight years later, while that of the Very Large Firms —a category comprised exclusively of Monenco, SNC, and Lavalin— had doubled to 50% (Statistics Canada, Cat. # 63-528 & 63-537 and Table 5.4).

Under those circumstances, it is not surprising to note that the industry in general and the focal organizations in particular had growth patterns that showed little correlation with one another and with the Gross Domestic Product. Engineering activity, which had peaked by the late 1970s decreased rapidly through the mid-1980s, while Quebec's GDP climbed rapidly, after a short stall during the 1981-82 recession (see Figures 4.3 to 4.5). As a result of these opposite trends, Engineering activity as a percentage of the province GDP fell by more than half to less than 3.5% between 1977 and 1986.

The recession had not spared Lavalin, which had suffered decreases in revenues and cutbacks of more than 1000 permanent employees. However, the mid-1980s was a remarkable period for the firm whose growth outpaced that of Quebec's economy and placed the firm among the world's largest, thanks also to increased international activities and major acquisitions throughout Canada. This growth is that much more surprising when it is considered that it was not supported by internal growth in its home base, and that it took place at a time when the home industry was facing falling revenues.

During 1981-82, Monenco also suffered decreases in its Net Income, while its Revenues remained stable. But, it too grew on the international market from the mid-1970s to the mid-1980s. Its overall performance, was more moderate than that of Lavalin, partly because energy, its area of traditional expertise, declined steadily during that period.

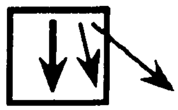
The 1981-82 was also a turning point for SNC, which also suffered decreases in its revenues, first domestically, and, one year later, internationally. Contrary to the other two firms, however, this period was followed by a decrease in the share of its international activities. Consequently, the pattern and the timing of its recovery, half way between that of the other two firms, mirrored closely that of the domestic economy.

10.1.4 Conclusion

From the economic perspective, the industry's evolution is explained in terms of factor endowments and growing demand, and in terms of the structure of the consulting-engineering industry in Quebec, where mega-projects created very large firms, capable of carrying out very large projects on the world scene.

This perspective was short on many of the specific elements that are important to strategic management. While it seemed well suited for explaining the long-run term performance of the industry and its structural changes, it contributed little to our understanding of its short- and medium- term performance, and even less that of individual firms. Since periods of 12 to 14 years exceed the planning horizon of most firms, they remain of great concern to strategists who are left without guideposts. Also, the consideration that the three firms were subject to somewhat different economic environments helped explain their uneven performances, at times, but leaves unanswered *why* such differences existed, *how* they arose, and *how* they can be tracked.

In the next section, we seek answers to these questions by going inside the organizations and paying more attention to the internal conduct of the firms within their various contexts.



10.2 The Managerial Model

Structures, Processes, and Product-Markets

Contrary to the macroscopic approach taken by economists, researchers in strategic management focus on the firm and consider that managers play a decisive role in shaping its conduct and its performance. Since this managerial approach is central to much of the literature reviewed in the earlier parts of Chapter One, we need only clarify its treatment of the role played by the managers, before we undertake to apply it to the three firms.

Although there is widespread consensus on the notions that the organization-environment fit is a primary goal of strategic management, and that its realization is incumbent upon its managers, there is wide divergence on the type of fit which should be sought and, crucial to this section, on the role that managers actually play in achieving it.

Three streams of thought dominate. In the **popular literature** and in the **Entrepreneurial School**, the strategic organization-environment fit is the brainchild of the CEO's "intuition, judgment, wisdom, experience, insight" (Mintzberg, 1988), and the role of the managers, especially that of the CEO is made central. Understanding of an organization's strategy entails knowing the psychological profile of its leader(s) (Miller D. & P. Friesen, 1978), since strategy making is considered in terms of the organization *and* of the personality of its CEO. This notion that the entrepreneur forms a symbiotic whole with his/her organization has given rise to the concept of the 'entrepreneurial organization' completely crafted by its leader/manager, of which it becomes a mere reflection.

In a second perspective, which prevails in the **mainstream management literature**, the emphasis shifts from the *makers* to the *making* of strategy. The strategic fit, then, is the result of a rational analysis of the organization's internal strengths and weaknesses vis-à-vis environmental opportunities and threats (SWOT). Researchers differ, however, in the relative emphasis that they accord to these components. According to some, the concern of strategic management is to define the firm's "distinctive identity" (*who* the organization is) (Selznick, 1957:63), around which it can integrate its components and effect an advantageous fit with its environment (Andrews, 1980). For others, the organization-environment fit is accomplished through a careful definition of *how* the firm can best compete with its products/markets (Ansoff, 1965). For still others, the main task of strategic management is to identify the sub-environment, the position, *where* the firm can secure a sustainable fit (Porter, 1980).

A third, and smaller group of writers in the academic literature —equally interested in the makers *and* in the making of strategy— take exception to the comprehensive, rational and prescriptive approach espoused by those in the mainstream. They consider that strategy formation is an iterative, behavioral and cognitive process which unfolds incrementally. Because of their "cognitive and process limits" (Quinn, 1978:8) organizational members are neither able to conceive nor willing to accept strategic changes on the basis of full-blown plans. These activities are understood post facto, shaping the actor's sense of the organization's internal and external contexts, and, in turn, affecting future decisions and behavior. The strategic process is not, "a neat, orderly, controlled process, but a messy one of trying to cope with a world the policy maker knew was too complicated for him" (Lindblom, paraphrased in Mintzberg, 1988).

But, regardless of the basis of strategy-making (be it vision or reason) or its form (be it incremental or global), the strategic management of a firm requires executive actions and choices with regards to its internal fitness and its fit with the environment —that is, with its structure and processes on one hand, and its product-markets on the other (Drucker, 1954; Chandler, 1962; Thompson, 1967; Miles and Snow, 1978; Galbraith & al., 1983). Thus, we will examine the actions taken and the choices made with regards to the organizational structures, the ownership and control and the strategic domains of the three firms, as we review their strategic evolution. To facilitate our analysis, these areas are summarized in Figures 10.5 (Monenco), 10.6 (SNC), and 10.8 (Lavalin).

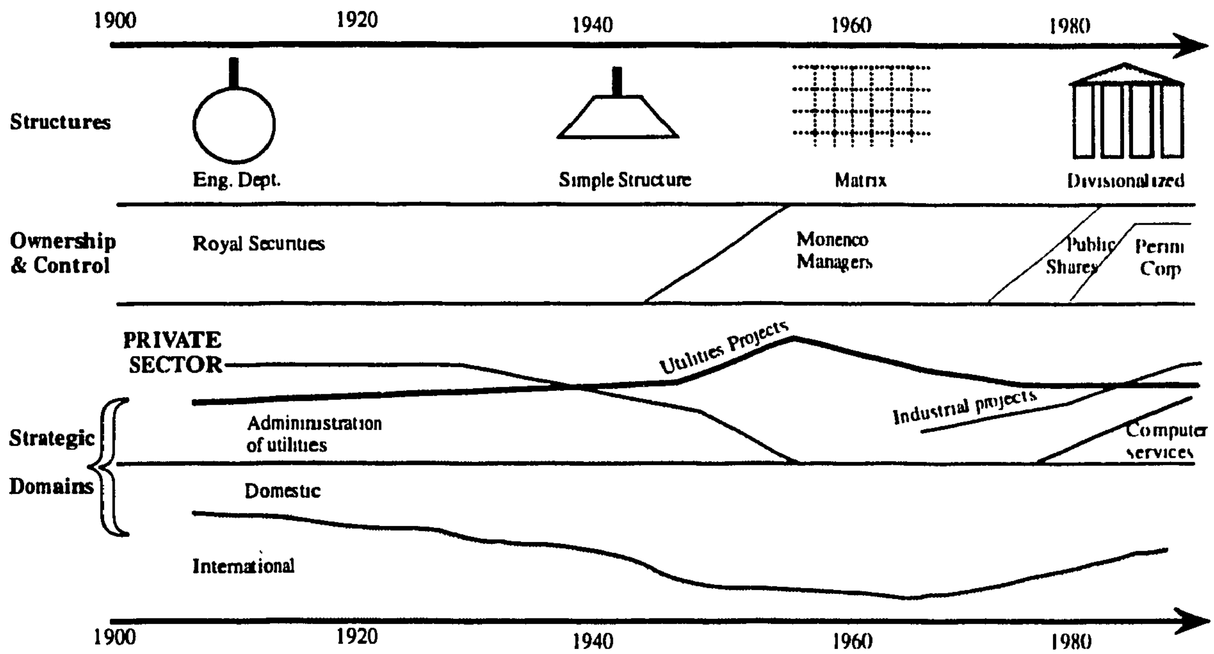
10.2.1 Monenco

An Engineering Department: Focus on Internal Fitness (1907 - 1946)

Until the end of WWII, Monenco's strategy was a sub-set of that of the Royal Securities: while the owners of its parent company sought out markets where there was a demand for electric and/or transport utilities (but no local resources to supply them), Monenco provided the technical and administrative skills needed to set them up and run them efficiently.

Figure 10.5

Strategic Periods at Monenco



"Zero overrun was the word and if you did not succeed, the wrath of the gods was upon you" (Smith, c.1988:16). To ensure the standardized and centralized administration of the utilities, the managers adopted an undifferentiated and centralized *structure* for their department and they *staffed* it with a nearly homogenous team of electrical engineers (see Table 6.2).

> In all of these projects for Calgary Power, there was an all important theme of minimum staff for operation and the first major development in Canada and perhaps in North America of automatic and remote controlled plants. This development was no doubt a big factor in the low cost power areas which would have been costly to have locally operated in the traditional fashion.
>
> (Smith, c.1988:16)

Since the staff and the structure were geared for cost-efficiency and technical expertise, they were more proficient at dealing with external projects in which technical considerations prevailed, and they performed better, for instance, in the Habbakuk project than they did in the politically charged Ottawa Valley project. The latter type of work being rare during this first strategic period, Monenco's focus on internal efficiency allowed it to grow within its stable environment.

Becoming an Autonomous Engineering Firm: (1946 - 1955)

As a result of the downturn in its traditional markets, both the inputs and the outputs of Monenco —its engineers, on one hand and the administration and evaluation of utilities on the other— changed and became more diversified after WWII.

While a majority of the engineers who had joined prior to 1946 had been trained in electrical engineering, most of those who joined afterwards were civil engineers (see Tables 6.2 and 6.3). In 1952, a senior manager "made a recruiting visit to the United Kingdom" to complement Monenco's strength in civil and mechanical engineering (Sexton: 1982:125)

The managers also sought and obtained contracts where Monenco had technical experience and from clients whom they had helped set up: power companies in New Brunswick, Nova Scotia and in the Northern Territories, as well as throughout the West Indies. Such a radical and rapid diversification of its staff and products made pressing the need for structural changes; however, these were delayed by nearly a decade until changes in the ownership and control of the firm made them possible.

"The sole owner, Mr. Killam, was, by that time, primarily interested in the financial well-being of his utilities and paid little attention to the operations of Montreal Engineering Company" (Sexton, 1982:107). By the early 1950s, the managers were finally able to put into place a *functional structure* aimed at improving internal efficiency, by allowing greater specialization and more delegation of authority. By 1953, "the company was finally divided into definite departments" (Ibid: 116).

> [T]he company had formerly comprised a group of senior engineers with few assistants, working closely with the Chief Engineer. Now, it became an organization with pyramidal command structure, divided into specialized sections in which senior engineers supervised growing numbers of younger men through successive delegations of authority.
>
> (Sexton, 1982: 114)

Monenco was differentiating not only from within, but from its affiliates as well; it acted less and less as an engineering department, and more as a consulting-engineering firm, serving new clients and offering new services to old ones. It also began to assume an increasing number of independent projects, based on "its abilities to design for minimum cost" (Smith, c.1988: 17). "It was in this decade that [Monenco] really branched out into overseas work as distinct from the work that [it] had been doing for International Power Company in Central and South America" (Ibid).

Focus on New Products-Markets (1955 - 1969)

Although the managers became the formal owners of Monenco in 1955, the firm continued to administer the utility companies still owned by the Royal Securities. With this captive but shrinking market on hand, and much of their personal investment at stake, the new owner-managers, headed by Gaherty, broadened the ownership base of Monenco with a company-wide profit sharing plan, aimed at inducing greater cooperation from its professional staff. This new form of control mechanism, based on mutual adjustment and horizontal linkages (Mintzberg, 1979), confirmed the shift in the firm's mission, from administration to consulting-engineering.

At the same time, the managers also began the informal practice of using "Coordinating Engineers", as the foundation of a structure of Project management. By the early 1960s, after the death of Gaherty, this way of operating was formally set into a *matrix structure* —less efficient, perhaps, but more effective— to deal with the larger and more complex projects in which the firm was becoming involved (see Figure 10.5).

During that period, Monenco grew and diversified in two ways:

- **it expanded its external activities by forming or acquiring new subsidiaries** (see Table 6.5). These additions were not usually the result of a planned strategy: some companies were formed to integrate backward and forward in the areas of printing, of plant inspection, of soils and materials testing and of computer applications (see #2, #7, #9, #18 and #25 in Table 6.5); others consolidated Monenco's position in areas of new experience (see #11, #15), and still others were formed or acquired to placate senior managers (#2, #25). At other times, new acquisitions were initiated by their clients or financiers, such as the World Bank (#4, #11, #23).

- **it also became internally more complex, as its center of gravity shifted further from the centralized administration of utilities to the decentralized management of projects.** This led to the opening of new offices in Canada and overseas. The first branch was opened in Calgary (1959), as a result of increased activities in that province. The next two offices were set up in connection with their involvement in the nuclear field: one in Toronto (1962) and one in Bombay (1964). In 1964, a small office was opened in Vancouver, and, finally, in 1967 another was opened in Halifax.

A Public Company, still controlled by its Managers: (the 1970s)

In order to finance their strategy of expansion, Monenco's managers decided, in the early 1970s, that their firm should imitate a competitor (H.G. Acres and Company) and go public. Although this move brought in immediate funds, it did not, at first, alter Monenco's strategy: its strength continued to be in its ability to deliver technical services *when called upon.*

Through a class of special shares, control of the company remained in the hands of its engineers/managers, and thus pressure for change was delayed until 1983 (discussed below). The new funds, on one hand, the loss of its lucrative contracts with Canadian International Power, on the other, propelled the company further down the path of geographic and technological diversification, all through the mid-1970s. Notably, it became much more active in Central Canada and in foreign markets, and its revenues from Industrial sources began to rise while new ones from Computer services were emerging.

Forming a New Alliance: (the 1980s)

Since its founding, Monenco had undergone changes in its internal structure and in its relationship with its parent company that were similar to a process of gestation, birth, weaning and maturation, that appeared to set the firm on a path of increasing independence:

- at first, its operations were intrinsically linked to those of the Royal Securities, and its own structure remained internally undifferentiated (1907-1946);

- as it grew in size and its work became less routine and more varied, its internal structure also became more complex (1947-1955);

- then, it evolved into a entity separate from the Royal Securities (1955-1969), before setting off in its own course (the 1970s).

Unfortunately, it suffered major losses in the recession of 1981-2 and reduced salaries and staff. Over the next few years, its share of income from Energy continued to drop significantly and was replaced by income from Computer Services and Industrial Sources. As well, income from foreign sources, which had climbed from 16% in the early parts of the decade to nearly 35% by the end of that decade, plateaued at just under 40% by the latter part of the 1980s.

In 1984, its managers reversed a life-long course of increasing autonomy, and relinquished majority control in favor of the US.-based Perini Corporation. The change in ownership and the attendant need to demonstrate financial performance set the firm on a strategy which was new but had familiar traits, since once again, Monenco was now part of a larger corporation.

10.2.2 SNC

Focus on External Fit: (1911 - 1949)

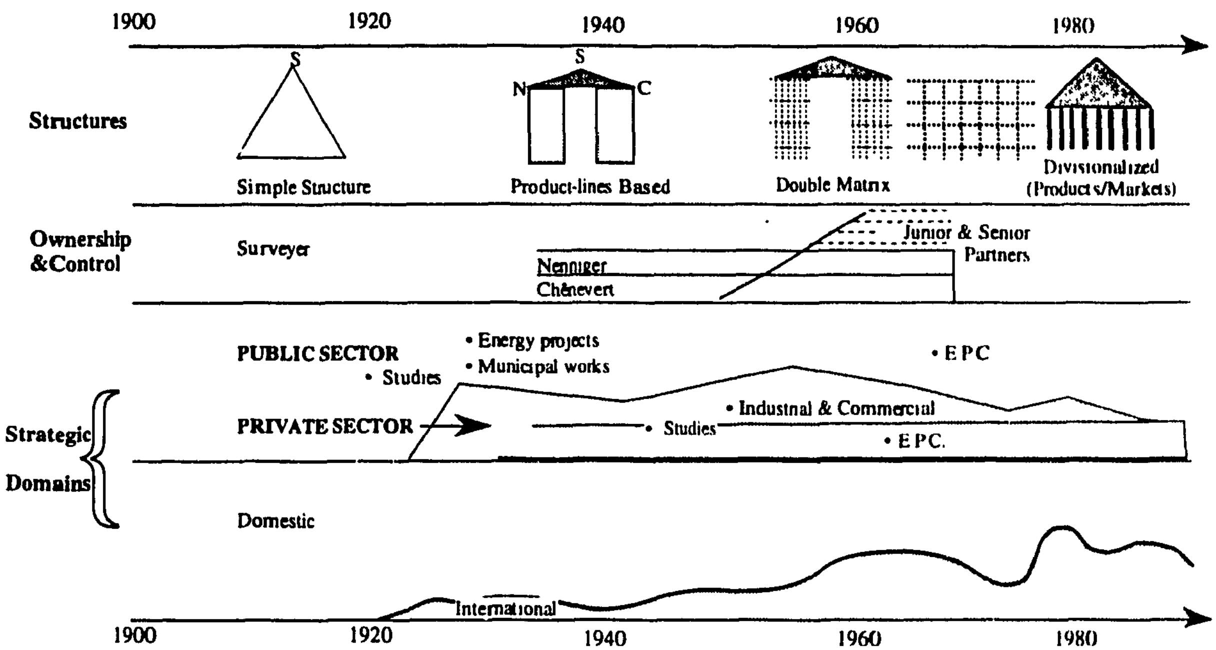
While engineering came as an adjunct to the investment business of the Royal Securities, much the reverse occurred at SNC where it was Surveyer's main field of activity until he became the managing director of International Bond and Share (IBS), in the late 1920s. Thus, lacking the financial resources of Monenco, SNC did much of its work in the public sector. Although Surveyer endeavored to penetrate the private sector, the realized strategy of his firm remained primarily focused on the public sector for twenty years. During that time, the structure of the firm remained a simple one, in accordance with the few technical studies that Surveyer, and later, Chênevert and Nenniger, were performing (see Figure 10.6).

After the crash, their business activities came to a near halt. While Surveyer managed IBS, his two associates pursued aggressive but very independent courses for the firm, suited to their individual styles and expertise: Chênevert took over commercial, institutional and municipal operations, while Nenniger pursued prospects in the private industrial sector.

However, activities on both sides remained limited through the 1930s and throughout the war, as it was for other engineering firms in Quebec. Although the results of their individual marketing efforts only began to bear fruit after the end of WWII, it was during these relatively inactive years, when Surveyer took a back seat and gave his associates freer reigns, that much of the blueprint for SNC's future strategy was drawn.

Figure 10.6

Strategic Periods at SNC



Parallel Strategies: (1950-1965)

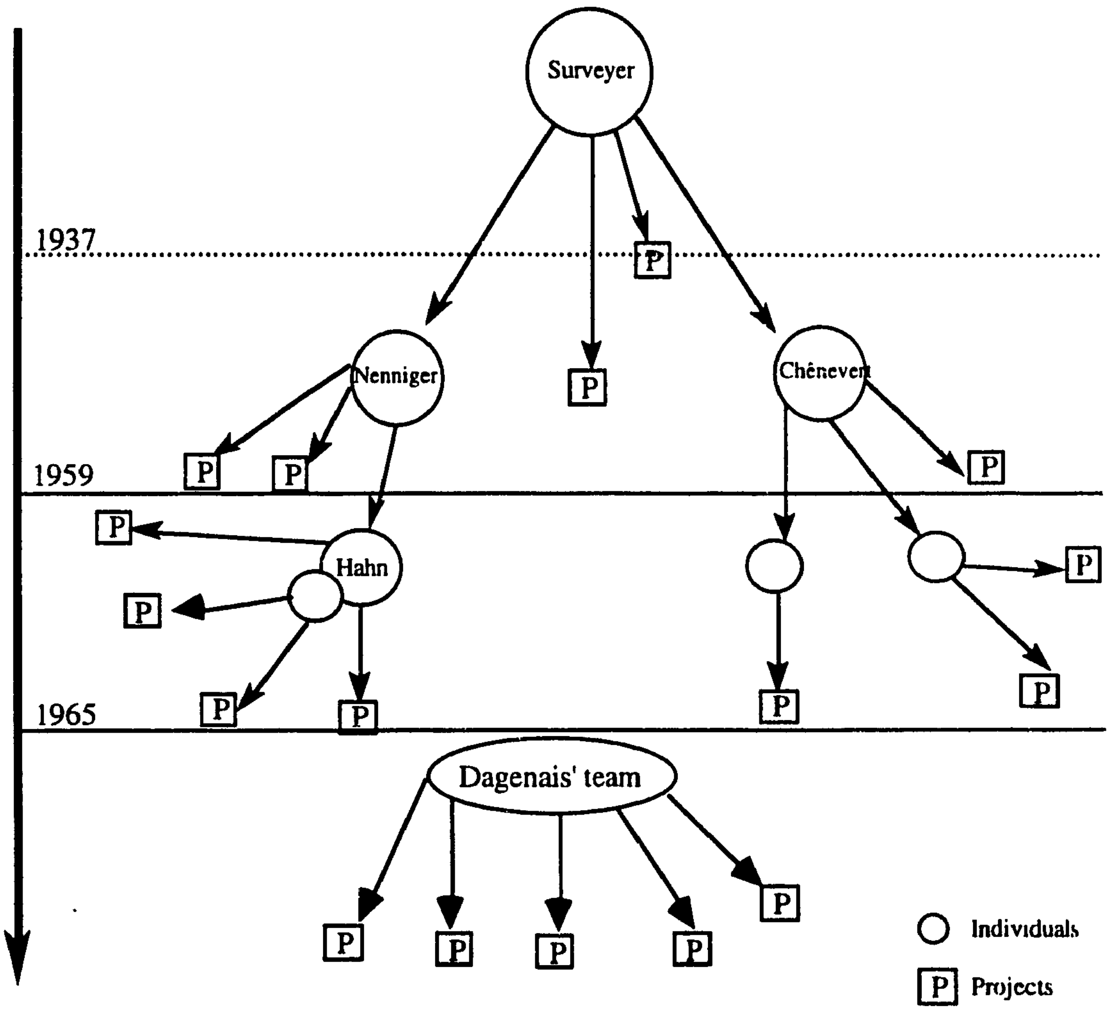
In the early 1950s, engineering activities resumed in the province, first in the private sector, which benefited Nenniger's side of the business, and, later in the public sector, where Chênevert landed major contracts with Hydro-Quebec, including a $136 million design contract for a dam at the Manic 5 site.

Through the 1950s, as Surveyer advanced in age, his younger associates came to run the firm on their own. A two-pronged strategy emerged, fueled by the personality feud between Chênevert and Nenniger. By the early 1960s, when a greater number of middle managers, from both sides of the firm, were allowed to initiate acquisitions and the formation of new subsidiaries, the two-man race became a two-team race with Chênevert and Nenniger acting effectively as coaches of opposite teams.

As with Monenco, diversification in new domains began either by becoming involved in a new project or as a result of choosing a new associate who had specialized skills (as illustrated in Figure 10.7). Unlike Monenco, however, the impetus for altering the organizational structure was internal and, consequently, the changes at SNC were not delayed. As early as 1940, the firm was effectively divided into two distinct blocks, each headed by an associate, each with its own product line and its own set of clients.

As junior partners were brought in, more fiefdoms were formed within the structure to satisfy their ambitions. The volume of business continued to grow, as did the costs of duplicating every service within the firm. So occupied was the firm in executing its numerous contracts that it postponed dealing with its internal schisms and inefficiencies until the mid-1960s, when continued tensions, growth, and the death of Surveyer brought the firm to the brink of coming apart at the seams. In 1965, the partners finally agreed to bring their parallel growth (by then, highly subdivided) under the common leadership of Dagenais. Dagenais quickly forced Chênevert and Nenniger into retirement. With this

Figure 10.7
Patterns of Growth at SNC
(through individuals and projects)



change in ownership and control, he began the transformation of SNC into a unified professional engineering firm, with a new organizational structure suited to reflect the needs of its external, rather than its internal, environments.

Although the new structure was chosen for its product orientation, it had many characteristics of a *matrix structure,* similar to the one that Monenco had adopted a few years earlier. It was felt that the new structure could better serve each market individually by bringing together people from various departments, from both sides of the firm. Consequently, it brought about fundamental changes in the internal operations of SNC.

- Firstly, it offered opportunity for cross-fertilization through the exchange and dissemination of knowledge. The pooling of staff drew open the "iron curtain" and brought together individuals from the East and West "blocks", causing them to interact and learn "together with trust, confidence and respect for each other", as never before[51].

- Secondly, it brought down the walls that separated the fiefdoms of individual partners. With time, the professional and informal affiliation of engineers and staff members cut across departments. This put a stop to the ability of individual partners —the two seniors in particular— to carry on independent policy-making.

In sum, the structure sanctioned the change from a balkanized partnership to an employee-owned, but centralized corporation. This meant that policy-making was reverting back to the top, as in the earliest days of the firm. What was new, however, was that the new leaders, led by Dagenais, were accountable to their peers for the performance of the company.

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[51] Memo from J.P. Gourdeau, dated March 2, 1966, p. 2.

So, in 1969, when the firm experienced losses, due to its lack of 'marketing aggressiveness' (Dagenais, quoted in Lalande, 1992:150), Dagenais' reaction was to delegate authority and responsibility. He made cutbacks at every level of operations, but also delegated more authority to the construction management group, since they were closer to the clients and in a better position to deliver an integrated line of engineer-procure-construct services (EPC).

Its new strategy, based on SNC's ability to deliver on its technological and managerial capabilities, allowed SNC to recover promptly from its losses. Three major turnkey projects (one domestic, two international) were undertaken. Between 1967 and 1977, twice as many subsidiaries were formed than during the previous decade, and SNC began the practice of forming companies in association with other firms (see table 7.2).

Nonetheless, it became clear by the middle of the 1970s that something was very wrong with SNC's strategy when Dagenais failed to win the James Bay contract, by far the most lucrative prospect of SNC's history. The need to improve its external fit led the firm to begin publishing, in 1974, an annual report of its finances and of its engineering activities.

Between 1975 and 1985, EPC projects —which involved marshaling financial as well as technical resources— became an increasing share of SNC's work, in Canada and abroad. It was felt that such complex projects in different markets were best handled by the firm's new structure. Once again, the focus of its strategy was on its external environment.

10.2.3 Lavalin

Young, French-Quebecker Firm seeks Work: (1936 -1950)

While SNC managed to serve both the private and public sectors, Lavalin's initial strategy was to limit itself to the latter, at opposite end from the strategic domain of Monenco. Unlike the other two firms, Lavalin remained, to the end, an entrepreneurial organization driven by the personal visions of a few owners-managers.

From the very start, Lalonde and Valois recognized that there was, in Quebec, a new market for the construction of public infrastructures which favored Francophone engineering firms like themselves. Thus, their initial market strategy was to use Valois' connections with public servants in the areas of education and of public roads. Indeed, during the first years of the firm, Lavalin worked principally in school, hospital and highway construction.

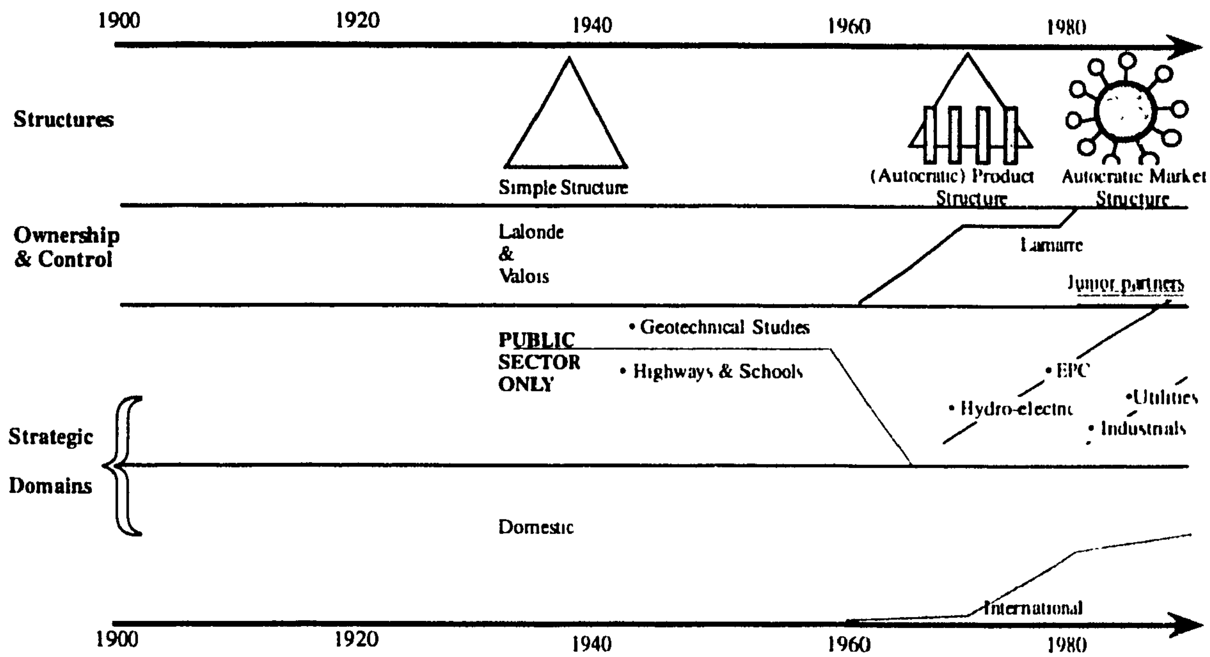
The firm's ability to carry out these contracts was assured by its simple and efficient structure, since, like Monenco, Lavalin was unfettered by the internal feuds which plagued SNC. From the start, Lalonde spent a great deal of effort in motivating the staff, ensuring its *efficiency* (in Barnard's sense of the word; 1938). Within a few years, he developed two distinctive specialties for Lavalin:

• He formed a subsidiary, the National Boring and Sounding Inc., the first local geotechnical company in Montreal, capable of addressing technical issues related to the bearing capacity of soils.

• His personal interest in cement also drove the firm to specialize in the use of prestressed concrete.

Figure 10.8

Strategic Periods at Lavalin



During its first years of operations, Lavalin's strategy was to offer these specialized services to the public sector, a domain which its owners knew well and felt comfortable in, unlike Monenco, which shunned government-related projects, and SNC, which embraced them only half-heartedly.

Experienced, French-Canadian Firm seeks Work: (1950 - 1972)

By the early 1950s, Lalonde and Valois demonstrated their ability to adapt to changes in their market conditions by extending their services to the federal government as well.

By 1960, Lavalin had also expanded the range of its services in studies, consulting, reports, plans and specifications, estimates and construction supervision. Since these services fell within the scope of civil engineering, and since Lavalin operated within a limited geographical area, the firm underwent no major structural changes during that period.

Toward the end of 1960s, however, it became apparent that the governments' programs of school and highway constructions were nearing completion. Initial efforts to build on the firm's accumulated experience in construction, and sell its expertise in the rest of Canada and abroad met with limited success. It seemed that Lavalin's major competitive advantage laid in its ability to deal effectively with clients in the public sector, and not in its broad technical expertise, like SNC, or its ability to be cost effective, like Monenco.

Well-Connected Firm Seeks New Opportunities: (1972-1986)

It was in an area quite outside its traditional product domain that Lavalin catapulted to the heights of success shortly after Bernard Lamarre assumed leadership in 1972. The Quebec firm was, still, a medium-size commercial and highway constructor, with a permanent staff of approximately 500. It was a threat to neither Monenco nor SNC, and not even their remote competitor in the area of hydroelectric power.

At that time, Monenco had revenues in excess of $20 million and an impressive domestic and international record of more than 50 hydro-electric power plants, 3 nuclear plants, 30 conventional thermal plants, 26 diesel and 7 gas turbine plants. For its part, SNC had revenues of around $25 million and major experience in hydro-electric power construction in Canada and abroad.

On the basis on technological know-how and financial capabilities, Lavalin seemed poorly positioned to vie for any major role in the construction of a $4 billion hydro-electric dam for which Monenco and SNC had to combine forces in order to present a credible bid. Yet, it was Lavalin, smaller and totally inexperienced in projects of that nature which emerged the 'lucky' winner. Officially, it played a junior position to the larger and vastly experienced Bechtel, but, managerially and financially, it had the lion's share of the deal: it was put in charge of hiring most of the workers, and its fees were set at a cost-plus basis, as expenditures for the project nearly quadrupled to $15 billion.

This contract had momentous consequences for the firm. Within a few years, its structure was changed to reflect the more complex nature of its projects as well as Lamarre's new leadership. In 1973, all of seven companies were grouped under the name of Lavalin Inc. Although power and decision making remained centralized at the top, the product structure reflected Lavalin's new capabilities to offer an "integrated range of the most advanced engineering services [...] whether they involved port or maritime facilities, exploration for new sources of energy, the environment, project management, or plant or road construction" (#2:5-6).

These larger and more complex projects gave Lavalin new opportunities to work with specialized firms. These were, in turn, acquired, when feasible, thanks to the funds that it had accumulated. At first, these acquisitions necessitated some internal structural adjustments, but, later, they enabled Lavalin to attack new markets.

Its new skills in construction management and project coordination allowed it to attack more credibly the international market, based on its ability to deliver complex EPC services. In 1982, international operations accounted for about 20% of its total fees. That same year, however, it faced an industry wide downturn in its domestic market.

Faced with such unfavorable external conditions, the senior managers turned their attention to making the domestic side of the firm more lean and efficient. They undertook another restructuring of the Lavalin Group, along geographical and technical standpoints. Canada was divided into 10 local units, and each of the former technical divisions was assigned a specific field of activity. In addition, four regional centers were formed in Montreal, Toronto, Calgary, and Vancouver. Also, some internal projects —such as the Project Management Information Systems— were also carried out to improve managerial efficiency.

Despite its growth and its administrative decentralization, ownership and control remained highly centralized in Montreal under Lamarre, as illustrated in Figure 10.8.

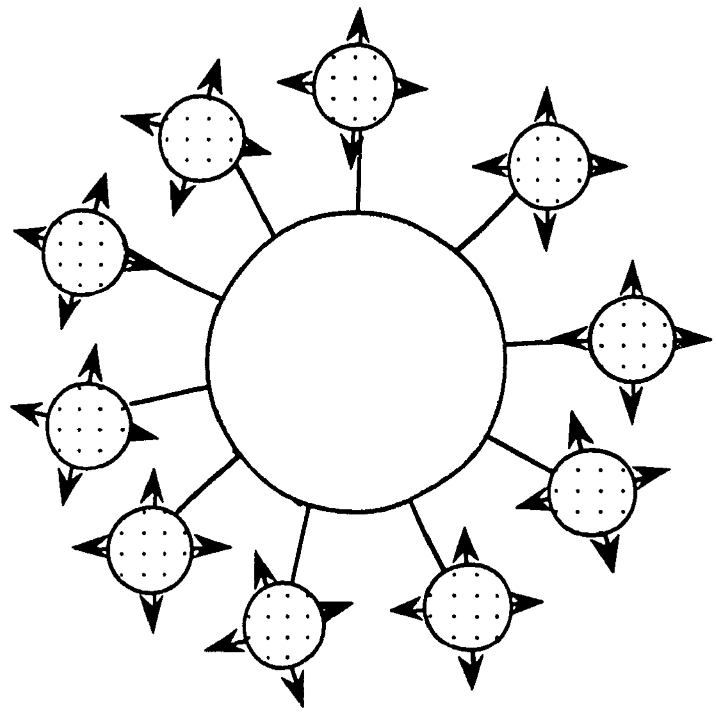
These organizational changes and continued international growth altered the firm profoundly. By 1986, Lavalin had more than 6,000 employees, 67 divisions, 18 associate companies in Canada, offices on all five continents and in more than 50 countries (#2:10). But, while its traditional products were selling well abroad, they faced a sluggish market in North America. There, they opted for a strategy of diversification, and Lavalin entered the utilities sector in the US., the urban rail transport manufacturing sector in Ontario, and the oil refining sector in Quebec (#2:5).

Fifty years after its founding, Lavalin was growing in the private sector, and in technical areas that were a far cry from its original construction business. This change was comparable in scope with what the firm had undergone a decade earlier when it entered the field of hydro-electric power; but, this time, it could no longer count on a generous environment to finance its strategic turn. Within four years, its whole empire collapsed, and only the consulting-engineering side of its business was salvaged when it was acquired by SNC.

10.2.4 Conclusion

Figure 10.9

Structure of Lavalin in the mid-1980s

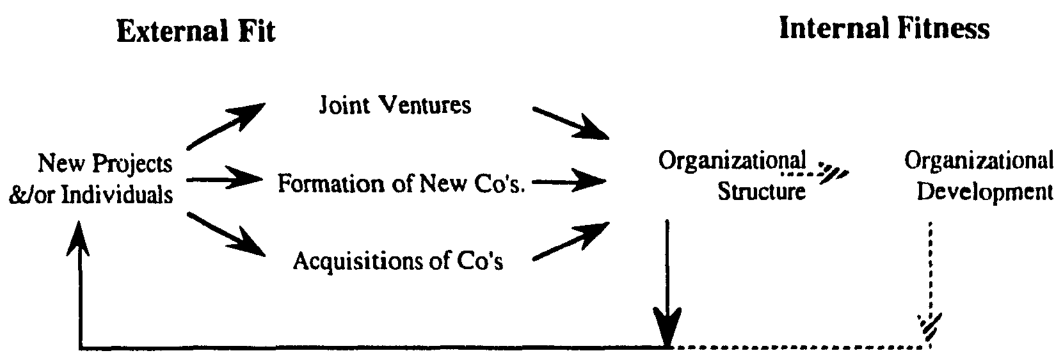


The economic perspective proposed that, over three decades of maturation, there developed in Quebec a fertile environment propitious for the growth of a particular species of organisms: engineering firms, capable of meeting the growing demands for infrastructure of that environment. A closer look from the perspective of industrial organizations suggested, in turn, that the rise of mega-projects in the public sector, with their large and complex requirements, favored the emergence of engineering firms which were also large and ever more complex.

The managerial perspective suggested that a further differentiation occurred among the sub-class of very large organizations. The three firms —driven by managerial strategy or chance— structured themselves internally and positioned themselves externally in different ways and were thus able to exchange individually with their environment. As a result, they showed patterns of strategy, growth and performance that were unique, in some instances, and common, in others.

An overall cycle of growth (shown in Figure. 10.10) was shared by all three firms. Typically, new projects or individuals brought them into new domains. Thus, new skills were acquired and incorporated in the old structures, which were then altered. (These structural transformations seemed to be facilitated by changes in the leadership of the firm.) Through this cycle of internal and external growth, punctuated by formal incorporation of companies, each of the three firms became the purveyor of an expanding range of engineering services.

Figure 10.10
Cycle of Growth of the Engineering Firms



Each firm entered the international market with its own set of skills. Monenco's life long international strategy was centered on its ability to export its *technical abilities*, in utilities, in energy projects and in computer services. SNC's exported its *managerial ability* to handle new projects effectively and adapt to local circumstances, as were confirmed by the Hawaiian project and its willingness to form joint ventures and associations with other firms. Lavalin's late entry into the international scene was based on its ability to deal effectively with the *financial and political* aspects of the projects, in close cooperation with Canadian foreign agencies.

Thus, from the economic perspective, we learned *what* general conditions the organizations had to contend with, and from the managerial perspective, *how* they actually did so. Thus, it is in the individual behaviors of Monenco, SNC and Lavalin that we found additional explanations for why, at times, their growth and performance departed so distinctly from the economy, the industry, and from one another.

Much has been learned by using the economic and managerial approaches, and, by and large, it was found that they do not conflict conceptually. The Contextual approach which follows will not attempt to displace nor to reconcile them, but, rather, it will take a different perspective in order to understand some of what has been left unanswered. Indeed, it is one thing to suggest that managerial actions may explain variations not caused by general economic conditions, it is quite another to understand why a particular firm was willing and able to grow while others retrenched.

In the next section, we pursue these issues by examining the strategic behavior of the three focal organizations in a broad and rooted context, bringing into focus the firm's history as well as its environment. Simply put, by failing to examine strategic behavior in an historical and broad context there is a danger of trying to explain it away, "out of context". The contextual approach will elicit new answers, and, hopefully, new questions as well.

10.3 The Contextual Approach

The Manager and the Organization as Members of Society

In military strategy, the *position* of an army refers to the place that it occupies in the battlefield. Given the topography of the environment, the army's strengths and weaknesses, and the location of its opponents, certain positions are more attractive than others because they are better suited for attack, defense, supply and mobility.

An important body of the strategic literature is grounded in similar concepts, as we saw in Chapter Two. The combination of products, markets and technology used by a firm defines its 'position' vis-à-vis its environment (they give rise to strategies that can be 'low-cost', 'niche', 'focused', 'differentiated', etc..., depending on what is emphasized). **Positioning, therefore, is the process by which an organization selects and secures *the* position** (a unique combination of products, market and technology) **which optimizes the 'fit' between its *internal* capabilities and the *characteristics* of its environment** (its clients, suppliers and competitors)[52].

Correspondingly, that degree of 'fit' is assessed along these same two dimensions, with different emphases given in the economic and in the managerial literature. The economic approach stresses the firm's relationship with its *external* environment, while the managerial approach stresses its *internal* capabilities: the

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52 See, for instance, Porter 1980, 1985, and 1990. His approach to strategy-making consists in an analysis of the firm's strengths and weakness, of the opportunities and threats of the environment, which leads to a choice of markets and of products, and to the design of the firm's value chain, that is, its technology.

organization is ***economically fit*** if it has ready access to supplies and if it can sell its products and services; it is ***technologically fit*** if it can efficiently transform its economic inputs into outputs.

According to the economic perspective, the organization is a given, and the conditions leading to its economic fit are largely dictated by the environment. By contrast, the mainstream strategy literature considers that the organization has some autonomy —but not power— in its ability to enhance its internal fitness and choose a particular fit with the environment. Thus, strategic level managers can alter the internal circumstances of the organization, and select a compatible environment with which to interact.

Both the economic and the managerial perspectives stem from the view that 'the organization qua organism' is a goal-driven, internally integrated system striving to survive in an antagonistic struggle with its environment. Consequently, much of the research focuses on these three areas of concern (organizational goals, organizational integration, and organizational adaptation) which are assumed to describe the essence of any organization.

We propose to take a contextual approach, and consider that there is a symbiotic —rather than antagonistic— relationship between the organization and its environment, one in which each can *fundamentally* alter the other, such that neither is a 'given'. While this suggests that the organization plays an active role in shaping society, it also views it as the *organon*[53], that is the *instrument* by which society transforms itself.

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[53] From the Greek οργανον: organization, instrument.

These considerations of fundamental interdependency between the organization and the environment parallel some recent works in biology which suggest that an organism survives not just by homeostatic adaptation (Lovelock, 1988:18), but also by changing "its material environment to a more favourable state" (Ibid:33). In biology this would lead the scientist to consider, for instance, not just the effect of oxygen on the growth of organisms, but also the effect of the latter on the abundance of oxygen (Ibid:119). In the context of this research, this leads us to consider that, in their mutual dependency, societies are transformed *through* organizations (Barnard, 1970).

A similar perspective has been considered by other social scientists. In sociology, Touraine (1973) argues that an organization can neither be fully independent from nor dependent on society, and is always "traversed" by it —as is an engineering firm which employs members of a particular professional class. In a similar vein, Perrow notes that organizations exercise considerable influence on their "environment [which] is almost always other organizations, so organizations are shaped by organizations" (1979:2-6).

In the economic approach, we take the environment and then the industry as the levels of analysis from which we look *at* the organization; and, in the managerial approach, we look at these external elements, from *inside* the firm. In this *contextual approach,* we take the environment as the appropriate level of analysis, and look *through* the organization. Specifically, we investigate social relationships as a third dimension of the organization's fit: a measure of its ability to *interface* with its environment on the basis of common social characteristics and goals. **An organization is *socially fit* if the personal backgrounds and**

affiliations of its upper managers, as well as its institutional ties, reflect the dominant forces of its *de facto* environment[54].

This third dimension of fit cuts across organizational boundaries, and is a measure of the extrafunctional links which exist between the members of an organization and those of its environment. Such a perspective is non-functional in that it is less concerned with the *immediate* goals or survival of the organization than with the *long-term* goals of its members and of groups in its environment. Thus, the contextual approach considers that the organization is never isolated from its social and historical contexts (though it can ignore or be unaware of them), and that relevant exchanges with its environment are not limited to those that are functional for the organization. Rather, they include exchanges in which the organization is used to serve the needs of individuals and social groups, inside and outside its walls.

As proposed in Chapter Three, this perspective will be operationalized by focusing on the social relationships between the engineering firms, on one hand, and specific key elements of their environment, on the other: their suppliers, clients, and the government. Thus, the contextual approach will draw heavily on earlier chapters which described the engineering industry, the historical context of Quebec and of Canada, the histories of the individual firms, as well as the comparative data on their social profile. To facilitate that process, a synopsis of the profiles of the firms is presented in Table 10.3.

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[54] Tentatively defined as the part of its environment with which it *actually* interacts. The concept of de facto environment will be discussed at length in the latter part of this chapter.

Table 10.3

Synopsis of the Profiles of the Firms

	mid-1960s	mid-1970s	mid-1980s
Monenco:			
•Language & Ethnicity	• English: mostly Canadians with some UK • No Francophones.	• Fewer from UK than before, minimal number of Francophone Quebeckers	
•Universities	Strong ties in Atlantic Canada and in Alberta, some representation from Europe. Nothing in Quebec	• No major changes	
•Government	• No high ranking public servants.		
•Clubs	• Some ties, primarily in rest of Canada; no profile in Quebec.	• Growing membership in rest of Canada and in Alberta; some in Eng Quebec, in high-profile and in local clubs.	
SNC :			
•Language & Ethnicity	• Ethnically mixed and balanced (Fr. & Eng Quebeckers, and immigrants) Little from rest of Canada.		
•Universities	• Strong representation with Fr & Eng Quebec, growing foreign representation; little representation from rest of Canada, but some recognition from Ont. and Alberta.		
•Government	• Very few high ranking government officials or public servants.		• Many high ranking public servants, from Quebec and Ottawa
•Clubs	• Nominal membership in Fr. and Eng. Quebec.	• Important membership in high profile and local Fr. and Eng. Quebec. Little in rest of Canada.	
Lavalin:			
•Language & Ethnicity	• French Quebeckers, mostly bilingual.		
•Universities	• Strong ties & representation from Poly & other Fr. Quebec; • foreign studies; • nothing from rest of Canada.	• Strong representation, ties and recognition from Fr. Que. Univer., less from Eng. Que., • little representation from rest of Canada, but some recognition from Ontario	
•Government	• Strong personal ties, but very few high ranking government officials or public servants.		• Greatest number of high ranking public servants, from Quebec and Ottawa.
•Clubs	• Nominal membership in French Quebec.	• Important membership in high profile Fr & Eng. Quebec, some in Ottawa Little in rest of Canada.	

10.3.1 The Seminal Contexts

The particular circumstances under which the firms were formed framed for each of them a strategic course from which it did not deviate for periods ranging from forty to fifty years. Thus, Lavalin's strategy —based on its social connectedness— was informed by its original social context throughout its fifty-year history. In contrast, the earlier strategy of Monenco —based on its know-how and efficiency— was defined for forty years by the managerial context which prevailed in its early years. In a third instance, the dual strategy of SNC was determined, for fifty years, by Surveyer's own bicultural background. His subsequent choice of partners and his relentless drive into the private sector contributed to set parallel tracks which the firm found hard to abandon. In all three companies the seminal context prevailed and overshadowed the other two contexts for decades, as illustrated in Table 10.4.

Monenco was formed as an engineering department to service the markets of its parent company. As a small part of a larger conglomerate, it had ready access to supplies and a set product/market strategy, and *technological efficiency* was its mission. Its strong social connectedness to the Maritimes and Western Canada —also defined by the owners of the Royal Securities— continued long after Monenco became an autonomous firm, and long after these regions of Canada ceased to be their target market.

Table 10 4

Seminal Contexts and Strategy (for Selected Periods)

	Economic • Strategy is defined by the economic environment. • Key success factor is the ability to obtain supplies and sell services	**Managerial** • Strategy is defined by internal environment • Key success factors are know-how and technological efficiency	**Social** • Strategy is defined by sociopolitical context • Key success factor is social connectedness with clients suppliers and regulators
Monenco (While Owned by K.S.)	++	+++	+
SNC (Prior to Dagenais)	+++	++	+
Lavalin (Throughout its history)	+	++	+++

SNC was formed to realize the vision and personal aspirations of Arthur Surveyer. During the first years of the firm's existence, its survival depended on *economic effectiveness*, that is, its ability to sell its services and acquire needed supplies (money and skills for example). To these ends, Surveyer deployed a great effort in marketing the services of his firm and his most important decisions involved hiring and promoting associates. The import of the firm's managerial context on its strategy was mixed; on one hand, its strategy was strongly influenced by its internal environment, but, on the other, the firm was handicapped by its inability to be technologically efficient. The influence of the social context on strategy was kept to a minimum. By personal inclination, Surveyer courted both Francophone and Anglophone businesses, and sought out contracts in the private sector more actively than he did in the public sector.

In his public stances, with regards to government-sponsored projects, he tried to influence —rather than follow— the major social trends of his day.

The circumstances at Lavalin, were of an even different sort. Its founding was primed and its early strategy was dictated by the policies of the Union Nationale government toward Francophone engineering firms. Clearly, it had to be *socially fit* with the environment which it was meant to serve. Founded in response to a signal from the social environment, Lavalin was sustained during its first years by the preferential opportunities made available to it by the Union Nationale government.

Although SNC may have ignored, and Monenco may have been unaware of their social contexts, the latter had major impact on each of these firms. Because of the backgrounds of its original members, Monenco continued to be better connected outside Quebec than it was inside the province; and the firm had limited access to French-speaking countries, in its international expansion. For its part, SNC failed to qualify as a good 'flag carrier' in projects sponsored by the Quebec government in the 1970s, and had limited access to international projects sponsored by federal government agencies.

10.3.2 The *de facto* Environments

Although the social context was crucial for Lavalin, of lesser importance for SNC, and seemed irrelevant for Monenco, its role continued to be major in the subsequent evolution of all three firms.

As the individuals and their organizations became more closely linked to certain elements of their environment, there emerged a unique configuration of suppliers, clients, and other key partners for each firm. Over time, **a custom-made environment crystallized around the social networks of their upper management team and board members,** as was shown for each of the three firms.

Under close scrutiny, it is clear that the firm's ethnolinguistic profile was never accidental. In each case, the linguistic characteristics of the firm can be traced to its origin. At Monenco, English was the language used at the Royal Securities, its first holding corporation; at SNC, bilingualism reflected Surveyer's eclectic education and taste; in the case of Lavalin, a Francophone make-up was essential since it was part of its original vocation to reflect Quebec's Francophone involvement in business.

Nor was the firm's ethnolinguistic profile ever inconsequential. In all three cases, strong ties with specific suppliers and clients evolved around the backgrounds of the members. Each *de facto* environment thus formed was one of the many combinations that was theoretically possible, given the array of potential suppliers, clients, and allies available to each firm.

10.3.3 The Firm as a Microcosm of its *de Facto* Environment

Although all three firms had their headquarters within a one-kilometer radius of one another, they reflected and interacted with these milieus according to their own internal make-up and external networks. Located in Montreal, Quebec, Canada, each company was predominately a skewed microcosm of one of these three realities, to the near exclusion of the others. Caricaturally, Monenco reflected the realities of English Canada; SNC, those of a cosmopolitan Montreal; and, Lavalin was a reflection of a nationalist Quebec.

Internally, they differed markedly from each other in their ethnic composition, the social backgrounds of their upper management team, and in their language of work. Externally, they cultivated relationships and established closer ties with certain institutions. **These ties were determined by the backgrounds of the upper managers and they reinforced the de facto environment of the firm. They also helped to delineate the strategic grounds on which the firms competed, by shaping, in part, their economic and technological profiles.**

These considerations are relevant to the issue of environmental determinism (Child, 1972; Chandler, 1977; Miles and Snow, 1978), for they suggest that the managers and board members of each of the firms —by virtue of their backgrounds— brought their organization closer to a unique configuration of suppliers, clients and other key elements, and that this unique subset with which it has privileged interaction came to constitute the firm's experienced environment, to the neglect of the others.

The *de facto* environment was determined by the backgrounds of its upper managers, partly by *enactment*, as managers filtered perceptually the elements of the environment with which they interacted; partly by *rational selection*, because the managers and their firms has easier access to compatible organizations; and, partly as a result of the *natural selection* of the environment which, in turn, favored firms which were compatible.

10.3.4 Impact on the Strategies of the Firms

During the formative years, the impact of the firm's social profile and connectedness was not limited to defining its de facto environment or its strategy. Through an effect akin to tropism, each firm continued to be oriented and to grow toward its social sources.

Although **Monenco** had moved its headquarters from Halifax to Montreal very early in its history, eighty years later, nearly all its upper managers and board members were Anglophones, and a large proportion were from the Maritimes and Western Canada. Over time, the organization strengthened these ties by maintaining offices, recruiting from and awarding scholarships to universities in Atlantic Canada. In turn, the universities reciprocated by awarding honors, while businesses and governments from the area awarded contracts to the firm. British engineers have also been highly represented at Monenco, mainly in the first decades of the firm's history. Its first contracts during WWII were obtained within the framework of the Commonwealth. When Monenco resumed its international expansion, as an independent engineering firm, it became heavily involved under the Colombo plan, and was particularly successful in India, in the former British West Indies, and in Anglophone Africa. Inversely, its presence in French-speaking countries remained minimal.

Quite clearly, it appears that the firm's unilingual profile had a major impact on its domestic and international growth. Within Canada, its foothold remained weak in Quebec, where it had its headquarters, and was stronger in the Maritimes and in Central Canada (Nova Scotia, New Brunswick, and Alberta). More specifically, it also seems that the linguistic make-up of the firm seriously hindered its ability to penetrate its home market in Quebec. In the 1970s, the consideration that a Francophone image —not just competency in French— was important, led Monenco to acquire Ingénierie Cartier, a dormant, but French-named engineering firm, for the sole purpose of trying to gain entry in the Francophone market (Sexton, 1982).

SNC had a distinctive bilingual and multicultural upper management, with little representation from the UK or from the rest of Canada. Correspondingly, it nurtured ties with both French- and English-speaking universities, but in Quebec only. Its club membership followed a similar pattern. More often than Monenco, but long after Lavalin had institutionalized such a practice, SNC began recruiting high profile public servants from Quebec City and from Ottawa. Domestically, SNC grew largely in Quebec as well as in Ontario, and, internationally, it penetrated markets that were Francophone, Anglophone, and Allophone.

The pattern of SNC's growth abroad was geographically different from Monenco's, encompassing, notably, more French-speaking and English-speaking countries in Africa and in the near East, with a lesser presence in Latin America and in the Far East.

Domestically, its Quebec presence was stronger than Monenco's, but it was not as concentrated as Lavalin's. In the rest of the country, it was concentrated in the two other cosmopolitan parts of the country, Toronto and Vancouver.

At the other end of the ethnolinguistic spectrum, **Lavalin** began as and remained a firm run by French-Quebeckers. It built very strong ties with the École Polytechnique, and, to a lesser degree, with other French-speaking universities in this province. Although its leadership included individuals who had studied at English-speaking universities in Quebec, the US, and the UK., they were always (with one exception) Quebec-born Francophones.

The firm's domestic growth in Quebec, and its international expansion in parts of the world where French is a major language (such as Haiti and Francophone Africa), suggests that language may have, unsurprisingly, continued to give the firm a comparative advantage in gaining access to these markets. In the 1960s, the federal government's avowed policy of expanding CIDA's role into Francophone Africa provides another example of the kind of broad opportunities to which Lavalin had access and continued to avail itself. Lamarre and his team continued to maintain personal contacts with key officials at that agency just as Lalonde and Valois had done at the Quebec Ministry of Roads, a few decades earlier.

There is ample anecdotal evidence, including the public announcements of various government officials, that a Quebec Francophone image was a valuable asset to any firm in contention for the James Bay project. Thus, SNC's cosmopolitan image and its association with one firm that was 'English' and another that was owned by an immigrant Francophone did little to qualify their consortium as an ideal flag carrier for an overtly nationalistic project.

During and after the recession of the early 1980s, the performance of Lavalin differed sharply from that of the other two firms. It is during such periods of discontinuity that the contextual approach differs the most from the economic and managerial perspectives. A strategy determined by the environment or based on sheer adaptation would have dictated that Lavalin adopt a less aggressive course of action. In fact, while the market was falling, the firm did not retrench; instead, it grew. Whether or not it was by design, it continued to fulfill its social mandate, at a time when local circumstances could no longer sustain its growth. Lavalin had acquired its own momentum, propelled by a slingshot effect of an economic and social nature.

10.3.5 The Organization as an Instrument of Society

As was shown earlier, the linguistic make-up of the upper management of a firm seems self-perpetuating. Other reports indicate that it tends to expand to the other levels within the firm (in Gagnon: 1991). If such a mechanism also holds for the ad-hoc structures that are put into place during construction projects —that is, if the linguistic backgrounds of the thousands of workers who are hired are largely determined by that of the hiring firm— then, this phenomenon offers possibilities of great interest for public policy and social transformation. As was shown in the foundation of Lavalin and —on a very large scale— in the James Bay project, it becomes possible for the client —the provincial government in this case— to institute a policy of hiring workers of a particular ethnolinguistic mix by selecting a managing firm with a corresponding language profile. **Hence, the state can implement public policy without having to state such policy publicly** —a matter which can prove delicate at times. The wishes of the governments in power in the 1930s and in the 1970s were made abundantly clear in their public statements, and lends more credence to this hypothesis; however, neither intent nor design is required for the process to be actually implemented.

The international market also presents instances where firms are used openly as an instrument of society. Through its foreign agencies, such as CIDA and EDC, the federal government has openly promoted the mutual interests of Canada and of developing countries. Since projects were carried out in different parts of the world under the Colombo plan (after WWII) and by CIDA (after 1965), they tended to favor Canadian engineering firms of different ethnolinguistic backgrounds. As we have seen, while the intent may have been to promote Canada's interests abroad, the government's policies also had the result of promoting the interests of Anglophones and, later, of Francophones at home.

10.4 Conclusion: Integrating the Three Approaches

A general model of the contextual approach is represented graphically in Figure 10.11. All three dimensions are taken into account. The first two dimensions —along economic and managerial factors— are those that are normally taken into account by the managerial literature. The third dimension, often unseen or ignored, comprises social factors newly elicited by the contextual approach.

10.4.1 Economic Factors.

The contextual approach adds texture to these traditional approaches in two ways:

- it positions managerial factors *within* the environment of economic factors, and defines the role played by managers in terms of (a) *effectively* selecting these economic inputs and outputs, and (b) *efficiently* performing that transformation. Furthermore,

- it shows how, through its outputs, the firm transforms the environment as much as it is transformed by it.

National resources available in the environment constitute *inputs* for which firms must compete. Hence relative performance among the latter is largely determined by individual cost schedules: if a raw material is less expensive in a particular home environment, local industries and individual firms for which this input represents a major cost are favored.

These cost schedules are themselves determined by the size and the quality of supporting industries (such as engineering schools), as well as by government policies (such as subsidies, tariffs and price controls). A number of factors, ranging from the level of training of engineers to their desire for social status, also come into play, as they translate into input costs for the firm. Much parsimony is permitted by the economic perspective because it suggests that only the net effect of these factors —their input costs— needs to be considered. Quebec engineering firms benefited from a pool of bilingual engineers, from foreign aid programs, and (in the late 1970s) from a lower Canadian dollar, all of which lowered their input costs. Some firms also took advantage of specific lower input costs. For instance, Lavalin benefited from low-cost technological transfers when it managed the James Bay project alongside Bechtel, the world-class American firm.

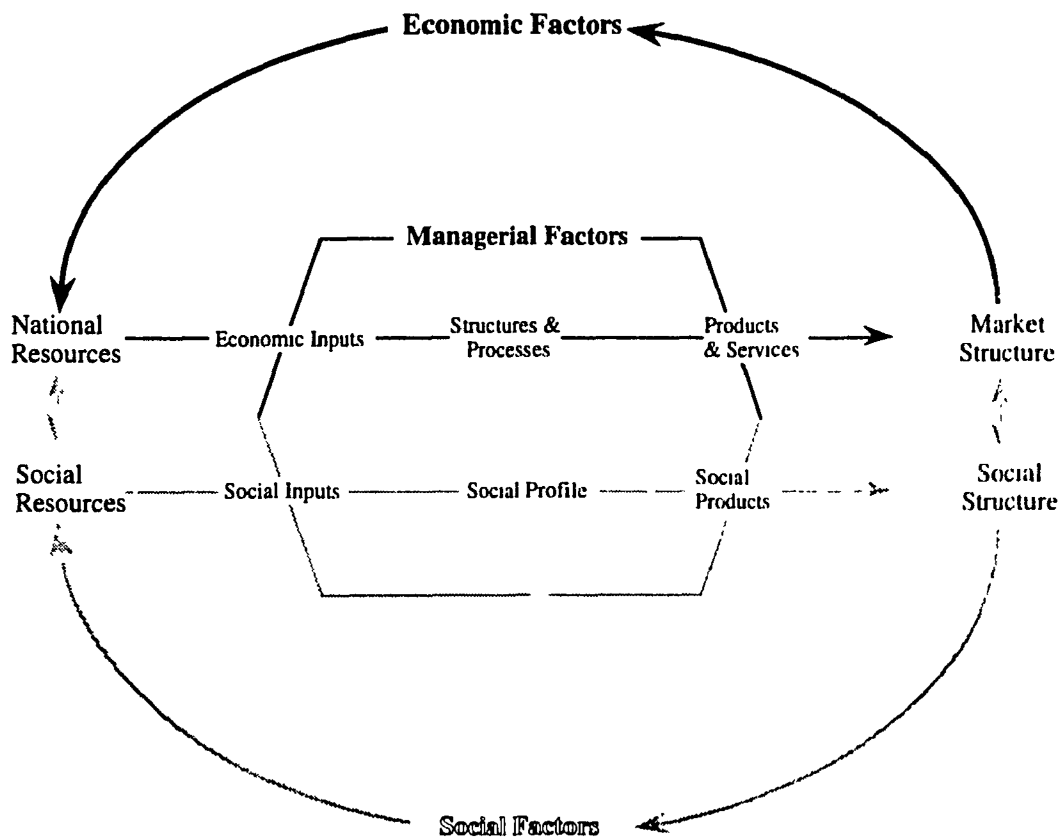
10.4.2 Managerial Factors

Within each industry, the firm which has the lowest cost in selecting, acquiring and processing inputs, has a comparative advantage over the others. Consequently, the firm adopts a strategy which improves its internal fitness as well as its external fit. That strategy may involve any of the following:

- a choice of the *Products and Services* that it intends to sell;
- a selection of *Economic Inputs,* and of the *Structures and Processes* through which they are transformed.

Figure 10.11

Three Dimensions of Organizational Strategy: Economic, Managerial and Social



Its strategy, combined with those of other firms, determine the particular *Market Structures* of the industry (monopolistic, oligopolistic, competitive, etc...). Thus, an important output of a firm's strategy is actually to create and shape the market within which it competes. As we have seen, Lavalin, Monenco, and SNC were not *faced* with an industry which had a high concentration ratio, *they created it.*

Quebec engineering firms were at the nexus of two streams of social changes which had ran parallel during the first half of this century in the province: 'the professionalization of the middle class' and 'a drive for provincial self-assertion'. These streams converged in the second half of the twentieth century, partly due to government-sponsored projects in Quebec. As construction of public infrastructure was booming, a number of traditional activities, including engineering, gradually took on a business orientation[55]. From a craft, engineering became a profession, then a business.

10.4.3 Social Factors

The global picture proposed in the general model is that the context of the firm has three dimensions: economic, managerial, and social.

The third dimension comprises social factors which are largely ignored by the other traditional approaches. There, discontinuities of a social nature create radically new opportunities and threats for industries and firms which are not

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[55] As was shown in an earlier graph, by the mid 1970s, university enrollment in Commerce surpassed that in Engineering. That the rise of Quebec engineering firms coincides with the relative decline in engineering enrollment in the province illustrates the need to view these phenomena in an historical rather than synchronic perspective.

equally prepared to detect and deal with them. Such discontinuities are not readily perceived through mechanisms of market watch and boundary spanning, partly because these mechanisms are set in place on the basis of an old order, and also because they are manned by individuals who are recruited from and connected with it. Further, as Simon pointed out, the ability to collect and process the information is limited by the observer's 'bounded rationality', such that "the scarce resource is not information; it is processing capacity to attend to information". He expands:

> The difficulty of coping with information-rich environment is compounded by the fact that most information relevant to top-level and long-run organizational decisions typically originates outside the organization, and hence in forms and quantities that are beyond its control. This means that the organization must have an 'interface' for ingesting such information selectively and for translating it into formats that are compatible with its internal information flows and systems.
>
> (Simon, 1976, p: 294)

Thus, the idea that boundary spanning and information gathering —whether they are directed or undirected (Aguilar, 1967; Hambrick, 1982)— can be all encompassing, is illusory. (A night guard in a Napoleonic army, told to be on the alert for *any and all* signs of danger, is still not likely to watch out for hot air balloons —or recognize one. In fact, his sky gazing would cause him to miss the more likely dangers from the ground). Although we assert that he gathers information through specific bands, we suggest that these are defined not only by the organization's design —as Simon suggests— but also by the observer's personal background. Furthermore, when a large group of organizational members share a similar background, signals emanating from their common sources are likely to be received early and strongly, while those from elsewhere are likely to be deemed unvalidated and, therefore, invalid.

The revolution which transformed Quebec society, starting in the 1960s, seemed quiet to many. But, it created specific opportunities in a number of industries, including consulting-engineering. Because of their individual *Social Profiles*, Monenco, SNC and Lavalin were unevenly positioned to be apprised of and to harness these opportunities.

Since different firms are connected with different suppliers, they obtain, by chance or by design, different *Social Inputs* (people, information...) from the *Social Resources* available in the environment. Changes in *Social Resources* prompted the founding of Lavalin, in 1936, and brought it, years later, to the co-management of the James Bay project with Bechtel. It was also quite natural —given the social resources available to him— that Frigon recommended a fellow French Quebecker and Poly graduate to join Surveyer's firm. (Less expected was the choice of Nenniger as the second partner, who started a 'second' column within the ranks of his organization). Like the two other firms, Monenco recruited and promoted to the highest positions graduates from a relatively steady pool of universities. All three firms may have intended to hire *engineers*, but they also got, in the process, individuals with particular social profiles, backgrounds and connections, who defined the firm's social profile.

In turn, the three focal organizations contributed, in varying degrees, to the formation of a new class of engineers-business people. The net result was an increase in Francophone control over Quebec's economy over the past three decades. This is represented by the *Social Products* of the firm, which maintains or reshapes the *Social Structure* of the national environment. These changes are collective and cumulative, and are not brought about by any single firm in the short run. The same holds for the effects of the *Products and Services* of firms on the *Market Structure.*

10.4.4 Conclusion

The contextual approach enriches our understanding of the relationship between the organization and the environment in many ways. First, it positions managerial factors within the larger constraints of economic factors, exposes their systemic relationship, and highlights the sphere of managerial action (see Figure 10.11). More importantly, it brings into relief the social dimension of organizational strategy. Although managers may ignore or even fail to acknowledge the existence of that social dimension, the model shows that it determines many of the inputs and the opportunities of the firm, and that, in turn, it is transformed by its outputs.

In the concluding chapter, we entertain conjectures of a more speculative nature, and then we examine the implications of our findings for the strategic management literature, as we draw from our study of the individual histories of Monenco, SNC and Lavalin in order to formulate concepts that may be applicable to a larger set of organizations.

11 Conclusion

Macroeconomic theory explains the long-term performance of the consulting-engineering industry in Quebec in terms of its major determinants, and Industrial Organization details the evolution of the market and its impact on the performance of groups of firms within the industry. In turn, the managerial perspective shows how the strategies of the three focal organizations created differences in their individual performances.

Because they focus on the 'here and now', the economic and managerial approaches are very useful for *describing* the conduct and performance of the firms, but they leave important gaps in *explaining* their uneven performance, especially during times of turmoil. They also fall short of explaining their growth patterns on the domestic and international scenes. Over time, the forces that drive individual firms to their success recede from view, and become so much part of the environment that they are no longer noticed. A synchronic examination of the economic and social environments of the consulting engineering firms in Quebec in the 1980s would have indicated, for instance, a decline in industrial activity, and a slackening interest in engineering as indicated by university enrollment (see Figures 5.1 and 5.2); surely, not a propitious time for growth. Yet, this was a period of remarkable growth for Lavalin. The contextual perspective suggests that the explanations for its remarkable and ultimately fatal performance are partly rooted in historical and social factors.

Thus, the fragmentary picture depicted by the traditional approaches is complemented by the contextual approach. Still lacking are explanations pertaining to the mechanisms by which some engineering firms obtain contracts of strategic significance, and an evaluation of the relevance of the contextual approach for other organizations, in other industries, or at other time periods.

11.1 The Structure of Luck

The histories of the three engineering companies are filled with 'lucky' or events which had a decisive effect on the fate of their organizations. For Monenco, such were the contracts that its senior managers obtained during and after the war. Similar events marked SNC's history: Surveyer's first contract in the private sector, as well as those that Nenniger and Chênevert obtained after WWII. Similarly, Lavalin could be deemed to have been lucky to obtain contracts from the provincial government, including the James Bay project.

Though often noted, such 'luck' is *systematically* neglected in the study of strategic management because it fails to meet two essential criteria to qualify as a bona fide field of investigation. Driven by the need to discover usable knowledge, writers in strategic management tend to study only those aspects of organizational life that can be *circumscribed* and *managed*[56].

Yet, however unmanageable or fluid a concept luck may appear to be, if it accounts significantly for the variability in organizational performance, as we

[56] Another example of an unamenable topic in organizational studies has been culture. Because of the need to remain utilitarian, its treatment in strategic management has been devoid of the depth and complexity afforded in the anthropological literature. Thus, researchers have sought to understand and define culture in terms of what it does *for* the organization, and have been eager to try to *manage* it.

have seen, it is worthy of further investigation. In this section, we will limit ourselves to try to understand and describe some of the patterns and manifestations of organizational 'luck', without attempting to circumscribe it or prescribe recipes.

As noted earlier, Porter's model proposes to explain a nation's success in a given industry by a combination of economic and industrial determinants (1990:71-3). Subsequently (Ibid:124-9), he suggests that ***chance*** and ***government*** are two extraneous variables which could influence these determinants. Chance is described as 'discontinuities' —in technology, input costs and market conditions— which turn into favorable circumstances for some industries and some organizations. The theory is that these technological and political shifts scramble the cards and favor certain players. Of particular interest to our undertaking are the facts (a) that *chance* and *government* are the only variables posited to be unrelated to one another, and (b) that *firm strategy* is assumed to have no influence on *chance*.

Based on Porter's model, one would explain Japan's success in the automobile industry by suggesting that, in part, that country *happened* to have been producing small cars when the petroleum crunch of the 1970s occurred. Similarly, Porter's model sheds some light on Lavalin 'luck' by suggesting that the firm *happened* to be Francophone when discontinuities in the environment made such characteristics attractive. The contextual approach goes much further, by suggesting that *the very formation of the firm*, not just the opportunities that came its way, was due to such a discontinuity. In a Darwinian analogy, this is equivalent to noting that environmental changes do not just present new challenges and opportunities for existing organisms, but they also create the circumstances for totally new ones, with new traits and features.

Because they are new, and unknown, these organisms go unnoticed by potential preys and predators. By Perrow's definition (1979) these organisms are, unbeknownst to the old order, not just *in* the environment, they *are* the environment.

The work of consulting-engineering firms consists primarily of custom-made projects of a non-repetitive nature[57]. Since no firm can predict what its next project might be or from whom it may come, how is it that some get consistently 'lucky', being at the receiving end when opportunities 'fall'?

Once more, a biological analogy may help illustrate. A firm which is well connected is similar to a desert plant crowned by a cluster of broad leaves which allow it to receive the occasional (and unpredictable) rain drop, before it reaches the ground and becomes available to all. No doubt, the extent and structure of such a network determine its effectiveness and its cost efficiency. It also involves a high risk factor since it must be in place beforehand and cannot be readily altered, as the experience of all Monenco, SNC, and Lavalin has shown.

There is ample evidence that, indeed, these three firms maintained social networks that differed from one another both in extent and in structure. Monenco's original network, for instance, was extensive in the world of finance thanks to the personal connections of Aitken and of Killam, and, after WWII in the world of the federal government, thanks to the war time service of its top managers. At SNC, Surveyer, and later Dagenais, maintained a network which was extensive but underutilized, since they chose to exploit only the part in the private sector.

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[57] Similar to unit production, as classified by Woodward (1965), except that their projects are rarely small.

In the beginning, Lavalin's network was highly focused; later, it extended opportunistically; throughout, it had strategic importance for the firm.

What difference does it make if these networks are *socially* based?

11.2 Managers as Social Links

Upper managers and board members act as agents who have much leeway and are seen, in the contextual approach, as simultaneous members of several organizations. It is incumbent upon strategists, then, to ensure that the behavior of organizational agents is congruent with the goal[s] of the focal organization.

The relationship between the focal organization and the agent can be formal and at arm's length (outcome-oriented) —as was favored by Monenco who hired part-time 'representatives'— or it may involve actually hiring them (behavior-oriented) —as Lavalin did from the outset, and as SNC did in latter years.

> [In Agency Theory, T]he question becomes, *Is a behavior-oriented contract (e.g. salaries, hierarchical governance) more efficient than an outcome-oriented contract (e.g. commissions, stock options, transfer of property rights, market governance) ?*
> (Eisenhardt, 1989:58 - emphasis added)

The issue is of interest both to the strategist —who seeks to reduce 'managerial opportunism' (in Eisenhardt, 1989)— and to the theoretician, for it helps define the types of situations and organizations in which such networks may be more prevalent.

The economic assumptions of a utility-maximizing agent argue in favor of using outcome-based contracts, since those that are behavior-based leave open the possibility that the agent may 'shirk' from his/her duties. Thus, it is hoped that "when the contract between the principal and agent is outcome based, the agent is more likely to behave in the interests of the principal" (Eisenhardt, 1989:60).

However, as Ouchi argued, much of the conflicts of interests that are inherent in the context of a Smithian firm are resolved in a clan-oriented organization, in which behavior is highly socialized and selfless (in Eisenhardt, 1989), and refusal to cooperate would be pathological (Barnard, 1970).

If members of the various organizations share common social characteristics, then it becomes possible to extend Ouchi's clan concept to their whole network, and to dispel not only the conflicts between principal and agent within one organization, but also those that may exist among these organizations. This view is further substantiated when the issue is also examined from the perspective of the other organizations.

From the point of view of the client organization, construction projects contain a high level of uncertainty due to the fact that they are custom-made and non-repetitive, for it becomes difficult to define the tasks, benefits, and obligations in contractual forms. First, there is the inevitable transfer of knowledge, which remains elusive, despite attempts at formalizing its flow, as in the following extract:

> All technical and economic knowledge, data, know-how and other information conceived, originated, prepared or developed during the course of the performance of the work or arising out of the work to be performed pursuant to this agreement [...] by the contractor, its employees [..] shall be and become the property of Monenco.
>
> (From Monenco Contract Files; specific dates and names withheld)

Second, the history of large projects, as the press regularly reports, is fraught with examples of cost overruns due to unforeseen and unforseeable difficulties. In this research, it was not surprising to note a very high number of amendments to the contractual agreements between clients and engineering firms.

A consequence of these high uncertainty factors is the tendency, noted in Chapter Five, to place great importance in 'interpersonal relations [...] in the choice of a firm' (Stratem, 1990:31). Therefore, it appears that the clients can rely on these common social backgrounds and connections to function as a control mechanism which can compensate for the inadequacy of formal contracts in situations of high uncertainty.

Such functionality requires neither intent nor awareness on the part of the organizations. Since their *de facto* environments are built around the social links of their members (whether members and organizations are aware of them or not), each organization 'finds itself' dealing within a socially compatible network of other organizations. Thus, organizations become socially positioned in unique ways, which, in turn, have strategic consequences on their conduct and performance. This view is in line with the concept of an *enacted environment* to the extent that the *de facto* environment is also selectively defined through social interactions of key members (Weick, 1979; Smircich & Stubbart, 1985). But, as we have seen, the basis of that selection, and therefore the very nature of that environment, is determined by the sociodemographic characteristics of these members, not by their perceptions and interpretations[58]; it is thus, originally, defined by what they *are*, not by what they *do*. Their subsequent actions and

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[58] As Smircich & Stubbart put it '*Enactment implies a combination of attention and action on the part of organizational members*' (1985:726).

those of their organizations, validate and reinforce the social positioning of the firm vis-à-vis the de facto environment.

These conceptual characteristics have important implications for strategic managers and for research. We turn to that issue in the latter part of the next, and final section.

11.3 Assessment of the Research and Future Directions

The model can be assessed on three interrelated criteria:

(1) Is it **valid**, does it explain what it purports to explain?

(2) Is it **useful**, does it say anything new, parsimoniously?

(3) Is it **generalizable,** or more practically: to what situations is it **generalizable**?

The present study provides positive answers to the questions of usefulness and validity, but says much less in terms of its generalizablity. Yet, to a large extent, the latter criterion can lend much credence to the first two. Therefore, we will address this issue in greater detail.

Other industries in Canada, and throughout the world have also been propelled to world prominence in the midst of discontinuities and profound social changes. The contextual approach offers some insight into these situations.

The ingredients of social changes which yield high-performing environments in which industries and organizations flourish are:

- A society in which different ***groups*** are involved in different work activities.

- an historically and socially rooted ***activity*** which causes talent to cumulate, to 'dam up', at the margins of mainstream economic activities;

- ***discontinuities*** which create, quite suddenly, new opportunities for these talents. Their abundance is such that the nation enjoys highly competitive input costs;

- the ***channeling*** of these factor advantages (talents, opportunities, input costs) into new or renewed organizations;

- the ability of some of these organizations to meet the ***social expectations*** formally or implicitly invested in them;

- the ability of these organizations to ***create***, jointly, an environment in which they can sustain these factor advantages.

Using these criteria, the model can be used to study a number of other firms in Quebec and in the rest of Canada. The period covered in this study offers a number of possibilities, since the construction-engineering industry was only one of the theaters where social transformation took place.

Universities and hospitals in this province also operate along linguistic lines. However, it is not necessary for the social trait to have such a functional basis. Financial institutions, insurance companies, ana department stores, may also have social profiles, though these are commonly (and superficially) labeled as 'their image'.

The success of other industries in other countries also seem to be the concretization of national drives (the US space race in the 1960s; German and

Japanese economic ardor after their defeat in WWII), would be of great research interest.

Just as the engineering industry turned out to be 'big business' in Quebec, certain forms of entertainment and sports have become lucrative activities for African-Americans. During the second half of the twentieth century, they —like French-Quebeckers— entered the business world through occupations that were neglected by the business class because they were not traditional venues for financial success. Sports and music had long been active occupations for African-Americans, as engineering was for French-Quebeckers. Similarly, Japanese industries, facing resource shortages at home, specialized in products that were neglected by more successful western industries (small radios and TVs, small cars...). All of these groups grew in the shadow of the dinosaurs that ruled the land, and they accumulated talent that became 'dammed up'. When there arose a demand for the sort of activity in which they had specialized, these groups already had a major head start.

A corollary inquiry, of immediate interest for this research, is to examine less successful Quebec engineering firms. Given the generic set of circumstances described in this dissertation, how did firms of similar social profiles perform ?

Such a contrast would allow the strategist to discriminate between major and minor success factors, for it is not enough to illustrate that successful firms display certain characteristics. What if unsuccessful firms also display similar characteristics? If the model is to be valid and useful, it must be "set up" for falsification, as Popper had argued (in Lakatos, 1978).

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