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# An n-dimensional model for predicting success and failure in Canadian Industry

**The Thesis of the Ph.D. dissertation**

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## ABSTRACT

The concept of failure and success in companies in industry is a complex one. The criteria of success is multi-faceted and can be represented by a number of factors ranging from abject and complete bankruptcy, through “fattening” up a company for takeover, to growth, return on investment, and the degree of shareholder and employee satisfaction.

The problem is that no one has yet developed a quick and accurate *qualitative* methodology to look at a company, place it in its life-cycle, place it in the context of its market, and then provide a prediction as to failure or success. This is a critical concept from a number of aspects: Investors, Shareholders, Merchant Banks, Competitors, et cetera.

But in a Canadian public policy perspective **success** is one of the most important aspects of decision making. In North America as well as around the world, governments need to make decisions on whether or not to provide assistance and whether to support an organisation through tax relief, grants of funds, or contributions of some sort to an organisation. There is little enough money to go around, and government must make strategic, long-term, and accurate decisions.

The focus of this research is to articulate a two-dimensional landscape on which we can place a company in terms of its maturity, and in terms of the marketplace’s maturity, so as to set up well-understood conditions against which we can make observations on **orthogonal dimensions** of the company’s infrastructure: a series of factors which research will show are critical to the ongoing growth and maturation of the company, and through which we can, with relative accuracy, predict the ultimate success or failure of the company.

We will use a standardised Likert scale and weighted averages to make these third dimensional observations, and then develop a single numerical score out of 10: 1 implying rapid failure; 5 implying a 50/50 chance of success; and, 10 implying a company well on track to succeeding in the high-tech marketplace.

This research was primarily **qualitative** in nature, but is built around quantitative factors so as to combine the two types of factors into a holistic approach to decision-making.

There is a large amount of literature around the numerical analysis of a company, and the company's health – where there is a significant gap is the qualitative aspects of a company: those subtle elements of leadership, innovation, incentives, et cetera that influence success or failure.

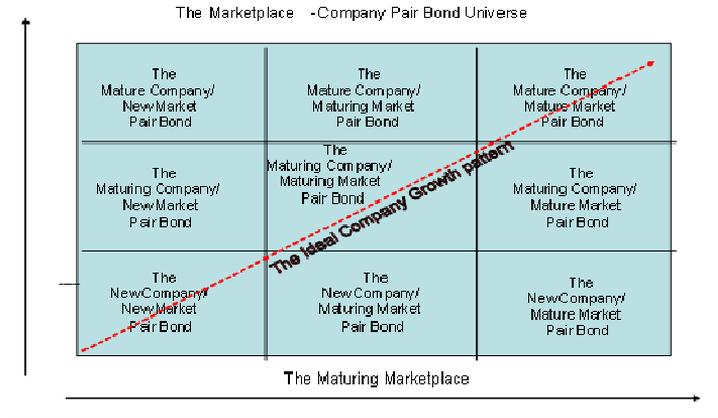
### **The Pair-Bond landscape.**

If we consider that a marketplace in Canada can exist in three broad states: emerging; evolving; and, mature, and that a company can also exist in one of three states: newly formed; evolving; and mature; we can then plot a company on a 3x3 landscape defining 9 potential states:

(n,e)	newly formed company in an emerging market
(n,ev)	newly formed company in an evolving market
(n, m)	newly formed company in a mature market
(ev,e)	evolving company in a emerging marketplace
(ev,ev)	evolving company in an evolving marketplace
(ev,m)	evolving company in a mature marketplace
(m,e)	mature company in an emerging marketplace
(m,ev)	mature company in an evolving marketplace
(m.m)	mature company in a mature marketplace

**Figure 1 - The Market-Company "Pair-Bond" (Author's Construction)**

We can graphically represent this as seen in figure 2.



**Figure 2 - The Pair-Bond Landscape (Author's Construction)**

We can also see that the fastest way for a company to start and then progress to market domination is through a diagonal line. The highlighted quadrant – the Mature-Mature pair bond is the quadrant a company aspires to – a mature company in a market dominance position in a mature marketplace.

If the market is already in place but the firm is new, a more vertical line is the fastest way to get to market dominance. If the market is new but the firm is established, the fastest path to dominance is a horizontal line. We can comment that in actual fact, companies do not grow in a line, and neither do markets, in fact, and in reality, companies grow in a staircase pattern through the maturing market, and depending on where they start, they may grow in a curving line. Although, observationally, new companies in new markets may show unsteady growth until they hit upon a strategy which works in their particular pair-bond. For instance, a company entering an already mature marketplace with a new and innovative product or service will quickly pass other organisations on the staircase to maturity, in an exponential curve to the mature market-mature

company pair-bond, and will eliminate or purchase competitors as it consolidates its position as one of the few dominating the marketplace.

Although this is a new model on which to place companies, it does not provide any mechanisms for prediction of failure to guide investors and public sector interests. In order to advance the body of knowledge, we need to add a number of new dimensions: that of factors essential to moving the company to that successful and market-dominant position – i.e., success; or alternatively an indication of where the enterprise is failing to properly and appropriately prepare for success.

The n-dimension factors considered in this dissertation are:

1. Human Resource structures
2. Creativity and innovation
3. Corporate culture and leadership
4. Supply chain management
5. Quality management
6. Stakeholder management
7. Financial and incentive management
8. Marketing management
9. Decision-making structures
10. Strategic importance of the sector/enterprise

### **Strategic alignment with national goals**

As the research also can be used as a predictive model to estimate whether or not a company will fail, it is vital to **decide whether or not a public sector should provide assistance** to the organisation.

In a marketplace increasingly competitive, and where national governments are defining strategic sectors, nationalising companies, and selecting “winners” to which to put increasingly-rare assistance; it is essential to be able to predict success and failure. This dissertation adds to the body of knowledge in public

management in that it gives a new tool to those public servants making choices in providing government aid to companies.

This dissertation also adds to the body of knowledge for micro-economic market assistance and sector selection from a **public sector** perspective. It will allow national governments to develop strategic advantages and ensure that from a macro-economic perspective, nations can invest in strategic sectors and develop a national advantage in highly focussed areas.

## **1. BACKGROUND AND AIMS OF THE WORK**

Public policy makers all over the world need to make strategic decisions on which sectors and enterprises they will invest in, and to whom they will provide strategic advantages. The selection of sectors is a relatively well-understood process in a public sector and can range from specialisation through prior market dominance, or even a need to establish a socio-economy in a particular sector. (Rondinelli, 2002), but the selection of individual enterprises is usually something which falls from the selection of a sector and tends to follow a more “shotgun” approach (Her Majesty’s press, 2000). The body of knowledge in public sector microeconomics does not contain a particular set of tools to predict success or failure in an enterprise, and as a consequence public sectors tend to invest and incent enterprises without full knowledge of how the investments will pay off in the longer term.

In Canada, there is a large set of rules and policies in place to provide incentives to the enterprises in a sector, seeking to secure public funds. They fall into two main areas:

- a) enterprise-initiated; and,
- b) Government-initiated.

In the former, the enterprises seeking incentives (tax credits, grants, etc.) must initiate the seeking of incentives through a web of rules with Industry Canada, Revenue Canada, various provincial and municipal grants and payments, etc.

In Industry Canada alone there are the following options offered to Canadian enterprises:

- a) Grants, contributions and financial assistance
- b) Loans and cash advances
- c) Loan guarantees
- d) Tax refunds and credits
- e) Wage subsidies
- f) Equity investments

In the latter case of government-initiated incentives, the governments of the day establishes incentive programmes, and sometimes advertises their availability through outreach programmes, or through specific programmes at universities, etc. There is a secondary industry which grows-up around the enterprise-initiated programmes wherein companies specialising in preparing grant and loan application forms will complete and submit applications on behalf of the company on a contingency basis.

In both cases those companies wishing to access funding and grants will have to submit some sort of application, or acknowledgement. When a company receives a government-initiated incentive, even though they may not have specifically requested it, there is often paperwork to fill out.

An example of a “simple” application form can be found in Annex C

In both events, it is apparent that public sectors, as shepherds of taxpayer’s remittances, need to be better at selecting enterprises to incent.

This dissertation covers that gap in the body of knowledge by introducing a tool to be used which *itself* can vary based on the sector being incented.

## **1.1 Research Scope**

This is a broad proposition – to limit scope to a narrower and more focused dissertation, and to ensure the usefulness to the body of knowledge, the scope is limited to the high-tech sector in Canada, and from a public sector management & governance perspective only.

In the section on future research opportunities, and areas of concern for future researchers, I note the potential to expand the scope of the developed tool to include other sectors, and to develop additional dimensions to evaluate, which may indeed, vary by sector.

This dissertation will also be restricted to only 10 dimensions in evaluating success. The author leaves it to future researchers to add new dimensions to the tool to be applied in failure-analysis; and to analyse other sectors.

### **1.1.1 Proposition**

The practice and knowledge base of public sector selection of enterprises for incentives will be advanced by the design and application of an n-dimensional model; which seeks to align the potential success and failure of the enterprise with the public policy decisions to incent that enterprise or not. In our case (the Canadian high-technology sector) we have selected 10 dimensions to include in the model – other sectors may have more or less.

Given the limited and declining availability of funds to enterprises, the micro-economic decision-making processes need to have advanced information available to bureaucrats in order to focus a country's resources to maintain and develop advantages over other countries.

### **1.1.2 Questions**

This dissertation poses the following thematic questions:

1. Can a tool be developed to improve the prediction of failure (and success) of a firm in the Canadian high-tech sector?

A tool needs to be able to assign simple numeric values to the defined dimensions to be examined – these numeric values need to be based on significant qualitative analysis. The analysis needs to be comprehensive enough so as to allow the operator of the tool to conduct research on the company being analysed, and then be able to input quantitative representations of the research in the dimensions.

2. Can this tool be flexible enough to encompass further dimensions as they are postulated, researched and added?

If the tool is to be applied to other dimensions, and other market segments, can the methodological approach of analysis, input, refinement, and output be extended to other cases.

3. In a Case Study, can the tool accurately predict the failure of a company?

The methodology and tool needs to be tested against a well understood case to determine if the results of the test reflect reality.

4. Could the Canadian federal government apply such a tool and how?

Through a research of existing funding mechanisms in the Canadian federal public service and interviews with senior executives, determine the likelihood of adoption by the government, and the requirements to adopt it.

### **1.1.3 Objectives**

The objectives of the research are to specifically advance the body of knowledge through the following focused outputs:

1. Identifying the existing base of knowledge (both theoretical and practical) in the area of enterprise failure-prediction through a literature review.
2. Identifying what constitutes failure in the context of public sector incentives to enterprises in a particular strategic sector in Canada (the High-tech sector)
3. Develop a tool to place the enterprise in a specific context (its own maturity and the marketplace's maturity), and then to add in a number of additional dimensions to refine the accuracy of predictions.
4. Apply the tool to a particular enterprise to test the capacity to predict failure.
5. Determine the potential to insert the tool into the Public sector framework in Canada.

#### **1.1.4 Design of research**

The dissertation project followed five phases:

##### **Phase I: the Literature review**

In the literature review phase, the researcher reviews and collates the existing state of the theoretical and practical body of knowledge to determine the use or existence of tools for incentive-based decisions, to determine the extent of the gaps in knowledge and tools, and to determine if there is presently research in these areas in the academic community.

##### **Phase II: the Development of the Tool and Dimensions**

In the development phase, the tool will be codified, developed, and the ten (10) selected dimensions will be articulated and weighted on a Likert scale. Along with this an excel-based spreadsheet will be created to capture and output a single reference page for use in determination decisions. Each dimension will each have sub-components for analysis and rating.

### **Phase III: the application to a company**

In the application phase, a Canadian high-tech company will be selected and the tool will be applied. Where possible, interviews with ex-members of the company will be conducted to validate observations and conclusions. The application phase requires that the researcher select a high-tech company with a very well-known and understood set of problems, and a well-researched body of knowledge available to test the tool. The selected company must have benefitted from government programmes, and ideally must be publicly traded so financial and other communications documents can be easily sourced.

### **Phase IV: observations on the use in the Canadian Public Sector**

In the observation phase, interviews will be conducted with senior civil servants in the Canadian public sector to discuss the potential use of such a tool within the public service, and an appetite to conduct further experiments. They will also be asked to comment on the decision making processes and legislative requirements which could prove to be a barrier to adoption. The results of these interviews and observations may be found after the tool exercising.

### **Phase V – Documentation and Presentation**

In the documentation phase the results of the previous phases will be gathered, collated and presented in a dissertation format.

#### **1.1.5 Research Methodology**

During the development and application phases, the research will follow a standard academic methodology:

**Literature review** – an overview of existing literature in key areas of research, and a search for on-going work in the field of research around the world.

**Gap analysis** – a review of the literature found with an eye to determining where there are gaps in knowledge, and ensuring that the research advances the body of knowledge in the areas of missing knowledge.

**Tool development** – a development of a tool or set of tools to be used to map the dimensions of the enterprise to be analysed, and to provide a simple report of the results of the analysis.

**Case analysis** – the analysis of a specific case. Taking an existing enterprise through the tool to produce preliminary results.

**Results analysis** – analysing the results of the case study to determine if the tool and methodology works, and where improvements could be made.

**Refinement and consultation** – refining the tool and methodology to fill the gaps in knowledge and weaknesses of the tool and consulting with senior executives to determine their willingness to adopt such a tool and what difficulties they would anticipate with such a tool.

**Presentation of results** – the documentation of the tool, case analysis and results in a formal dissertation, and notes on how to apply the tool in other sectors.

### **1.1.6 Tools to develop**

There are a relatively small number of tools to be developed – specifically:

1. Excel spreadsheet to capture the weighted observations of the extra dimensions for the enterprise being analysed; and,
2. Call letters to senior Civil Servants requesting an interview and permission to use the interview notes in the dissertation

### **1.1.7 Data Input/output formats**

The data to be input to the excel tool will be gathered using input sheets (see Annex). Once the data is gathered through the input sheets it is input into the specific tabs in the excel tool, and a single standardised score based on the Likert scale is output on the summary tab.

Relatively extensive analysis is necessary prior to input to ensure that the data entered is as meaningful as possible. Potential sources of information are: interviews with enterprise executives, review of annual reports, marketplace analysis, investment analysis, stakeholder discussions and analysis.

The tool is a quantitative tool, and as such is only as good as the data provided.

## **2. SYNOPSIS OF LITERATURE**

### **2.1 The notion of success**

As mentioned earlier, “success” is defined in many ways in the high tech industry. It can range from explosive growth, to merely making the firm attractive enough to be taken over by a larger competitor.

In Canada, the measure of success is often the development of intellectual property and patenting that property in a company, and then safeguarding those patents while a bidding war is undertaken by larger competitors.

One Canadian high tech services firm interviewed for this thesis had as a core strategic outcome: “increase the goodwill and intellectual property in the firm to a point where we can maximise the return when we sell it to a larger firm”

Given all these various descriptions of success, the tool we develop in this thesis defines success as continuing in business, i/e the standard accounting concept of a business being a “going concern”

This is important as the tool is designed to be used by public policy executives in deciding on whether or not to provide public funds to a company. It is not

good optics to provide money to a firm which then merely declares bankruptcy or becomes insolvent, shortly after receiving taxpayers funds.

## **2.2 Synopsis of research and literature reviews on success and qualitative factors.**

Many researchers recognise the importance of small business survivability, especially as an incubator to a successful sector; and many studies have identified attributes of successful start-up firms.

Allen and Hall in 2008 analysed and suggested innovation and managerial expertise were key attributes to start up performance; while J.R. Brown suggested in 2005 that the start-up investors were a key performance indicator. Still others studied finance and financial management expertise as a component of survivability and success, (Robb, (2002)).

These studies examine venture and entrepreneurial characteristics and have found that access to capital, the degree of novelty, location, and stability with key stakeholders have contributed to the success and initial survivability of small businesses.

However, as firms progress and transition through the business life cycle other factors beyond those that help a new venture become viable are needed to achieve continued success, growth, and survival. While many studies have looked at reasons for venture failures, few have examined the factors that are associated with long-term success; and fewer still have looked at a large scale of qualitative factors.

Successful venture managers consistently analyze various types of data including qualitative and quantitative information. Quantitative data are objective and consist of demographic and financial information related to the profitability of the firm and various types of ratio analysis such as return on

assets, return on sales, leverage, profit margins, etc. As long as this information is timely and captured accurately, making decisions based on quantitative information is useful and routine. It is as regularly used by both private and public sector analysts.

Qualitative data, on the other hand, are subjective and more difficult to measure. They relate to things such as management expertise, business location, product innovation, product development, etc.

Because qualitative data are difficult to assess, several models and templates have been developed to assist business leaders in knowing what information should be captured and how it should be evaluated. However, due to its subjective nature, it is often unclear how or what type of qualitative information is related to success.

Furthermore, there is limited empirical research evaluating whether qualitative measures are correlated with key success factors. Thus, an important and yet unanswered question is whether qualitative information, when properly measured and analyzed, can be used to measure a firm's success.

A host of informative studies have identified factors that lead to **venture success and failure**

Some of these and their factors include:

- Bull and Willard (1993) – Elements of entrepreneurship as a key success factor,
- Choi and Stack (2005) – provision of key advisory services by stakeholders such as angel investors, financial advisors, and internal advice,
- Colombatto and Melnik (2007) – the relationship between prior experience in start-ups and the likely success of the venture,

- Covin and Slevin (1990) – the relationships between structure of the company and its likely performance,
- Duchesneau and Gartner (1990) – an examination of the characteristics of the lead entrepreneur, startup processes undertaken during the founding of the firm, and firm behaviors after start-up, including management practices and strategic behaviors, associated with new venture success and failure,
- Gadenne (1998) – a review of basic management practices across industries to define success factors,
- Gartner, Starr, and Bhat (1998) – using case studies to define a set of critical success factors across industries,
- Lechler (2001) – how social interactions can lead to success in a venture,
- Lumpkin and Dess (2001) – looking at elements of entrepreneurial attitudes including autonomy, innovativeness, risk taking, proactiveness, and competitive aggressiveness as factors in long term success,
- Roure and Keeley (1990) – an attempt to define a set of predictors for high-tech success,
- Shepherd, Douglas, and Shanley, (2000) – how a risk mitigation strategy can lead to longer term success,
- Timmons (1994) – examining basic success in new ventures, and;
- Vesper (1990) – who looked into strategies to ensure long term business viability.

### **2.3 Some thoughts on “failure”**

The concept of success, can of course, be turned over to look at “failure” instead. Like success, there is copious literature on the concept of a failed company or enterprise, and indeed, much has been written on the subject of failed socio-economies.

Failure in socio-economies at a national scale can be seen as failure of what could be considered a ‘strategic sector’ and we will return to that concept as we start to develop lines of enquiry within our methodology.

Firstly, companies: Dr. Clayton Christianson posits that creativity, innovation and good customer services are all factors of success, and alternatively, can be, when performed poorly, factors of failure. (Clayton Christianson, Harvard Business Press, 1997)

Mark Crowne at an IEEE conference in 2002 explored how execution in sales, marketing and delivery are commonly recognized, but failures in product development are less obvious. His paper explores the Critical product development issues that can lead to company failure.

Interestingly, we see that predicting success tends to be a more quantitative exercise (the “numbers are good”, the ratios are favourable, et cetera), but predicting failure tends to be a backward looking exercise once the company has failed, and it often cites both qualitative and quantitative factors. Seldom do we mention or analyse predictive qualitative factors *before* a failure.

Whole industries as well are subject to failure, and in the context of this dissertation, this is one of the dimensions we must examine from a policy perspective. Governments often make conscious decisions to support an industry, or regard it as a strategic investment by the citizens.

Why then, should a policy maker offer incentives, credits, monies or assistance to a failing industry.

Conversely, of course, we want a policy maker to make investments in a thriving strategic sector such as high technology, potash, mining, etc.

Fishing for example, has undergone a collapse in Canada and as an industry; the government has decided not to incent the industry as much as it does other ones.

In fact, Pearse and Walters in an article in 1992 looked at failure factors for the entire fishing industry. If we develop a set of dimensions for a failing industry we would want to examine quotas, incentives, and the alignment with the country's strategic goals.

### **3. THE RESEARCH CONTEXT**

#### **3.1 Approach to research**

The approach to the research and analysis is that of a combination of qualitative and then quantitative analysis. This is because although case analysis of a company usually includes a quantitative analysis of the “numbers” (return on investments, profitability, earnings before interest, taxes, depreciation and amortization, market capitalization, et cetera). In the context of my new methodology and tool – these standard analytical tools do not provide sufficient information to a public policy maker, who may not even have the business acumen to interpret these types of data accurately. The methodological approach proposed is to gather sufficient qualitative data so as to be able to make qualitative evaluations of the company's “health”. We can create a table to examine these factors to emphasise why I have chosen a qualitative research method:

No	Factor	Qualitative	Quantitative
1	Philosophy	Phenomenon, social	Positivism, hard science
2	Goal	Understanding / meaning Event prediction	Numerical prediction / testing hypothesis
3	Focus	Quality	Quantity (numbers)
4	Method	Action research	Experiment & correlation
5	Data	Interview / observations Documents Artifacts	Questionnaire, scales, tests, inventories
6	Design	Flexible	Structured
7	Sample(s)	Purposeful	Large and random
8	Generalisation	Unique cases	Generalisation
9	Analysis	Inductive	Deductive
10	Researcher	Immersed in research	Detached from subject

**Figure 3. The Qualitative vs. Quantitative paradigm (Author's construction)**

### **3.2 Qualitative Multi-Case Study: Type of Qualitative Research**

Qualitative research focuses on experiences and is a research method often used in case analysis; as is the case in this new methodology. Qualitative researchers focus more on sociological and the “softer” science observations - human behaviors, organisational behaviours, interpersonal interactions, corporate cultures, etc. They also focus on the root causes of these factors, and how they are governed, and in the context of this research – can be used to make accurate predictions on the potential for failure of structures in the company being analysed, and potentially the entire enterprise itself. Often qualitative analysis is combined with rudimentary quantitative analysis, and that is the case in this research. Based on qualitative reviews, literature reviews and the creation of a weighted Likert scale, we can draw both qualitative and quantitative conclusions to allow for a more accurate prediction model.

It has been noted (Black, 2009) that findings and results are more likely to be accepted if they are quantified (i.e., numerically expressed). However, there is

little scientific evidence that these types of data are in fact, more reliable than qualitative data based on strong observation and scientific methods.

However, the term “qualitative research” can be defined in a number of general ways: Here are some widely accepted definitions in use today in case study methodologies:

- a) Denzin and Lincoln in 1994 defined qualitative research as a method which focuses on interpretation of phenomena in their natural settings to make sense in terms of the meanings people bring to these settings. Qualitative research involves collecting information about personal experiences, introspection, life story, interviews, observations, historical, interactions and visual text which are significant and meaningful.
- b) Patton (2002) defined qualitative research as an attempt to understand the unique interactions in a particular *situation* (italics mine). The purpose is to understand in depth the characteristics of the situation and the meaning brought by participants and what is happening to them at the moment. The aim of qualitative research is to truthfully present findings to others who are interested in what you are doing.
- c) According to Pope and Mays (1995), qualitative researchers study things in their natural settings in an effort to discover the meanings seen by those who are being researched (or subjects) rather than that of the researcher.
- d) Qualitative research seeks to provide understanding of human experience, perceptions, motivations, intentions, and behaviours based on description and observation and utilizing a naturalistic interpretative approach to a subject and its contextual setting (Encyclopedia.com 2009).
- e) Qualitative research is a process of naturalistic inquiry that seeks in-depth understanding of phenomena within their natural setting. It focuses

on the "why" rather than the "what" of social phenomena and relies on the direct experiences of human beings as meaning-making agents in their everyday lives (University of Utah, College of Health, 2009).

One of the key components of using quantitative research methods in the high-tech industry is that we depend on the natural gregariousness of the high-tech entrepreneur, and the collaborative nature of the high-tech industry in Canada.

Having been a high-tech entrepreneur, and discussing the dissertation with other executives in the Canadian high-tech sector, I have learned to depend on the high-tech key employees sharing their experiences through this natural expansiveness found in the entrepreneur.

Jack and Anderson (1999), at Aberdeen University, found that "visiting entrepreneurs" enjoyed talking to students about their ventures; and government executives often interchange high-tech executives into the government in order to specifically capitalise on the executives' capacity to share experiences. I was myself; an executive brought into the government of Canada and was therefore tasked with bringing my experiences into government.

The wide variety of material (articles, public documents, financial filings, books, magazines, etc.) covering high-tech entrepreneurs in Canada and their easy accessibility makes this particular sectors a target-rich environment for qualitative research methods. This material forms the bulk of my research materiel in testing my tool and methodology; and is based on qualitative research-based questionnaires and interviews with both high-tech executives and public sector executives. Entrepreneurship, as it has been described in literature, is about creativity, innovation, leading-edge engineering, and market segment creation. (Aldrich and Martinez, 2001, McKenzie, 2007). Due to the subjective nature of this research method, and the already well-understood and well-defined use of qualitative methods in prediction of enterprises in the private

sector (Feint, Jeffcoate & Chappell, 2002) and (McKeown, 2010); in this dissertation I rely more on qualitative research, which focuses on understanding how people interpret company cultures, how they construct their worlds, how they interact in a positive, negative and destructive way with the enterprise and the marketplace.

I have created a tool which takes the heretofore unexamined qualitative aspects of high-tech enterprises, and puts them into a simple tool allowing the public decision-maker to quantify a score. I evaluate and review available documentation on the enterprise to be studied, and answer a number of qualitative questions on each of the 10 dimensions.

In this dissertation, the tool and methodology meets Yin's (2009) criteria for case studies:

- a) The research question is of the how-and-why nature (“How do decision makers develop enough qualitative knowledge of an enterprise to make a decision”, and “Why do enterprises fail, and why do we provide funding to failing companies”).
- b) The use of the tool and methodology has no control or influence over the enterprise.
- c) The need for public policy-makers to make decisions to fund and offer grants to high-tech enterprises and sectors exist all over the world in the public sectors of many countries, and are highly relevant to present-day governance.

## **1.2 Case Selection and Data Collection**

After proposing the research question, I selected the units of analysis (the bounded systems), which in this study are the 10 individual dimensions of the enterprise to be reviewed. And within those dimensions a further set of specific 1-10 answerable questions. The case study research method does not follow

specific data-collection methods in a qualitative-like fashion, but more appropriate to our case, focuses on description and explanation.

When choosing the test case, it was critical to select an enterprise which was not only well-understood, but also had a large volume of easily available data, material, writings, and easily accessed executives. The opportunity to develop a solid starting place to start to develop a body of new knowledge is of critical importance.

It is a fact that researchers and academics need to start from a well-understood point to then continue on to develop an ever-increasing body of knowledge, to start to test the hypothesis and determine if conclusions or estimates can be extrapolated from the data.

As Yin stated, the process of replication is essential to allow the experiment to become a robust source of data for researchers. (Yin, 2009, p.54). In this case – we need to start from a point in time well enough understood to test the hypothesis, and to start the collection of empirical data. For the purposes of this tool and methodology, multiple runs through the tool with multiple companies are treatable as experiments as defined by Yin.

My test case was carefully selected so that it could be used to predict a result; and that result could then be tested and examined against the known outcome. To select the case, I used the “purposeful sampling” method.

### **3.3 Selecting companies for failure**

The process of selecting a company which has failed to use as a case study for the research, development and refinement of the tool is a two-phased process requiring: firstly, a selection of the company; and secondly, a scan of the available information on the company through interviews, publicly-available documentation and other reference material.

Blackberry (Research in Motion (RIM)) was an obvious choice as the company has not yet failed, but its decline has been startling and obvious: in 6 years they went from the dominant smartphone player to a 2nd tier player. How did this happen? Could it have been predicted? And most importantly was there a systematic and intelligent approach to the assistance the Canadian government and Canadian taxpayers provided to Research in Motion / Blackberry over the decade. The other aspect of analysing BlackBerry is that there are many publicly available documents for the company, and much analysis of the company's internal structures is easily accessible. This information is vital in preparing analysis using the tool.

The tool asks questions of the 10 dimensions under review for the company, but the responses need to be well-informed and based on fact, as described above in the section on research methodology and context.

## **4. CONDUCT OF RESEARCH AND RESULTS**

### **4.1 Defining the new methodology**

The methodology to be defined to exercise the model and tool is a very straightforward one. It is designed to prepare literature and responses to our questions in the dimensional analysis and the model.

#### **4.1.1. Selecting the company.**

This step requires the researcher or policy analyst to determine which company within which industry is to be analysed. Often for the policy analyst, this is determined by the senior executives in the ministry or department; but sometimes this is left up to the discretion of the analyst.

In the Canadian context, sometimes an entire industry will be analysed.

#### **4.1.2. Selecting the pair-bond**

The first step in our methodology is to determine into which pair-bond the company to be examined is being

#### **4.1.3. Gathering the research.**

As in the case of RIM, in most cases there is a great deal of public literature available on the company. Such documents as:

1. Interviews with executives (past and present)
2. Interviews with public policy makers
3. Reviews of Annual reports and quarterly filings in both the TSX and the NYSE
4. Annual meeting minutes
5. Teleconferences with CEO and COO
6. The Annual financial analyst teleconference
7. Meetings with clients of the company in the public sector
8. Meetings with other industry workers

If the company being analysed is well known, then there may be written literature it as well. Often strategic sector companies have books written about them, or case studies are available at business schools.

#### **4.1.4. Answering the questions.**

For each of the 91 questions, an answer must be prepared. It requires both research as well as knowledge of the company and the questions. During an interview with a junior level analyst, the questions were found to be quite intuitive.

The analyst will need to qualitatively judge the response both on the research and on his/her knowledge of the other companies in the industry being examined.

#### **4.1.5. Entering the data**

Into the tool, the analyst needs only to enter their qualitative judgement based on research in each of the 91 areas. Each dimension and sub-question is to be evaluated on a simple Likert scale of 1-10: one being an extremely negative answer, and 10 being a completely positive answer.

#### **4.1.6. Changing the weightings**

The tool is designed to allow the public policy analyst to change the weighting as the model matures, and more information about a particular sector is available. In our initial run of the methodology and model, we have specifically weighted at the neutral end of the scale.

#### **4.1.7. Interpreting the results**

The results of the analysis will appear on a summary slide at the beginning of the tool. The resulting score from 1-10 can be interpreted as follows:

1-4: Likelihood of failure

5-6: Likelihood of stagnation

7-10: Likelihood of Growth and Sustainability

### **4.2 Running the model with our selected case**

In this dissertation, I have chosen to analyse RIM/Blackberry. It is an easily identified organisation, and it is well enough known internationally to remain relevant to the reader. It also has sufficient public documents outlining the company and the marketplace that detailed research is not needed beyond public documents and some reference literature (see References and end-notes). In order to “run” the model, it is first necessary to identify the pair-bond into which we will place the enterprise. In order to do that, some rudimentary analysis of the market place and the company is necessary. Easily found documentation on the marketplace can be used for that part of the pair-bond, and public documents, newspapers, interviews, etc., can provide the information for the second part of the pair-bond

### **4.3 Analysing the company**

The ultimate goal of the research objectives was to answer the research questions. It is known that data collecting methods can affect the quality, quantity, adequacy and relevance of the research – therefore the overall quality of the research (Pawar, 2004). Interestingly, data collection methods are used in both quantitative and qualitative approaches to research. The methods selected are based on the chosen research approach and may include in-depth interviews, group interviews, observations, survey research and case studies, which often use interviews or questionnaires combined with documentary research. Data collection can also incorporate secondary data such as organizational documentation. To be successful in any data collection undertaken, the researcher must clearly understand the objectives of the data collection.

Use of this tool requires both qualitative and quantitative approaches to research.

### **4.4 Analysis and results**

#### **4.4.1 Dimensions**

Once the enterprise to be analysed is placed on the pair-bond landscape, it is necessary to “complicate” the model through the addition of dimensional factors which impact the company’s likelihood of success. For instance – if research shows that a company in a mature marketplace needs to have a particular approach to strategy-making and the company being analysed does not exhibit this behaviour, and then one can posit that the likelihood of success in this area is below 50% on a simple Likert scale. Depending on the market type (high-tech in our case), the weight of this dimension may be higher or lower as seen in the spreadsheet tool.

#### **4.4.2 Dimension 1 – Human Resources (HR)**

Research shows that HR is one of the more important aspects of a company. In our case study (Blackberry in the high-tech marketplace) we can see that HR implies how human resources are managed effectively to the company bottom-line. In my case study, Blackberry had fairly strong HR processes in place in the early 2000s, and with the exception of the two co-CEOs, the company exhibited a professional HR regime, one which would be expected at a mature company-mature market pair-bond. The company scores a solid 8/10 in this area.

#### **4.4.3 Dimension 2 – leadership and culture**

Research shows that new companies need inspirational, quick and nimble leadership. Resources need to be attracted; proselytising to stakeholders and early adopters takes precedence over rigidity. In our case study, Blackberry had a cowboy mentality (witness the senior executives drunk on a plane, and forced to leave), and a very administratively-weak leadership. Leadership was shared amongst two “co-CEOs” (itself a structure not well understood or successful), and these two leaders, who were not in fact strong leaders, were not focused on business and were seen as indulging their personal interests – Hockey and Physics. The company scores 4/10 in this area.

#### **4.4.4 Dimension 3 – Quality Control**

Quality Control is a dimension which varies with both the market and the company. Its variance is as one would expect – new companies and new markets in the high-tech sector are not driven by quality. In fact, stakeholders in the markets and companies reward innovation and the rush to adopt. The so-called “early-adopters” are not interested in quality at all, and are often satisfied to have the latest technology, and to learn how to adapt their own companies to respond to new technology innovations.

In this case – Blackberry rushed to purchase QNX, rushed the new operating system into market, and rushed the Q10 and Z10 products. They ended up delaying the release of the product due to quality issues. Although they did not release an inferior product, their own internal quality and production cycles were out of alignment significantly. The company scores a 5/10 in this area.

#### **4.4.5 Dimension 4 - Creativity and Innovation**

Creativity and innovation vary wildly as the marketplace and the enterprise changes. In a new marketplace – innovation can come from anywhere and any stakeholder, but as a market matures, there is far less exchange of innovation and ideas between companies and stakeholders until at market maturity creativity in a company is zealously-guarded and protected.

In the case of Blackberry – they were an extremely innovative organisation in the early market and as the company grew – in fact their use of the Mobitext paging system to send and receive text messages was innovative, but adding in the Blackberry keyboard to allow for simple two ways messaging in the 1980s and early 1990s was extremely innovative. By the year 2006 when iPhones were introduced, the company was reduced to innovating within production processes, and adding in refinements to the existing product base. They had a bit of a “me too” innovation focus – e.g., touch screens, app stores, etc. Although the organisation had lost market and competitor intelligence, it can be acknowledged that the innovation part of the company was still present – when presented with an idea or concept that the customers wanted, the innovation team did figure out new creative ways to deliver it. The innovation function was diluted throughout the enterprise though, which reduced their innovative “index” somewhat. None the less – Blackberry scored reasonably well in this area – scoring close to a solid 8

#### **4.4.6 Dimension 5 - Supply chain management**

Supply Chains, like other dimensions, vary widely across the development of marketplaces and companies. Blackberry is a solid supply chain manager – they have not had problems sourcing components – their problems lie in the fact that what they purchase, integrate and sell is not wanted by consumers. Blackberry scores a solid 7 in this area

#### **4.4.7 Dimension 6 - Stakeholder management**

Stakeholder management is a dimension which varies with the marketplace and company maturity. Research shows that the focus of primary and secondary stakeholders vary with the development and evolution of a company. What is critical at all stages is to manage the stakeholders effectively, to have a good idea as to who they are, and their expectations, and lastly, to ensure that reaching out to stakeholders is done in an effective and systematic way. In this case, Blackberry completely lost sight of one of their primary set of market stakeholders – competitors. Their stakeholder management team did not put into place a regime designed to manage this stakeholder, and they lost sight of competitor analysis – while they focussed only on iPhone and Apple, the second-wave smartphone developers (Samsung, HTC and LG, and Google itself with the Nexus phone) snuck in with a new operating system, new applications, and higher quality phones. The stakeholder regime also lost sight of the investor's needs, and did not manage the expectations of the investment and debt community. BlackBerry was left flat-footed due to a lack of management of stakeholders. The company scores a 4/10 in this area.

#### **4.4.8 Dimension 7 - Financial and incentive management**

Financial and incentive management changes as company and market changes as well. In fact – very often, employees will defer their incentive payments or

re-invest them into the company only so they can see the company in which they have invested emotionally grow faster.

In the Blackberry case – their pay and incentive schemes were poorly designed. They continued to reward the early investors, and key employees were in a sense, shut out of the money. Blackberry forgot to map the general characteristics of the requirements for the different incentive schemes depending upon where the firm was in its market evolution. They did not relate the strategic design factors of their incentive schemes to the type of employee, and the specific incentives were not tailored to improve the company's strategic position. For an innovation-based company, they also made a cardinal mistake – they forgot the team components of compensation and forgot to adequately compensate innovation. They scored a 5/10 in this category:

#### **4.4.9 Dimension 8 - Marketing Management**

Marketing management is closely tied to stakeholder management, as the external stakeholders are often contacted primarily through the marketing and market intelligence team.

In the case of Blackberry – they were definitely in a mature marketplace and were a mature company – they had a product that consumers wanted and prior to 2006 they were, in essence the market-makers. However, at maturity, the marketing function is primarily that of market intelligence, market management, and competitor intelligence. Innovations in marketing techniques are not necessary – the consumers wanted the Blackberry product. Blackberry should have known that Samsung, HTC and Apple were innovating, and they should have known what was being introduced to the marketplace. Consumers were clearly demanding a higher level of interaction with the smartphone, and this was not brought back to the company headquarters and product development. There was a clear failure of marketing management and intelligence, and as a consequence, Blackberry was caught flat footed.

#### **4.4.10 Dimension 9 - Decision Making Structures**

The market lifecycle plays an important role in defining the type and frequency of decisions that must be made. An immature firm accepts that only some of its decisions will create significant payoffs, hence it follows a constant focusing and refocusing of information search modes within the market to find the big payoff. The failure risks with any given decision are relatively small. It is the portfolio of decision-making that has a high expected value. Once the firm graduates to corporate status, time is needed to make the right decision. Only a few strategic options may be available and any given option has high implementation costs. The risk of failure leads to significant write-offs of corporate assets. In the case of Blackberry they generally made good decisions until the trend of bad decision-making in the late 2000s. In fact, they really only fell down in the area of production decisions and marketing decisions. As a consequence, Blackberry scored a 6.2 in this area.

#### **4.4.11 Dimension 10 - Strategic Importance of the sector/enterprise**

The strategic importance of a sector or an enterprise is a component of the “nationality” of a company, how much the public sector supports it and the degree to which the country sees it as a sector or company of strategic importance. Blackberry can be seen as a member of a strategic sector in Canada, and is recognised as a “Canadian” success story. It can be anticipated that the government of the day will take an interest in the success or failure of the company, and in the messaging that a failure will send to the world. The company scores a solid 7 in this area.

## **5. CONCLUSION & RECOMMENDATIONS**

### **5.1 Testing our tool and methodology with a second case**

In order to confirm the results of the test case, I decided to run another company through the process. Again, it needed to be in the correct industry, it needed to

have a great deal of public information available, I needed to have access to executives and former executives of the company, and I needed to be able to connect the results of the tool with the results observed either today or at a particular point in time.

For comparison purposes as well, I needed to be able to ensure that the company received or was receiving public funds in some way, and that, ideally, the company was in a **more successful posture** to ensure that the tool would be predicting a clear success.

To this end, I selected CGI – a large Canadian high tech services company – known around the world as an outsourcing and mergers and acquisitions expert in the high tech industry.

Unlike our test case in the previous chapter, I will not delve in to the rationale behind the assignment of the numbers in each sheet of the tool, I will merely point out that they are based on research conducted:

1. Through interviews with executives (past and present)
2. Through interviews with public policy makers
3. Reviews of Annual reports and quarterly filings in both the TSX and the NYSE
4. Annual meeting minutes
5. Teleconferences with CEO and COO
6. The Annual financial analyst teleconference
7. Meetings with clients of the company in the public sector
8. Meetings with other industry workers

## **5.2 Results in Summary - RIM**

As indicated previously, the tool itself guides the analyst in the completion of a series of questions designed to probe 91 aspects of the company from a

qualitative perspective, and based on the research conducted by the analyst on the company. Summary sheet from the tool:

Company Name	BlackBerry Inc.
Pair-Bond	Mature-Mature
HR Score	8.395061728
Leadership Score	4.407407407
Quality Score	5.20661157
Creativity	7.777777778
Supply Chain	7.530864198
Stakeholder Management	4.148148148
Incentives	5.111111111
Marketing	5.571428571
Decision making	6.296296296
Strategic Sector	7.3125
Final Score	6.175720681
0-4 Strong likelihood of failure 5-6 Likelihood of failure 7-10 Increasing likelihood of success	

Figure 4. Summary Page from Tool (Author's Construction)

The data are entered into the tool in individual sheets which provide a weighted score out of 10 and are then transferred to a summary sheet where the scores are shown as a total value out of ten for the company.

The tool is predicting a **lukewarm success with a potential to fail**. It is showing that the company is strong in their Human Resource management, creativity and supply chain management, but is poor at leadership and stakeholder management. **The tool is predicting limited success – and this is exactly where Blackberry is today.**

They have lost market share, their leadership was vilified in the press, and although their product is seen as creative and of good quality – it is also seen as not producing what the consumer wants. They have lost their stranglehold on the marketplace, and other competitors are seen as more innovative. Blackberry is today entrenching their product in the business marketplace segment, and is placing more and more emphasis on software and services.

If the tool were being used by government analysts to determine if Blackberry was a good candidate for additional funding and attention, the analyst would have to conclude that **Blackberry is no longer a strong player, and government funds could be better placed elsewhere.**

### 5.3 Results in Summary for CGI



Figure 53 - Summary Page - CGI (Author's Construction)

As indicated previously, the tool itself guides the analyst in the completion of a series of questions designed to probe 91 aspects of the company from a qualitative perspective, and based on the research conducted by the analyst on the company.

The data are entered into the tool in individual sheets which provide a weighted score out of 10 and are then transferred to a summary sheet where the scores are shown as a total value out of ten for the company.

The results are quite accurate in an historical context and in today's market view of CGI.

The tool is predicting a success with little potential to fail. It is showing that the company is strong in almost all qualitative aspects we measured.

This is where CGI is today. They are widely regarded as a mergers and acquisitions specialist with a growing confidence in the financial analysts view. Not only have they not lost market share, but their leadership is widely acknowledged in the press as being highly focused and motivated to success in the industry.

If the tool were being used by government analysts to determine if CGI is a good candidate for additional funding and attention, the analyst would have to conclude that CGI is a strong player, and government funds could be certainly passed on to CGI.

The numerical analysis bears this out as well, as CGI is almost without exception regarded as a "Strong Buy" in the marketplace.

Again, note that the tool appears to be best utilised **in both** a quantitative and qualitative context.

The ultimate decision to transfer assistance to an enterprise remains the purview of elected representatives, and as such, it remains the responsibility of these representatives to select and identify strategic sectors and enterprises.

#### **5.4 A return to the original research questions**

So, we return to the original questions asked in the proposition:

Q: Can a tool be developed to improve the prediction of failure (and success) of a firm in the Canadian high-tech sector?

A: Yes, a tool can be developed to improve the capability of predicting failure in a firm, or if, by extension, a public sector should make an investment in the firm; or perhaps the degree to which it should make the investment.

Q: Can this tool be flexible enough to encompass further dimensions as they are postulated, researched and added?

A: The tool can have additional dimensions added as further research is made, and if different marketplaces are introduced, more dimensions can be added. For example, in the mining sector – whether or not exploration initiatives are being made and the efficacy of the exploration would be new dimensions to be added to the tool – along with subordinate questions for this particular dimension.

Q: In a Case Study, can the tool accurately predict the failure of a company?

A: The detailed information researched on the company selected for analysis was input to the tool, and the resulting output showed that the company would probably succeed, but would only *marginally* succeed. This is proven out in reality.

Q: Could the Canadian federal government apply such a tool and how?

A: The Canadian federal government could apply such a tool – however, their methodology of transferring funds would have to change from a broad tax-credit / sectorial focus to a more narrow enterprise-targeted focus. Some of the programmes (see next section) *are* targeted at individual companies, and those would be programmes which could use the tool. Interviews with civil servants indicate that this tool would be a valuable addition to their analysis, decision making and recommendation processes.

## **5.5 Observations of the use of the tool in the public sector space.**

The tool, with its analysis of orthogonal dimensions connected to a simple Likert scale provides an opportunity to determine how it could be used in a public sector context.

In interviews with policy analysts and economic analysts in the public service, the primary responses were positive – many felt that this would be a tool mostly used in briefing and providing analysis on strategic sectors and companies to senior bureaucrats.

As a senior bureaucrat, myself, and after consulting with other senior public servants at the high executive levels, we note that presentation of the results of this tool would have the following positive effects on the decision making process. Inevitably, better information will result in better decision making. It is in this respect, that executives are eager to have new tools available when making decisions on how best to fund and assist sectors in the national economy, and bring additional intrinsic value to the international perception of a country's place in the world.

Determining which sectors are of strategic importance to a country is a long process involving many factors. However executives note that selection includes analysis of the number of companies in the sector which have a reasonable chance of success, or a number of companies in the middle ground needing assistance to improve.

Industry Canada and Finance Canada – two of the departments at the federal level most populated with economists are always looking to determine the efficacy of their policies on strategic sectors. Too often, they turn to econometric models based on well-established quantitative figures. They remark that a need exists to extend their models to the usage of qualitative metrics, but that often qualitative and quantitative metrics cannot coexist easily in their models.

After review of the tool, they feel that this may provide that connection, but that they will need to determine the weighting factors in each of the orthogonal dimensions. They agree with the author that some dimensions are common to many sectors, but that there are additional dimensions which may only be applicable to certain sectors.

For instance, in discussions with executives in the Department of Natural Resources, their mining and forestry experts felt that there is a need to create dimensions for exploration or resources, exploitation of resources, test-drilling methodologies, etc.

This tool provides an extra set of “eyes” on companies and their potential to succeed.

In a Canadian context, though, it is only specialised times when governments make a decision to directly interact in a single company, although it does happen – e.g. Radarsat in British Columbia, Royal Bank of Canada merger denial, et cetera.

One of the primary observations on the use of the tool in the Canadian public sector is that legislation may need to be changed to allow governments (federal and provincial) to directly target companies.

At the present time, most governments target a sector – for instance, the federal government targets the High tech sector, the provincial government targets the auto industry, municipalities target the tourism sector, etc. In this scenario the tool provides some value added to the decision making process in that economists and executives can get a “feel” for how many companies in the sector will be positively impacted.

Many senior executives caution that making legislative changes to how a government targets a sector is a lengthy process, and is often a tool elected officials use to ensure that all regions of the country (sometimes their own elected region) receives public funds to improve industry in that area.

A key observation on using the tool in a sector tax credit-based funding mechanism is that the tool will likely only be useful in making predictions on the broader base of companies active in that sector. This is useful, but not necessarily a focussed decision making tool.

Where the tool is of most use, and where there is a clear gap in the public sector landscape is in the targeted programmes. For instance an executive in the National Research Council of Canada and an executive in the Natural Sciences and Engineering Research Council of Canada have both indicated that they need this tool to allow them to better evaluate granting decisions.

In one unnamed case public monies were granted to a firm in the high tech sector which had very positive quantitative figures. The executive noted that if the tool had been available to the determining analysts, information may have been made available to decline the grant, and when the company became insolvent the public funds would not have disappeared.

Another observation on using the tool in the public context is that it will need to be injected into the decision making process. This could have the unfortunate effect of lengthening the decision making time. It does, however, provide more information to the decision makers, so as a trade-off most bureaucrats would prefer information over timeliness. Especially when dealing with taxpayers funds.

The information gathering parts of the tool are another area of interest for the public sector. In fact, many of the organisations requesting targeted funds from are publicly traded firms looking for additional investments to research innovation. There is much information available on publicly traded firms, and their annual reports in Canada provide many of the orthogonal dimensions root information. However, in the cases where the applying enterprises are not publicly traded, some of the foundational information may not be available

To this end, we observe that information required to process an application may need to be amended to also include elements of the orthogonal dimensions in the tool.

This will not be onerous on the company, and in fact, as pointed out by one executive, proper stewardship of public funds should include asking any appropriate question the decision maker determines is necessary.

There is no reason why a company applying for public monies should not have to provide detailed information on their organisation structures, their HR regimes, their incentive schemes, their supply chain management, their corporate culture, their innovation structures, et cetera.

## **5.6 New Scientific Findings**

To summarise the new scientific results arising from my dissertation, we have derived new findings in 5 major areas:

### **5.6.1 Methodology**

The methodology is entirely new, we have proven that a methodological approach (never before codified) can analyse and recommend the likelihood of a company to succeed, stagnate or fail in the Canadian marketplace as a tool for public policy makers.

### **5.6.2 Research**

We have proven that a collected body of work on qualitative analysis of a company in terms of its potential to fail or succeed does not exist in concert with a methodology and tool. This dissertation provides the start of a body of knowledge in qualitative analysts of likelihood of success and failure in the Canadian marketplace.

### **5.6.3 Metrics**

I have proven that the proposition of 91 metrics being gathered into a single collated result for policy makers can enhance public policy economist's decision making processes.

### **5.6.4 Model**

With the help of a Likert scale I have proven that a qualitative dimensional-based model to collect and integrate qualitative aspects of a company in the high tech sector can be used as an accurate predictor of probability of success and failure independent of quantitative models.

### **5.6.5 Tool for Public Policy**

With the help of the above-referenced model and toolset, I have shown that public policy makers and financial executives can improve their capacity to decide on to which companies they should be granting funds, defining new strategic sectors, or declining to assist.

## Publications specific to the Dissertation

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19. Project Management Institute – Ottawa National Symposium  
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[http://www.pmioc.org/index.php?option=com\\_content&view=article&id=282:symposium-2013-keynote-speakers&catid=79:events](http://www.pmioc.org/index.php?option=com_content&view=article&id=282:symposium-2013-keynote-speakers&catid=79:events)