

**STRATEGIC ANALYSIS OF A
CIVIL ENGINEERING CONSULTING FIRM**

by

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Abstract

This report provides a strategic analysis of a small sized engineering firm competing in the British Columbia, Canada region. The analysis focuses on how to increase the firm's profitability by examining its internal structure and the external environment.

The analysis considered the relative growth of the industry and reviewed potential opportunities and threats. It analysed the firm's competitiveness in each of the market segments and reviewed means by which it could increase its competitiveness.

The analysis showed that the firm competes well within the current segments it operates in and has the potential to be competitive in a new market segment. The analysis developed several strategic alternatives to meet the firm's key goals. Based on the potential of each alternative to achieve the firm's goals a preferred option of allocating non-billable time to expanding workload was recommend. The workload expansion included the First Nations and private development segments the firm currently competes in, as well as expanding into the municipal government segment where the firm showed potential to be competitive.

Dedication

I wish to dedicate this paper to my parents, Pamela King and Sergio Tonin. They have been the best role models anyone could hope for and the driving support and motivation in everything I have attempted.

Acknowledgements

I would like to thank all of the staff at David Nairne and Associates Ltd. for their encouragement and support during my pursuit of an Executive Masters of Business Administration (EMBA) degree.

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1: Introduction

The following strategic analysis of a civil engineering firm will focus on David Nairne and Associates Ltd. (DNA). The strategic analysis will review the civil engineering industry and markets that DNA competes in; DNA's current position in those markets; and what strategic alternative or alternatives the company can implement to increase its workload and profitability.

The strategic analysis will address:

1. What current value propositions DNA offers?
2. Can DNA expand its current market segments to increase profitability?
3. Can DNA expand into new market segments to increase profitability?
4. What internal change or changes to DNA's value proposition are required to improve efficiencies and allow expansion in existing and new market segments?

To address these questions this analysis will review the industry and the various market segments available to DNA to compete in. It will explore DNA's current value propositions, its strengths, weakness, and the gaps it needs to fill to successfully, or more efficiently, compete in market segments that show potential for profitability.

The analysis will begin with a review of DNA's current strategic position including what services it provides; what its value proposition is in delivering those services to its current customers; and how the firm internally operates to support that value proposition.

An external analysis of the industry will follow the review of the firm. The external analysis will outline the value or supply chain of the civil engineering industry; it will present an analysis of the five forces affecting it including rivalry, threat of entry, substitutes, buyers and suppliers. The external analysis will also examine the sources of advantages in the industry; the relative importance of each advantage; and a comparative analysis of how DNA and key competitors in the industry rate in comparisons on these sources of advantage. It will conclude with identification of the threats and opportunities in the external market place, and the internal strengths and weakness of DNA specifically with respect to competition in multiple segments in the market.

Proposed strategic alternatives that DNA can implement to improve its position in the market will follow the external analysis. This section will present each alternative including a review of each alternative's ability to correlate the internal strengths and weakness of the company with respect to the opportunities and threats identified in the external market.

The strategic analysis will conclude with an implementation analysis of the preferred alternative to determine whether DNA's internal operations are compatible with the strategic alternative presented, and if they are not, what changes are required to bridge any gaps.

2: Organisation's Current Position

This section provides an outline of what DNA is, including the history of the company; where the company has chosen to compete; what it competes on; and how the company delivers its services to be competitive. This section will also summarise the key issues or questions currently facing the company.

2.1 Organisation Overview

2.1.1 History

The late David Nairne founded DNA in 1972 as a structural engineering firm. DNA worked in parallel with CM Projects, a construction management company, owned by David employing a single fulltime construction manager. By 1976, DNA had grown from three members to 10 including a civil engineer. Throughout the 1970s, DNA and CM Projects, sub-contracting architectural services, primarily worked with private developers. During this time, the group also began working on First Nations infrastructure and building projects funded by Aboriginal Affairs and Northern Development Canada (AANDC – branch of the federal government) previously known as Indian and Northern Affairs Canada (INAC).

By the late 1970s, DNA had grown to approximately 18 members and David brought on Fereydoun Dabiri, a district engineer he had worked with at AANDC, as a partner. Based on the growth in the private sector market in the late 1970s the partnership also formed a construction company Nemus. By the early 1980s DNA, CM Projects and Nemus grew to approximately 50 full time staff. The private sector recession in 1981 resulted in layoffs of approximately half of those numbers and for the partnership to refocus more heavily on the First Nations' infrastructure market. By the mid 1980s, Nemus was dissolved and CM Projects was amalgamated into DNA. During the mid 1980s, the staffing was approximately 25 with personnel ratios of 75 percent civil and 25 percent structural with the firm focusing primarily on First Nations' projects. By the early 1990s the First Nations' buildings markets was growing and in response, DNA brought in an in house architect and acquired Harry Hawthorn Architects.

In the mid 1990s, due to increased pressure from unions on construction and construction management companies to join, DNA separated its construction management services into a separate

company Norson Construction and soon after the DNA partners severed all corporate and personal ties to Norson. By the mid 1990s DNA had approximately 40 fulltime staff providing civil, structural, architectural and planning services to primarily First Nations clients.

By 2000, DNA's architectural portfolio had grown and by 2005, the personnel ratios shifted to approximately 50% Civil and 50percent Building (structural and architectural). Today DNA operates solely out of its North Vancouver office, has five managing partners and employs approximately 42 fulltime professional staff with 80percent of its projects First Nations and the balance private development. Though DNA competes in numerous sectors of the construction industry, this strategic analysis will focus primarily on the civil engineering business unit.

2.1.2 Products and Services

DNA's civil engineering department provides delivery of engineering design and construction inspection services in the following areas:

- Roads (highways, urban and rural streets);
- Sanitary sewer collection, treatment and disposal systems;
- Water supply, treatment and distribution systems;
- Storm water management systems; and
- Earthworks (land shaping).

The general tasks preformed in varying degrees for the design and construction stages of a project include the following services:

Design Services:

- Topographic surveys
- Design engineering
- Design drafting

Construction Services:

- Contract administration
- Construction inspections
- Record drawing preparation

2.1.3 Size and Geographic Scope

Based on market conditions and estimated profit ratios, in the early 1990s the DNA partners made a conscious decision to operate primarily out of a single office and to limit the company's professional staff to approximately 50 members, or the capacity of the current office. Today there are 42 full time professional staff and four support staff operating in the firm's sole North Vancouver office. The following table summarises the personnel ratios and revenue ratios of DNA's two main departments:

Table 2.1 DNA Personnel & Revenue Ratios

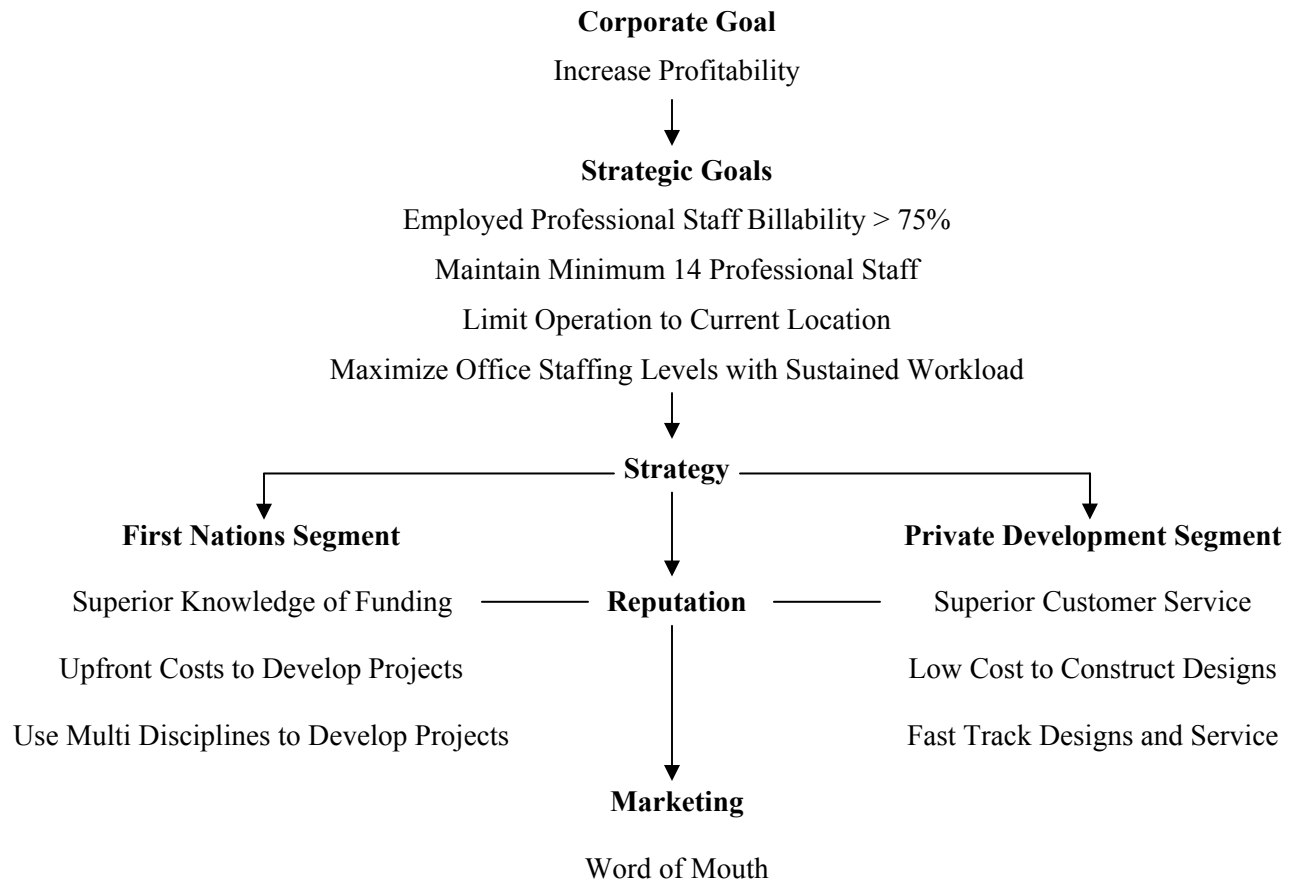
Department	Personnel Ratio	Revenue Ratio
Building	47%	50%
Civil	53%	50%

The building department includes both the structural engineering and architectural departments. Individually their personnel ratio would be 13 percent and 34 percent respectively. The civil department includes the civil engineering and planning departments. Individually their personnel ratios would be 40 percent and 13 percent respectively. Planning services are provided by planning professionals and include development of overall community plans including community development policy. It should be noted that the ratios of both personnel and revenue are an average of the last two fiscal years (ending July 31, 2011). The Civil engineering department currently consists of 17 professional staff. The department has the capacity to support a total of 25 professionals or six additional staff, subject to the available workload to justify the overhead costs to carry them.

Though DNA has competed in geographic locations such as Alaska, the Yukon and parts of Alberta, traditionally the company's primary geographic operations have been in British Columbia and as such, this strategic analysis will focus on the industry in this location.

2.2 Current Strategic Position

Figure 2.1 DNA Current Strategic Position



2.2.1 Where – Product & Customer Segment Focus

The civil engineering department focuses the delivery of its engineering services on two primary market segments, First Nations customers and private development customers. As mentioned previously, workload companywide (all business units) is distributed approximately 80 percent First Nations and 20 percent private development. Within the civil department, the workload distribution between these segments is approximately 65 percent First Nations and 35 percent private development.

First Nations

First Nations' projects generally require a longer timeframe for completion as the federal government funding process requires the project to go through a minimum of four phases as follows:

1. **Feasibility Study:** Assessment of the feasibility of the proposed project including: identification of project goals, stakeholders, permitting requirements, project milestones, project hurdles, options to deliver it, cost estimates of options and conclusions and recommendations of how best to implement the project including budgeting and timelines. Deliverables generally include a feasibility report and funding submission for the pre-design phase of the project.
2. **Pre-design (60 percent design):** The pre-design phase initiates the technical design of the recommended option or the option that was approved and funded by AANDC. This includes the general topographic survey, geotechnical investigations and other sub-consultant tasks required to confirm the conclusions of the feasibility assessment. Based on the results, the design is technically laid out but not fully completed as results may lead to new options or directions being explored. Deliverables generally include a pre-design report summarising the findings of the sub-consultant and prime consultant investigations and recommendations on whether the original option is still technically achievable and if not what modifications are required. Updated construction cost estimates are provided based on the more detailed level of project understanding and 60 percent design drawings are submitted along with a funding submission for the design phase of the project.
3. **Design (100 percent design):** The design phase of the project includes all technical information required to accurately describe how to construct the project. The deliverables generally include detailed design drawings of the infrastructure; technical specifications describing the means and methods of each supplied and constructed component in the design; construction contract documents specifying the owner and contractor agreement and understanding of the delivery of work; a draft operations and maintenance manual for the systems constructed; a draft commissioning plan for the systems constructed; and a project funding brief for the construction phase of the project.
4. **Construction:** The construction phase of the project includes tendering the project to construction companies, contract administration between the owner and the awarded contractor, construction engineering inspection or review of the work performed by the contractor, project closeout including review of the commissioning of the system, final project completion reporting, and record drawing preparation. Deliverables include,

record drawings, a project completion report, final operation and maintenance plan and final commissioning plan.

As described above, each phase requires project applications for funding and a review and approval process. Approved projects are only funded when the region's current budget and regional project priority rankings allow for it. These requirements make scheduling the delivery of all four phases of a project difficult and generally result in projects lasting multiple years before being completed or in some cases stalled permanently at one of the first three phases.

Private Development:

Private development projects require approval through municipal governments and generally only go through two phases, design and construction. As private development projects are funded privately, they generally proceed at the request of the private customer and are completed once design and construction has conformed to municipal government bylaws.

2.2.2 What – Value Proposition

Though the design work associated with both First Nations and private development projects is very similar, DNA's value propositions differ between the market segments due to the policies and procedures required for federal approval of First Nations' projects.

First Nations:

DNA's value proposition with respect to First Nations' projects is one of reputation. DNA relies on its reputation of having worked with First Nations' communities for 40 years and as such has an in depth familiarity with the federal government review and approval processes for funding First Nations' projects. DNA's company record of successfully proposing and securing funding for large infrastructure projects and its dedication to working with First Nations' communities to deliver them has allowed DNA to be successful in this segment.

Private Development:

DNA's value proposition with respect to private development projects is one of superior customer service and value engineering. At comparable market costs, DNA provides prompt service in the provision of designs as well as prompt decision making to limit costs associated with securing municipal approvals and/or delays in construction. The company also prepares designs to limit the cost to construct while maintaining the functionality of the designs.

2.2.3 How – Core Activities

With respect to its core activities, DNA has made key decisions corporately and operationally to adequately deliver its value propositions to the market segments in which it competes.

First Nations:

As funding for capital projects and therefore payment for services can take significant time DNA's unwritten corporate policy is to provide preliminary services upfront with the intent or understanding that reimbursement for these services will come once the project has received funding. Preliminary services include, preparation of project funding application, meetings with AANDC technical and funding review agents and general project initiation correspondence. As there are no guarantees that projects will be supported by AANDC, DNA corporately takes on the liability associated with the potential bad debts for providing these up front services.

Operationally the company encourages staff members to initiate and maintain relationships with AANDC staff to better understand timing for project funding, available project funding and educate the AANDC staff as to the need for the projects DNA is working on. As the firm's various departments provide different types of services to different First Nations communities, the members of the firm recognise potential projects for its other business units within those communities it is providing services for and leverages current relationships to procure new projects.

Private Development:

As delays in providing services incur additional costs to private development clients such as cost of capital, monthly taxation, and opportunity costs including lost rental or land sales revenues, DNA prioritises design and project management time to private development projects over other customer segment projects that are less time sensitive. Specifically, experience drafting personnel's time is prioritised for private development projects to reduce the turnaround time for designs. This operational decision has allowed DNA to provide superior service and has allowed DNA to be awarded private development projects even when DNA's cost to provide its services is higher than DNA's competition.

2.3 Organisational Structure

DNA's form of organisational structure has developed over the history of the company. The structure is very organic, with limited formality, and has been shaped by the long-term members of the firm mainly competing in the First Nations' market segment. The structure is complementary to some operations that the firm performs in the industry, however it is not necessarily the most ideal for the full range of services DNA provides, and may not be as compatible with service delivery to other segments

in the industry. The following section identifies the key elements of DNA's organisational structure and identifies strengths and weaknesses associated with it.

2.3.1 Formalization:

DNA's current level of formalization is low. The company's current formalization consists of:

- Policy manual outlining office conduct and general company procedure
- Medical and dental benefits

There are informal internal procedures within the organisation that though implied are not formally written out, or strictly enforced. These include:

- Schedule of timesheet reporting (typically the last day of each month)
- Invoice preparation deadlines (typically by the end of the 2nd week of the month)
- Project number assignment (opening billable project numbers with assigned budgets)
- Days receivable on invoicing (company policy 30 days but collections lag)

Job classifications are defined in order of apparent seniority in the civil department as follows:

- Department Head
- Senior Engineer/Manager
- Project Engineer/Manager
- Junior Engineer/Assistant Project Manager
- Engineering Technologist
- Draftsperson

Though there are classifications of employee positions, they do not come with formalized job descriptions and workload is typically distributed based on existing employee strengths, or their current project workload.

The company tends to have informal versions of:

- Job descriptions
- Chains of command
- Lines of authority

- Channels of communications
- Internal project management procedures and reporting

These informal procedures are noticeable with interactions between departments. Specifically when internal boundaries between departments overlap, it is sometimes difficult to determine where authority lies in decision-making. As there are no formal project management procedures, when new projects start involving more than one department, roles, reporting, and milestone requirements are not clearly defined.

The company's relative informal structure has inherent strengths and weaknesses some of the most noteworthy are indentified below:

Strengths:

- Limits formal reporting procedures enabling project team to meet extraordinary deadlines
- Better adaptable to changing external environments
- Decision making and knowledge sharing at all levels
- Lower level of formality lends to more relaxed working environment (can also be weakness)
- Adaptable to new personnel, personalities and methods of executing projects (could also be a weakness if certain staff cannot effectively operate)
- Promotes an entrepreneurial mindset in employees (fewer boundaries on employees)

Weaknesses:

- Informal structure can leave valuable employees behind that do not work well or find a fit within the informal networks
- Communication breakdowns may occur due to undefined lines (those needing information may not receive it)
- Efficiencies may be lost in project delivery procedures due to undefined roles or milestone requirements

2.3.2 Specialization

DNA provides civil engineering services through an array of cosmopolitan specialists. Their skills are transferable between other companies locally, nationally or globally.

Unlike many civil firms, though DNA provides civil consulting services in roads, water, storm sewer and sanitary sewer functions it does not have dedicated business units within the department that specialise in each of those functions. As such, DNA's professional civil staff generally completes design tasks associated with all or some of those functions on a project by project basis. Therefore, DNA subcontracts areas of infrastructure projects that require specific specialization. Sub contracted specialists or sub-consultants include:

- Water treatment design
- Sewage treatment design
- Geotechnical design

Though each staff member works on numerous types of projects with varying tasks associated in each of them, DNA's specialisation is still moderately high as the tasks involved in each project are generally design related. The moderately high degree of specialization carried by DNA has both strengths and weaknesses some of the more noteworthy have been identified below:

Strengths:

- Prepare project designs in efficient manner saving production time and delivering projects within or under budget
- Proficiency in securing funding through specialised application processes and relationships
- With regards to being non-function specific: knowledge sharing between employees as they gain experience in different sectors of engineering
- With regards to being non-function specific: development of managers that have broad based, less specialized knowledge in the industry and are able to manage or develop numerous types of projects
- Form strong external relationships with specialty sub-consultants (lends to better service and pricing privileges)

Weaknesses:

- Cosmopolitan specialisation allows for competition for its profession employees not only with competing firms but non competing firms located nationally or globally
- With regards to being non function specific: Lack of specialization in these specific sectors limits DNA's revenues generated by projects that require them
- Requires increase signalling to external market of DNA's competencies

2.3.3 Professionalism

Minimum industry requirements for the job classifications listed in Section 2.3.1 are summarised below:

- Department Head - Registered Professional Engineer and 10 or more years experience
- Senior Engineer/Senior Manager - Registered Professional and eight or more years of experience
- Project Engineer/Manager - Registered Professional and four or more years of experience
- Junior Engineer/Assistant Project Manager - BaSc in Engineering
- Engineering Technologist - Certified or in training engineering technologist
- Draftsperson - Proficient in Autodesk drafting software

DNA generally adheres to these industry standards when filling job classifications and therefore its level of professionalism is high. Some of the more noteworthy strengths and weakness associated with DNA's high level of professionalism include:

Strengths:

- Ability to perform tasks associated with scope of the project
- Has governing body (BC: Association of Professional Engineers and Geoscientists – APEG) to provide practice guidelines, policies and reviews
- Required levels of education and somewhat uniform industry standards for education and experience allows for large market of professional staff (local, national and global)

- Non unionised allows for negotiations of work periods and compensation (depending on ability to compete in the market for a professional this could also be a weakness)

Weaknesses:

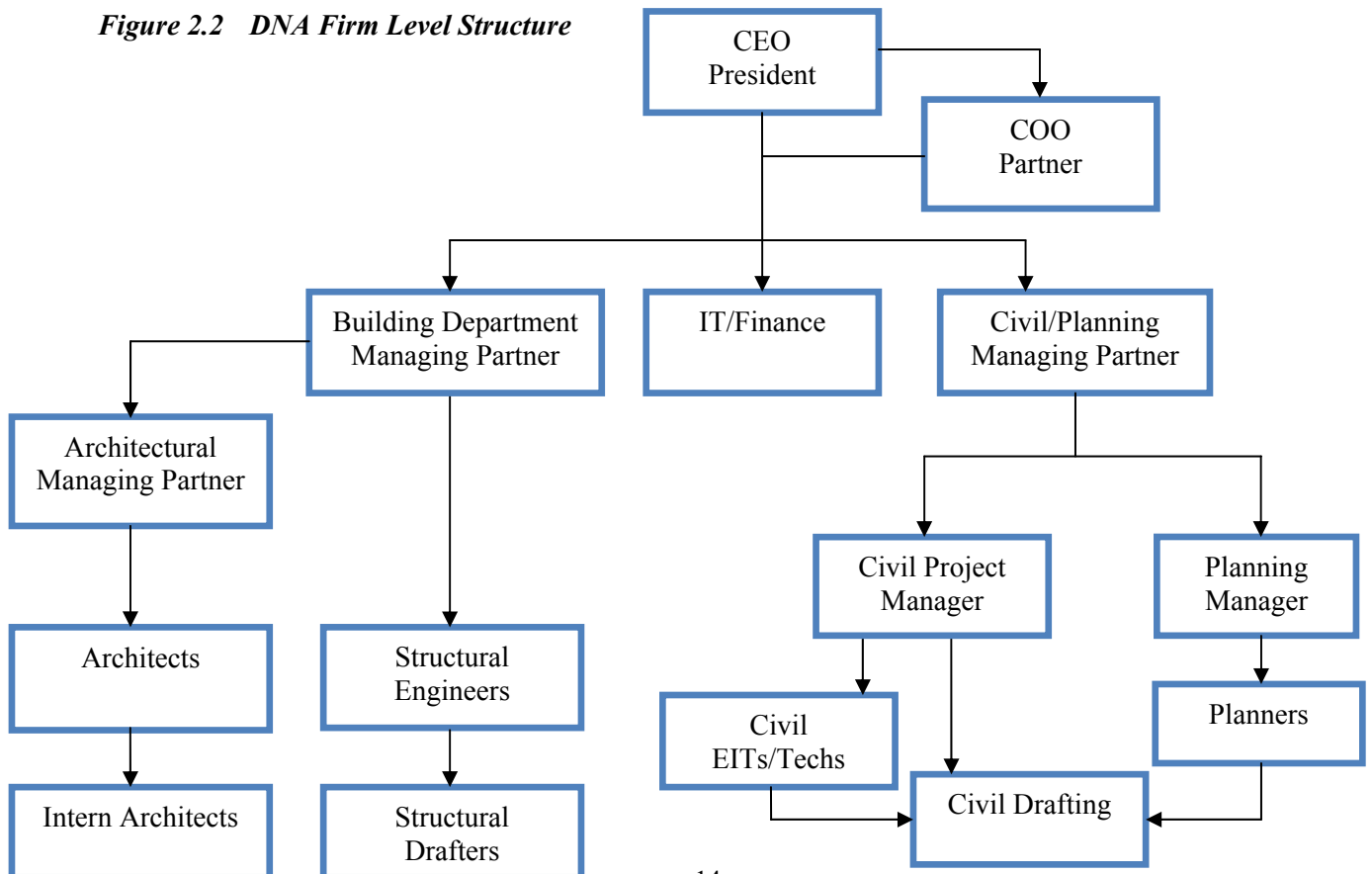
- Key professional staff have increased power when threatening to exit (especially when supply of professional staff is low)
- Local, national and global competition for professional staff
- Higher level of professional staff generally requires higher labour wages

2.3.4 Hierarchy of Authority

DNA’s hierarchy of authority and organisational structure can be depicted on two operational levels each with varying levels of decision-making and methods of communication. The two levels include:

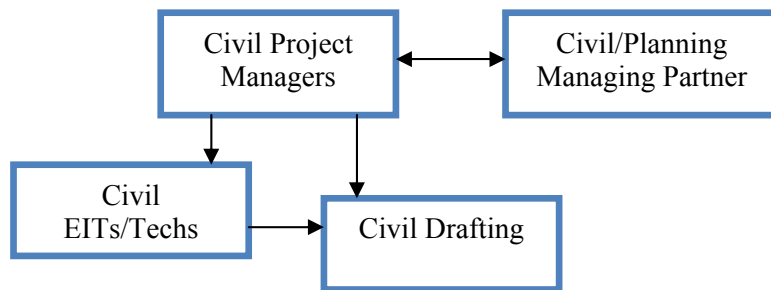
1. Firm Level
2. Project Level

Figure 2.2 DNA Firm Level Structure



The decision-making on a company level tends to be centralized at the president with input from the partners. Communication flows concerning company strategy or operational issues that are not project specific is top to bottom or bottom to top with some channel jumping between the department heads and those below the department managers. External communications at the CEO and partner level are generally with financial entities. External communications at the professional department levels (including IT and Finance) is usually project based.

Figure 2.3 DNA Project Level Structure



Based on DNA’s high level of professionalism on a project level the decisions are somewhat decentralised, relying on its various levels of professional staffs to make project related decisions with reviews and guidance at the civil project manager level. Communication is often flat with all members of a project team communicating with each other. This is due to limited formalisation concerning internal project reporting and limited standardization concerning project delivery. All project members usually carry out external communications with sub-consultants, with external client communication generally handled by the project manager or relationship manager including marketing and client/project development.

Over the last five years, federal funding in the BC region on First Nations’ buildings and infrastructure projects have declined by 20 percent. In addition, in 2011 federal priority for First Nations’ project funding has been shifted towards water system treatment needs for a minimum of five years . This shift is limiting the opportunity for funding for a number of DNA projects currently in the AANDC system and subsequently reducing DNA’s anticipated booked work. Based on this decline in one of its core market segments, and the consequent reduction in anticipated booked workload, DNA needs to review potential strategies to reduce the anticipated revenue and profit losses.

To do this, internal changes may be required to maximize revenues associated with current workload or additional workload may be required to increase professional staff’s utilization rates.

Ideally, DNA would like to develop enough workload not only to make sure existing staff remain fully utilized, but also to justify hiring new professional staff to maximize the utilization of the current available office space (additional six staff). Potential options to develop additional workload and or to maximize current workload include:

- Expand workload in current market segments
- Expand workload in new market segments
- Improving on internal efficiencies to maximise profits of existing workloads
- Increase scope of services offered to maximise revenues associated with existing workloads

3: External Analysis

This section will identify threats and opportunities in the industry; assess the relative importance of sources of advantage of firms operating in the industry; and the general competitiveness of DNA in comparison with key competitors in the industry. This information will form the basis of developing the strategic alternatives for the firm to address the firm's key issues.

3.1.1 Industry Definition

The civil engineering industry is a service based industry that provides design, project management and construction inspection services for municipal infrastructure projects that include:

- Topographic and legal surveying
- Roads (highways, urban and rural streets)
- Sanitary sewer collection, treatment and disposal systems
- Water supply, treatment and distribution systems
- Storm water management systems
- Earthworks (land shaping)

The above infrastructure projects are relevant in most if not all geographic locations in one form or another. In addition, infrastructure projects range significantly in scale. The size or estimated value of a project often defines the number of companies that will be able to compete for it. A civil engineering firm can only provide the design services that it has the manpower to deliver.

To practice in the industry at least one member of the company must be accredited in the region's professional engineering association or governing body. In addition, as a company assumes liability with services rendered, a company practicing in the industry generally is required to carry professional liability insurance in order to provide services.

Typically, a civil engineering company generates revenues by its professional employee's hourly billings to the company's billable projects. Each employee has an hourly billing rate, which is assigned by ownership, and is based on the estimated market worth of that employee with respect to his or her position. Billable projects are generated by the company through their client contacts (sole

sourced projects), and successfully awarded requests for proposals (RFPs) for civil engineering services. Internally, each project has a set budget in which the project deliverables are to be produced. The project manager assigns billable project tasks to the company engineers, technicians and themselves, and all members of the project team bill towards the project budget until the deliverables are met.

A successful project is one that generates revenues, meets the terms of reference of the project, is completed on schedule, and is completed within budget. When projects go over budget, without the consent of the customer, the revenues above the project budget are typically written-off.

3.1.2 Industry Supply Chain

The figure below illustrates a typical civil engineering industry supply chain.

Figure 3.1 Civil Engineering Industry Supply Chain.

Suppliers are represented by the blue arrows and allow a civil engineering firm to deliver services to infrastructure developer customers. As shown above sub-consultants' services can be provided to customers through civil engineering firms or a customer can directly procure the services from a sub-consultant. Regardless of the method used to initiate sub-consultant services, the civil engineering firm coordinates the sub-consultants' services with the overall design. Once a design is complete, customers utilise contractors to construct the infrastructure work designed by the firms. The

designing firms are responsible to inspect and review the work of the contractor to confirm that it is meeting the design intent. Once projects are constructed, they are commissioned and are utilised by the public.

3.2 Competitors

3.2.1 Industry Structure

Though individual practicing engineers must be registered with the professional association in that region, Association of Professional Engineers and Geoscientists (APEG) for instance in BC, there is not a requirement for registry of engineering firms with any governing body. BC does however have a society for engineering firms known as the Consulting Engineers of British Columbia (CEBC). The CEBC was established in 1976 and is a voluntary membership society offering a number of benefits including business practice assistance; government relations/advocacy; business development; awards/public relations networking; and professional development.

Currently 60 civil engineering firms are registered with the CEBC. Based on an interview conducted with Brian McAskill of CEBC these firms represent the majority of medium to large firms operating in BC and represent approximately 60 percent of all civil engineering firms in the province. Based on his estimate, it is assumed that over 100 civil engineering firms are competing in the BC market.

Based on the membership information for municipal engineering firms from CEBC website, the approximate industry structure in specific geographic locations throughout BC is summarised in the following table.

Table 3.1 Distribution of Civil Engineering Firms by Geographic Region

GEOGRAPHIC REGION	CEBC MEMBERSHIP OFFICES
Lower Mainland	73
Island	24
Interior	27
Northern	22

Source: <http://membersearch.cebc.acec.ca>

Lower mainland includes the metropolitan areas making up the Lower Mainland and the Sunshine Coast areas. Island represents the Vancouver Island area. Interior represent the Thompson

Okanagan area. Northern represents the balance of townships and cities outside of the other three geographic regions. It should be noted that the regional distribution counts report the number of offices and not just firms therefore a single firm can be represented in more than one geographic location and can have more than one office in a single geographic location.

The concentration of firms within different geographic locations corresponds to the concentration of infrastructure projects provided in those areas. The firms are generally concentrated in geographic locations where infrastructure projects are most highly concentrated. As illustrated above the most concentration of firms is in the Lower Mainland, which supports BC Stats reported building permits associated with that region, summarised in Section 3.2.2 Relative Size & Growth of Segments.

3.2.2 Types of Competitors

Firms are categorised by size as follows::

- Small – local or specialized consulting firms with professional staff less than 50
- Medium – regional consulting firms with professional staff from 50 to 200
- Large – national consulting firms with professional staff from 200 to 800
- Mega – multi-national consulting firms with professional staff greater than 800

The size of the firm generally dictates the geographic scope in which they compete. Usually small, to medium firms operate out of one to five offices within the same region or province and compete primarily in that specific region. Large to mega firms generally operated in more than one region or province and often have representative offices nationally.

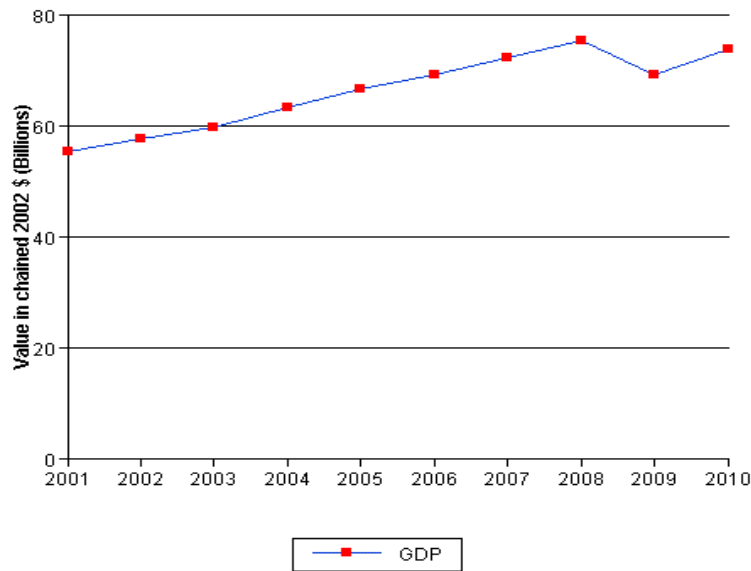
Smaller to medium firms, though potentially providing services to all segments, primarily focus on one or two main segments, while large to mega firms often focus on all four segments.

3.3 Customers

3.3.1 Market Size & Growth Rate

The civil engineering industry, along with other construction based consulting industries, generally trends with that of the construction industry within their region. Statistics Canada reported a steady increase in GDP (Canada wide) within the construction industry from 2001 to 2008 when the global recession hit Canada where GDP numbers dropped to 2006 levels. The industry appears to be growing again following the 2008 recession as indicated in the following figure.

Figure 3.2 2001-2010 Construction Gross Domestic Product (NAICS 23)



Source: <http://www.ic.gc.ca/cis-sic/cis-sic.nsf/IDE/cis-sic23vlae.html>

According to the Statistics Canada data summarised below, consulting firms in the construction industry including civil engineering, structural engineering, geotechnical engineering, mechanical engineering, electrical engineering, architecture and landscape architecture (Canada Wide) have consistently shown positive gross profit margins:

Table 3.2 Canadian Construction Consulting Services Gross Profit Margin

	2005	2006	2007	2008	2009
	\$ Millions				
Operating Revenue	16,084.40	18,770.80	22,802.50	25,700.10	24,748.20
Operating Expenses	13,832.60	16,629.70	19,779.00	22,311.90	21,948.50
<i>Salaries, wages & Benefits</i>	<u>6,583.80</u>	<u>7,534.30</u>	<u>8,484.70</u>	<u>9,825.10</u>	<u>9,527.80</u>
Gross Profit Margin (%)	14%	11%	13%	13%	11%

Source: http://www40.statcan.gc.ca/101/ind01/13_163_3947-eng.htm?hili_serv16

As shown in the following table Statistics Canada also reports consistent positive gross profit margins for construction consulting firms operating in BC. Detailed gross profit margins separated by service sector (architectural, landscape architecture and engineering) are included in **Appendix A**.

Table 3.3 British Columbia Construction Consulting Services Gross Profit Margin

	2005	2006	2007	2008	2009
	\$ Millions				
Operating Revenue	1,982.70	2,412.40	2,922.60	3,042.30	2,885.50
Operating Expenses	1,700.10	2,118.90	2,448.30	2,662.60	2,612.50
<i>Salaries, wages & Benefits</i>	<u>838.00</u>	<u>944.30</u>	<u>1,062.20</u>	<u>1,231.10</u>	<u>1,196.50</u>
Gross Profit Margin (%)	14.2	12.2	16.2	12.5	9.5

Source: <http://www40.statcan.gc.ca/101/cst01/serv12k-eng.htm>

As illustrated above, the consulting industry creates opportunities for profit even in bad times, generally due to the ability for firms to down size or upsize staff levels to fit the industry demand and government stimulus spending in the construction industry. As this spending has traditionally been focused towards infrastructure projects, the civil engineering industry is often subsidised during times of recession.

Notwithstanding the positive gross profit margins, the global recession caused a decline in profits for consulting companies. It is assumed that profit margins have increased after 2009 following the increased growth of the construction industry.

3.3.2 Customer Segments

The customers in the industry can be broken up into two major categories, private segment customers and public segment customers as summarised in the following table.

Table 3.4 Civil Engineering Customer Segments

PRIVATE SEGMENTS	PUBLIC SEGMENTS
Small Developers	Ministry of Transportation
Medium Developers	Municipal Governments
Large Developers	Federal Government
First Nations	

Public Customers:

Public customers include federal governments, provincial governments and local municipalities. They often have specific branches that deal with the procurement of infrastructure projects with varying degrees of procedure. Civil engineering services are generally procured through public RFPs (open to anyone) which define the scope of work associated with the project and the level of qualifications

required to submit a proposal. In some instances, engineering firms are prequalified to compete for public projects through request for qualifications (RFQs). Often municipal governments keep lists of qualified firms and only submit RFPs to firms on that list.

Though federally funded, First Nations customers act somewhat like private customers, as they generally have specific relationships with only one or a few select firms as described below.

Private Customers:

In most instances private customers are companies that specialise in land development and have procured services from civil engineering firms numerous times. As such, they have specific relationships with one or a few civil engineering companies and often request pricing for services from those select few and therefore forgo the RFQ or even the RFP process. Often times the scope of work is not clearly identified and the private customers rely on the consultants' experience to price the job accordingly. Often if priced wrong, the onus to perform and deliver an approved design contract is still expected. Even though these relationships exist, and there are customer preferences towards these relationships, low price often times outweighs exemplary past performance by a consulting firm.

3.3.3 Relative Size & Growth of Segments

First Nations Customers:

Though there has been a reduction in the yearly federal capital spending to the BC region and a shift in project priorities for funding consideration, there are still significant capital dollars being spent yearly on First Nations' projects. As of September 30, 2006 there are 198 First Nations in the BC region. As projects are often phased over a number of years and there are multiple projects with a single customer, developing relationships with the majority of the customers provides opportunities for firms to develop workload in the segment, or the potential for workload in the future. DNA for example currently has working relationships with only 18 percent of the market segment, so expanding working relationships to additional First Nations could further DNA's workload in this segment and the firm's ability to secure future priority projects.

The growth in this segment largely depends on federal policy with respect to capital budgets for First Nations' projects. Typically, liberal governments afford more dollars to First Nations' infrastructure spending. In addition, federal and regional policy in terms of project types receiving priority varies with the current administration. Therefore, government policy has a strong influence on growth of the segment and project type funding preference.

Public & Private Customers:

Reported building permits are an indication of the relative size and growth of the civil engineering industry in this segment as civil engineering services are required for delivery of most if not all projects that require building permits. The following table summarises the value of building permits for private and public sector projects from 2006 to November 2011. Refer to **Appendix A** for the detailed BC Stats report.

Table 3.5 Value of British Columbia Building Permits

	2006	2007	2008	2009	2010	2011
	\$ Millions					Jan - Nov
BC Total	11,541.5	12,544.6	10,577.1	7,629.8	9,723.8	8,578.9
Residential	7,620.7	8,611.7	6,899.3	4,491.1	6,705.9	5,729.7
Industrial	358.8	323.9	292.2	245.3	241.6	329.8
Commercial	2,493.7	2,647.9	2,623.5	1,757.2	1,787.0	1,758.4
Public	1,068.3	961.2	762.1	1,136.5	989.3	761.1

Source: *British Columbia Building Permits for Development Regions and Regional Districts, by Type 2002 – 2010, 2011 Y-t-D*, BC Stats

The growth trends associated with the different market segments for the above time period is illustrated in the following table.

Table 3.6 2006 - 2010 Relative Segment Growth in Terms of Building Permit Value

	2007	2008	2009	2010
BC Total	9%	-16%	-28%	27%
Residential	13%	-20%	-35%	49%
Industrial	-10%	-10%	-16%	-2%
Commercial	6%	-1%	-33%	2%
Public	-10%	-21%	49%	-13%

As indicated in the above table, there was a 28 percent decline in the reported value of BC construction during the recession (2008-2009). Private sector construction (residential, industrial and commercial) experienced a 35 percent decline during that time. Public sector construction showed an opposite trending over the recession with 49 percent growth from 2008 to 2009; this is most likely due to federal and provincial government stimulus spending. The table also shows a general resurgence in the BC construction industry since 2009 in the private segment. The Stats BC report indicates that the BC construction industry was on track near the end of 2011 to repeat the results it achieved in 2010 only down 6.6 percent from the previous year to date numbers.

3.9.2.2 Customer Preferences

Though there are numerous cost and customer advantages utilised by civil engineering consulting firms, there are only four main criteria that customers select a firm based on. These four criteria include:

1. Price for the services rendered
2. Schedule or timeline for delivery of services
3. Existing relationship between the customer and the consulting firm
4. Experience or level of qualifications of the consulting firm

The following table identifies key customers within the private and public customer groups and summarises their observed weighting of criteria for the selection of a civil engineering firm.

Table 3.7 Customer Weighted Selection Criteria (1 = most weight)

Customer	Cost	Schedule	Relationship	Experience
Private Developers	1	2	3	4
First Nations	3	2	1	4
Public				
Provincial/Federal Government	2	3	4	1
Municipal Governments	2	3	4	1

As illustrated above, more weight is placed on the cost of services for private customers, where public customers look for experience and reputation in delivering the services. This difference can be attributed to whether the project are funded privately with cost of capital, as well as to the longevity of ownership of the completed infrastructure.

Private Developers:

Often private developers sell the works with the properties they develop, or gift them to municipalities and governments after completion as a condition of their development agreements for real estate projects. For these reasons, private developers look to minimise costs associated with these works, including consulting costs, and subsequently cost of services as was weighed the highest. As speed of delivery of consulting services reduces carrying costs and the time it takes to construct and sell or lease the property, schedule has been weighed second highest. As private developers look to reduce searching costs for consultants, and prefer to work with staff they are familiar with so as to receive prompt service, relationship has been weighed third highest. As private developers generally do not own

the infrastructure after it is constructed, and therefore are not required to maintain and operate it, and liability of inadequate design is held with the consultant, experience has been weighed the least highest.

First Nations:

As First Nations often times rely on their consulting firms to assist with identification of community infrastructure and development needs, and to prepare AANDC funding applications for the projects, relationship has been weighed the highest. Since First Nations clients develop infrastructure for their own communities, and are required to use it, operate it and maintain it, experience has been weighed the second highest. As funding for First Nations' projects is limited, the costs associated with consulting services, which is covered by the funding, has been weighed third highest. As project phases have to be delivered within a fiscal year, and the First Nations clients have limited control on the approval and funding of subsequent phases, schedule has been weight least highest.

Public:

For public customers they are the end owners and maintainers of the infrastructure works, with the general public being the end user, therefore experience has been weighed the highest. Cost has been weighed the second highest as governments look to complete as many projects as they can within their fiscal year budgets. Schedule has been weighed third highest as government projects affect the general public and are often required to improve service. Relationship has been weighed least highest as government projects are generally tendered and awarded to firms that display the necessary experience at a cost effective price and therefore existing working relationships have little weight in selection.

3.3.4 Time and Cost Risk of Customer Segments

The customer groups also have different levels of risk associated with them, specifically in terms of reliability of collections for services rendered. In the industry, private customers are generally a higher risk for collection of billings. Generally, services are provided on credit, with payment for the services required after the maximum credit period or at the completion of a milestone established in advance of the project starting. This industry system of services for credit puts added weight on relationships with clients. For public or government projects, budgets and contracts are in place and the project is staged so that there is low risk for payment of services rendered.

The following table summarises the risk associated with the key customers in each of the private and public market segments in terms of the time cost to deliver the project and the potential for bad debt.

Table 3.8 Risk Associated with Customer Types

CUSTOMER	Time Cost	Potential for Bad Debt
PRIVATE		
Small Developer (non repeat)	Very High	Very High
Small Developer (repeat)	High	Medium-High
Medium/Large Developer	Medium	Low-Med
GOVERNMENT		
Small Project	Medium	Low
Medium Project	Medium	Low
Large Project	Medium-High	Low
FIRST NATIONS		
Small Project	Medium	Medium
Medium Project	Medium	Medium
Large Project	Medium-High	Low-Medium

The risk associated with late or non-payment for services rendered diminishes with both the size of the private customer as well as the past working relationship between the engineering firm and the customer. However as payment for services is dependent on the economic conditions for developing, there is no guarantee for total payment of fees no matter the size of the private customer or length of relationship an engineering firm has with them.

One-off smaller developers generally represent the most work for the fees earned as they have limited experience, require more time to educate, and have limited contacts with development authorities. They often carry the highest risk of bad debt as their projects are small and therefore there is less leverage in terms of withholding of services or deliverables to affect payment. In many instances to help mitigate bad debt from small one off developers engineering firms require a retainer before initiating work and payment in full before submission to approval authorities. However, this practice is risky as the customer could choose to go to a firm that will produce deliverables without a retainer.

Though First Nations' projects are federally funded, the funding is transferred from the regional branch of the AANDC to the First Nations directly and it is on the onus of the First Nations to appropriately administer the project funding. Due to unforeseen cost overruns in the administration of the projects, some consulting services can go unpaid.

3.3.5 Customer Opportunities and Threats

Since the recession, largely due to government stimulus funding, public sector work provincially, federally and on the municipal government level has been growing. This growth provides opportunities for firms currently operating in those segments to expand their workload in them or for firms not currently competing in them to expand into them. There is some threat to firms shifting focus to this segment as the growth had declined in 2010 largely due to reduced stimulus funding. The private sector market segment also appears to be growing since the recession primarily in the residential development market, but with some growth in commercial development.

With a wide range of customer segments within the industry and the cyclical nature of available workload in each segment, opportunities are available in the form of shifting a firm's focus to those customer segments that are booming at a specific time. The threat of this is that focus will be drawn away from core company segments and existing customers can be lost entirely because of minimised focus on their needs. Customer threats also include risks associated with the time it will take to deliver services and receiving payment for services rendered.

3.4 Suppliers

The table below identifies key suppliers in the industry. Suppliers are grouped according to their internal and external presence in the company and are further described in the following paragraphs.

Table 3.9 Key Suppliers for Provision of Civil Engineering Consulting Services

INTERNAL TO COMPANY	EXTERNAL TO COMPANY
Professional Staff	Sub-consultants
Technology	Operations
Support Staff	

Professional Staff:

Professional staff are suppliers that are often employed fulltime by the company or on a contract bases and are assigned an hourly billing rate based on the estimated market worth of that employee with respect to their position. Their time is billed towards a project and is the core service that the company charges its customers for (core source of revenue). Typically professional staff includes:

- Professional Civil Engineers

- Civil Engineers in Training
- Engineering Technologists
- Drafting Technicians

Professional staff are supplier groups that greatly affect the profit of the company, assuming projects are secured. Effective managers, engineers and technicians are crucial to providing customer value. These staff demand specific compensation and it is the company's mandate to ensure that the rates billed for these staff realise a profit when compared to their salaries while still remaining competitive in the market. Lack of motivation either financial or other can cause companies to lose key professional staff and therefore limit the company's competition in the industry. Therefore, engineering firms compete against each other for competent professional staff.

As billable professional time is directly related to company revenue, agent principal problems arise as companies rely on the truthfulness of professional staff concerning project billings. Time billed to a project that is not actually spent working on it cuts into a company's profitability. In addition, time not spent on a project and therefore not billed to a project such as sick time or time for administrative functions also cuts into company profits. Policies and procedures need to be such that non-billed professional time is limited and billable professional time is productive.

Support Staff:

Support staff are suppliers often employed fulltime by the company or on a contract bases that provide services to the company that support its core source of revenue. They include:

- Secretarial
- Information Technology
- Accounting/Finance
- Legal
- Human Resources
- Insurance

The costs associated with changing support staff varies depending on its type or level of importance of its supporting role to the company. For example, there are lower switching costs with support roles that have few policies and procedures associated with them. Changing insurance providers has a relative low cost; however, as accounting departments have higher learning curves for the staff the switching cost is higher.

Sub-Consultant Companies:

Sub-consultant companies are suppliers that provide additional professional services outside the core competency of the company but are required to deliver the particular infrastructure project. Sub-consultant firms are often selected to work on a project through a similar RFP process by the customer either directly or by coordinating a proposal with the civil consultant for a customer's RFP. If subcontracted by the client there is no formal contract between the two firms, however if subcontracted by the civil engineering company a contract is in place defining the scope of services. Typical sub-consultant firms include:

- Geotechnical Engineers
- Electrical Engineers
- Mechanical Engineers
- Architects
- Specialty Systems Engineers

Sub-consultant firms are often one of many competing for projects in the same fashion as civil engineering firms do in the market and therefore their power as a supplier is low. There are some exceptions specifically in the case of specialty systems engineering companies. The limited quantity of these types of companies makes them a limited resource at times and therefore they can choose what to charge and may provide lower prices to favoured civil engineering firms. All sub-consultants do have the ability to delay the delivery of projects based on their internal workload scheduling.

Technology:

- Software
- Hardware

To stay competitive in the market civil engineering firms utilise a multitude of office, design and drafting software to deliver their services. As such, they are required to purchase the chosen software as well as the hardware to effectively run the programs. The software providers, once chosen, often have a captured customer, as the switching costs associated with re-training staff on alternate software are high. Due to this, the chosen software providers are able to sell licensing and program updates to the captured customer with limited competition from alternates.

Operations:

Operations are suppliers that provide the infrastructure required for the company to operate.

They include:

- Office Leasing
- Office Furniture
- Utility Providers

Companies competing in similar market places and segments in a geographic location often have the opportunity to reduce the effects these suppliers have on their profits by operating in areas with historically lower costs for the services/products supplied.

3.5 Entrants

As the industry is growing, there is room for potential entrants into the market. As you cannot practice within most geographic regions without accreditation in the regions professional engineering association or governing body, potential entrants are assumed to be individuals or an individual that holds the require accreditation. They are often small one man or multi person firms that leave existing firms or they are a mid to large sized firm from other regions expanding into a new region.

Though there are low switching costs for customers to utilise a new entrant there are some barriers to potential entrants which depend on the anticipated size of the potential entrant that will deliver services. The following summarises the barriers associated with small sized entrants.

- Available credit to carry overhead costs of services provided on credit
- Necessary experience to qualify for projects
- Necessary contacts to maintain profitable workload
- Qualification for liability insurance

Medium to mega sized firms expanding into BC can do so by either establishing a new office in the region and staffing from existing or newly hired staff, or acquiring an existing firm operating in the market.

3.6 Substitutes

Substitutes for civil engineering services include packaged predesigned and ready to install infrastructure systems. Within the industry, these often included various forms and types of:

- Wastewater treatment systems
- Water treatment systems
- Storm water treatment systems

These predesigned systems have specific applications to specific design criteria and are often not easily modified for varying conditions. For public sector projects, substitutes often require a proven track record or have a wide range of acceptance in the industry to be utilised in public projects. This is also the case for private customers as the infrastructure they have designed and constructed is often turned over to public entities and therefore the chosen systems have to meet the public entity's standards. However, as they do provide time and cost savings, they are looked to as substitutes to the tradition design and construct delivery of infrastructure projects.

3.7 Five Force Synthesis

The figure below illustrates the apparent strength of each of the five forces on the industry and the following table summarises the key factors affecting its apparent weighting. In the case of supplier power, the apparent strength is referencing that of professional staff.

Figure 3.3 Industry Five Force Apparent Threat Levels and Bargaining Power

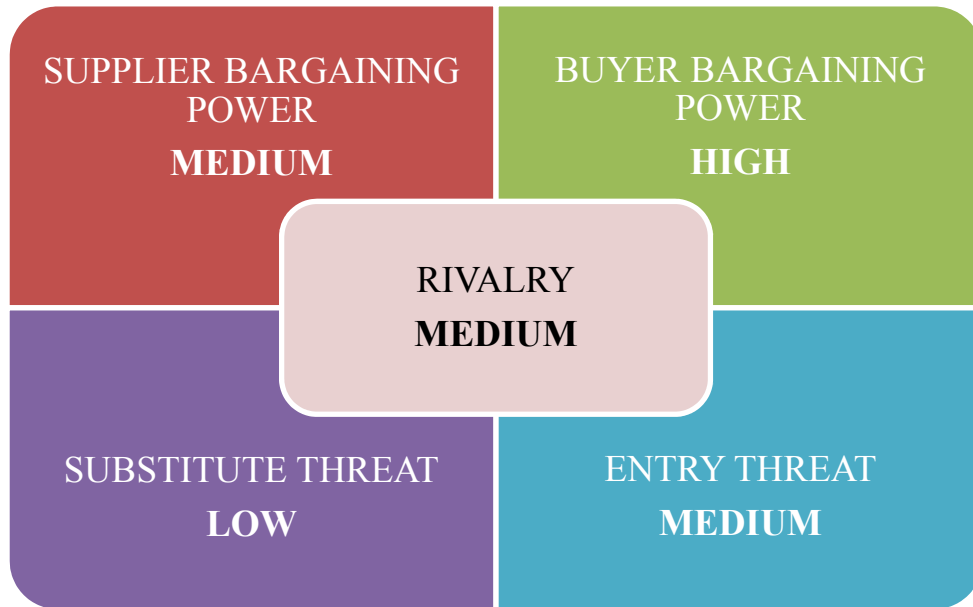


Table 3.10 Engineering Industry Five Forces Factors for Apparent Weight

Rivalry Degree	Entry Threat	Substitutes Threat	Buyer Power	Supplier Power
Medium	Medium	Low	High	Medium
+Demand Growth	+Growing Market	+Regulations	-Price Knowledge	-Scarce Expertise
+Increasing Concentration	-Capital Requirements	+Design Adaptability	-Low Switching Costs	+/-Training Requirements
+Low Fixed Costs	-Scarce Expertise	+Standards	-Cost Sensitive	+Non Unionised
+Differentiation by Size	-Insurance Required	+Unproven Systems	+/-Relationship Sensitive	+/-Market Driven Salaries
-Lots of Firms				
-Diversity of Rivals				

The following sections summarise potential changes in each force and the opportunities and or threats these changes create.

3.7.1 Rivalry

As each customer segment can be cyclical, often rivalry can increase when available projects in one market segment diminishes, as companies that generally compete in that market look to new markets

to subsidise their decline in booked work. This was apparent during the economic downturn, as many companies relying on the private sector industry shifted focus to government projects that were subsidised federally and provincially by economic stimulus dollars. When a company shifts its focus to other market segments this can often lead to a decrease in the level of service to the company's current customer base. This decrease in service can provide opportunities for competing companies to acquire dissatisfied customers. The cyclical nature of the construction industry means that it is continually resulting in apparent threats or opportunities to those firms competing in it.

3.7.2 Entrants

The growth of the market and relatively low barrier to entry allow new firms to enter the market. However, the time for a newly formed firm to establish themselves and position themselves to be a threat in the market is long. The relevant changes with regards to new entrants is in the form of large or mega firms purchasing existing companies to establish themselves in new markets, or to eliminate competition in existing markets forgoing the time required to establish themselves in these markets. Though purchase or mergers of firms may be beneficial at the ownership level of the acquired firms, the structure or organisation of the mega firm taking over may not align with the desired workflows of existing professional staff at the acquired firm. This dissatisfaction with workflows may lead to increased exiting of professional staff to rival firms. Firms that hire professional staff that fit well within their current workflows can maintain employees for longer periods of time, as long as compensation is within market value, and therefore reduce the chances of employees switching to new firms.

3.7.3 Substitutes

Due to regulatory requirements and the required length of time for current substitutes to be accepted as industry standards their threat is currently low. However once some systems are proven and accepted their threat of replacing some forms of civil engineering design services may increase.

Currently opportunities are available in collaborating with companies that produce package systems and contracting fees for utilising the package system products in the design. Threats associated with this opportunity exists in the form of existing customers bypassing the consulting firm and direct buying the systems to meet their needs.

3.7.4 Customers

Due to the low switching costs, and the high level of rivalry in the industry between reputable firms, customer bargaining power is high. This level of bargaining power can be both an opportunity

and threat depending on the relationship building or maintaining capabilities of engineering firms. Firms that do not build strong working relationships with their clients limit loyalty to their services and increase the chance for existing customers to look elsewhere for services.

3.7.5 Suppliers

The knowledge leverage and rivalry between engineering firms competing for the best and brightest of professional staff and the ability of professional staff to change firms with low switching costs results in suppliers having medium bargaining power in the industry. This bargaining power may be either an opportunity or threat to a company depending on whether a company is able to entice exiting staff with salaries they are comfortable paying or losing staff because they are unable to meet market salary demands. This bargaining power of professional staff is amplified in firms where knowledge is held with only a select few staff as they can demand significant compensation as they are integral to the operation of the firm.

As larger firms absorb small firms and the competition shifts from being between varying numbers of varying different sized firms to being between only a few mega firms operating in the industry, supplier bargaining power may diminish.

3.7.6 Summary of Industry Threats and Opportunities

The table below summarises the observed opportunities and threats in the external industry.

Table 3.11 Industry Opportunities and Threats Summary

OPPORTUNITIES	
Growing Markets	Industry associations to market through
Available segments to expand to including federal/provincial/municipal government	Leverage relationships with sub-consultants for potential new customers
Additional services to offer that provide increase customer willingness to pay and increase revenues	Low switching costs for customers if competition underperforms
Leverage relationships from other disciplines within firm for potential new customer	Low switching costs for customers if a firm can differentiate itself
THREATS	
Training time to develop talent	Medium level of industry rivalry
Low switching costs for exiting professional staff	Market saturation by large/mega firms

3.8 Sources of Advantage

There are a number of sources of advantages for firms in the civil engineering industry to provide lower cost services or to provide higher customer value or willingness to pay for those services. The following sections identify the key sources of advantages that civil engineering firms use to compete in the industry.

3.8.1 Cost Advantage

Cost advantages allow civil engineering firms to charge less for the services they deliver than their competition or to compete more effectively on price. Often cost advantages can be on an industry level applying to all projects; to projects in specific segments of the industry; or to a single one-time project. The following section identifies the key sources of cost advantage in the civil engineering industry.

3.8.1.1 Sources of Cost Advantage

INPUT COSTS:

As civil engineering services are delivered primarily through the company’s professional staff, the cost structure of a firm competing in the industry is generally the overhead required to support the professional staff as well as the salaries to employ them. As highly effective professional staff are often compensated well, the firm must appropriately set their billable rates to account for the compensation

but ensure that the rate is not too high when charging for services. Based on salary distribution throughout a firm and related billing rates, as well as the competitive markets for professional staff, input costs are somewhat level between firms and therefore are not considered a sources of cost advantage.

RELATIONSHIPS:

Relationships with Existing & Potential Clients

Having relationships with clients in the industry that frequently require engineering services due to the large amount of projects they complete each year is a cost advantage for firms. These relationships dramatically reduce searching costs in the form of staff time required for firms to locate and identify potential projects that would be suitable to bid on. They also reduce marketing costs for the firm, especially if the firm maintains numerous repeat customers that they can depend on for sustained workload. Maintaining these relationships takes effort in the form of project managers/engineer time. The ability for a company to minimize this time, while creating and maintaining relationships, also provides a cost advantage to the firm.

Relationships with Sub-consultants:

Positive working relationships with sub-consultants who provide complimentary services to delivery of infrastructure projects can provide cost advantage. Locating a reputable sub-consultant to deliver a project takes staff time. Having a positive working relationship with providers of these services reduces the search time, and the subsequent cost passed onto the fees to deliver the project. In addition, the positive working relationship often lends to sub-consultants reducing their mark-up for risk they associate with the work performed by the civil consultant as well as to the likely hood of collecting invoices.

OPERATIONAL EFFICIENCY

As the civil engineering business is based on delivering services to its clients, the more efficient the company can deliver them allows them to potentially provide those services at a more competitive rate. Operational efficiencies include:

Project Management:

Effectively managing a project and its budgets, including sub-consultant coordination, task scheduling, and workload distribution can make the delivery of projects more efficient, therefore allowing companies to charge less to their customers to deliver the services associated with them. The project delivery method or structure employed by a company often influences how effective projects can

be managed and budgets controlled. For instance, some firms have staff that are solely dedicated to the management of projects. These managers can be specific to a type of infrastructure or type of customer segment. Other firms utilise the project engineer to handle all senior project engineering along with the project management, including scheduling, budget management, invoicing and customer/regulatory relationship management. A more structured approach is generally seen as more cost effective as it reduces coordination time. Granted a firm has sufficient workload to justify a dedicated project manager, this can reduce the firm's marginal costs but will increase its overhead.

There are specific courses and accreditation for project management; however, the structure a company has in place for delivering the project must be compatible with the style or method these accredited project managers employ. The competency of professional staff managing a project, within the structure the firm employs, influences how efficiently the project is delivered. Therefore, the skill level or adaptability to management structures of employed professional staff is an important factor in cost advantage for a company.

Utilization Rates:

As billable rates for professional staff are tied to the salaries paid to those staff, companies with lower overhead can afford to reduce these rates while still maintaining competitive salaries to their professional staff. The result of this can be lower costs charged for delivering a project. In addition, higher levels of professional staff utilisation on projects minimises the carrying costs of those professional staff in terms of wage and overhead.

Though each source of cost advantage described affects whether a firm has higher or lower costs than its competitors, some sources of advantage are recognised as providing a greater advantage than others. The following table weighs the relative importance of the cost advantages described above.

Table 3.12 Source of Cost Advantage Weight as Percent of Total

COST ADVANTAGE	WEIGHT
Relationships	
With Existing & Potential Clients	25%
With Sub-consultants	5%
Operational Efficiency	
Project Management	30%
Utilization Rates	<u>40%</u>
Total	100%

Utilization rates has been weighed the highest at 40 percent as firms that maximise the utilization of their employees can afford to reduce costs associated with delivery of services as they capture more revenues per employ. Ideally, a firm would like to have all of their staff fully utilised and therefore secure revenue for every hour the staff member is paid. Project management has been weighed the second highest at 30 percent as it allows workload to be delivered more efficiently, with less wasted staff time, allowing the firm to charge less for the delivery of the services and increase available time for additional workload.

The payment of employees for non-billable staff time associated with workload development needs to be recovered, and therefore can result in the firm having to charge more for its services to do so. Because of this, relationships with clients has been weighed third highest at 25 percent as it reduces non-billable time for staff to search for projects. Relationships with sub-consultants also helps to reduce non-billable time associated with searching for sub-consultant that will provide preferred prices, however the cost advantages associated with this is much less than reduction in search cost associated with workload therefore it has been weighed the least at 5 percent.

3.8.2 Customer Cost & Utility Advantage

Some sources of advantage provide both a cost advantage to the firm as well as a customer willingness to pay. The following section identifies the key sources of both cost and customer utility advantage in the civil engineering industry.

3.8.2.1 Sources of Cost & Utility Advantage

SERVICE SCOPE

Utility Advantage:

In many instances, consultant companies in the construction industry carry multiple consultant types under one company. Providing additional complimentary consulting services can provide a customer value advantage as it reduces the searching cost of the customer (utility benefit) to hire the consulting team required to deliver their project. In addition, as some customers construct varying types of projects (both building and infrastructure), a relationship formed with the building consultant in the firm can lead to a potential relationship with the infrastructure consultant.

Cost Advantage:

Providing additional complimentary consulting services can provide a cost advantage to the firm by providing lower coordination costs between the consultants required to deliver the project. These

advantages include searching costs to obtain the services, meetings, scheduling and onsite task coordination. Provision of additional services also reduces the firm's marketing and project acquisition costs and shortens the sales cycle.

SIMILAR PROJECT EXPERIENCE:

Utility Advantage:

If a company operates or specializes on certain project types or with certain customer segments, they can develop reputation in those areas, which attracts customers due to reduced searching costs associated with finding a firm that can meet their needs. This utility advantage is often the case in the private segment as they wish to utilise firms with strong knowledge of the regulations within the municipalities they will be developing in to reduce the time it takes to complete designs and get construction approvals.

Cost Advantage:

Civil engineering companies that are experienced in delivering certain types of infrastructure projects, or projects with specific standards, can complete those projects faster than firms with less experience can. This means less billable time and therefore a lower cost charged for the service.

LOCATION

Utility Advantage:

Companies that have offices in areas where many customers are located or where the customers can easily access and utilise their services provides a utility advantage to the potential customers. Infrastructure projects generally require coordination meetings between a number of consultants as well as the customer themselves. Proximity to a client base as well as to complimentary services provides an incentive for potential customers to use a specific engineering firm.

In addition, location relative to where the final infrastructure project is constructed can provide customer value. Often when a company is located in the area or municipality the project is being developed in, the company has an associated knowledge with the development regulations in the area, and subsequently an appearance of expediting municipal approvals. This knowledge may not in fact be true, as the company may not have worked in that area frequently enough to be proficient in the delivery in services in it, however their being located in it may result in a cold call from a potential customer developing in that area.

Cost Advantage:

Companies that have offices in areas where many customers are located or where the customers can easily access and utilise their services enjoy a cost advantage due to reduced searching and marketing costs. In addition, if a firm is located in or near the geographic location where a project is, they can reduce costs associated with travelling to site or professional time associated with meetings with review agents and customers in that area. As project construction sites often have to be visited by the professional staff for meetings or for field inspections, to confirm that the work is being completed in accordance with the design, a firm that is located close to the project site has a cost advantage in delivering the project.

3.8.2.2 Relative Importance of Cost & Utility Advantages

Though each source of cost and utility advantage described effects how firms position themselves in the industry, some advantages are recognised as providing a greater positional advantage than others provide. The following table weighs the relative importance of the cost and utility advantages described above.

Table 3.13 Source of Cost & Utility Advantage Weight as Percent of Total

COST & UTILITY ADVANTAGE	WEIGHT
Service Scope (number of services offered)	20%
Similar Project Experience (number of similar projects)	50%
Office Proximity to Client	10%
Office Proximity to Project	<u>20%</u>
Total	100%

Similar project experience was weighed the highest at 50 percent as it not only implies high reputation in delivery of services for types of projects that customers complete, but it provides significant workflow efficiencies resulting in faster delivery of projects and therefore the ability to charge less for those services. Service scope and office proximity to project are tied with the second highest weighting at 20 percent as they are viewed to provide approximately the same level utility advantages to the client, and cost advantage to the firm. Office proximity to the client was weighed the least at 10 percent since client and consultant meetings can be held through various technological means, therefore there is lower customer willingness to pay to be closer to a consultant and there are limited cost saving to firms that are closer to clients.

3.8.3 Customer Utility Advantage

Civil engineering companies that differentiate themselves from the competition in the industry often create customer value or willingness to pay. In these instances, firms may not have to compete on price for projects but can charge a premium over their competitors for the associated additional value using that firm's services provides. The following section identifies the key sources of utility advantage in the civil engineering industry.

3.8.3.1 Sources of Utility Advantage

REPUTATIONAL CAPITAL

Companies that operate in the industry develop a reputation based on the profile of a project, and whether it is delivered on time and on budget. This reputation can be an advantage or disadvantage based on the perceived success or perceived failure of the project by their client, potential clients, or the public. Sources of reputational capital that provide a customer willingness to pay include:

Reputation for Design Reliability:

Companies that are perceived to deliver designs with limited errors or omissions, which result in fewer changes during construction, provide customer value for their services. Most firms strive for reliability of designs however, since the speed in delivery of the services means more profits realised on a project, rushed designs to improve profitability can result in errors or omissions. To avoid errors and omissions firms have peer reviews of design deliverables, or senior reviews. As there are additional time costs associated with peer/senior reviews, the level of reviews vary depending on the project budget or non billable time the company is willing to invest to confirm the reliability of the design.

As firms generally secure projects based on lowest cost, to develop a high reputational capital for reliability the company may have to take some losses. However, once developed, this reputation of providing quality service can afford them to charge higher prices for their services or increase the amount of projects they are requested to bid on.

Reputation for Complex Projects:

Civil Engineering companies that develop a reputation for successfully delivering complex infrastructure projects are often short-listed and single sourced for delivery of other complex projects even if they are different in type. Their expertise in delivering them provides customer value as the customer would rather pay a potential premium than have the design not work out or result in costly construction.

Corporate Social Responsibility:

Some customers have a willingness to pay for firms that demonstrate corporate social responsibility (CSR). However since many projects require the designs to follow government set regulations, there is very little competition between firms in terms of defining and promoting their CSR programs.

FIRM SIZE

Larger construction and infrastructure projects have higher fees associated with them. As delivery of projects is often time sensitive due to funding availability, cost of capital or the required end use of the project, the delivery of large scale projects often requires a multitude of professional staff working on the project at one time. Since this is the case, larger scale civil engineering companies with enough personnel to deliver the large project as well as service their current clientele usually secure large projects. Therefore, in the case of large infrastructure projects, higher customer value is generally placed on larger firms as they are perceived as being a less risky firm to deliver the project successfully.

In addition, as larger projects have higher capital costs associated with them, and are generally used or interacted with by a larger majority of the public, these projects carry a larger liability. Larger civil engineering companies are seen as having deeper pockets, carrying more liability insurance, and therefore being a more attractive direction to go to limit the risk associated with the cost of the project not performing as intended.

RESPONSIVENESS OF SERVICE

Much like the utility advantage associated with similar project experience, delivering services that are of an accepted quality in a time sensitive manner provides customer value. As project timelines and schedule are often crucial to its success, developing a reputation of consistently meeting or exceeding schedules, as well as being responsive to customer needs or changes, provides a willingness to pay for that firm's services.

3.8.3.2 Relative Importance of Utility Advantages

As discussed in Section 3.3.2 Customer Preference and illustrated in Table 3.7 Customer Weighted Selection Criteria, selection criteria varies by segment. Since the utility advantages listed above contribute to these selection criteria, they also vary by segment. The following table weighs the relative importance of the utility advantages described above to each of the four market segments. Following the table, the weighting of utility advantage for each segment is explained by describing how those utility advantages relate to the segment's selection criteria.

Table 3.14 Market Segment Source of Utility Advantage Weight as Percent of Total

UTILITY ADVANTAGE	MARKET SEGMENT WEIGHT			
	First Nations	Private	Fed/Prov Gov	Municipal Gov
Reputation for Design Reliability	40%	30%	55%	55%
Reputation for Complex Projects	20%	5%	20%	15%
Firm Size	10%	10%	15%	15%
Responsiveness of Service	<u>30%</u>	<u>55%</u>	<u>10%</u>	<u>15%</u>
Total	100%	100%	100%	100%

First Nations:

First Nations customers rate relationship and experience as the highest selection criteria for hiring a civil engineering firm. As the final constructed product is generally operated by the First Nations maintenance departments, First Nations customers generally form relationships with firms that have a high reputation in delivering reliable designs within First Nations communities. Based on this reliability of the design has been weighed the highest at 40 percent. Responsiveness of service has been weighted second highest at 30 percent since First Nations’ projects receive federal funding and therefore require that funding to be spent and the deliverables submitted within a certain timeframe. Usually the timeframe is before the end of the fiscal year that the funding has been released. Since most First Nations communities are isolated communities with their own infrastructure requiring varying degree of complex designs, reputation for complex projects has been weighed fourth highest at 20 percent. As most First Nations communities are remote, and are often smaller scale, firm size has been assigned the lowest weight of 10 percent.

Private Developer:

Private developers rate cost and schedule as the highest selection criteria for hiring a civil engineering firm, therefore in the case of utility advantages responsiveness of services was weighted the highest at 55 percent. Design reliability was weighed second highest at 30 percent due to the time associated with changes required during design as well as potential costs due to changes required in construction. Firm size was weighed third highest at 10 percent to account for appearance of available staff to work on projects as backlogged workload can often delay deliverables. Reputation for complex projects was weighed lowest at 5 percent as generally private development work consists of upgrades to existing infrastructure and is less complex in terms of size and scope.

Federal/Provincial Government:

Federal/provincial government projects are generally procured through an RFP process in which the successful firm is the lowest cost firm that has qualified with relevant experience. Their projects are publically funded and generally utilised by a large majority of the public and therefore the designs need to be reliable and sound. For this reason, reputation for design reliability was weighed the highest at 55 percent. As government funded projects are usually large, more complex projects, reputation for complex projects have been weighed second highest at 20 percent. As it is often the case that larger firms receive approval for qualification for government projects, firm size been weighed fourth highest at 15 percent. As federal and provincial government funded projects often have a deadline for completion as project budgets need to be spent to align with government fiscal year funding and spending requirements responsiveness of services has been weighed at 10 percent.

Municipal Governments:

Municipal governments select civil engineering firms similarly to the federal and provincial government, and as such, the weighting of utility advantages are similar. Adjustments in the weighting include a five percent decrease in weight in reputation for complex projects to account for the smaller scale projects they undertake. There is an increase in responsiveness of service by 15 percent to account for willingness to pay for firms that can deliver the projects within the municipal governments' tighter project timelines.

3.8.3.3 Relative Importance of Type of Source of Advantages per Segment

As each segment weighs cost, utility and cost, and utility advantage differently, the following table summarises the apparent weighting of the type of source of advantage per segment. The weighting is based on the segments' general selection criteria of a civil engineering firm as discussed in Section 3.3.2 Customer Preference, and illustrated in Table 3.7 Customer Weighted Selection Criteria. Weightings have been assigned based on the type of source of advantages ability to meet the market segments' priority selection criteria.

Table 3.15 Market Segment Source of Advantage Weight as Percent of Total

TYPE OF ADVANTAGE	MARKET SEGMENT WEIGHT			
	First Nations	Private	Fed/Prov Gov	Municipal Gov
Cost Advantage	20%	50%	20%	20%
Cost & Utility Advantage	50%	20%	30%	30%
Utility Advantage	<u>30%</u>	<u>30%</u>	<u>50%</u>	<u>50%</u>
Total	100%	100%	100%	100%

3.9 Relative Competitiveness Analysis

This section will summarise DNA’s relevant competitors in the market. It will present the apparent relevant positions of those competitors and rate how they compare with DNA on the sources of advantage presented in the previous section.

3.9.1 Relative Competitors

The relevant firms that DNA competes with or could potentially compete with are described in Table 3.16 below.

Table 3.16 Relevant Competitive Firms

Firm	Abbrev	Founded	Employees	Service	BC Locations
Kerr Wood Leidal Associates Ltd.	KWL	1975	100	Municipal Engineering	3 - Vancouver, Victoria and Kamloops
Urban Systems Ltd.	USL	1975	150	Municipal engineering, landscape architecture, transportation engineering, environmental engineering	8 - Richmond, Victoria, Kamloops, Kelowna, Calgary, Edmonton, Fort St. John and Nelson
R.F. Binnie & Associates Ltd.	RFB	1969	130	Municipal engineering, and surveying services	6 - Surrey, Burnaby, Courtenay, Qualicum Beach, Sechelt, Squamish
Aplin & Martin Consultants Ltd.	AMC	1968	75	Municipal engineering, planning, land surveying	3 - Surrey, Abbotsford, Kelowna
McElhanney Consulting Services Ltd.	MCS	1910	400	Municipal engineering, surveying, Structural Engineering	14
Opus Dayton Knight Consultants Ltd.	ODK	1965	2300	Municipal engineering, environmental Engineering	5 - North Vancouver, Vancouver, Victoria, Kelowna, Smithers
Associated Engineering Ltd.	AE	1952	800	Municipal engineering, environmental Engineering, transportation engineering, landscape architecture, structural engineering, survey	2 - Burnaby, Kelowna

3.9.2 Relative Competitiveness of Competitors in Relation to DNA

The following tables evaluate the competitors with respect to DNA on the various sources of advantage previously identified. For each source of advantage, a value between one and five is provided for each firm. A weight was previously assigned to each source of advantage. The relative score for each company with respect to that source of advantage is the company's value multiplied by the weight factor. The table summarises the total score for each company with respect to cost advantage, cost and utility advantage, and utility advantage.

As identified in Section 3.8.2.2, each market segment weighs each source of utility advantage differently, and as identified in Section 3.8.3.3 Relative Importance of Type of Source of Advantages per Each market Segment, each market segment weighs each type of source of advantage differently; therefore, separate tables and scores have been prepared for the four market segments discussed:

1. First Nations
2. Private Developers
3. Provincial/Federal Government

4. Municipal Governments

The final score within that segment with respect to the type of advantage is the relative score multiplied by the weighting factor of the type of advantage for that segment. For each segment, the relative advantages of the four main competitors within that segment are being scored.

3.9.2.1 Scoring Methodology

The scoring is generally subjective, based on assumptions and observed market conditions including notable projects, estimated firm growth, and discussions with industry professionals. The following summarises the key variables used for rating each firm for the particular source of advantage.

SOURCE OF COST ADVANTAGE

Relationship with Clients:

Scored on the observed booked work and repeat customers of the varying firms analysed.

Relationships with Sub-consultants:

Scored on the observed frequency in which firms utilised similar sub-consultants from project to project. Those that utilised a core group of sub-consultants were scored highest.

Project Management:

Scored on the observed level of formalization within each firm for delivery of projects. Firms with a more formalized structure employing higher levels of project management structures were scored highest.

Utilization Rates

Scored on the observed number of market segments the firm was operating in and based on the observed growth in firm size over the past three years. Generally when firms increase in size it is an indicator of high levels of workload and the need for additional staff to deliver projects, further indicating high utilization rates of current staff.

SOURCE OF COST & UTILITY ADVANTAGE

Service Scope:

Scored on the observed number services the firm provides. Those with more services applicable to the market segments' projects scored higher.

Similar Project Experience:

Scored on the duration of time a firm has operated in the particular segment, and the level of workload the firm maintains within that segment. Those specializing in a particular market segment, operating longer in that market segment, and maintaining more booked work scored higher.

Office Proximity to Client:

Scored on the number of offices the firm provided within the general area that customers in a specific market were located. Those firms with more offices scored higher.

Office Proximity to Project:

Scored on the number of offices the firm provided within the general area that potential projects would be located for that particular market segment. Those firms with more offices scored higher.

SOURCE OF UTILITY ADVANTAGE

Reputation for Design Reliability:

There are firms in the industry that have a poor reputation for reliability; however, that is not the case of the firms reviewed here, therefore all firms carry the same score.

Reputation for Complex Projects:

Scored on the number of larger, more complex, high profile projects completed by a firm. Those firms delivering higher numbers scored higher.

Firm Size:

Scored on the estimated number of professional staff in a firm. Those firms with more professional staff scored higher.

Responsiveness of Service:

Scored on customer feedback regarding use of particular competitors, in addition to the apparent focus the firm has in that sector. Those firms focusing on a particular market segment scored higher.

3.9.2.2 First Nations Market Segment Relative Competitive Analysis

Table 3.17 First Nations Market Segment Relative Competitive Positions

	Firm:	DNA	KWL	USL	MCS	ODK
	Size:	Small	Med	Med	Large	Mega
Sources of Cost Advantage Weight (20%)						
Relationship with Clients (25%)		5	3	3	2	1
Score		1.25	0.75	0.75	0.5	0.25
Relationships with Sub-consultants (5%)		3	3	3	2	1
Score		0.15	0.15	0.15	0.1	0.05
Project Management (30%)		2	3	3	4	5
Score		0.6	0.9	0.9	1.2	1.5
Utilization Rates (40%)		2	3	3	4	5
Score		0.8	1.2	1.2	1.6	2.0
Total Cost Score		2.8	3.0	3.0	3.4	3.8
Segment Weight of Cost Score		0.6	0.6	0.6	0.7	0.8
Sources of Cost & Utility Advantage Weight (50%)						
Service Sope (20%)		3	2	2	4	4
Score		0.6	0.4	0.4	0.8	0.8
Firm Experience (50%)		4	3	3	3	2
Score		2.0	1.5	1.5	1.5	1.0
Office Proximity to Client (10%)		1	3	3	3	3
Score		0.1	0.3	0.3	0.3	0.3
Office Proximity to Project (20%)		1	3	3	3	3
Score		0.2	0.6	0.6	0.6	0.6
Total Cost & Utility Score		2.9	2.8	2.8	3.2	2.7
Segment Weight of Cost & Utility Score		1.5	1.4	1.4	1.6	1.4
Sources of Utility Advantage Weight (30%)						
Reputation for Design Reliability (40%)		4	4	4	4	4
Score		1.6	1.6	1.6	1.6	1.6
Reputation for Complex Projects (20%)		3	3	3	2	2
Score		0.6	0.6	0.6	0.4	0.4
Firm Size (10%)		1	2	2	3	5
Score		0.1	0.2	0.2	0.3	0.5
Responsiveness of Service (30%)		4	3	3	2	2
Score		1.2	0.9	0.9	0.6	0.6
Total Utility Score		3.5	3.3	3.3	2.9	3.1
Segment Weight of Utility Score		1.1	1.0	1.0	0.9	0.9
Total Sources of Advantage Score						
Total SOA Score		3.1	3.0	3.0	3.2	3.0

The relative competitive analysis of DNA and its key competitors in the First Nations market segment resulted in DNA scoring second highest with a score of 3.1, 0.1 less than ODK the first highest scoring firm.

Sources of Cost Advantage:

DNA scored lowest with regards to cost advantage even though it scored highest in terms of relationships with clients and second highest in terms of relationships with sub-consultants. These high scores with respect to relationships are due to DNA's specialized focus on the First Nations market segment and the frequency in which it uses a small group of sub-consultants on the projects it delivers to ensure the sub-consultants maintain familiarity with DNA's clientele, further improving DNA's relationship with them. The overall low score in cost advantage is due to DNA's lack of formalization, which results in a low score in project management and utilization rates, which are weighed second and first respectively in terms of cost advantage.

In contrast, the larger firm ODK, though not receiving particularly high scores in relationships with clients and sub-consultants due to its lack of focus on the First Nations market segment, scored highly in terms of project management and utilization rates. The multiple markets the firm competes in allow it to spread projects in various sectors over its professional staff maintaining utilization through downturns in one particular segment. The firm's multiple locations also allows for distribution of workload over multiple offices, pooling resources, which also increases utilization rate. Its larger size as an organization also implies larger levels of formalization in terms of project management and delivery of services, having dedicated project managers that assign tasks and schedule the workload more effectively reducing costs associated with inefficiency. The same logic was applied to MCS the second largest firm. The other two firms being larger than DNA, but smaller than ODK and MCS, received median scores with respect to cost advantage.

To increase its score in terms of cost advantage DNA may wish to increase their formalization in terms of project management and review alternatives to maintain higher utilization rates, such as servicing new market segments or expanding the client base they service in the existing segments they compete. DNA should look to do this while continuing to maintain the levels of client and sub-consultant relationships they have however, as project management and utilization weighs higher, sacrificing some relationship management may be worth the advantages received by increasing utilization rates and project management scoring. Any changes to project delivery methods to increase utilization rates, and thus DNA's cost advantage score, should be reviewed in terms of effects it has in cost and utility advantages and utility advantages as these types of advantage are more important to firms than cost advantages based on the market segment weighting.

Sources of Cost & Utility Advantage:

DNA scored second highest with regards to cost and utility advantage primarily due to the experience it has at delivering First Nations' projects which provides the highest weight, and the scope of services it provides which is tied for second highest weighting. Even though DNA does not provide as many infrastructure related services as its competitors, it does provide building services including architecture and structural engineering, which allows the firm to coordinate all forms of First Nations' projects. DNA scored lowest in proximity to clients and projects as it only has the one office in North Vancouver while the competing firms have a minimum of three offices located in the region DNA competes and therefore all competing firms score similarly in the location advantages. MCS scored highest due to the size of the firm, and the fact that it has the highest amount of geographic locations.

To increase its score in terms of cost and utility advantage DNA may wish to increase the scope of services it offers as it is tied for the second highest weighting. DNA could also look to scale its operations to other geographic locations, such as the Island, Interior or North. As geographic expansion is costly in terms of client and staff searching cost, and operation start-up, the benefit of this option should be reviewed closely with DNA's key strategic goals and growth plans.

Sources of Utility Advantage:

DNA scored highest with regards to utility advantage, primarily due to the responsiveness of service associated with the company based on its knowledge of AANDC funding requirements and the focus the firm has on the market. KWL and USL scored second highest as they also focus strongly in this market, but lesser so than DNA. All three firms scored highest in complex projects as they are all recognised as delivering many forms of projects for First Nations clients where MCS and ODK, the larger firms, mainly compete within the segment to supplement workload when there are downturns in other segments and therefore may not have the experience in appropriate technologies utilised in First Nations communities. Their larger size also holds the lowest weight and therefore does not augment this fact.

To increase its score in terms of utility advantage, DNA may wish to increase their reputation in delivery of complex projects. They can potentially do this by aggressively marketing past successful complex projects or expand their scope of services to internally deliver more complex services such as water and sewage treatment specialization.

3.9.2.3 Private Development Market Segment Relative Competitive Analysis

Table 3.18 Private Developer Market Segment Relative Competitive Positions

	Firm:	DNA	USL	RFB	AMC	MCS
	Size:	Small	Med	Med	Med	Large
Sources of Cost Advantage Weight (50%)						
Relationship with Clients (25%)		3	3	3	2	1
Score		0.75	0.75	0.75	0.5	0.25
Relationships with Sub-consultants (5%)		3	3	3	2	1
Score		0.15	0.15	0.15	0.1	0.05
Project Management (30%)		3	3	3	4	5
Score		0.9	0.9	0.9	1.2	1.5
Utilization Rates (40%)		3	3	3	4	5
Score		1.2	1.2	1.2	1.6	2.0
Total Cost Score		3.0	3.0	3.0	3.4	3.8
Segment Weight of Cost Score		1.5	1.5	1.5	1.7	1.9
Sources of Cost & Utility Advantage Weight (20%)						
Service Sope (20%)		2	2	3	4	4
Score		0.4	0.4	0.6	0.8	0.8
Firm Experience (50%)		3	3	3	3	3
Score		1.5	1.5	1.5	1.5	1.5
Office Proximity to Client (10%)		3	3	4	3	4
Score		0.3	0.3	0.4	0.3	0.4
Office Proximity to Project (20%)		1	3	4	3	5
Score		0.2	0.6	0.8	0.6	1
Total Cost & Utility Score		2.4	2.8	3.3	3.2	3.7
Segment Weight of Cost & Utility Score		0.5	0.6	0.7	0.6	0.7
Sources of Utility Advantage Weight (30%)						
Reputation for Design Reliability (30%)		4	4	4	4	4
Score		1.2	1.2	1.2	1.2	1.2
Reputation for Complex Projects (5%)		3	3	3	3	3
Score		0.15	0.15	0.15	0.15	0.15
Firm Size (10%)		1	2	2	2	2
Score		0.1	0.2	0.2	0.2	0.2
Responsiveness of Service (55%)		5	3	3	3	3
Score		2.75	1.65	1.65	1.65	1.65
Total Utility Score		4.2	3.2	3.2	3.2	3.2
Segment Weight of Utility Score		1.3	1.0	1.0	1.0	1.0
Total Sources of Advantage Score						
Total SOA Score		3.2	3.0	3.1	3.3	3.6

The relative competitive analysis of DNA and its key competitors in the private development market segment resulted in DNA scoring third highest with a score of 3.2, 0.4 less than MCS the first highest scoring firm.

Sources of Cost Advantage:

DNA scored lowest, tied with USL and RFB, with regards to cost advantage. However, DNA has scored better in cost advantage in this market segment verse the First Nations market segment. The better scoring is contributed to the more streamlined project delivery method of the segment and the different project management approach DNA employs in delivering the services; these include delegating tasks and budgets to team members and specifying hard deadlines for delivery. DNA is tied for first with USL and RFB in scoring highest in terms of relationships with clients and relationships with sub-consultants. Client relationship is rated high for these firms as they are the primary markets in which the firms focus and therefore the professional staff in these firms are viewed to focus on maintaining and developing these relationships. The lower relationship scoring in the larger firms is due to the diversity in many market segments they service. The same factors identified in the First Nations market segment result in the larger firms AMC and MCS scoring lower in relationship and higher in utilization rates and project management.

As was the case in the First Nations market segment, to increase DNA's score in terms of cost advantage, DNA may wish to review alternatives to provide higher utilization rates, such as servicing new market segments or expanding the client base they service in the existing segments they compete. Though the delivery of services in this segment is more formalised, DNA may also wish to evaluate the method of project delivery to find efficiencies to improve the its score in project management.

Sources of Cost & Utility Advantage:

DNA scored second lowest with regards to cost and utility advantage primarily due to its lower proximity to projects compared to the other firms and the fewer services it provides. Each firm scored similarly in proximity to clients as the general concentration of customers in the segment that DNA competes for are located in the Lower Mainland, and most firms only have one office within that area with the exception of RFB and MCS who operate two and therefore received higher scores. Their greater geographic scope also scored them higher in proximity to projects as private developers situated within the lower mainland often develop in other geographic regions. Based on these factors MCS, being the largest firm with the most services and locations, scored highest in sources of cost and utility advantage.

As was the case with the First Nations market segment to increase its competitiveness in terms of cost and utility advantage DNA could increase the scope of services it offers. It could also look to increase its experience in the segment, providing greater specialisation in this segment as it is the most heavily weighted source of advantage. Again, increasing geographic scale to be closer to projects and clients could also improve the firm's scoring; however, as previously discussed this option would be costly in terms of time and financial resources.

Sources of Utility Advantage:

DNA scored highest with regards to utility advantage, primarily due to its score with respect to responsiveness of service which is weighed the highest. DNA's strategic position of providing superior service to this specific customer segment, specifically meeting their primary weighting criteria for selection of a consultant allows it to gain workload and advantage over other competitors. The high score is based on positive reports from DNA clients with regards to the firm's responsiveness when compared to others they have used. The other firms all scored the same with regards to responsiveness of services based on the before mentioned client reports and the firms' focus on multiple market segments

All firms scored the same in complex projects as firms competing in the market are seen to be capable of delivering the services required by the customer segment, as they are generally not complex. DNA scored lowest in terms of size, for the reasons described in the First Nations market segment. It should be noted that though a large firm, MCS scores the same as the medium sized firms as office size from location to location is comparable to the medium sized firms.

To increase its score in terms of utility advantage, DNA may wish to increase their size; however, the costs to expand the office or open another location may not be advantageous especially since size is weighed least in the private development market segment.

3.9.2.4 Federal/Provincial Government Market Segment Relative Competitive Analysis

Table 3.19 Federal/Provincial Government Market Segment Relative Competitive Positions

	Firm:	DNA	RFB	MCS	ODK	AE
	Size:	Small	Med	Large	Mega	Mega
Sources of Cost Advantage Weight (20%)						
Relationship with Clients (25%)		2	4	3	3	4
Score		0.5	1	0.75	0.75	1
Relationships with Sub-consultants (5%)		4	3	3	2	1
Score		0.2	0.15	0.15	0.1	0.05
Project Management (30%)		3	5	4	4	5
Score		0.9	1.5	1.2	1.2	1.5
Utilization Rates (40%)		3	4	3	4	5
Score		1.2	1.6	1.2	1.6	2.0
Total Cost Score		2.8	4.3	3.3	3.7	4.6
Segment Weight of Cost Score		0.6	0.9	0.7	0.7	0.9
Sources of Cost & Utility Advantage Weight (30%)						
Service Sope (20%)		3	4	4	4	5
Score		0.6	0.8	0.8	0.8	1
Firm Experience (50%)		2	4	4	4	4
Score		1	2	2	2	2
Office Proximity to Client (10%)		1	3	3	4	4
Score		0.1	0.3	0.3	0.4	0.4
Office Proximity to Project (20%)		1	3	3	5	5
Score		0.2	0.6	0.6	1	1
Total Cost & Utility Score		1.9	3.7	3.7	4.2	4.4
Segment Weight of Cost & Utility Score		0.6	1.1	1.1	1.3	1.3
Sources of Utility Advantage Weight (50%)						
Reputation for Design Reliability (55%)		4	4	4	4	4
Score		2.2	2.2	2.2	2.2	2.2
Reputation for Complex Projects (20%)		2	4	4	5	5
Score		0.4	0.8	0.8	1	1
Firm Size (15%)		1	3	4	5	5
Score		0.15	0.45	0.6	0.75	0.75
Responsiveness of Service (10%)		3	4	3	3	3
Score		0.3	0.4	0.3	0.3	0.3
Total Utility Score		3.1	3.9	3.9	4.3	4.3
Segment Weight of Utility Score		1.5	1.9	2.0	2.1	2.1
Total Sources of Advantage Score						
Total SOA Score		2.7	3.9	3.7	4.1	4.4

The relative competitive analysis of DNA and its key competitors in the federal/provincial government market segment resulted in DNA scoring lowest with a score of 2.7, 1.7 less than AE the first highest scoring firm and 1.0 less than second lowest scoring firm. The low scoring of DNA is primarily attributed to the limited work completed in the market segment to date.

Sources of Cost Advantage:

DNA scored lowest with regards to cost advantage. As DNA does not compete in this market segment frequently the firm scored low with regards to customer relationships. To attain workload in this market sector DNA has higher searching costs than its competitors have, and therefore scored the lowest. RFB and AE scored highest in the relationship with client advantage due to the perceived large amount of projects they complete in this market segment. DNA scored highest in relationships with sub-consultants for the reasons previously discussed in the First Nations market segment. As RFB's perceived main customer group focus is MoT they have a companywide management method for the delivery of government projects and therefore scored highest in project management along with AE based on their size and level of formalization as was discussed in the previous market segment positions. Though ODK is a mega firm they complete less government projects than AE the other mega firm and therefore scored lower than them AE and the same as the large firm MCS. As MCS primarily delivers government projects in the north region, and it is smaller, they scored lower than AE in terms of utilization rates.

To increase DNA's score in cost advantage DNA would need to dedicate time and cost resources to increase client relationships, develop project workload, and an effective project delivery/management system. Corporately DNA would have to determine that expansion into this sector would be worth the costs, and that DNA would be able to capture enough market share from its competitors to cover those costs and more importantly increase company profitability.

Sources of Cost & Utility Advantage:

DNA scored second lowest with regards to cost and utility advantage. This low score is primarily contributed to DNA's limited firm experience in the delivery of projects in this segment which is weighed the highest at 50 percent. DNA also scored lowest in terms of proximity to projects, and customers, as federal/provincial government projects and offices are located throughout BC and DNA only has the single office in North Vancouver. AE scored the highest in cost and utility advantage due to the multitude of offices it has throughout BC and the larger scope of services it provides.

To increase its score in cost and utility advantage DNA would have to consider aggressively marketing and expanding into the segment to develop more experience, which is, weighed the highest.

The option of expanding geographically in conjunction with the more focused approach of workload acquisition could also be done to further increase the company's score. Both of these options however are costly in terms of time and money resources.

Sources of Utility Advantage:

DNA scored lowest with regards to utility advantage, primarily due to its low reputation for complex projects in the sector, which is the second highest weighted source of utility advantage. The competing firms scored a minimum of 2 points higher than DNA do to their more active delivery of services in this segment with ODK and AE scoring highest due to the size of the firms and the correlation that it has with delivery of more complex projects. All firms scored the same in terms of responsiveness of services with the exception of RFB, which scored a point higher due to the focus they have on the segment. DNA scored lowest in terms of size, for the reasons described in the previous market segment positions.

To increase its score in terms of utility advantage, DNA would need to develop a higher reputation for complex projects. To reduce costs this could be done by pursuing more complex projects within the existing market segments the firm competes in so as to limit time and cost to develop the reputation and the contacts required to secure them in a market segment they do not actively compete. The option of increasing their size in conjunction with this could also be considered; however, the costs associated with this may make this option not feasible.

3.9.2.5 Municipal Government Market Segment Relative Competitive Analysis

Table 3.20 Municipal Government Market Segment Relative Competitive Positions

	Firm:	DNA	USL	RFB	AMC	MCS
	Size:	Small	Med	Med	Med	Large
Sources of Cost Advantage Weight (20%)						
Relationship with Clients (25%)		3	3	3	3	3
Score		0.75	0.75	0.75	0.75	0.75
Relationships with Sub-consultants (5%)		3	3	3	2	1
Score		0.15	0.15	0.15	0.1	0.05
Project Management (30%)		3	3	3	4	5
Score		0.9	0.9	0.9	1.2	1.5
Utilization Rates (40%)		3	3	3	4	5
Score		1.2	1.2	1.2	1.6	2.0
Total Cost Score		3.0	3.0	3.0	3.7	4.3
Segment Weight of Cost Score		0.6	0.6	0.6	0.7	0.9
Sources of Cost & Utility Advantage Weight (30%)						
Service Sope (20%)		2	2	3	4	4
Score		0.4	0.4	0.6	0.8	0.8
Firm Experience (50%)		3	3	3	3	3
Score		1.5	1.5	1.5	1.5	1.5
Office Proximity to Client (10%)		3	3	4	3	4
Score		0.3	0.3	0.4	0.3	0.4
Office Proximity to Project (20%)		2	3	3	3	3
Score		0.4	0.6	0.6	0.6	0.6
Total Cost & Utility Score		2.6	2.8	3.1	3.2	3.3
Segment Weight of Cost & Utility Score		0.8	0.8	0.9	1.0	1.0
Sources of Utility Advantage Weight (50%)						
Reputation for Design Reliability (55%)		4	4	4	4	4
Score		2.2	2.2	2.2	2.2	2.2
Reputation for Complex Projects (15%)		3	3	3	4	4
Score		0.45	0.45	0.45	0.6	0.6
Firm Size (15%)		1	2	2	2	2
Score		0.15	0.3	0.3	0.3	0.3
Responsiveness of Service (15%)		3	3	3	3	3
Score		0.45	0.45	0.45	0.45	0.45
Total Utility Score		3.3	3.4	3.4	3.6	3.6
Segment Weight of Utility Score		1.6	1.7	1.7	1.8	1.8
Total Sources of Advantage Score						
Total SOA Score		3.0	3.1	3.2	3.5	3.6

The relative competitive analysis of DNA and its key competitors in the municipal government market segment resulted in DNA scoring lowest with a score of 3.0. Like the previously discussed federal/provincial market segment, DNA does not actively compete in this market segment. However, unlike the federal/provincial market segment DNA scored much closer to the key competitors. DNA scored 0.6 less than highest scoring firm MCS in comparison to 1.7 below in the federal/provincial government segment and only 0.1 below USL the second lowest firm in comparison to 1.0 below in the federal/provincial government segment.

Sources of Cost Advantage:

DNA scored lowest, tied with USL and RFB, with regards to cost advantage, 0.2 points higher than in the federal/provincial market segment due to the relationships the company has gained with various municipal governments while competing in the private development market segment. All firms scored the same in terms of relationships with clients due to them all having worked in and developed a similar level of relationship with municipalities. DNA is tied for first with USL and RFB in scoring highest in terms of relationships with sub-consultants. The same factors identified in the First Nations market segment result in the larger firms AMC and MCS scoring lower in relationship with sub-consultants and higher in utilization rates and project management.

As was the case in the First Nations market segment, to increase DNA's score in terms of cost advantage, DNA may wish review alternatives to provide higher utilization rates, such as servicing new market segments or expanding the client base they service in the existing segments they compete.

Sources of Cost & Utility Advantage:

DNA scored lowest with regards to cost and utility advantage primarily due to its lower proximity to projects compared to the other firms and the fewer services it provides. Each firm scored similarly in proximity to clients as the general concentration of municipal customer projects that DNA would compete for are located in the Lower Mainland, and most firms only have one office within that area with the exception of RFB and MCS who operate two and therefore received higher scores. DNA scored lowest in terms of proximity to projects as they again only have one office, and being North Vancouver is not as centrally located as the other firms who all scored the same in terms of proximity to projects.

As was the case with the First Nations market segment for DNA to increase its competitiveness in terms of cost and utility advantage DNA could increase the scope of services it offers as it currently scores the lowest in this area. It could also look to increase its experience in the segment, providing greater specialisation in this segment as it is the most heavily weighted source of advantage, and though

it does not currently compete in this segment DNA possesses adequate experience to deliver the projects. As there is only a slight advantage to having additional offices in the proximity to clients and the projects the option of expansion to another location would not justify the costs.

Sources of Utility Advantage:

DNA scored lowest with regards to utility advantage, but only 0.1 point less than three other firms and 0.2 points less than the highest scoring firms AE and MCS. DNA's lower score with respect to the three next firms is due to the firm size. As mentioned previously, as most firms only have one or two offices in the area that DNA competes, with relatively similar numbers of professional staff, all four key competitors scored the same with respect to firm size. As AE and MCS complete numerous complex projects they received the highest score in this area and subsequently the highest score for utility advantage. With respect to responsiveness of service all firms scored the same as no one firm focuses on this segment. DNA scored the same as the others as it has the ability to be equally competitive with the other firms currently servicing this segment due to the comparable project delivery methods of private segment projects. DNA has been scored less than it was in responsiveness in First Nations and Private Development segments, (four and five respectively), because the municipal government segment weighs this advantage at only 15 percent which is much less than the 30 percent weight carried in the First Nations segment and the 55 percent weight carried in the private development segment. As such, it is anticipated that DNA's delivery of service to this segment would be slower and subsequently the three score was given.

To increase its score in terms of utility advantage, DNA could increase their size, or expand into the new market segment and focus heavily on it increasing its responsiveness of service. However, these two options may not be advantageous especially since size and responsiveness are weighted least in the municipal government market segment and the fact that costs associated with expansion of size and dedication to a completely new market segment are high.

3.10 Relative Competitive Analysis Summary & Conclusion

In terms of DNA's competitiveness in the industry with respect to the four market segments, DNA scored third highest out of the five key competitors in the private development and First Nations market segments that it currently competes. DNA scored lowest in both the federal/provincial government market segment and the municipal government segment where it does not actively compete. However, the competitive analysis identifies that DNA is much more competitive in the municipal segment. This higher degree of competitiveness is due to the similarity in service delivery to that of the private development segment in which the firm currently competes.

Based on review of the scoring in all segments, to improve its competitiveness, DNA could consider the following adjustments:

Source of Cost Advantage:

- Increase formalization to increase efficiency in delivery of projects
- Expand in current market segments to increase workload and subsequently utilization rates of its professional staff
- Expand into new market segments to increase workload and subsequently utilization rates of its professional staff

Sources of Cost & Utility Advantage:

- Increase scope of service offered
- Expand to new geographic locations to increase proximity to clients and projects

Sources of Utility Advantage:

- Focus efforts on procuring more complex projects to increase its reputation in delivering those projects
- Increase the size of the firm (number of professional staff)

The following Section 4 Strategic Alternatives will identify potential strategic alternatives for DNA to implement to achieve the key goals of the firm. The alternatives are based the industry threats and opportunities identified in Table 3.11 Industry Opportunities and Threats Summary and the options identified in the relative competitive analysis to improve its competitiveness in the market

4: Strategic Alternatives

4.1 Identified Alternatives

Based on the industry external analysis, the strengths and weakness of the organisation, and the relative competitiveness analysis, the following alternatives are presented to potentially improve DNA's position in the market. Each alternative is reviewed initially for fundamental feasibility with the organisation's key goals: if an alternative does not fit at the fundamental level it is abandoned, if it does then it will be examined further including potential implementation requirements and apparent benefits to the company. The main corporate goal of the firm is to increase profitability. The key strategic goals to do this, as illustrated in Figure 2.1 DNA Current Strategic Position, against which the fundamental feasibility of the alternative will be reviewed, include:

- Professional Staff Billability > 75 percent
- Maintain Minimum 14 Professional Staff
- Maximize Office Staff Capacity with Sustained Workload
- Limit Operation to Current Location

The alternatives have been separated into two main categories, those being where in the market DNA should focus its business development in to increase workload, and how internally DNA can change to be more competitive. Internal changes that allow for increased workflow efficiencies will allow projects to be completed sooner allowing resources to be utilised to develop or to work on additional workload. Increased workflow efficiencies will also result in the firm becoming more cost competitive, which can help develop the additional workload required to meet the key goals of the firm. Internal changes such as increases in service scope may also provide additional workload to meet the firm's key goals.

4.1.1 Where to Focus Workload Development

4.1.1.1 Alternative 1 – Narrow Market Segment Scope to Focus on Single Market Segment

DNA has successfully competed in the First Nations market segment for 40 years. DNA has relied on existing and new clients within the segment to provide the majority of the company's workload

throughout all business units. The use of its multi disciplines to promote work throughout each of the company's departments has helped to solidify working relationships with its First Nations clientele leading to high instances of repeat business. In addition to the First Nations segment, over the last five years DNA has developed valuable customer relationships in the private development market segment. Service to this segment now provides approximately 35 percent of DNA's workload.

Implementing this alternative would mean reducing the degree of service provided to either the First Nations segment or to the private development segment so adequate manpower can be assigned to focus workload development in only one segment. As workload development takes time, narrowing DNA's market scope to a single segment would result in a decline in workload, reduction of billability of professional staff, and reduction in revenue and subsequently profitability. The only way that this would not be the case is if there is a strong indication that DNA can develop the lost workload of the abandoned segment by focusing on only one, which is unlikely. For these reasons this alternative does not meet the key goals of the firm and therefore will not be examined further.

4.1.1.2 Alternative 2 - Expansion of Current First Nations & Private Development Market Segments

Expansion into both the First Nations market segment and the private development market segment would provide the firm the opportunity of increasing its workload while continuing to maintain two forms of revenue streams reducing its vulnerability to a decline in one should the firm only focus on that one. Focusing on the growth of two or more segments allows the firm to be more adaptable and efficient at switching its focus to the market segment that is growing more rapidly in the cyclical industry it operates. This adaptability will better help to maintain the billability of the firm's professional staff and subsequently the firm's profitability.

First Nations Expansion:

Even though federal spending has declined, and priorities have shifted at AANDC to funding of mainly high priority water projects, there are still opportunities within the market segment to capitalise on, these opportunities include:

- Under serviced clients by competitors
- Clients with little knowledge of the funding requirements for capital projects
- Clients whose projects have a high priority or potential for a high priority ranking at AANDC but without the capacity to initiate them

- First Nations with block funding (access to large amount of capital to be used at their discretion)
- Increase scope of services to deliver more services on a project by project basis to maximise revenues on projects

The key to expanding in this market is identifying the information that will allow DNA to determine what potential projects are with each First Nations, what priority ranking AANDC has given each project and which potential First Nations clients currently do not have a civil engineering consultant or are being under serviced by their current consultant.

To determine what available potential projects are with each potential First Nations, DNA should review the Assets and Capital Reporting System (ACRS) assessments for potential First Nations clients. First Nations' capital assets include buildings and infrastructure on the First Nations' reserves. ACRS assessments are reports prepared for the First Nations by an engineering firm that reviews the various capital assets of each First Nations and reports on the condition of the assets, deficiencies in them, and requirements for upgrades including potential new infrastructure projects. The gathering and review of the various ACRS assessments from First Nations that are not currently clients of DNA can allow DNA to determine potential projects with each potential client. Knowing the types of potential projects each First Nations will allow DNA to prioritise focus on those projects and clients that have a high potential for funding by AANDC.

AANDC ranks First Nations' projects submitted for funding request in order of priority for each fiscal funding year (April 1 to March 31). Determining which current and potential First Nations' projects are high on this list would allow DNA to better prioritise time towards which clients to attempt to acquire and which current client projects the firm should focus its time on to move through the AANDC funding system. To do this DNA should look to leverage relationships with AANDC staff and with DNA's current client base to access the list or at a minimum determine which First Nations with high priority projects do not have an engaged civil engineering firm or have an underperforming civil engineering firm associated with them (underserviced First Nations clients).

To acquire potential new clients DNA will have to again, leverage existing First Nations, AANDC and other relationships for recommendations to those First Nations with identified high priority projects. DNA will have to determine the current level of service the potential First Nations are receiving to determine how feasible it will be to acquire them. Those First Nations without a clear civil engineering consultant should be pursued rigorously, followed by those with underperforming

consultants. Attempts to acquire First Nations with adequately performing consultants should be abandoned.

Private Development Expansion:

As discussed in Section 3.3.3 Relative Size & Growth of Segments and as illustrated Figure 3.2 2006 - November 2011 Relative Segment Growth in Terms of Building Permit Value, the private development market segment has been growing since the recession. DNA's provision of services to the private development segment has been unfocussed with only one project manager/engineer developing the client base and workload associated with it. Furthermore, as discussed in Section 3.3.4 Customer Preferences and indicated in Table 3.6 Customer Weighted Selection Criteria, private developer customers prioritise the cost of services highest followed by schedule, then relationship and lastly experience. This growth in the industry; customer buying traits; and unfocussed efforts to date on the part of DNA to compete in this segment provides opportunities in the private development market segment including:

- New customer entrants into the market segment
- Under serviced customers by competitors
- Ability to aggressively compete on cost for customers in the segment
- Current limited knowledge of DNA's provision of services to the market segment

To be successful at expanding its workload in the private development market segment DNA will have to compete on cost as well as continue to provide superior customer service throughout the growth. DNA will also have to successfully market the firm's ability to do so to new customers to have opportunities to compete for projects.

To compete better on costs, DNA will need to review in detail how its billable rates compare to its competitors in the market. DNA can attempt to determine this by:

- Discussing DNA billable rates compared to other consultants with current clients
- Reviewing public record proposals for municipal RFPs as services are similar
- Discussing billable rates with direct competitors or with engineers that were past employees of competitors

Once DNA has established what rates or what range of rates are competitive, DNA will have to determine what the company can afford in terms of adjusting its current billable rates. The result may be ranges in rates for different levels of professional staff that are applied on a project-by-project basis

depending on how aggressively the company wants to obtain the specific project. Acceptable minimum limits of profitability would have to be determined at a corporate level and applied to each project the firm is competing for.

As only a small percentage of current staff operate in this segment non-billable time or reductions in billability would be expected for knowledge sharing/training of current and new staff. The costs associated with training existing or new staff to deliver private development service would include opportunity costs of not developing work in other segments and opportunity costs associated with the non-billable time of the professional staff involved in the training. However, the result of increased staff proficient with delivery of private development services, that the training would provide, would help to maintain the superior customer service DNA currently offers its clients and allow DNA to effectively increase its workload in this segment. This would also maintain or grow DNA's reputational capital in this segment allowing DNA to better compete in the market segment.

As RFPs for private development projects are not public and often only presented to firms that the individual private developer is already familiar with, DNA will have to market its service provision to potential customers in this segment. To effectively focus its efforts on developing new relationships with key customers in the market segment DNA can:

- Develop private segment marketing information including specific project information sheets, a company profile focused on private development services and references for services rendered
- Develop list of existing customers in market segment
- Leverage existing relationships in the industry (current clients, municipal government contacts, contractors, material suppliers) for introductions to decision makers at potential customer companies
- Produce construction site signage to market DNA's current involvements in private development projects in the areas it currently operates

The provision of services to the private development segment has been unfocussed with only one project manager/engineer developing the client base and workload associated with it. To expand the segment DNA needs to dedicate more time to developing marketing material and establishing relationships with key customers within the segment.

Internal Policy, Structure and Cultural Change Requirements for Expansion:

- New hires to facilitate growth in multiple segments

- Develop specific teams or groups that are responsible for each segment
- Develop variable billable rates for each employ that differ based on the type of segment the firm is completing in or size of project the firm is competing for
- Develop specific profit or acceptable benchmark billability for managers and technicians working in each segment
- Develop segment specific project delivery methods including management, reporting, and success/failure measures
- Allow for cross segment training to allow for better manpower shift from one segment to the next in the event of downturns in a specific segment (flexibility of staff)
- Allow for additional non-billable time to acquire new customers and projects and develop the marketing and promotional material to adequately expand the market segments

4.1.2 Alternative 3 - Focus Expansion of Workload in New Municipal Government Market Segment

Of the two market segments that DNA does not actively compete in (federal/provincial government and municipal government) analysed in Section 3.9 Relative Competitive Analysis, DNA scored higher in the municipal government segment. This alternative proposes to focus attention to aggressively expanding into the municipal government market segment to develop additional workload.

To date DNA has little experience in provision of services to the municipal government market segment; however, the design and delivery process is similar to that of the private development market segment. As most private development projects are located within municipal government jurisdictions, the delivery of services for those projects must follow the bylaws and standards of the municipalities. Having delivered services for private clients in a number of municipalities, DNA staff has the knowledge base to successfully deliver services to this segment.

With the knowledge base to produce the deliverables required for the municipal government market segment the main hurdle to expansion into this segment would be qualifying and winning RFPs offered by the various municipal governments. To provide the highest opportunity of success in expanding into the municipal government segment DNA would need to take the following steps:

- Develop project worksheets and company resume to establish sufficient reputational capital in delivery of municipal government projects

- Qualifying as an accepted engineering firm to respond to RFPs in each municipality DNA wishes to compete in
- Develop a standardised framework for responding to municipal government RFPs that can be relatively easily adapted and customised to specific municipal RFPs
- Align billable rates to those of key competitors to be cost competitive
- Leverage relationships gained through private segment work to be shortlisted for RFPs (often RFPs are only submitted to three prequalifying firms)
- Utilise gained skills in delivery of private segment work and develop a formalized structure for municipal government project delivery

The benefits of expanding to the municipal government market segment while continuing to compete in DNA's existing market segments include:

- Adds an additional revenue stream
- Can expand into the municipal government segment in conjunction with expansion of the private development segment as the delivery of services are complimentary

4.1.3 Alternative 4 - Expansion of First Nations & Private Development Market Segments & Expand to New Municipal Government Segment

This alternative is a combination of Alternative 2 - Expansion of Current First Nations and Private Development Market Segments and Alternative 3 - Focus Expansion of Workload in New Municipal Government Market Segment. Based on the discussion in Alternative 3, delivery of services to the municipal government market segment is similar to that of private development. Therefore, this alternative proposes expansion into the new municipal government market segment in conjunction with the expansion of the private development market segment, as the same marketing and qualifying materials could be used in addition to the project delivery methods (one delivery and management structure for the two segments).

Additional lost opportunity costs would arise due to the added professional staff time required to pursue the avenues required to potentially secure projects (identified in Alternative 3), however the potential for an additional added revenue stream should make up for the upfront and ongoing costs to develop the segment in conjunction with the other two.

4.1.4 How to Improve Competitiveness

4.1.4.1 Alternative 5 – Geographic & Location Expansion

As identified in Section 3.9.2 Relative Position of Competitors in Relation to DNA, sources of advantage that key competitors have that DNA lacks is that of location. As discussed in Section 2.1.3 Size and Geographic Scope, though DNA has operated out of multiple offices at different times in its history, the staffing at those offices have been low and the majority of its services have been offered out of the one location in North Vancouver.

Based on DNA's key goal and management preference of operating out of the one North Vancouver location and that this is the most costly alternative in terms of financial resources to increase workload, Alternative 1 - Geographic and Location Expansion will not be examined further.

4.1.4.2 Alternative 6 - Increase Operational Efficiencies

Even though expansion of workload in current or new segments will require adjustments in formalisation to allow for better more efficient expansion, this option proposes focusing internally on operational efficiency in a more intense and comprehensive way and not allocating resources to workload development.

As identified in Section 3.9.2 Relative Position of Competitors in Relation to DNA, a key source of cost and utility advantage is the efficiency at which services are delivered. One factor in improving efficiencies is having a formal set of delivery methods for each market segment the firm competes in that maximises professional staff's billable time and minimises time of delivery. This will allow for increased profitability as well as the ability of the firm to support an increase in workload.

As discussed in Section 2.3.1 Formalisation, DNA's current level of formalisation is low. Generally, project responsible engineers utilise staff on an availability basis to deliver projects. The number and priority of projects currently being worked on in the firm is unknown by the department heads and managing staff. Workload is not prioritised, and project milestones and final delivery schedules are often unclear even between those staff members on the project team.

Developing a more formal structure for overall department operations along with a formal delivery methodology specific to each market segment the firm competes in could provide increased workflow efficiencies and subsequently company profitability.

Department Structure and Formalization:

With respect to increasing the department's overall operational formality DNA could implement the following formal structures and policies:

- Define corporate reporting/communication channels
- Define project reporting/communication channels
- Company or departmental wide formats for standard documents including, proposals, letters, memos, emails, construction documentation (change orders, site instructions, field reviews etc.)
- Set policy on project deliverables review and project proposal review by senior staff (possibly senior partners) to ensure quality and accuracy of deliverables, gain understanding of project workload, and identify possible opportunities or threats
- Scheduled department meetings of managers to update on booked workload
- Prioritise booked workload and coordination of efforts to deliver
- Set monthly profitability or revenue targets
- Update and distribute to managers monthly revenue reports to determine if revenue targets are being met
- Set firm revenue collection period and provide incentives for managers to collect
- Set department goals and strategies for acquisition of new clients

Project Delivery Structure and Formalization:

With respect to delivery of projects within each sector, the development of a more formal structure for delivery can allow for increased efficiencies due to the repetition in service provision, providing the project team a clear understanding of project requirements and milestones, accuracy in tracking budgets, and organisation of the following:

- Assignment of project by department head to project manager
- Formal project start-up meetings outlining the history of the project, the client, the required deliverables, the overall budget, and the timeframe in which the project has to be delivered

- Assigning of specific tasks, time to complete and budget to complete in to specific projects members and assigning ownership of meeting those target schedules and budgets
- Produce a project summary sheet with owner information, sub consultant information complete with budgets and required schedules for completion of their work, and internal project team members and specific responsibilities and milestones for completion
- Produce a project deliverable worksheet that lists all deliverables need to be produced, how many and to where they need to be submitted (client, review agent or office copies)
- Weekly project meetings to update progress (informal if required)
- Peer review protocol
- Final deliverable review protocol (by senior manager or senior partners)
- Project wrap-up meeting identifying what went right, what went wrong, where efficiencies could have been made and learning points that could be applied to future projects

Increasing efficiency also includes reduction of non-billable time that does not produce workload such as sick time as well as reduction in non-productive billed hours to projects (erroneous billing to projects). These two instances of inefficiency are generally related to agent principal problems, specifically how to accurately monitor that employees are billing their time honestly. As continual monitoring of every employee would be unproductive and costly, effectively promoting honest billing of time requires delegation of budget responsibility and specific incentives. Potential policies that DNA can implement to reduce non-productive hours include:

- Assign specific tasks and budgets to each project team member and make them responsible for meeting the schedule and budget targets
- Discourage or not allow overbilling to project tasks, with incentives offered for finishing on or below budget and penalties for finishing over (could be related to yearly bonus, raises and or promotions)
- Policies on max number of paid sick time, overages could be unpaid or discounts employee's potential bonus.
- Project by project feedback on performance of each project team member's strengths and weakness in performance of project tasks and production of project deliverables,

including offer praises where due and constructive criticism and training or instruction in areas where they underperformed

- Managers note time when employees are observed not working when known tasks have been assigned to them for future discussion at project member feedback meetings

It should be noted that there could be backlash due to apparent increase in policing and a less trusting work atmosphere. However, by placing the responsibility in the staffs hands, and involving them more in the overall project management it is anticipated that they will have a sense of ownership of the success of the project and work harder towards delivering it within the expectations of the firm.

4.1.4.3 Alternative 7 - Increase Scope of Services Offered

Increasing the scope of services DNA offers would maximise the revenues generated on secured projects as well as provide additional cost and utility advantage to the firm by increasing its reputational capital as a one stop shop and or a firm with a wide range of services to meet most if not all customer needs. The addition of one or a variety of professional services would require changes in the liability insurance the firm carries. Potential additional services that DNA could offer customers include:

- Highway design personnel
- Legal survey
- Water and sewer treatment specialists
- Hydrogeological engineering
- Electrical engineering
- Mechanical engineering
- Geotechnical engineering
- Environmental engineering or biologists

Though increasing the scope of service offered to its customers is a means of increasing utility and cost advantage for the firm, there are varying degrees of risks associated with each potential service. The following table summarises the various risks and the observed level of risk associated with each of the potential additional services along with the observed potential for additional revenue:

Table 4.1 Observed Risks & Degree of Risk Associated With Potential Additional Services

Potential Additional Service	Cost to Adopt	Risk of Liability	Utilization Risk	Reputation Time	Potential Revenues
Highway Design Engineer	Low	Low	High	High	Med-High
Legal Survey	Med	Low	Low	low	Low
Water/Sanitary Sewer Treatment Specialist	Med	Med-High	Med	High	Med
Hydrogeological Engineering	Med	High	Med	High	High
Electrical Engineering	Low	Med	Low	Low	Med
Mechanical Engineering	Low	Med	Low	Low	Med
Geotechnical Engineering	Low	High	High	Med	Med
Environmental Engineer/Biologist	Low	Med-High	Low	High	Low-Med

Highway Design Engineer:

Though DNA does some highway design with the various projects it procures through its existing market segments, the firm does not specialise in MoT highway design. Provision of highway design services would require the hiring of one or more engineers proficient in this service as well as hiring or training drafting technicians to produce the necessary design drawings. As the type of service is similar to the roads DNA currently designs, and there are specific design guidelines and criteria to design highways, there is little liability risk when compared to those services currently offered by DNA. The utilization risk is high as DNA does not currently compete in this segment and therefore unless aggressively expanded into DNA would not have sufficient workload to keep the professional staff at an acceptable utilization. The time to build a reputation with the government to deliver these projects is high as past performance is generally required to get qualified to submit RFPs for these projects. Should the reputation be developed then the potential revenues are medium to high granted sufficient workload and utilization is realised.

Legal Survey:

Legal surveys are required for all private development land rezoning and subdivisions and for identifying legal boundaries of municipal and government lands and rights of ways (ROW). The delivery of legal surveying services requires a registered British Columbia Land Surveyor (BCLS), and the instrumentation associated with topographic surveying. To perform legal survey's at least one member of the consulting firm must be a registered BCLS with a minimum 51 percent ownership of the firm. As such, to deliver this service, DNA would need to acquire or start a separate company that provides these services with DNA as a 49 percent owner. Due to the above, the cost to adapt the service is rated as medium. The risk of liability, utilisation risk, reputation time are all low as DNA currently delivers topographic survey services, the staff hired would be used regularly on projects, and an already

reputable BCLS would be required to adopt delivery of the service. Potential revenues are ranked low as the revenues for this service are low compared to existing services delivered by DNA.

Water/Sanitary Treatment Specialist:

Water/sanitary treatment specialists are specialised civil engineers. Provision of specialized water/sanitary treatment services would require the hiring of one or more treatment specialist. As specialists generally demand higher wages and either own their own specialty engineering firms, or are members of other competing firms in the market, the cost to adopt this service is rated as medium. Generally the liability associated with these designs is similar or greater than the services currently provided by DNA based on the fact that they often deal with systems that allow for adequate treatment of contaminated drinking water or the treatment of sanitary waste that is discharged to environmentally sensitive areas. Though DNA does deliver projects with water/sanitary treatment systems utilization risk has been rated as medium as these projects only represent a portion of the projects and there may be some time for the firm to develop an appropriate level of these projects to keep the specialty staff adequately utilized. Unless the specialists acquired carry a strong reputation in the industry, and have an immediate association with DNA, the time for the firm's reputation to develop for this service is high based on the requirement of successfully procuring and delivering high profile projects associated with treatment. As treatment design is complicated the fees to deliver them can be high, however the low volume of projects and relatively low staff level delivering them results in only a medium rating for potential revenues.

Hydrogeological Engineering:

Hydrogeological engineers are specialised civil engineers. Provision of hydrogeological engineering includes locating groundwater and confirming the quantity available and the quality. As it is a form of specialisation of civil engineering it is similar to water/sanitary treatment specialists in terms of its ratings. The only notable difference is with respect to liability. It can carry a higher liability due to costs associated with not identifying adequate sites to develop groundwater on, and risks associated with errors in quality measurements of groundwater.

Electrical Engineering:

Electrical engineers provide electrical system designs associated with infrastructure systems and buildings. Provision of these services would require hiring of professional staff registered with APEG for the design of these services and therefore the cost to adopt this service is low. As electrical systems are often complex and can lead to fire and loss of property and or life the risk of liability has been rated medium. As most infrastructure projects delivered by DNA require electrical engineers the utilization

risk is rated as low. Regulations and bylaws concerning design of electrical systems are relatively standard and therefore reputation time for this service has been rated low. Though fees associated with most infrastructure projects are relatively low compared to other services, the opportunity for the electrical professional staff working with the building department to deliver their projects is high and as such the revenue potential of delivery of this service has been rated medium.

Mechanical Engineering:

Mechanical engineers provide mechanical systems designs associated with infrastructure systems and buildings. The provision of these services and the risks associated with it are similar to those of electrical engineering mentioned above including the ability for them to compliment the delivery of DNA's building department's projects.

Geotechnical Engineering:

Geotechnical engineers provide designs to adequately support infrastructure systems within the proposed soils they are to be installed on or in. Much like electrical and mechanical engineering, provision of these services would require hiring of professional staff registered with APEG for the design of these services and therefore the cost to adopt this service is low. However unlike mechanical and electrical engineering, as each site is different with varying soil characteristics and requirements for assurance of designs with respect to supporting soils, the liability risk is high. Geotechnical engineering is required for all infrastructure projects delivered therefore utilization risk is low. As some designs for earthworks are complex requiring experience of similar instances or long term practice reputation time has been rated medium. Also, like electrical and mechanical engineering, though fees associated with most infrastructure projects are relatively low compared to other services the ability for them to compliment the delivery of DNA's building department's projects rate its revenue potential as medium.

Environmental Engineering or Biologist:

Environmental engineers or biologists provide reviews of the sites and environmental habitats impacted by proposed infrastructure projects, and provide recommendations to mitigate habitat disturbance or whether the projects are detrimental to the habitat and therefore not feasible to develop. Like electrical, mechanical and geotechnical engineers, in the case of environmental engineering provision of this service would require hiring of professional staff registered with APEG for delivery of this service or hiring an accredited biologist qualified to review and report on the impacts associated with development within environmental habitats. Based on this the cost to adopt this service is low. As many regulatory agencies and stakeholders are involved in the environment and disruption of it the risk of liability is medium to high. Since environmental assessment reports and environmental professionals

are generally required for all infrastructure projects utilization risk is low. As professionals require practice in the industry to hold reputation with the various regulatory and stakeholder groups the time for developing sufficient reputation in delivery of this service is high (unless a high reputation professional can be acquired). As these services are also complimentary to DNA's building departments delivery of projects the potential for revenues is rated as medium.

4.2 Evaluation of Alternatives

The following section will review the alternatives identified in Section 4.1 against the key goals of the organisation and determine the relative scoring of each alternative with respect to achieving those goals. As alternatives one and five have been rejected in the previous section, the evaluation will only consist of the alternatives summarised below:

- Alternative 2 - Expansion of Current First Nations & Private Development Market Segments
- Alternative 3 - Focus Expansion of Workload in New Municipal Government Market Segment
- Alternative 4 - Expansion of First Nations & Private Development Market Segments & Expand to New Municipal Government Segment
- Alternative 6 - Increase Operational Efficiencies
- Alternative 7 - Increase Scope of Services Offered

4.2.1 Key Factors to Achieve Firm’s Key Goals and Relative Weight

For the purpose of evaluating the alternatives identified in the preceding section, the following table summarises the key factors to achieve the firm’s goals and the relative weighting associated with each of them.

Table 4.2 Key Factors to Achieve Firm Goals and Relative Weights

Evaluation Goal	Weight
Potential to Increase Profitability	30%
Potential to Increase Workload	20%
Cost to Implement	10%
Timeframe to Increase Workload	15%
Fit with Core Competencies	15%
Degree of Organisational Change	10%
Total	100%

Potential to Increase Profitability:

Weighed highest at 30 percent as DNA is interested in operating in the industry as profitable as possible, therefore alternatives that allow for this such as providing additional revenue streams will score higher.

Potential to Increase Workload:

Weighed second highest at 20 percent as available workload is the key factor to maintaining high utilization rates of DNA staff and promoting higher reputational capital in the segments it operates in, providing potential for further workload.

Cost to Implement:

Equal to degree of organisational change as lowest weight of 10 percent as DNA is willing to incur upfront implementation costs if long-term increase in profitability and workload can be achieved.

Timeframe to Increase Workload:

Equal to fit with core competencies with the third highest weight of 15 percent due to the fact that the company currently has a decline in its booked work and would like to increase workload as soon as possible.

Fit with Core Competencies:

Equal to timeframe to increase workload with the third highest weight of 15 percent as the ability to fit with the current skill sets of its professional staff allow for better delivery of services in terms of efficiency (utilisation rates) and quality as the learning curves will be low.

Degree of Organisational Change

Equal to cost to implement as lowest weight of 10 percent as company is willing to adjust methods of operation if long-term increase in profitability and workload can be achieved.

4.2.2 Alternative Assessment

The following table evaluates the proposed alternatives with respect to the key factors to achieve the firm’s goals previously identified in the preceding section. For each goal, a value between one and five is provided for each alternative. A weight has been assigned to each key factor as identified in Table 4.2 Key Evaluation Goals and Relative Weights. The relative score for each alternative with respect to that factor is the alternative’s value multiplied by the weight factor. The table summarises the alternatives overall score with respect to achieving the key goals of the organisation.

Even though the alternatives have been grouped previously as where in the external environment to develop workload and how to internally increase competitiveness they all require non-billable time in order to implement. As there is a limited amount of non-billable time management can commit to alternatives, all remaining alternatives will be reviewed together to determine which alternative fits best with achieving the firm’s key goals.

Table 4.3 Evaluation of Alternatives Against Key Factors to Achieve Firm's Goals

Alternative:	Alt 2	Alt 3	Alt 4	Alt 6	Alt 7
Key Factors					
Potential to Increase Profitability	4.0	2.0	5.0	3.0	2.0
Weight	30%	30%	30%	30%	30%
Score	1.2	0.6	1.5	0.9	0.6
Potential to Increase Workload	3.0	2.0	5.0	2.0	3.0
Weight	20%	20%	20%	20%	20%
Score	0.6	0.4	1	0.4	0.6
Cost to Implement	4.0	3.0	2.0	2.0	1.0
Weight	10%	10%	10%	10%	10%
Score	0.4	0.3	0.2	0.2	0.1
Time to Increase Workload	3.0	2.0	4.0	1.0	1.0
Weight	15%	15%	15%	15%	15%
Score	0.45	0.3	0.6	0.15	0.15
Fit with Core Competencies	5.0	3.0	4.0	3.0	2.0
Weight	15%	15%	15%	15%	15%
Score	0.75	0.45	0.6	0.45	0.3
Degree of Organisational Change	4.0	2.0	3.0	1.0	1.0
Weight	10%	10%	10%	10%	10%
Score	0.4	0.2	0.3	0.1	0.1
Total Alternative Score	3.8	2.25	4.2	2.2	1.85
Alternatives Descriptions:					
Alt 2: Expansion of Current First Nation & Private Development Market Segments					
Alt 3: Focus Expansion of Workload in New Municipal Government Market Segment					
Alt 4: Expansion of First Nation & Private Development Segments & Expand to New Municipal Segment					
Alt 6: Increase Operational Efficiencies					
Alt 7: Increase Scope of Services Offered					

4.2.3 Alternative Scoring

The alternative assessment resulted in Alternative 4: Expansion of First Nations & Private Development Market Segments & Expand to New Municipal Government Segment scoring the highest in terms of achieving DNA's key strategic goals at 4.2. This alternative received the highest score as it provides the highest potential to increase profitability and workload that are weighed the highest at 30 percent and 20 percent respectively. In addition, the time it would take to increase the workload is lowest (therefore receiving the highest score in that category) as it focuses on expanding three market segments to secure workload instead of two or one as is the case with Alternatives 2 and Alternative 3. The alternative also has a relatively high fit with the core competencies of the firm, second after Alternative 2, as it proposes expanding two existing segments and entering a new market with delivery of services that are complimentary with that of an existing segment already serviced. It ranks third in degree of organisational change due to the required formalisation and structure required to deliver three different segment projects and the requirement to develop workload in a new market segment.

Alternative 2: Expansion of Current First Nations & Private Development Market Segments scored second highest at 3.9, 0.3 points lower than Alternative 4. Though the alternative scored highest in degree of organisational change (required the less change) and with fit with core competencies as it focuses on market segments already serviced, the fact that it is limited to expansion of only two segments resulted in lower potential to increase profitability and workload (weighted the highest and second highest).

Alternative 3: Focus Expansion of Workload in New Municipal Government Market Segment scored third highest at 2.25, 1.95 points lower than Alternative 4. As the alternative suggests operating within the existing market segments DNA services, using the same methods and means of acquiring workload, and only focusing on trying to expand into the new municipal government segment, the scoring of potential to increase profitability and workload are both significantly lower than Alternative 4. In addition, due to this focus on a new segment, the score relating to overall time to increase workload is low (will take longer to increase workload). As the firm will still be operating in the two segments in currently competes, but will be focusing on expanding to a new one it scores third highest behind Alternative 2 and Alternative 4 in terms of fit with core competencies and degree of organisational change.

Alternative 6: Increase Operational Efficiencies scored fourth highest at 2.15, 2.0 points lower than Alternative 4. Though it scores third highest in terms of potential to increase profitability (highest weighting) due to its ability to reduce project delivery times capturing the time savings as profits it scores lowest in potential to increase workload (the second highest weighted goal). It scores lowest in increased workload because even though reducing project delivery time technically allows a firm to deliver more projects, the alternative itself does not provide a means of developing the workload to fill that time. For this reason, it also scored the lowest in time to develop workload (would take the longest to do). It should be noted that this alternative could be done in conjunction with the others to provided added benefits to the firm (complimentary alternative to the others to further achieve the strategic goals). The alternative will also have relatively high costs when compared to other alternatives due to the level of formalization it implies at all levels of the company's service delivery. This also results in it scoring low in degree of organisational change (high level of change required).

Alternative 7: Increase Scope of Services Offered scored the lowest at 1.9, 2.3 points lower than Alternative 4. Though it scored third highest in terms of potential to increase profitability (highest weighting) and potential to increase workload, due to the additional revenue streams added by the new services, it scored the lowest in time to implement due to the searching and reputational time it would take to develop the new services. In addition, as it requires expansion to services outside those currently

offered by DNA the organisational change and fit with core competencies scores were the lowest. The cost to implement score was also the lowest due to the necessity of bringing in new staff with limited workload to keep them billable and the cost of training that staff.

The following Section 5 Final Recommendations outlines the recommendations of this strategic analysis including the recommended alternatives, the recommended timeline for implementation (short to medium to long term) and the organisational changes required to implement the immediate short-term alternative.

5: Final Recommendation

Alternative 4: Expansion of First Nations & Private Development Market Segments & Expand to New Municipal Government Segment is the recommended option to best meet the key goals of the firm. Complementary alternatives to this option to be implemented in the medium term include Alternative 6 Increase Efficiency in Workflows and Alternative 7 Increase Scope of Services. Depending on the degree of success the company has in increasing its booked work in the three different market segments, there may be a need or the ability in the long term to implement Alternative 5 Size and Geographic Expansion.

5.1 Implementation Timeline

5.1.1 Short Term

1-2 Years: Alternative 4

In the immediate short-term the firm should focus on where in the industry to develop additional workload. As discussed in the proceeding section, Alternative 4 - Expansion of First Nations & Private Development Market Segments & Expand to New Municipal Government Segment is the best alternative to develop and sustain additional workload. The following Section 5.2 Alternative 4 Implementation Analysis reviews the potential internal gaps associated with implementing the alternative and potential solutions to close them.

2-5 Years: Alternative 6

If DNA is able to develop sufficient workload to maintain or meet the firm's short-term goals, the firm could then focus on how to better deliver its services or increase its competitiveness and look to implement Alternative 6 - Increase Operational Efficiencies. As this alternative requires non-billable time that can take away from service delivery or workload development, the firm should review the gaps required to implement the alternative, develop solutions to close those gaps, and develop a plan to implement the alternative in a way that limits the negative effects on the firm's delivery of services.

5.1.2 Medium Term (5-10 Years): Alternative 7

As identified in Section 3.8.2.2 Relative Importance of Cost & Utility Advantages, and illustrated in Table 3.13 Source of Cost & Utility Advantage Weight as Percent of Total, scope of services offered carries a weight of 20 percent and carries a potential to develop both cost and utility advantages potentially increasing the firm's revenues, profits and reputation. Once DNA has developed sufficient workload, it can look to further increase revenues and profits associated with the workload by implementing Alternative 7 – Increase Scope of Services Offered.

As identified in section 4.1.8 Alternative 7 - Increase Scope of Services Offered, and illustrated in Table 4.1 Observed Risks & Degree of Risk Associated With Potential Additional Services, the services with the lowest risk and provide the highest potential for additional revenues are mechanical engineering and electrical engineering. Should implementation of the short-term recommendations result in additional booked work in multiple segments, the addition of the services with low adopting costs would add further revenues and profits.

The delivery of additional services would require internal changes in the firm in terms of overall operation and on a project delivery level. The change requirements and gap filling requirements should be determined prior to proceeding with the implementation of this medium term alternative.

5.1.3 Long Term (10 Years +)

Alternative 5 – Size and Geographic Expansion was rejected prior to the evaluation of alternatives in Sections 4.2 as it does not conform with the current company business model of operating within the single North Vancouver office. However, in the long term (10 years +), the success of DNA at developing workload in its existing segments it competes in and expansion into the new municipal market segment may lead to review of the ability of the firm to compete in other geographic locations, or at a minimum the need for a second office in the Lower Mainland. This will of course be subject to external market conditions and the long-term planning of the firm over the next 10 years. Like the medium terms option, prior to implementing alternative 5 the internal capabilities of the company should be reviews, in addition to the external environment and anticipated gaps and potential solutions explored.

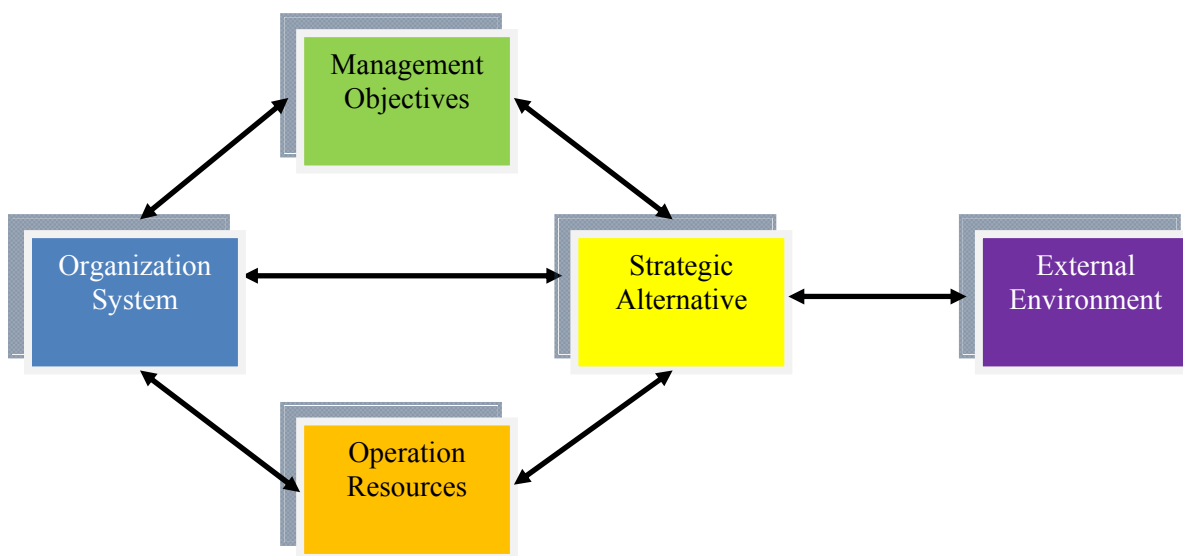
5.2 Alternative 4 Implementation Analysis

The following section analyses the immediate short-term recommendation, Alternative 4 - Expansion of First Nations & Private Development Market Segments & Expand to New Municipal

Government Segment in terms of the organisation's ability to implement it. The analysis utilises the "Diamond-E Drill" framework from Crossan Killing and Fry, which identifies three internal capabilities required for successful execution of the alternative. These three internal capabilities include:

- Management Objectives: preference and expertise
- Organizational Systems: structure and culture
- Operational Resources: human and financial

Figure 5.1 *Diamond-E Framework*



The framework above defines the relationships between the three internal criteria, the strategic alternative and the external environment. The alternatives proposed are to respond to perceived industry threats or opportunities that affect the company goals. The double head arrows in the diagram indicate that the external environment and the internal criteria have the ability to drive or constrain strategy and that the strategy has the ability to shape or affect the internal criteria as well as the external environment.

The following implementation analysis will review whether the three capabilities of the firm are consistent or inconsistent in terms of implementing the proposed alternative, what gaps are present in implementing it and what potential solutions are available to close those gaps.

5.2.1 Management Objectives

Management refers to the partners/managing partners and associates/project managers in the firm. There are two main management required preferences, which will be used to review compatibility of the strategic alternative with the firm’s management. These two objectives include:

1. Increase workload/profitability
2. Reduce billable time to implement

The following table summarizes how well the proposed alternative matches the objectives of management and identifies observed gaps in meeting them.

Table 5.1 Management Objectives Under Alternative 4

Management Levels	Required Preferences	Observed Preferences	Major Gaps	Gap-Closing Analysis
Partners/Managing Partners	Increase Workload/Profitability.	Match	None	None
	Reduce billable time of professional staff to implement.	Limited Match	Reluctance to reduce billings of staff.	Review benefits of short term billings loss with potential profits of additional workload.
Associates/Project Managers	Reduce billable time to implement.	Limited Match	Time cost to managers to implement expansion, and maintain relationships will reduce billability.	Buy in for project managers required to implement strategy to increase company workload and profitability. Billability related directly to performance bonus.

Alternative 4 matches well with one of the three current management preferences. Specific gaps in the analysis include:

1. How to have ownership buy-in for reduced billing to implement alternative; and
2. How to limit the negative effect on manager’s performances bonuses associated with managers expanding workload in the market segments.

The following table identifies potential solutions to the gaps associated with alternative 4.

Table 5.2 Management Preference Gaps & Potential Solutions Under Alternative 4

Identified Management Gap		Potential Solution
1.	Buy in from partnership to reduce billability of staff to implement.	Complete cost benefit analysis of potential profitability the additional workload will result in versus the cost to implement it.
2.	Buy in of managers to spend time expanding workload when reduces billability and subsequently performance bonuses.	Increased workload will reduce manger downtime and the effect of reduced manager billability for implementation. Provide incentives to increase workload. Performance bonuses not based solely on billability but on dollar value of secured workload procured and other non billable metrics including minimizing days receivable and bad debt.

5.2.2 Organisational Systems

The following table identifies the required organisational systems to implement the proposed strategic alternative, the capability of the existing organisational systems to meet them, observed gaps between the two and potential solutions to close or reduce those gaps.

Table 5.3 Organisational Systems Under Alternative 4

Required Capabilities	Existing Systems	System Gaps	Gap-Closing Analysis
Technical staff to deliver services.	Match	None	None
IT to deliver services to segments.	Match	None	None
Relationships necessary to develop workload.	Match	None	None
Training systems for potential new staff or for existing staff to deliver services in multiple segments.	Limited Match	Limited standardized project delivery methods or training methods.	Develop more formalization and standardization to allow for easier training or adopting of new market segment by new or existing staff.

The system requirements to implement Alternative 4 match well with all of the required organisational systems with the exception of training systems. The limited formalization and standardization of project delivery and management methods for the different segments result in gaps in the required training of technical staff to implement this alternative. The proposed solution is to increase project delivery formalization and standardization.

5.2.3 Operational Resources

The following table identifies the required operational resources to implement the proposed strategic alternative and the availability of those resources within the existing organisation. If the resources are not available, the table summarises what is lacking and what potential solutions are available to provide them.

Table 5.4 Operational Resources Under Alternative 4

Resource Category	Required Resource	Available Resource	Major Gaps	Gap-Closing Analysis
Reputation	Knowledge of successful delivery of service with First Nation projects.	Match	None	None
	Knowledge of successful delivery of services for municipal government projects.	Match	None	None
	Knowledge of successful delivery of services for municipal government projects.	Match	None	None
Marketing	Recognition of ongoing work in private sector by customers not familiar with DNA	No Match	Current marketing comes primarily through existing client recommendations.	Develop construction site signage for marketing services on existing projects throughout lower mainland. Develop private development specific promotional material to forward to potential clients.
	Registry of firm as approved consultant at majority of municipal governments.	No Match	RFPs not sent directly to Firm. Firm needs to search and qualify for every RFP.	Develop relevant experience and formally apply for qualification in majority of municipal governments.
Time/Lost Revenues	Project manager time to develop necessary promotion material, leads and contacts.	Medium Match	Buy in from partnership to reduce managers billability to successfully implement.	Cost benefit analysis to determine if lost billable time spent will be made up by workload and reduction in technical staff down time due to it.
			Buy in from managers to reduce billability as tied to bonuses.	Manager performance bonus metrics adjusted so not solely dependant on billability but on dollar value of projects brought in and other non billable metrics such as reduction in days receivable and bad debts.

Alternative 4 matches well with all of the required resources in terms of reputation. The firm however lacks marketing requirements to implement the alternative. The proposed solutions would need

to be carried out to adequately develop the necessary avenues to secure new clients and new workload. There is a gap as well in terms of time/revenue resource and the requirement for partnership and manager buy in for this. The proposed solution would be a cost benefit analysis to show that the time spent developing the workload makes up for the time/revenue loss and adjust manager bonuses to rely less on billability and be more balanced with other non-billable tasks such as workload development, reduction in days relievable and bad debts. It should be noted that this gap filling solution is also identified in management preference.

5.2.4 Alternative 4 Implementation Summary

Based on the preceding implementation analysis of Alternative 4, the major gap associated with implementing it is the reduction of management's billable time to implement it. Since all alternatives will result in reduction in billable time, and Alternative 4 scores the highest in terms of meeting the firm's key goals, specifically increasing profitability, this gap should be considered acceptable. As such, the alternative should be further explored with DNA's management and partnership group to determine the solutions to best close the gap and to develop a plan to implement the alternative in a way that limits the negative effects on the firm's delivery of services.

Appendix A: Detailed Gross Profit Margin by Construction Consulting Service Sector

	2005	2006	2007	2008	2009
	\$ Millions				
Architectural Services					
Operating Revenue	2,059.0	2,373.0	2,807.2	3,105.4	3,019.7
Operating Expenses	1,708.2	2,017.3	2,340.3	2,616.4	2,631.9
<i>Salaries, wages & Benefits</i>	759.9	883.3	1,047.4	1,156.0	1,155.0
Operating Profit Margin (%)	17%	15%	16.6%	15.7%	12.8%
Landscape Architect Services					
Operating Revenue	231.9	256.4	275.8	293.2	286.6
Operating Expenses	204.7	222.0	227.8	241.7	239.2
<i>Salaries, wages & Benefits</i>	<u>97.9</u>	<u>108.7</u>	<u>121.8</u>	<u>130.3</u>	<u>127.2</u>
Gross Profit Margin (%)	11.9	13.4	17.4	17.6	16.5
Engineering Services					
Operating Revenue	13,793.5	16,141.4	19,719.5	22,301.5	21,441.9
Operating Expenses	11,919.7	14,390.4	17,210.9	19,453.8	19,077.4
<i>Salaries, wages & Benefits</i>	<u>5,726.0</u>	<u>6,542.3</u>	<u>7,315.5</u>	<u>8,538.8</u>	<u>8,245.6</u>
Gross Profit Margin (%)	13.6	10.8	12.7	12.8	11.0

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