

Professional Perspectives on the Development of Canada's Oil Sands:
An Application of Q Methodology

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Abstract:

Despite the economic benefits generated by the development of Canada's oil sands, the controversy over the sector has been substantial. Given the influential role stakeholder perspectives plays in the economic future of the industry and its related policy decisions, a systematic study was conducted. Using Q Methodology, a selected group of individuals from a variety of professionals engaged in oil sands development through their work were interviewed. The use of factor analysis reveals three perspective groups, and allows us to identify areas of consensus and contention. The results are discussed in the context of the future economic viability and growth of the oil sands sector.

Keywords:

Q Methodology, factor analysis, oil sands development, economic policy, perspectives.

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1) INTRODUCTION

The oil sands industry is a major contributor to the Canadian economy, and the development of the resource is the largest energy project currently on earth (Mech, 2011). Regulatory frameworks coupled with increasing demand for fuel in the early 1990's created the right conditions to make the industry economically viable. Since then, the speed and scope of oil sands development has greatly accelerated (Woynillowicz, 2005). Today, the oil sands impact Canada's economy extensively. The industry contributed \$91 billion to the Canadian economy in 2012, accounts for 22% of Alberta's GDP, generates over \$3.5 billion in royalties annually, employs half a million people, has raised \$28 billion in revenue to governments in Canada, and attracted billions in investment (IHS CERSA, 2014; Government of Alberta, 2014).

Despite these economic benefits, management of the oil sands boom has been controversial. Effects from the extraction, transportation, and sale of the commodity have environmental, political, social, health, economic, and national dimensions. Due to these impacts, groups and organizations are campaigning for their interests to be protected, often putting competing interests at odds. According to the Institute of Energy Economics and Financial Analysis, "anti-tar sands campaigns" have cost oil sands producers \$17 billion in lost revenue as the result of delays or cancellation in development projects (IEEFA & OCI, 2014). These tensions have caused some to question the future viability of the oil sands industry.

This paper is interested in exploring the nature of the debate over oil sands development, and how perspectives on the effects of development impact the economic potential of this natural resource. To do so, we use Q Methodology to systematically study the perspectives of various professions involved in the oil sands on issues that are central to the oil sands conversation. Using factor analysis, we identify perspective groups amongst the professionals and areas of agreement and disagreement between the groups.

By revealing and explaining perspective groups amongst the oil sands professionals, this study provides an alternative to the stark "for" versus "against" development narrative

that is portrayed in the media, with descriptions of perspectives groups that are nuanced. The study also identifies areas of consensus and contention on policy issues that require decisions in order to ensure the future viability of the oil sands industry while also reducing unproductive lobbying¹ costs.

This is a novel study. Polling data has been collected from the Canadian public and specific stakeholder groups on a variety of issues related to oil sands development (Angus Reid Global, 2014; Linnitt, 2014; CAPP, 2011).² Q Methodology studies have been completed on a various economic topics and policy dialogue themes including health economics (Baker R. T., 2006), energy options (Cuppen, 2010), economic decision making (Grunig, 1971), resource management (Kangas, 2010), risk perceptions for innovation investing (Babcock-Lumish, 2005), rationality, economic growth (Clarke, 1990), and local employment and trading systems (Barry & Proops, 2000).

Q methodology was used to design the data collection process, and factor analysis is used as the statistical method to generate the results. The result is a unique dataset collected throughout the summer and fall of 2014 and corresponding output. This research hopes to contribute to the Q Methodology body of research and provide an analysis of perspectives of those professionally involved the development of the industry that is shaping Canada.

In terms of layout, the first section provided an introduction to the topic and research. Going forward, Section 2 sets the context of the controversy surrounding oil sands development and a brief discussion of how the different viewpoints affect the economics of the oil sands industry. Section 3 is an explanation of Q Methodology and Factor Analysis, along with the corresponding specifics for this study. Section 4 contains the results of the data analysis. In Section 5, implications and applications from the findings are considered. The paper is concluded by the discussion in Section 6.

¹ The term “lobbying” is used to cover all efforts intended to influence the actions of officials (beyond purely legislative)

² A mere few examples of research are listed and not meant to serve as an exhaustive list of all research done on opinions and perspectives on the development of Canada’s oil sands.

2) CONTEXT

The development of the oil sands is frequently a topic of news headlines in Canada and abroad (Hoberg, 2012; Paskey, 2012; Way, 2011). While this industry is multi-dimensional and its' growth has a wide range of implications for Canada, the media often reduces the conversation to a "for" and "against" development narrative (Berman, 2014), (Belick, 2014). Some examples of this are:

"...The conversation about the costs and benefits of Alberta's oil industry has never been more divisive, never more visible nor more heated. Never have the oil sands been more thunderously championed nor more widely denounced..." (Turner, 2012)

"...the controversy surrounding Canada's most contested energy endeavour. While government and industry use the term "oilsands," environmentalists prefer "tarsands." The term "toilsands" captures elements of both perspectives." (Scharper , 2014)

"...(the controversy) creates a stalemate between resource extraction enthusiasts and environmental purists... This draconian assessment leaves little room for actual dialogue... if one finds themselves in the middle of the polarization bridge they feel too ill-informed to be effectively engaged and cannot disseminate truth from myth..." (Belick, 2014)

"... how important it is for us to overcome the 'taking sides' attitude over oil sands, pipelines and climate change that has taken root in our country and find ways to create real conversations about solutions to some of the greatest challenges of our age..." (Berman, 2014)

Oversimplifying a complex issue is a common habit of the media (DiFrancesco, 2011; Tran, 2014). This one-dimensional characterization occurs for a variety of reasons. To start, the media has economic incentives to cater to their target audience's political

leanings thus often focusing on one dimension of a topic (McCluskey, 2012). As well, ‘traditional’ journalists values of fairness and balance mean journalists incorporate two views for one issue, often selecting extremes from each side in hopes the net result will be a balanced portrayal. Special interest and advocacy groups involved in oil sands development may “push polarization” in pursuit of increasing public support for their goals (McCluskey, 2012).

This type of coverage negatively effects the economic opportunities presented by the oil sands, with disagreement bringing the policy-making processes to a standstill. Given the location and geological make-up of the oils sands, they are considered an “unconventional” type of oil and require the perfect combination of regularly and economic conditions to succeed as an industry. In particular, transportation routes for refinement and export of the commodity are essential to the sector’s growth (IEEFA & OCI, 2014). Opposition efforts have delayed or even caused cancellations of pipelines, extraction projects, and related infrastructure construction. With the economic viability of the oil sands already being precarious, disruptions to company timelines or investor confidence can quickly erode profitability (Munson, 2014). Thus, understanding perspectives of those professionally engaged in the oil sands is crucial when considering the future potential of the industry, and provides the motivation for this study.

3A) Q METHODOLOGY

Q Methodology³ provides a systematic way to characterize “human subjectivity”. It seeks “underlying patterns or meanings” from text (Danielson et al, 2009) by utilizing both qualitative and quantitative research techniques to systematically study perspectives. William Stephenson developed Q methodology in 1935 and today, Steven Brown with Kent State University serves as an expert to those using the methodology. Originally development for use in psychology, Q Methodology has since been applied other fields

³ The following section on Q Methodology draws from best practices provided by Q methodology guides (Brown, Durning & Selden, 2008) (Brown S. R., 1980) (Addams & Proops, 2000) (de Graaf & van Exel, 2005) and academic papers using the methodology as examples such as (Cuppen, 2010) (Bergsma, Matthews, Nijnik, & Nijnik, 2014) (Clarke, 1990) (Cuppen, 2010) (Dasgupta & Vira, 2005) (Davies & Hodge, 2007) (Focht & Lawler, 2000) (Kangas, 2010).

where social perspectives are relevant, including economics, political science and public policy (Brown S. R., 1980).

As Q Methodology seeks an in-depth understanding of a person's view on a topic, a small sample of individuals knowledgeable on the issue provide insightful results. The methodology identifies the perspectives that exist on the subject of study without determining "how those subjectivities are distributed across the population" (Brown, Durning & Selden, 2008). This differs from R methodologies which seek to understand a population, and thus require a large enough sample to represent that larger population (Brown, Durning & Selden, 2008). Replicability is the important reliability test for Q methodology, while generalization of the sample to a larger population is of lesser importance. Test-retest reliability of Q studies have ranged from 0.80 and up, according to work by Brown (1980). A small, well constructed sample can generate perspectives on a topic, because an important assumption behind Q methodology is that a limited number of viewpoints exist on any subject (Nicholas, 2011).⁴

In short, Q methodology uses quantitative data to find pattern by using correlation and factor analysis to group viewpoints based on the arrangement of statements, as opposed to by traits (ie age, gender, profession, etc). Selected individuals rank-order a list of statement cards onto a bell-shaped grid according to their opinions on the statement. The grid's spectrum of 'most agree' (+4) to 'most disagree' (-4) is shadowed by a force distribution, limiting the number of cards for each column with less on the extremes (see Figure 1 in the Appendix). Each person's final grid (a 'Q sort') is translated numerically with each statement card corresponding to a number. Upon aggregating the Q Sorts electronically, factor analysis is used to find clusters of participants with similar sorts thus sharing similar views. These clusters, or 'factors' represents trends in the data (Brown, Durning & Selden, 2008).

⁴ For a in-depth discussion for the reliability of *Q Methodology*, please read *Reliability in Q Methodology: A Case Study* by Nicholas, 2011.

Q Methodology differs from the commonly used R methodologies, where data is normally organized in a $P \times Q$ matrix \mathbf{X} with P columns corresponding to the respondent $p=(1,2\dots P)$ and Q rows corresponding to the observed variable. In other words, the statements are the dependent variables and the sorters are the independent variables (Brown, Durning & Selden, 2008). In Q Methodology, \mathbf{X} is transposed to \mathbf{X}' and factor analysis is applied to the variance-covariance matrix $\mathbf{Q}=\mathbf{X}\mathbf{X}'/Q$ to find factors representing Q Sorts with similar results (Kampen & Tamas, 2013).

However, the differences between typical 'R' methodology and Q methodology extend beyond the manipulation of the data matrix. In essence, variables in R methodology are objective and subject to cause-and-effect relationships while in Q methodology, variables are subjective and given value based on an individuals' opinion (Brown, Durning & Selden, 2008).

The Q methodology process can be organized into five main segments starting with the concourse phase, then identifying the sample and recruiting participants, collecting Q sorts, compiling the data, then using factor analysis to analyze the data to generate results (Brown, Durning & Selden, 2008). Each segment and this study's tailoring of the methodology are explained in turn:

1) "Concourse Phase": generating statements

The first step in Q methodology is to identify a "concourse" which is the range of views that currently exist on the topic of study. The statements collected for the concourse should be subjective, represent a range of perspectives, and cover the key issues associated with the topics. From the concourse a specific sample of statements are selected, which are called 'Q statements.' The ideal number of statements to use is up to the researcher. Best practices suggests having enough statements to adequately cover the topic of interest, while using a small enough number to ensure the Q sort process is not too onerous for the participants (Addams & Proops, 2000) (Brown S. , 1993) (de Graaf & van Exel, 2005).

Our Choices:

An assortment of online sources was drawn from to develop the discourse, including a spectrum of news providers (local, national, international), publications from organizations, and social media feeds. Keywords of topics of interest related to oil sands development were entered into Google and articles generated were considered for content. Specific sources include media providers like CBC News, The Financial Post, The Globe and Mail, BBC, New York Times, as well as industry sources such as Oil Sands Today and the Oil Sands Review, think tanks such as the Institute for Research on Public Policy, and environmental groups such as the David Suzuki Foundation. Quotes were pulled from these sources and entered into a spreadsheet. The statements were categorized as to what topic they focused on. During this process which spanned approximately one month, a local subject matter expert with extensive international and national experience on economic, environmental and public policy issues was consulted to ensure the statements covered the necessary issues. A total of 113 statements were selected for review and 44 were chosen to be included in the study.

II) Identifying the sample and recruiting participants

As previously mentioned, participants in Q methodology are specifically selected based on their knowledge on the subject matter. Thus, Q methodology targets specific individuals to create a sample. The number of Q participants considered sufficient for robust results ranges. Some researchers suggest a minimum of 10 participants, with 40 considered the upper bound. (Addams & Proops, 2000; Brown S. , 1993; Brown S. R., 1980; Cuppen, 2010; de Graaf & van Exel, 2005). Again, reliability tests have proven the replicability of the methodology, with individuals producing the almost the same Q sort at two different points in time. Thus using a small sample in Q Methodology studies results in reliable measures of subjectivity (Nicholas, 2011).

Our Choices:

Stakeholders of the development of Canada's oil sands could encompass almost anyone in Canada given the scope of the industry's impacts. However, people professionally engaged in the oil sands were targeted, with depth of knowledge specified as a

requirement for participants. Breadth of perspective was achieved by including a range of professions from a variety of industries in the study.

Throughout the recruitment and scheduling process, depth of knowledge and range of perspective were considered. We categorized participants based on their job title, and by asking them which profess they belonged to. Categories were then defined based on their information and how many people fit into general professional types.

Participants represented the following professional fields: researcher, advocacy, sustainability/environment, law, human resources, journalism, research and development, corporate social responsibility (CSR)/stakeholder relations, labourer, professor, management, sales and marketing, engineering, finance and accounting, economics and policy analysis. A breakdown of these categories is provided below as well as in the Appendix.

Table 1: Professional Breakdown of Sample

| PROFESSION | NUMBER |
|----------------------------|---------------|
| ADVOCACY | 4 |
| CSR/STAKEHOLDER RELATIONS | 2 |
| ECONOMICS | 1 |
| ENGINEERING | 2 |
| FINANCE AND ACCOUNTING | 2 |
| HUMAN RESOURCES | 1 |
| JOURNALISM | 1 |
| LABOURER | 1 |
| LAW | 2 |
| MANAGEMENT | 2 |
| POLICY ANALYSIS | 5 |
| PROFESSOR | 2 |
| RESEARCH AND DEVELOPMENT | 2 |
| RESEARCHER | 6 |
| SALES AND MARKETING | 2 |
| SUSTAINABILITY/ENVIRONMENT | 3 |
| <i>TOTAL</i> | <i>35</i> |

Participants work in a variety of organizations including think tanks, consultancies, provincial and federal governments, oil and gas service providers, oil and gas companies, non-governmental organizations (NGO's), media, industry and professional associations, financial institutions and academia. A breakdown of the organizational types is provided below as well as in the Appendix.

Table 2: Types of Organization Represented in the Sample

| ORGANIZATION TYPE | NUMBER |
|-----------------------------------|---------------|
| ACADEMIA | 6 |
| CONSULTING | 2 |
| FEDERAL GOVERNMENT | 4 |
| FINANCIAL INSTITUTION | 3 |
| INDUSTRY/PROFESSIONAL ASSOCIATION | 3 |
| MEDIA | 1 |
| NGO | 3 |
| OIL AND GAS | 6 |
| OIL AND GAS SERVICE PROVIDER | 4 |
| PROVINCIAL GOVERNMENT | 1 |
| THINK TANK | 5 |
| <i>TOTAL</i> | <i>38</i> |

These organizations span public and private institutions, as well as the non-profit and academic sectors, as per the breakdown below which is included in the Appendix.

Table 3: Sectors Represented in the Sample

| SECTOR | NUMBER |
|---------------|---------------|
| ACADEMIA | 7 |
| NON PROFIT | 9 |
| PRIVATE | 15 |
| PUBLIC | 7 |
| <i>TOTAL</i> | <i>38</i> |

It should be noted that the individual characteristics of the participants are generally unimportant in Q Methodology. What is of interest is the perspectives that exist within the group (Brown, Durning & Selden, 2008).

III) Collecting Q sorts

Prior to this stage, the statements selected are indeterminate, they have no value or significance, they are merely statements on cards (Almeida & Stricklin, 2004). In order to make these statements have statistical meaning, a person needs to sort them according to their values. Participants are asked to rank the Q statements on the Q sort grid according to their view. This process results in a linear ranking of statements with positive and negative scoring values for each card from the center of the grid. This process reveals the preferences in terms of which statements are of greater importance to the individual. This process also provides a numerical value to each statement, providing data which can then be analyzed by transforming the statements from an indeterminate to determinant state (Almeida & Stricklin, 2004)

Validity of each Q sort is not an issue as there is no criteria for correct or incorrect on an individual's perspective. Thus, a statement receiving a score of zero from different participants holds relatively equal value so means are also relatively equivalent, setting the conditions for calculating correlations between the Q sorts (Brown, 1980).

Our Choices

For this study, interviews were conducted in-person. Face-to-face data collection was selected over electronic methods in order to ensure sufficient communication of instructions as well as to ensure a high completion rate. Interviews occurred in Ottawa, Ontario as well as in Calgary and Edmonton, Alberta. The cities were selected based on their concentration of professionals working on oil sands related business and policy. Forty people were scheduled for interviews, with thirty-eight ultimately conducted due to two cancellations.

IV) Compiling the Data

The Q Sorts collected from the interviews are aggregated in order to perform factor analysis. The statement cards are assigned a number so a record of each Q Sort can be translated into a grid of numbers.

Our Choices

PCQ Soft was used to compile the data as the software is designed specifically to handle Q methodology data and can perform factor analysis.

3B) FACTOR ANALYSIS

Purpose

Factor analysis is used to find patterns in data by determining if a number of variables ($Y_1, Y_2, Y_3\dots$) of interest are linearly related to a smaller number of unobservable factors ($F_1, F_2, F_3\dots$). Regression analysis is inapplicable for this task because the underlying factors are unobservable at the outset. The process of determining these factors can be represented as:

$$Y_1 = \beta_{10} + \beta_{11}F_1 + \beta_{12}F_2 + e_1$$

Where Y is the variables (Q Sorts in this case), F are the underlying variables, and β are the *factor loadings* (how correlated Y is with F). It is assumed that the unobservable factors, F , are independent on one another, while the error terms are independent, and have zero correlation with the factors (Tryfos, 2001).

Factor Analysis applied to Q Methodology

Factor analysis examines patterns of correlations between data, which when applied to Q methodology are Q Sorts. Q Sorts that are highly correlated are influenced by the same factors (DeCoster, 1998). A handful of factors are identified which reflect similarities in the construction of Q sorts. These factors define the perspective groups amongst the participants (the term factor and perspective are used interchangeably going forward).

For this study, Exploratory Factor Analysis (EFA) was used. EFA studies the dimensionality of variables to find the smallest number of factors needed to explain the correlations. This is distinct from Confirmatory Factor Analysis (CFA) that studies how a hypothesized model fits a sample of variables (Pearce & Yong, 2013).

Step 1: Generate correlation matrix

Each sort entered into PCQ Soft is assigned a number based on when it was entered. Using the sort numbers, a correlation matrix is created. The matrix contains what are essentially correlation coefficients, which indicate the degree of correlation between each sort. This is a powerful tool because the values of the linear relationships between sorts can be compared directly (Almeida & Stricklin, 2004) and thus the correlation matrix provides the basis for the rest of the factor analysis (Pearce & Yong, 2013).

To determine what value of correlation coefficient is substantial, the standard error formula is used. If the coefficient exceeds $2.58(1/\sqrt{N})$, given $\sigma = 1/\sqrt{N}$, where N is the number of statements and 2.58 is the number of standard errors necessary to incorporate 99% of the area underneath the normal distribution curve. For our study, $\sigma = 1/\sqrt{44} = 0.15$ therefore $2.58(0.15) = 0.39$. This means that correlation coefficients below 0.39 indicate the two Q sorts share little in common (Brown, Burning & Selden, 2008).

Step 2: Extract Factors using the Centroid Method

Using the correlation matrix, factors among the data are found such that when those factors are extracted, no correlation between the pairs of sorts remains, suggesting the factors themselves account for the original correlation (Pearce & Yong, 2013). To extract the factors, the ‘centroid’ approach was used. The centroid approach provides “as a means to integration in an indeterministic framework by finding sorts which have the most in common” (Almeida & Stricklin, 2004). Another way to conceptualize the process is that the centroid approach defines centers of gravity embedded in the correlation matrix. The center of gravity is where weight tends to fall on average thus identifying sorts that have the most in common, represented as a vector that spans the longest dimension in the data space (Almeida & Stricklin, 2004).

Step 3: Varimax Factor Rotation

Extracted factors require rotation in order to become interpretable. Rotation matches as many variables (Q Sort) as possible with as few factors as possible while maximizing the amount of high loadings from each Q Sort. This process defines each factor by creating a

close cluster of correlation variables so the factor can be interpreted (Pearce & Yong, 2013).

There are two different ways to rotate factors: orthogonal and oblique. Orthogonal rotation moves the factors 90 degrees from one another because the factors are uncorrelated. Oblique rotation assumes factors are correlated and is more complex because it involves multiple coordinate systems (Pearce & Yong, 2013) (DeCoster J. , 1998). For this study, orthogonal route was taken, using the *varimax* form.

Varimax “seeks the rotated loadings that maximize the variance of the squared loadings for each factor” (Tryfos, 2001) in order to produce as few factors as possible (QPrimer). Mathematically, Varimax searches for linear combination of original factors so the variance of the loadings is maximized (Abdi ,2003) such that:

$$V = \sum (q_{y,f}^2 - q_{y,f}^{-2})$$

where $q_{y,f}^2$ is the squared loading of the y th variable on the f factor, and $q_{y,f}^{-2}$ is the mean of the squared loadings.

Step 4: Select factors for analysis

Once factors are created, “factor loadings” are computed based on how closely an individual’s perspective correlates with the factor. A factor loading is like a correlation coefficient, ranging from -1.00 through to +1.00, with higher values representing a Q Sort that is highly correlated with that factor (Valenta & Wigger, 1997).

Using the factor loadings, a “factor array” is generate through a procedure of weighted averaging – all Q Sorts that have factor loadings greater than a minimum specified significant level are combined and a ‘factor array’ is generated to show what an “average” sort for the factor looks like. Since factor loadings represent the correlation of each Q Sort with the factor, the significant level is calculated using the same formula as for correlation coefficients: $\sigma = 1/\sqrt{N}$, where N is the number of statements. For our

study, $\sigma = 1/\sqrt{44} = 0.15$, therefore when $p < 0.1$, then $2.58(0.15) = 0.39$ is the significance level for the factor loadings (Brown, Durning & Selden, 2008). Q Sorts that load significantly with two or more factors are considered “confounded” and removed from the weighted average calculation (Stenner & Watts, 2008).

The rotated factors are analyzed to determine the number of factors that represent the data. Typically in factor analysis, the first few factors explain the greatest amount of variation among the data and are thus the most useful to understand patterns. Choosing how many factors is sufficient to explain the data while ensuring each factor is strong enough to be legitimate requires considering two pieces of information: eigenvalues and the number of sorts with statistically significant factor loadings.

For statistical rigor, the amount of variance accounted for by each factor is considered. Eigenvalues express this information. Factors with an eigenvalues less than one are discarded. A “scree plot” is used to graph the eigenvalues on the vertical axis with the number of factors on the horizontal axis to show at what number of factors does the major drop in eigenvalue magnitude occur. Factors should be kept prior to the drop in eigenvalue size (DeCoster, 1998).

For interpretability, how many sorts are correlated with each factor above the minimum statistically significance level is considered. Expressed through the factor loadings, it is considered necessary in Q Methodology to have at least one sort load significantly with each factor, while most researchers require multiple sorts highly correlated in order to consider the factor interpretable.

Using the information identified and created, the process of factor analysis can be expressed mathematically in matrix notation as:

$$\mathbf{R} = \mathbf{PCP}' + \mathbf{U}^2$$

where R is the correlation matrix, P is the matrix of factor loadings (P' is the transpose of this matrix), C is the matrix of correlation between the factors, and \mathbf{U}^2 is the diagonal matrix (Pearce & Yong, 2013).

Our Choices

PQC Soft caps the number of factors extracted to nine. For this study, nine factors were initially extracted, rotated, and then considered. Based on the two criteria of interpretability and variance explained (expressed through eigenvalues), three factors were ultimately selected. The scree plot displays the eigenvalues successively decreasing with the number of factors selected. Factor extraction and rotation was then re-run using three factors only. The result of this process is considered the results of the study.

4) RESULTS

Introduction to the Three Perspectives

The factors extracted depict three unique perspectives (the term factor and perspective are used interchangeably). Collectively, the three factors explain 50% of the variance across all perspectives, with Factor A accounting for 26/50, Factor B for 17/50 and 7/50 for Factor C. Perspective A and B are the largest factors based on their respective eigenvalues of 10.06 and 6.51 and the portion of the variance explained.

Each perspective is described in turn. Descriptions are based on key pieces of information, namely the statements that were most agreed and disagreed with, the center column statements which are issues considered less important, and, how the perspective relates to the others. Given Q methodology seeks to study perspectives based on Q sorts, focus is placed on the results of the factor analysis rather than the participants who completed the sorts. After detailing each perspective, an analysis of the results and their applications will be discussed.

Perspective A: Economic Expansion Enthusiasts

This perspective most agrees that royalties are critical to Alberta's fiscal health, that improving port capacity - whether by pipeline or rail – to open the door to Asia's rapidly growing markets is in Canada's national interest, and that pipelines can transport oil safely. Perspective A most disagrees that tar sands are the dirtiest oil in the world, that the only truly ethical solution is to phase out oil, and that crude oil transportation has proven to be unsafe and should be stopped.

The level of agreement and the relative ranking of importance of the statements suggests Perspective A most values the economic opportunities of the oil sands. Infrastructure and transportation related to the future development of the oil sands is important to this group. Given the content of the statements in the -4, +4 and 0 columns, Perspective A is summarized as enthusiasts of oil sands development in light of the economic benefits.

Perspective A has the largest number of sorts correlated (15/31 sorts accounted for by the 3 factors) and explains 26% of the 50% of the variance extracted by the three factors. Factor loadings for sorts correlated with Perspective A were high compared with the other two perspectives, with an average loading of 0.71, maximum of 0.88, and minimum of 0.46.

Perspective B: Policy Change Supporters

Perspective B most agrees that a national carbon tax would help Canada transition from oil to less-polluting energy sources, that subsidies via tax breaks to the oil sands and the fossil fuel industry should be swapped for investments in clean energy technologies, and that pollution regulations in Canada are too lax. In terms of most disagree, Perspective B does not believe the need for energy outweighs the environmental risks of developing Alberta's oil sands, that there is no evidence between health issues in communities local to the oil sands and their development, and that royalty rates on oil sands production should be kept low in order to ensure sufficient profitability.

Based on the statements in the "most agree" column, this group is clearly concerned with the environmental impacts from oil sands development, and believes that policy instruments can assist in improving environmental protection and quality. Based on the content of the center column, Perspective B places economic considerations - mainly at the national level including inflation, currency valuation, labour supply and spillover effects from oil sands development - below other issues.

Perspective B had the second largest number of sorts contributing, with 15/31 sorts associated. This group provided 17% of the 50% variance explained by the extracted factors. Factor B had overall lower significance loadings for the sorts loading for the Perspective, with an average of 0.63, a maximum loading of 0.82 and minimum of 0.47.

Perspective C: The Nationalists

While Perspective C contains the smallest number of sorts, it provides an interesting, contrasting view in relation to the two larger, more united groups. This third perspective most agrees that Canadian oil refineries should prioritize Canadian crude over foreign sources even if trans-national transportation is required, toxic byproducts in the Athabasca River from tar sands extraction is putting First Nations communities and the fish they eat at risk, and that the oil sands provide employment for highly skilled workers. Perspective C most disagrees that the only truly ethical solution is to phase out oil, that the need for energy outweighs the environmental risk of developing the oil sands, and that there is no link between local health issues and oil sands development.

Perspective C seems concerned most with the impact the oil sands have on the well being of Canadian citizens. The local impacts from oil sands development are of importance to this perspective. This cohort differs from Perspective A and B as it appears more concerned about on-going effects of current development, rather than future oil sands development.

This perspective is the smallest of the three, with 5 of the 31 sorts accounted for by this factor, and 7% of the total 50% of the variance explained. Perspective C contains the lowest significance loadings per sort in the cluster, with an average of 0.49, a maximum of 0.63 and minimum of 0.41.

Factor Correlations

Table 4 shows how statistically correlated each factor is with the others: the higher the correlation value, the more similar the perspectives are. Note the leading decimals have been omitted. Given that all of the correlations are below 50, each perspective is unique.

Perspective A and B appear to be equally different. Factor C is more correlated with the other factors given 34 is greater than 26.

Table 4: Factor Correlations

| Factors | A | B | C |
|----------------|----------|----------|----------|
| A | 0 | 26 | 34 |
| B | 26 | 0 | 34 |
| C | 34 | 34 | 0 |

Areas of Consensus and Contention

The factor analysis computed in PCQ Soft generated eleven statements of consensus. ‘Consensus’ for the purposes of the software is when at least two of the three perspectives provided the same score for a particular statement.

| Consensus Statements | Factor | | |
|---|---------------|----------|----------|
| | A | B | C |
| Canada's oil sands have vaulted the country to energy superpower status. | 0 | -1 | 0 |
| Oil sands royalties are critical to Alberta's fiscal health. | 4 | 3 | 3 |
| The oil sands are a source of valuable foreign investment that contribute to the country's economic well-being | 2 | 1 | 2 |
| The wealth generated by the oil sands flows across the country through interprovincial trade. | 1 | 0 | 0 |
| It is possible to development the oil sands while simultaneously managing the environmental risks. | 3 | 2 | 2 |
| The oil sands developments have provided opportunities for people and First Nations governments to become really prosperous and independent. | 2 | 1 | 2 |
| Teachers, retailers, civil servants and anyone not employed by the oil industry in Alberta face rising costs. | 0 | 0 | 1 |
| Crude oil transportation has proven to be unsafe and should be stopped | -4 | -3 | -3 |
| Stricter regulations on greenhouse gas emissions for the oil and gas sector could slow oil sands growth. | 1 | 1 | 0 |
| The United States would gain more employment opportunities from the oil sands than the rest of Canada if oil sands development goes ahead as projected. | -1 | -1 | -1 |
| The oil sands represent a tremendous opportunity for innovation through the development of low-carbon extraction methods. | 2 | 2 | 2 |

Areas of Consensus

There are two particularly important area of consensus: all perspectives agree that it is possible to develop the oil sands while managing the environmental risks. And, all perspectives strongly agree that crude oil transportation has proven to be unsafe and should be stopped.

Two statements generated consensus but of less magnitude: all slightly disagreed that the United States would gain more employment opportunities from the oil sands development if development continues as project, and all slightly agreed that the oil sands represent a tremendous opportunity for innovation through the development of low-carbon extraction methods.

Areas of Contention

Each perspective proves unique in their regard for particular statements.

| Distinguishing Statements for Factor A | A | B | C |
|---|----------|----------|----------|
| Toxic byproducts from tar sands extraction are poisoning the Athabasca River, putting downstream First Nations communities and the fish they eat at risk. | -2 | 2 | 4 |
| Oil sands operations currently impact only a very small portion of Canada's expansive boreal forest. | 3 | -1 | -1 |
| The need for energy outweighs the environmental risks of developing Alberta's oil sands. | 0 | -4 | -4 |
| More of the oil sands revenue should go to Canadians rather than fossil fuel companies. | -2 | 2 | 3 |

Factor A scored on the other end of the spectrum from the other perspectives on four statements. The need for energy outweighing the environmental risks is strongly disagreed with by Factors B and C, but Factor A slotted this issue in the center suggesting the perceived economic-environmental trade-off associated with oil sands development is of little importance to this Perspective.

Factor A also agrees that only a very small portion of Canada's boreal forest has been impacted by oil sands development, while the other two factors disagree.

| Distinguishing Statements for Factor B | A | B | C |
|---|----------|----------|----------|
| The oil sands projects will have long-term impacts for the entire planet. | -1 | 3 | -2 |
| Canada's human rights record contributes to its status as the world's ethical choice as a source for oil. | 1 | -3 | 1 |
| Rather than subsidizing the oil sands and fossil fuel industry through tax breaks, we should be investing in clean energy technologies. | 0 | 4 | 0 |
| Pollution regulations in Canada are too lax, as evidenced by the unlined tailings ponds, stunning emissions and pollution. | -2 | 4 | 0 |

Factor B scored on the other side of the spectrum from the other perspectives on four statements. This group most agrees that subsidizing the oil sands through tax breaks should be substituted with investments in clean energy technologies, while the other two factors placed this topic in the center suggesting less agreeability and/or importance. Factor B also most agrees that pollution regulations in Canada are too lax given the evidence listed, while Factor A disagrees and Factor C slots the statement in the center.

| Distinguishing Statements for Factor C | A | B | C |
|---|----------|----------|----------|
| Canadian oil refineries should prioritize using Canadian oil before imported oil, even if it means transporting oil from Western Canada across the country to the refineries. | -2 | -2 | 4 |
| A national carbon tax would help us move from oil to less-polluting energy sources. | 1 | 4 | -3 |

Factor C scored on the other end of the spectrum from the other Perspectives on two statements. Factor C most agrees with prioritizing the use of Canadian oil over foreign sources while the other two Factors disagree. The use of a national carbon tax to transition from oil to less-polluting energy sources is disagreed with by Factor 3 while Factor A agrees and Factor B most agree.

Factor C is particularly interesting in terms of the Perspectives Sort is the statements that appear in the most disagree column also appear in the most disagree column of both Perspective A and Perspective B. “The only truly ethical solution is to phase out oil” appears in the -4 category for both Perspective A and C. Statements 23 and 27, “the need

for energy outweighs the environmental risks of developing Alberta's oil sands" and "there is no evidence on linkages between health issues in local communities and oil sands development", respectively, are most disagreed with by Perspective C and B.

While Factor C remains a unique perspective, there are issues of consensus between Factor C and both other factors, particularly Factor B. It is also interesting to note that these areas of consensus only appeared in the most disagree column, with no Perspectives placing the same statement in the most agree pile.

Key Areas of Consensus and Distinction

From viewing the areas of consensus (✓) and contention (X) amongst the perspectives, the following topics are highlighted as key areas of interest because of the role the issue plays in the economic future of the oil sands:

- ✓ All factors disagree (A:-4, B:-3, C:-3) that "crude oil transportation has proven to be unsafe and should be stopped."
- ✓ All factors agree (A:+3, B:+2, C:+2) that "it is possible to development the oil sands while simultaneously managing the environmental risks."
- ✓ All factors agree (A,B,C:+2) that "the oil sands represent a tremendous opportunity for innovation through the development of low-carbon extraction methods."
- X "Canadian oil refineries should prioritize using Canadian oil before imported oil, even if it means transporting oil from Western Canada across the country to the refineries" is most agreed with by Factor C (+4), in contrast with Factor A and B who both disagree (-2).
- X "Rather than subsidizing the oil sands and fossil fuel industry through tax breaks, we should be investing in clean energy technology" was most agreed to Factor B (+4) yet Factor A and C both scored the statement with a zero.

5) APPLICATIONS AND IMPLICATIONS

What did we learn and what can we do with this information? The areas of consensus and contention that have the most relevance to the short to medium term viability of the oil sands is of focus for this discussion.

Consensus: All Agree that Balanced Development is Possible

For those professionally engaged with the oil sands, it appears ‘for’ versus ‘against’ development is inaccurate. In general, those engaged believe development and environmental risk management can coincide. This is a particularly important result given ‘social license’ is an increasingly important element of project approval for the extractive sector, oil sands included (Davis & Franks, 2014). A Goldman Sachs study of 190 international oil companies found that within the last decade, the time for new projects to come online doubled in length, and stakeholder-related risks create the largest risk category facing companies. A Harvard study on the costs of company-community conflict in the extractive sector found that the largest costs of conflict “were the opportunity costs in terms of the lost value linked to future projects, expansion plans, or sales that did not go ahead” (Davis & Franks, 2014)

When the life of new projects hinge on public support, perceptions have real value and significant impact (Kenyon & Read, 2014). In 2014, three new extraction sites were cancelled: Shell’s Pierre River, Statoil’s Corner project, and Total’s Joslyn North. The projects were deemed unfeasible for a complexity of reasons, but lack of social approval may have contributed to the cancellations. Knowing where perceptions lay can help companies allocate efforts to secure the support needed to develop and expand their operations.

Consensus: All Disagree that crude oil transportation is unsafe and should be stopped

Oil transportation has been a contentious issue, causing pipeline projects to hang in limbo as companies and governments seek legal and social approval. The results of this study show that those professionally engaged do *not* believe crude oil transportation is unsafe and should be stopped.

This result is important because transportation of the extracted oil sands to refineries and markets is essential for growth of the industry. Oil is typically moved by rail or pipeline, and both methods have received backlash due to health and safety risks, geopolitical implications, and environmental concerns.

In terms of pipelines, there is currently three major pipelines routes that serve as both critical components of oil sands growth, and lightning rods for debate: Keystone XL, Northern Gateway, and Energy East. The first two pipelines will be discussed here in the crude transportation sector, while Energy East will be incorporated in the next section on prioritizing Canadian oil over foreign sources at Canadian refineries.

The Keystone XL pipeline would connect the oil sands with the large American market to the south. Since the pipeline was proposed in 2008, The Canadian government and the pipeline company, TransCanada, have been lobbying the United States government for approval. The Conservatives in Ottawa allotted \$16.5 million for advertise Keystone in 2013-14 (Panetta, 2014) while TransCanada spent \$1.05 million to lobby the American Congress in the same period (Snyder, 2014). Simultaneously, the American Petroleum Institute oil company members spent almost \$8 million seeking government approval for the pipeline (Thomas, 2014).

Those seeking to block Keystone have received significant financial support. The Rockefellers multi-million dollar ‘Sustainable Development’ program has supported fossil fuel divest advocates with 350.org, while wealthy individuals have committed to funding anti-pipeline advertising campaigns. (Litvan, 2013). Although discrepancies in metrics render it difficult to know exactly how much has been spent lobbying for and against Keystone, reports show that total spending since 2008 is in the tens of millions (Israel, 2013) (Litvan, 2013) (Panetta, 2014) (Snyder, 2014).

Enbridge’s Northern Gateway pipeline would send oil sands to the Pacific Coast where it can be sent via tankers to export markets. The route passes through the Rocky Mountains

and the rain forests of British Columbia, traversing First Nations' land along the way. The pipeline has received fierce opposition from environmental groups, First Nations communities, and many British Columbia residents (Mayeda & van Loon, 2014). As a result, Enbridge has dedicated

Uncertainty over pipelines is costly. The on going “transportation bottleneck” is “suppressing the price of Canada’s heavy crude and costing the economy as much as \$50 million a day” according to the Canadian Chamber of Commerce (Argitis & Mayeda, 2014). Adding together the current missed revenue from the transportation bottleneck, with the damages caused by variability in economic feasibility of new projects, plus the lobbying/PR costs, disagreement is expensive. Additionally, lobbying is inherently unproductive in economic terms given lobbying costs are sunk regardless of the outcome of the decision on the project. Given the scale of lobbying efforts, it is economic best interests that decisions are made on the proposed pipelines as soon as possible in order to minimize both sunk and opportunity costs.

Consensus: All Agree that the oil sands are an opportunity for innovation for low-carbon extraction methods

All perspectives agree innovation for low-carbon extraction methods can be developed through oil sands projects. This result is important considering one of the biggest concerns about oil sands development is the environmental footprint created from extraction methods. Because the bitumen is mixed with sand, the oil is often extracted using steam from heated water. While the steam-assisted gravity drainage (SAGD) technology turned the otherwise worthless natural resource into a valuable commodity, it uses a large amount of water and energy. The process has caused uproar and protest from environmental groups and citizens concerned with the ecological footprint from oil sands development.

Many technological innovations are already underway. Generally, oil sands producers recognize the cost-savings, increased production potential, and improved environmental performance from lower-carbon extraction methods (PriceWaterhouseCoopers, 2013).

The combination of these benefits could greatly improve the economic outlook of the oil sands, for the impacts themselves on the industries margins, as well as for the potential to ease costly objections to extraction. Knowing there is consensus on this topic, government and industry could focus more research and development efforts on low-carbon extraction technology.

Contention: Prioritizing Canadian Oil at Canadian Refineries.

Our study shows that prioritizing Canadian oil over foreign sources at Canadian refineries is debated. Perspective C strongly agrees with this idea, however Perspective A and B both disagree.

Energy East plans to send crude from Alberta and Saskatchewan to refineries in Eastern Canada. This particular pipeline has received opposition for those concerned about the environmental, health, and economic implications (CBC News, 2014). The results of this study suggest the Energy East pipeline will continue to be a contentious one, as professionals do not agree on prioritizing Canadian oil simply because it is a Canadian sourced commodity.

6) DISCUSSION

The Value of Understanding Perspectives and Building Consensus

Building and securing consensus for projects and policies requires funds and time. Contest theory models the effort exerted by players pursuing a prize, and cases show that often the value exerted exceeds the value of the prize to be won. While this specific outcome may not be the case for the oil sands, contest theory illustrates the inherently unproductive activity of contest efforts (Heyes & Liston-Heyes, 2013). Many public relations (PR) campaigns are currently seeking increased support for the views of companies, NGO's and interest groups. Examples include Suncor's "Oil sands question and response" (OSQAR) platform, the "Tell it like it is" campaign by the Government of Alberta, and the "More 2 the Story" forum created by Cenovus, as well as organizations/networks such as DeSmog Canada, Tar Sands Solutions Network, 'Ethical Oil', and the 'Dirty Oil Sands' network.

The costs to uncertainty are enormous. Lobbying, PR campaigns and advocacy use money and time, and are inherently unproductive. Disagreement on new extraction projects and oil sands industry infrastructure is eroding the economic viability of the sector, while inhibiting companies from generating potential revenue. Investors require confidence in order to fund corporate endeavors. While the oil sands have already generated vast economic benefits, the potential for their future are clouded with uncertainty. Thus, understanding perspectives of those professionally engaged and identifying specific topics of consensus and contention are valuable. .

Given Q Methodology is applicable to small sample sizes, it would be interesting to study the perspectives of other groups involved in the development of Canada's oil sands or a specific policy topic that is currently contentious.

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Figure 2: List of statements included in the study

| STATEMENTS |
|--|
| 1. Tar sands are the dirtiest oil in the world |
| 2. Canada's oil sands have vaulted the country to energy superpower status |
| 3. Oil sands royalties are critical to Alberta's fiscal health |
| 4. The oil sands are a source of valuable foreign investment that contribute to the country's economic prosperity |
| 5. The wealth generated by the oil sands flows across the country through interprovincial trade |
| 6. The environmental movement's fixation on the oil sands has crowded out discussion of other important policy issues. |
| 7. Each dollar invested in the oil sands spurs additional spending across other sectors of the economy. |
| 8. Employers in other provinces besides Alberta are left short of skilled workers due to the oil sands. |
| 9. Relying on the oil sands for employment and government revenue is a dangerous game because of oil price volatility. |
| 10. The rapid pace of oil sands development is inflating Canada's dollar, which hurts the competitiveness of manufacturing in Eastern Canada |
| 11. Canadian oil refineries should prioritize using Canadian oil before imported oil, even if it means transporting oil from Western Canada across the country to the refineries |
| 12. It is possible to develop the oil sands while simultaneously managing the environmental impacts |
| 13. Toxic byproducts from tar sands extraction are poisoning the Athabasca River, putting downstream First Nations communities and the fish they eat at risk |
| 14. A national carbon tax would help us move from oil to less-polluting energy source. |
| 15. The only truly ethical solution is to phase out oil |
| 16. The oil sands developments have provided opportunities for people and First Nations governments to become really prosperous and independent |
| 17. Teachers, retailers, civil servants and anyone not employed by the oil industry in Alberta face rising costs. |
| 18. The oil sands provide employment for thousands of highly skilled engineers and tradespeople, precisely the kind of workers Canada needs more of. |
| 19. Oil sands operations currently impact only a very small portion of Canada's expansive boreal forest. |
| 20. The petroleum and pipeline industries have significant influence on the Government of Canada's legislative agenda. |
| 21. It's in the national interest that Western Canada has improved port capacity - whether by pipeline or rail - that will open the door to Asia's rapidly growing markets. |
| 22. The oil sands projects will have long-term impacts for the entire planet. |
| 23. The need for energy outweighs the environmental risks of developing Alberta's oil sands. |

24. More of the oil sands revenue should go to Canadians rather than fossil fuel companies.
25. The effect of greenhouse gas emissions on our children and grandchildren is an intergenerational crime.
26. Crude oil transportation has proven to be unsafe and should be stopped.
27. There is no evidence on linkages between health issue in local communities and oil sands development.
28. Stricter regulations on greenhouse gas emissions for the oil and gas sector could slow oil sands growth.
29. Pipelines can transport oil safely.
30. Increased Chinese involvement in Canada's oil patch and an impending trade agreement with Beijing poses a threat to Canada's sovereignty.
31. The federal Conservative government has intimidated community watchdog groups, gutted environmental legislation to limit democratic participation of citizens, and silenced scientists, all in an effort to pave the way for the expedient approval of massive tar sands development.
32. The development of Canada's oil sands is a matter of energy security.
33. Increased production from Canada's oil sands will make an important contribution to fossil fuel supply through 2050.
34. Canada's human rights record contributes to its status as the world's ethical choice as a source for oil.
35. The United States would gain more employment opportunities from the oil sands than the rest of Canada if oil sands development goes ahead as projected.
36. Royalty rates, the main form of tax on oil sands production, must be kept low in order to ensure sufficient profitability in the sector.
37. Temporary foreign workers are part of the solution to the labour shortage in the oil sands.
38. The oil sands represent a tremendous opportunity for innovation through the development of low-carbon extraction methods.
39. Oil sands producers recognize their responsibilities for good social performance.
40. The oil sands industry is possibly the most controversial subject in Canada today.
41. Chinese investment will lead to Chinese control of Canada's natural endowments.
42. Rather than subsidizing the oil sands and fossil fuel industry through tax breaks, we should be investing in clean energy technologies.
43. Keystone is typing up Canadian diplomats in Washington, whose precious time would be better spent on other files.
44. Pollution regulations in Canada are too lax, as evidenced by the unlined tailings ponds, stunning emissions and pollution.

Figure 3: Breakdown of professions included in the sample

| PROFESSION | NUMBER |
|----------------------------|---------------|
| ADVOCACY | 4 |
| CSR/STAKEHOLDER RELATIONS | 2 |
| ECONOMICS | 1 |
| ENGINEERING | 2 |
| FINANCE AND ACCOUNTING | 2 |
| HUMAN RESOURCES | 1 |
| JOURNALISM | 1 |
| LABOURER | 1 |
| LAW | 2 |
| MANAGEMENT | 2 |
| POLICY ANALYSIS | 5 |
| PROFESSOR | 2 |
| RESEARCH AND DEVELOPMENT | 2 |
| RESEARCHER | 6 |
| SALES AND MARKETING | 2 |
| SUSTAINABILITY/ENVIRONMENT | 3 |

Figure 4: Breakdown of the types of organizations represented in the sample

| ORGANIZATION TYPE | NUMBER |
|-----------------------------------|---------------|
| ACADEMIA | 6 |
| CONSULTING | 2 |
| FEDERAL GOVERNMENT | 4 |
| FINANCIAL INSTITUTION | 3 |
| INDUSTRY/PROFESSIONAL ASSOCIATION | 3 |
| MEDIA | 1 |
| NGO | 3 |
| OIL AND GAS | 6 |
| OIL AND GAS SERVICE PROVIDER | 4 |
| PROVINCIAL GOVERNMENT | 1 |
| THINK TANK | 5 |
| <i>TOTAL</i> | <i>38</i> |

Figure 5: Breakdown of the sectors represented in the sample

| SECTOR | NUMBER |
|---------------|---------------|
| ACADEMIA | 7 |
| NON PROFIT | 9 |
| PRIVATE | 15 |
| PUBLIC | 7 |
| <i>TOTAL</i> | <i>38</i> |

Figure 6: Scree plot of eigenvalue by the number of factors extracted

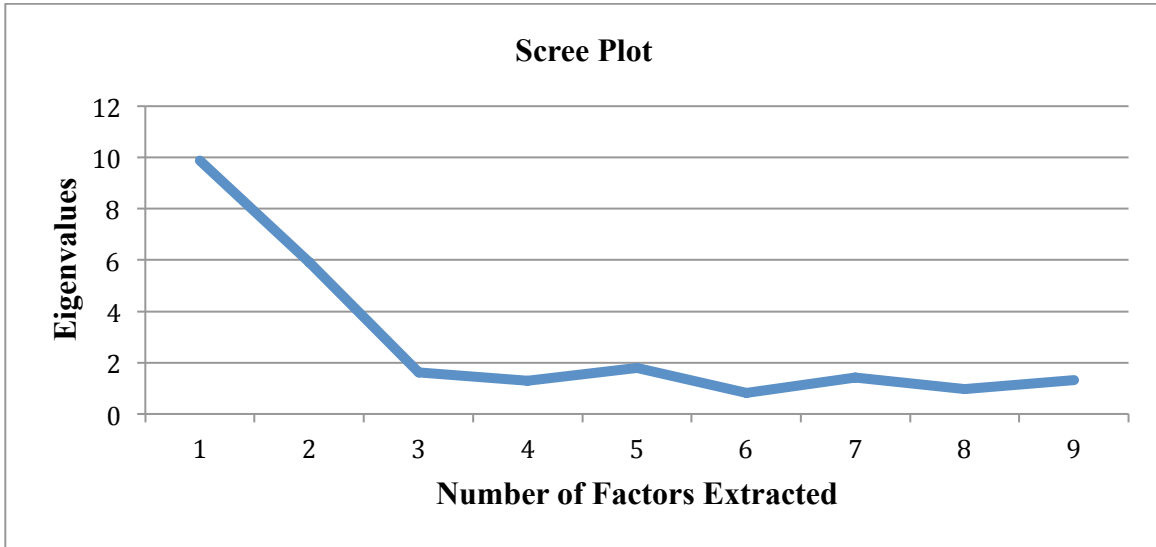


Figure 7: Preview of correlation matrix (38x38 matrix available upon request)

| Sort | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|------|----|-----|-----|----|----|----|----|----|----|-----|----|-----|
| 1 | 0 | 34 | 5 | 5 | 64 | 45 | 46 | 40 | 47 | -1 | -5 | 14 |
| 2 | 34 | 0 | -20 | 17 | 34 | 22 | 32 | 23 | 39 | 17 | 4 | -11 |
| 3 | 5 | -20 | 0 | 23 | 23 | 8 | 11 | 10 | 4 | -20 | 39 | 29 |
| 4 | 5 | 17 | 23 | 0 | 30 | 36 | 20 | 8 | 23 | -1 | 20 | 13 |
| 5 | 64 | 34 | 23 | 30 | 0 | 47 | 48 | 32 | 54 | -5 | 16 | 25 |
| 6 | 45 | 22 | 8 | 36 | 47 | 0 | 69 | 14 | 60 | 33 | 23 | 25 |
| 7 | 46 | 32 | 11 | 20 | 48 | 69 | 0 | 25 | 67 | 26 | 20 | 11 |
| 8 | 40 | 23 | 10 | 8 | 32 | 14 | 25 | 0 | 10 | -1 | 22 | 33 |
| 9 | 47 | 39 | 4 | 23 | 54 | 60 | 67 | 10 | 0 | 20 | 14 | 7 |
| 10 | -1 | 17 | -20 | -1 | -5 | 33 | 26 | -1 | 20 | 0 | 29 | 20 |
| 11 | -5 | 4 | 39 | 20 | 16 | 23 | 20 | 22 | 14 | 29 | 0 | 33 |
| 12 | 14 | -11 | 29 | 13 | 25 | 25 | 11 | 33 | 7 | 20 | 33 | 0 |

Figure 8: Statement scores by factor

| | Factors | A | B | C |
|--|---------|----|----|---|
| 1. Tar sands are the dirtiest oil in the world | | -4 | -1 | 1 |
| 2. Canada's oil sands have vaulted the country to energy superpower status | | 0 | -1 | 0 |
| 3. Oil sands royalties are critical to Alberta's fiscal health | | 4 | 3 | 3 |

| | | | |
|---|----|----|----|
| 4.The oil sands are a source of valuable foreign investment that contribute to the country's economic prosperity | 2 | 1 | 2 |
| 5.The wealth generated by the oil sands flows across the country through interprovincial trade | 1 | 0 | 0 |
| 6.The environmental movement's fixation on the oil sands has crowded out discussion of other important policy issues. | 1 | -2 | -1 |
| 7.Each dollar invested in the oil sands spurs additional spending across other sectors of the economy. | 3 | 0 | 0 |
| 8.Employers in other provinces besides Alberta are left short of skilled workers due to the oil sands. | -1 | 0 | -2 |
| 9.Relying on the oil sands for employment and government revenue is a dangerous game because of oil price volatility. | 0 | 1 | -2 |
| 10.The rapid pace of oil sands development is inflating Canada's dollar, which hurts the competitiveness of manufacturing in Eastern Canada | -1 | 0 | -2 |
| 11.Canadian oil refineries should prioritize using Canadian oil before imported oil, even if it means transporting oil from Western Canada across the country to the refineries | -2 | -2 | 4 |
| 12.It is possible to develop the oil sands while simultaneously managing the environmental impacts | 3 | 2 | 2 |
| 13.Toxic byproducts from tar sands extraction are poisoning the Athabasca River, putting downstream First Nations communities and the fish they eat at risk | -2 | 2 | 4 |
| 14.A national carbon tax would help us move from oil to less-polluting energy sources | 1 | 4 | -3 |
| 15.The only truly ethical solution is to phase out oil. | -4 | -2 | -4 |
| 16.The oil sands developments have provided opportunities for people and First Nations governments to become really prosperous and independent | 2 | 1 | 2 |
| 17.Teachers, retailers, civil servants and anyone not employed by the oil industry in Alberta face rising costs. | 0 | 0 | 1 |
| 18.The oil sands provide employment for thousands of highly skilled engineers and tradespeople, precisely the kind of workers Canada needs more of. | 3 | 0 | 4 |
| 19.Oil sands operations currently impact only a very small portion of Canada's expansive boreal forest. | 3 | -1 | -1 |
| 20.The petroleum and pipeline industries have significant influence on the Government of Canada's legislative agenda. | 0 | 3 | 3 |
| 21.It's in the national interest that Western Canada has improved port capacity - whether by pipeline or rail - that will open the door to Asia's rapidly growing markets. | 4 | 0 | 3 |

| | | | |
|--|----|----|----|
| 22.The oil sands projects will have long term impacts for the entire planet. | -1 | 3 | -2 |
| 23.The need for energy outweighs the environmental risks of developing Alberta's oil sands. | 0 | -4 | -4 |
| 24.More of the oil sands revenue should go to Canadians rather than fossil fuel companies. | -2 | 2 | 3 |
| 25.The effect of greenhouse gas emissions on our children and grandchildren is an intergenerational crime. | -3 | 1 | -2 |
| 26.Crude oil transportation has proven to be unsafe and should be stopped. | -4 | -3 | -3 |
| 27.There is no evidence on linkages between health issue in local communities and oil sands development. | -1 | -4 | -4 |
| 28.Stricter regulations on greenhouse gas emissions for the oil and gas sector could slow oil sands growth. | 1 | 1 | 0 |
| 29.Pipelines can transport oil safely. | 4 | 2 | 1 |
| 30.Increased Chinese involvement in Canada's oil patch and an impending trade agreement with Beijing sees a threat to Canada's sovereignty. | -3 | -3 | 0 |
| 31.The federal Conservative government has intimidated community watchdog groups, gutted environmental legislation to limit democratic participation of citizens, and silenced scientists, all in an effort to pave the way for the expedient approval of massive tar sands development. | -3 | 3 | 0 |
| 32.The development of Canada's oil sands is a matter of energy security. | -1 | -3 | 1 |
| 33.Increased production from Canada's oil sands will make an important contribution to fossil fuel supply through 2050. | 2 | 0 | 2 |
| 34.Canada's human rights record contributes to its status as the world's ethical choice as a source for oil. | 1 | -3 | 1 |
| 35.The United States would gain more employment opportunities from the oil sands than the rest of Canada if oil sands development goes ahead as projected. | -1 | -1 | -1 |
| 36.Royalty rates, the main form of tax on oil sands production, must be kept low in order to ensure sufficient profitability in the sector. | -2 | -4 | -3 |
| 37.Temporary foreign workers are part of the solution to the labour shortage in the oil sands. | 0 | -2 | -1 |
| 38.The oil sands represent a tremendous opportunity for innovation through the development of low-carbon extraction methods. | 2 | 2 | 2 |
| 39.Oil sands producers recognize their responsibilities for good social performance. | 2 | -1 | -1 |
| 40.The oil sands industry is possibly the most controversial subject in Canada today. | 1 | 1 | -1 |
| 41.Chinese investment will lead to Chinese control of Canada's natural endowments. | -3 | -2 | 1 |
| 42.Rather than subsidizing the oil sands and fossil | 0 | 4 | 0 |

| | | | |
|---|----|----|----|
| fuel industry through tax breaks, we should be investing in clean energy technologies. | | | |
| 43.Keystone is typing up Canadian diplomats in Washington, whose precious time would be better spent on other files. | 0 | -1 | -3 |
| 44.Pollution regulations in Canada are too lax, as evidenced by the unlined tailings ponds, stunning emissions and pollution. | -2 | 4 | 0 |

Figure 9: Factor facts

```

31 sorts have been accounted for in 3 factors:
n   fac   sorts contributing to each factor
[15] A | 2 6 7 9 14 16 19 20 21 23 24 25 27 33 34
[11] B | 8 13 17 18 28 30 31 32 35 36 37
[ 5] C | 3 4 11 12 29

Factors have no loadings greater or equal to 39:
[ 6] Confounded: 1, 5,15,22,26,38,
[ 1] Not significant: 10,

```

Figure 10: Factor A factor array

| Factor A | | | | | | | | |
|----------|----|----|----|----|----|----|----|----|
| -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| ----- | | | | | | | | |
| 1 | 25 | 11 | 8 | 2 | 5 | 4 | 7 | 3 |
| 15 | 30 | 13 | 10 | 9 | 6 | 16 | 12 | 21 |
| 26 | 31 | 24 | 22 | 17 | 14 | 33 | 18 | 29 |
| | 41 | 36 | 27 | 20 | 28 | 38 | 19 | |
| | | 44 | 32 | 23 | 34 | 39 | | |
| | | | 35 | 37 | 40 | | | |
| | | | | 42 | | | | |
| | | | | | 43 | | | |

Figure 11: Factor B factor array

| Factor B | | | | | | | | |
|----------|----|----|----|----|----|----|----|----|
| -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| ----- | | | | | | | | |
| 23 | 26 | 6 | 1 | 5 | 4 | 12 | 3 | 14 |
| 27 | 30 | 11 | 2 | 7 | 9 | 13 | 20 | 42 |
| 36 | 32 | 15 | 19 | 8 | 16 | 24 | 22 | 44 |
| | 34 | 37 | 35 | 10 | 25 | 29 | 31 | |
| | | 41 | 39 | 17 | 28 | 38 | | |
| | | | 43 | 18 | 40 | | | |
| | | | | 21 | | | | |
| | | | | | 33 | | | |

Figure 12: Factor C factor array

| Factor C | | | | | | | | |
|----------|----|----|----|----|----|----|----|----|
| -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| ----- | | | | | | | | |
| 15 | 14 | 8 | 6 | 2 | 1 | 4 | 3 | 11 |
| 23 | 26 | 9 | 19 | 5 | 17 | 12 | 20 | 13 |
| 27 | 36 | 10 | 35 | 7 | 29 | 16 | 21 | 18 |
| | 43 | 22 | 37 | 28 | 32 | 33 | 24 | |
| | | 25 | 39 | 30 | 34 | 38 | | |
| | | | 40 | 31 | 41 | | | |
| | | | | 42 | | | | |
| | | | | | 44 | | | |

Figure 13: Consensus Statements

| Consensus Statements | Factor | | |
|---|--------|----|----|
| | A | B | C |
| Canada's oil sands have vaulted the country to energy superpower status. | 0 | -1 | 0 |
| Oil sands royalties are critical to Alberta's fiscal health. | 4 | 3 | 3 |
| The oil sands are a source of valuable foreign investment that contribute to the country's economic well-being | 2 | 1 | 2 |
| The wealth generated by the oil sands flows across the country through interprovincial trade. | 1 | 0 | 0 |
| It is possible to development the oil sands while simultaneously managing the environmental risks. | 3 | 2 | 2 |
| The oil sands developments have provided opportunities for people and First Nations governments to become really prosperous and independent. | 2 | 1 | 2 |
| Teachers, retailers, civil servants and anyone not employed by the oil industry in Alberta face rising costs. | 0 | 0 | 1 |
| Crude oil transportation has proven to be unsafe and should be stopped | -4 | -3 | -3 |
| Stricter regulations on greenhouse gas emissions for the oil and gas sector could slow oil sands growth. | 1 | 1 | 0 |
| The United States would gain more employment opportunities from the oil sands than the rest of Canada if oil sands development goes ahead as projected. | -1 | -1 | -1 |
| The oil sands represent a tremendous opportunity for innovation through the development of low-carbon extraction methods. | 2 | 2 | 2 |

Figure 14: Distinguishing Statements for Factor A

| Distinguishing Statements for Factor A | A | B | C |
|---|----|----|----|
| Toxic byproducts from tar sands extraction are poisoning the Athabasca River, putting downstream First Nations communities and the fish they eat at risk. | -2 | 2 | 4 |
| Oil sands operations currently impact only a very small portion of Canada's expansive boreal forest. | 3 | -1 | -1 |
| The need for energy outweighs the environmental risks of developing Alberta's oil sands. | 0 | -4 | -4 |
| More of the oil sands revenue should go to Canadians rather than fossil fuel companies. | -2 | 2 | 3 |

Figure 15: Distinguishing Statements for Factor B

| Distinguishing Statements for Factor B | A | B | C |
|---|----------|-----------|----------|
| The oil sands projects will have long-term impacts for the entire planet. | -1 | 3 | -2 |
| Canada's human rights record contributes to its status as the world's ethical choice as a source for oil. | 1 | -3 | 1 |
| Rather than subsidizing the oil sands and fossil fuel industry through tax breaks, we should be investing in clean energy technologies. | 0 | 4 | 0 |
| Pollution regulations in Canada are too lax, as evidenced by the unlined tailings ponds, stunning emissions and pollution. | -2 | 4 | 0 |

Figure 16: Distinguishing Statements for Factor C

| Distinguishing Statements for Factor C | A | B | C |
|---|----------|----------|-----------|
| Canadian oil refineries should prioritize using Canadian oil before imported oil, even if it means transporting oil from Western Canada across the country to the refineries. | -2 | -2 | 4 |
| A national carbon tax would help us move from oil to less-polluting energy sources. | 1 | 4 | -3 |