Available online at www.sciencedirect.com
ScienceDirect
ELSEVIER
International Journal of Project Management 25 (2007) 683–693
INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT
www.elsevier.com/locate/ijproman

'Cultural' differences in project risk perception: An empirical comparison of China and Canada

Renaud de Camprieu [a,*], Jacques Desbiens [b,1], Yang Feixue [c,2]

[a] Département des Sciences Administratives, Université du Québec en Outaouais, 101, rue Saint Jean-Bosco, Gatineau, Quebéc, Canada J8X 3X7
[b] Université du Québec, 555 boul. de, Chicoutimi, Canada G7H 2B1
[c] Faculty of Economics and Management, Tianjin University of Technology, 263, Hongqinan Road, Nankai District, Tianjin, China

Received 13 July 2007; accepted 19 July 2007

Abstract

Evaluating the opportunities and risks of a new project proposal is a complex process that brings into play objective as well as subjective factors, not only in the process itself but also in the selection of the data used to support or justify the evaluation. There is much evidence in the social sciences that people differ in their perception and evaluation processes. It is therefore important for the proponents of a new project to understand, before they commission lengthy and expensive feasibility studies, how the individuals that will be involved in the approval process develop their perception of the level of risk of the proposed project. This paper presents the results of an empirical study that was conducted to investigate whether and how project managers from different cultural horizons differ in the way they assess the risk of a large project. A conceptual framework was developed and an inferential approach (conjoint measurement) was used to determine, from the results of a project risk comparison exercise, how subjects with project management experience relied on various risk factors to assess the risk of a project. Significant differences between Chinese and Canadian citizens are reported, the implications of this finding are discussed and avenues for further research are suggested.

Keywords: Project risk assessment; Risk perception; Feasibility; Cultural differences; Conjoint measurement

1. Introduction

Large scale projects that entail a high level of risk usually require the review and approval of several individuals who represent organizations with different mandates and goals (entrepreneurs, investors, finance institutions, venture capitalists, governments, regulators, unions, etc.). Douglas and Wildavsky [13] reported several empirical studies suggesting that "*different decision makers worry about different risks – war, pollution, employment, inflation*" (pp. 1–2). Furthermore, in the global economy of the 21st century, these projects increasingly require joint ventures – or some other forms of partnership – between organizations originating from different geographical and cultural horizons [14]. Assessing a project proposal involves appreciating whether it would be 'good or bad' for the organization and, it is well documented in the social sciences literature that "*even more than perception and interpretation, cultural conditioning strongly affects evaluation*" [1, p. 91]. It is therefore important for the promoters of high risk partnership-based ventures to understand, before they commission lengthy and expensive feasibility studies, how the individuals involved in the approval process would assess the risk of such projects, particularly when they belong to different cultural environments. Understanding how stakeholders perceive risk is also essential for communicating with them effectively, which is another key risk management function [11].

* Corresponding author. Tel.: +1 819 595 3900x1742; fax: +1 819 773 1747.

E-mail addresses: renaud.decamprieu@uqo.ca (R. de Camprieu), Jacques_Desbiens@uqac.ca (J. Desbiens), yangfeixue@tjut.edu.cn (Y. Feixue).

[1] Tel.: +1 418 545 5011x5247; fax: +1 418 693 9072

[2] Tel./fax: +86 22 23679751

0263-7863/$30.00
doi:10.1016/j.ijproman.2007.07.005

Evaluating the risk of large projects is a complex process that brings into play numerous objective as well as subjective factors, not only in the process itself but also in the selection of the data used to support or justify the decision. In order to cope with such complex decisions "*managers make choices based on simplified rather than real situations. This 'subjective rationality' narrows and alters the objective facts. Because managers from different cultures perceive the world differently, their 'subjective rationalities' differ, as do their ways of simplifying complex realities into perceived environments in which they become capable of making choices*" [32], quoted in [1, p. 167]. For example, Tao and Brennan [34] identified several studies suggesting that people living in Chinese, or Chinese-influenced cultures are characterized by perceptual and cognitive processes and strategies that embody 'holistic' norms (interdependent view of self) in distinction to the more 'atomistic' norms (independent view of self) characterizing European and American people (p. 573).

The purpose of this paper is to present the results of an investigation of differences in the process of evaluating project risk between individuals belonging to different geographical and cultural environments. China and Canada are the two environments featured in this comparative study.

2. Literature review

Given the scope of this research, the literature review covered both the project management and the cross-cultural domains.

2.1. Project management literature

Mathematical models, based either on probabilistic approaches or on statistical regression, have been developed to attempt to quantify risk [20,4] or to predict the success of a venture [28,3]. However, because innovative projects are usually "one of a kind", the probabilistic approach is often inappropriate and, "*there is absolutely no evidence that complicated mathematical models provide more accurate forecast than simpler models that incorporate intuitively pleasing rules of thumb*" (Schnaars, quoted in [19]). Similarly, in their recent book, "Project Selection Under Uncertainty", Kavadias and Loch [20] conclude that "*decision-theoretic models (operations research, mathematical programming, etc.) have not been widely adopted in practice because of their complexity, their lack of transparency and their failure to properly account for dynamic relationships and interaction effects*". Indeed, decision makers often complain that quantifying project risk is not sufficient to help them make an enlightened decision about the fate of an innovative project idea: "*Risks factors are often presented in narrative form steeped in technical methods and jargon, making it difficult for managers who are not experts to make informed judgments*" [10]. What decision makers really need is to be made aware of the sources of project risk and be given the information necessary for appreciating their likelihood of occurrence and consequences: "*Rising to the challenge of large projects calls for shaping them during a lengthy front-end period. The seeds of success or failure are planted early... Contrary to practices described in the project-management literature, which views risks as a concern to be dealt mostly through Monte-Carlo simulations once projects have been scoped, we have observed [in the IMEC sample] that risk mapping is viewed as an important ex-ante strategic concern by project sponsors*" [24].

In an empirical study of innovation projects, Whittaker [37] identified poor project planning, particularly in the area of risk analysis, as a common cause of failure. In a recent survey of high technology projects, Dalla Coletta and de Camprieu [9] found that the perceived degree of project success was positively related to the perceived degree of effort invested in risk analysis; but, they found *no* statistical relationships between the degree of perceived risk of a project and the level of effort invested to analyze its risk. These findings confirm earlier survey results that, while there is evidence that analyzing risk at the planning stage promotes project success, project managers seem to experience difficulty in deciding how much effort they should devote to risk analysis [25].

In summary, while there is ample evidence that quantifying risk appears insufficient for helping sponsors make sound project decisions, this review has not found any study that addressed the process through which project sponsors develop their perception of the risk of a project.

2.2. Cross-cultural literature

In their book "*Risk and Culture*", Douglas and Wildavsky [13] argue that, because each form of social life has its own typical risk portfolio, risk perception is heavily influenced by a '*cultural bias*' that is integral to social organization (p. 8). There is indeed a considerable amount of literature that documents the existence of cultural differences in human behaviour in general and in management in particular [2]. With regards to the two cultural environments investigated here, differences between Eastern and Western economies have been reported in a number of studies using different approaches. For example, Hofstede [16] statistically inferred four central and largely independent bi-polar 'dimensions' of a national culture from a data bank of employee attitude surveys undertaken within IBM subsidiaries in some 66 countries. He defined these dimensions as follows ([18]: 401): *Power Distance* (the extent to which the less powerful members of organizations and institutions, including the family, expect and accept that power is distributed unequally); *Uncertainty Avoidance* (intolerance for uncertainty and ambiguity); *Individualism versus Collectivism* (the extent to which individuals are integrated into groups); *Masculinity versus Femininity* (assertiveness and competitiveness versus modesty and caring). Because a number of studies have reported evidence that fatalism mediate risk perception [8] the dimension "*Uncertainty Avoidance*" is of particular interest to the present study on project risk evaluation. According to Hofstede, societies that have a low level of uncertainty avoidance condition their members to accept uncertainty and this leads them to take personal risks more easily and to be more tolerant of people who have different opinions. In high uncertainty avoidance societies, people are raised with the idea that, as the future is unpredictable, they should attempt to lower uncertainty with a view of keeping control over their destiny. Members of these societies tend to have a high level of anxiety, to be more nervous, more emotional and more aggressive. Furthermore, high uncertainty avoidance societies create institutions that foster security and risk avoidance. Hofstede suggests that there are three ways of 'creating security': technology, law and religion or ideology. A fifth dimension, *Confucian Dynamism* (long term orientation) was subsequently added by Hofstede [17] after he realized that uncertainty avoidance might be irrelevant to Chinese populations. Societies that score low on 'long term orientation' are less attached to tradition and more open to change. This dimension is interesting because differences in time perception have been a recurring theme in the cross-cultural literature [15].

As displayed in the charts provided in Appendix, China and Canada have quite different profiles on Hofstede™ Cultural Dimensions. The most striking differences are in terms of *time orientation* (long term for China and short term for Canada) and *individualism* (high in Canada and low in China).

Hofstede's concepts and results clearly suggest that managers from different cultural environments might perceive and evaluate project risk differently. Unfortunately, the validity of Hofstede's work has been severely criticized on both conceptual and methodological grounds [23]. However, a number of other research using different approaches have also reported comparisons between Eastern and Western economies using a variety of values scales [27,6,30,26,36,33,29]. Kim et al. [21] advise that, from a methodological perspective, Schwartz's conception is one of the most elaborate systems currently available for cross-cultural research. Schwartz and Bilsky [31] derived a number value dimensions through multidimensional scaling of value attributes. In order to avoid ethnocentric biases, values attributes from all world-religions and items from cultural-specific questionnaires (Europe, Asia, Africa, etc.) were incorporated into the construction of his value instrument, the Schwartz Value Survey (SVS). The survey that provided the data for constructing the SVS involved more than 60,000 individuals in 64 nations in all continents. The SVS includes 10 motivational types at the individual level and seven cultural value dimensions. While all ten motivational dimensions are found in every culture, the level of importance of each value dimension varies from one culture to the next. The seven cultural value dimensions that are presented as guiding principles in life include: *Life self-mastery* (ambition, success, daring, competence), *harmony with nature* (unity with nature, protecting the environment, world of beauty), *intellectual autonomy* (curiosity, broadmindedness, creativity), *affective autonomy* (pleasure, exciting life, varied life), *conservatism* (social order, respect for tradition, family security, wisdom), *preference for hierarchy* (social power, authority, humility, wealth), and *societal or egalitarian commitment* (equality, social justice, freedom, responsibility, honesty). Surveys have revealed that the three cultural dimensions of conservatism, preference for hierarchy, and self-mastery are more prominent in traditional societies. For example, self-mastery (independent, ambitious, daring, capable) was given the highest evaluation in China. On the other hand, the values of autonomy, egalitarian commitment, and harmony with nature were found to be more prevalent in modern/postmodern societies [30,31]. Surveys that focused on motivational dimensions have also identified differences between Eastern and Western managers. For example, in a four country comparison, Sarros and Santora [29] using the Schwartz's Value Survey found that Chinese managers do not identify self-direction (independent thought) as a key value dimension, unlike their Australian, Japanese, and Russian counterparts. For them, the predominant value orientations are those of benevolence (concern for the welfare of others) and security (safety, harmony, and stability of society or relationships, and of self).

Another value orientation of interest in this study addresses people's relationship with the external environment. It was found that North Americans aspire to dominate the environment whereas Chinese aspire to live in harmony with it [1, p. 25].

In spite of the fact that differences in value orientation between Eastern and Western societies have been identified in many empirical studies, several authors argue that aspects of the Chinese value system remain invisible when Western instruments are used to measure cultural values [7,22]. Bond [7] custom designed an instrument (The Chinese Value Survey) to measure the Eastern social value system that is derived from the Confucian ethos. Surveys using this instrument found that the value perceptions of Chinese students appeared very different from those obtained in previous studies with Western value instruments [27,30].

This brief review suggests that cross-cultural research is plagued with numerous conceptual and methodological pitfalls. Several authors go as far as questioning whether the concept of culture can be operationalized in a useful way [35]. At the same time, even if there is no consensus on the identification and measurement of the culture concept (e.g., through differences in 'cultural' values), there is a considerable amount of evidence that managers around the globe react differently to statements about issues highly relevant to project management, including those dealing with uncertainty and risk. Therefore, given that the purpose of this study is simply to investigate whether individuals belonging to different geographical and cultural environments (China and Canada) differ in the way they perceive or evaluate the risk of a project, there is no need *at this time* to embed the investigation in one cultural conception or the other. What is needed, however, is a conceptual framework articulated around the concept of project risk.

3. Conceptual framework

Aubert and Bernard [4] have recently developed a model that attempts to integrate the many notions of risk put forward in the various disciplines (finance, insurance, project management, environmental studies, health, industrial safety, etc.). According to their model, the future environment of a project is shaped by the combined action of a number of forces (endogenous and exogenous risk factors). Because the success of a project depends on the actual state of the future environment, and because it is not known which state will prevail, there is uncertainty. The corresponding project risk can be analyzed in terms two risk components:

1. Events that exogenous and endogenous factors could trigger and that would affect the success of the project. Events are represented by a density function $f(y)$ and the probability of each event is a function of the risk factors.
2. The amplitude of the impact of each event on the success of the project, if it occurs. Impacts are represented by the density function $g(x)$ and the amplitude of the impact is also a function of the risk factors.

Risk is conceptualized by a risk density function $h(x,y) = g(x/y)\ f(y)$ that combines the probability and the amplitude of the impact of the various events. The concept of *Risk Exposure* [5] often referenced in the project management literature, is a version of the risk density function:

$$\text{Risk Exposure} = \sum_{i=1}^{n} P(X_i) * C(X_i)$$

where $P(X_i)$ is the probability of an undesirable event i and $C(X_i)$ is the consequence of that event.

The conceptual framework that was developed for this research is inspired from Aubert and Bernard's work. As displayed in Fig. 1, it suggests that the perception a person develops of the risk of a project is a function of three sets of variables:

- The risk factors (exogenous and endogenous) that the person will consider in assessing the risk of the project;
- the perceived probability of each salient factor having an impact on the project;
- the perceived magnitude of the impact of each salient factor on the viability or the performance of the project.

Based on the knowledge accumulated in cross-cultural research, this perceptual process is potentially influenced by four sets of independent variables:

- Cultural factors
- Individual factors
- Socio-economic factors
- Situational factors

This conceptual framework suggests several questions regarding the influence that the cultural variable could exert on the individual process of risk assessment.

When they evaluate the risk of a project, do people from distinct cultural environments differ in terms of:

(a) the types of *risk factors* they consider and the relative importance attached to each factor considered?
(b) the relative importance attached to the perceived *likelihood of occurrence* of each individual risk factor?
(c) the relative importance attached to the perceived *impact* of each individual risk factor if it occurs?

The conceptual framework also suggests that, when attempting to answer those questions, it is necessary to take into account the other independent factors (cultural, socio-economic, individual and situational).

4. Methodology

Based on the conceptual framework, two hypotheses are addressed in this study:

Hypothesis 1: *When they evaluate the overall risk of a project, decision makers in China differ from decision makers in Canada in terms of the relative importance they attach to the various risk factors.*

Hypothesis 2: *When they evaluate the overall risk of a project, decision makers in China differ from decision makers in Canada in terms of the relative importance they attach to the probability and impact components of risk.*

The methodology that was developed and implemented for testing the null hypothesis for each one is presented next.

4.1. Overall approach

An inferential approach was selected to test the hypotheses. It involves two steps. (1) ask subjects with project management experience to compare the level of risk of alternative projects that have different risk profiles and then (2) infer from their responses the relative importance they attached in doing the comparison to the various risk factors as well as to the probability and impact components of risk.

The subjects should be selected and the task should be designed with a view of minimizing the variance associated with socio-economic and situational factors. While it is expected that, because of individual factors, the variance within each of the two groups (China and Canada) will

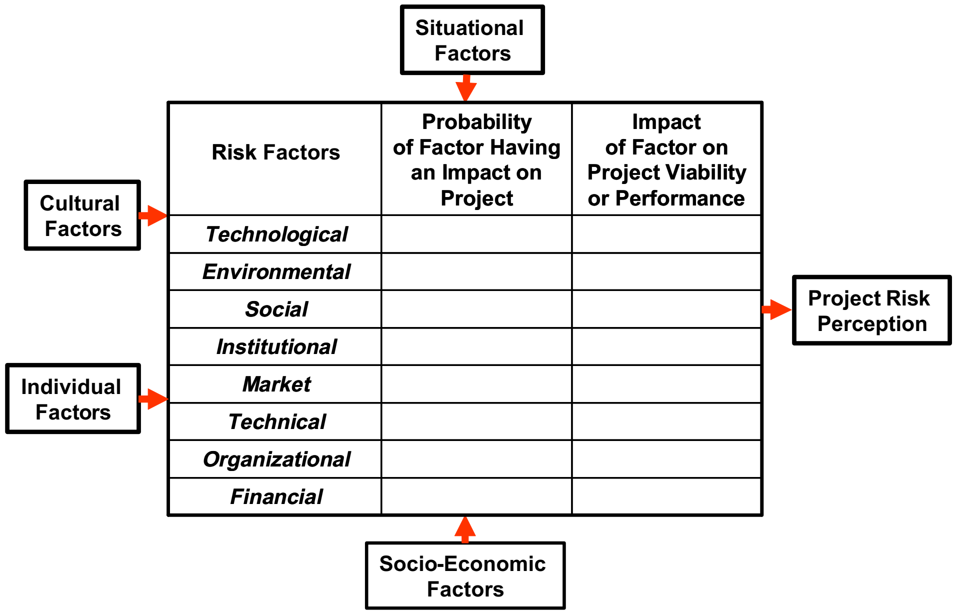


Fig. 1. Conceptual framework.

be high, significant differences in 'central tendency' between the two groups would be indicative of a 'cultural' influence on project risk perception.

4.1.1. Subjects

The subjects who participated in this study are enrolled in the Masters program in project management offered by the University of Quebec both in Canada and in several universities in mainland China. It is important to note that exactly the same program is offered in Canada and in China and, that the admission criteria (academic achievement and a minimum of three years of project management experience) are identical in both countries. As a result, the two groups have similar profiles in terms of education and management experience. Finally, because of the specific cultural comparison featured in this study (China vs. Canada), the Canadian respondents of Asian origin were *not* included in sample.

4.2. Task

The task that the subjects were required to perform simulates a selection process of a real-life project. They were presented with the following scenario: There is a requirement for a new electricity generation facility in a region that is expected to experience population and economic growth in the next twenty years. Eight proposal featuring different technologies and technical solutions were submitted by different industrial groups. Subjects were invited to assume the role of a member of a multidisciplinary taskforce whose mandate is to recommend the *optimum* electricity generation project for the region. They were told that for each of the eight proposed solutions, a risk profile featuring three salient risk factors (technology, market and environment) and their corresponding estimates of probability and impact was developed by experts. Subjects were invited to perform a pair-wise comparison of the eight projects on the basis of the profiles developed by the experts. Table 1 displays the two risk profiles featured in one of the paired comparisons.

For each paired comparison subjects were instructed to select the project that they felt was the most risky or, alternatively, to indicate if they felt that the two projects carried the same level of risk. A total of 21 paired comparisons were presented and the participants concluded the exercise by filling out a short classification questionnaire.

Table 1
Example of project risk profiles featured in the paired-comparisons (Comparison H)

Electrical generation project #	Technology	Market	Environment
3	20% Chance that the proposed technology will be 5% less cost-effective than projected	5% Chance that the market demand will be 20% below the break-even level	20% Chance that new environmental protection standards will be applied in a 5–10 year time frame. The project would not meet them.
5	5% Chance that the proposed technology will be 20% less cost-effective than projected	5% Chance that the market demand will be 20% below the break-even level	5% Chance that, once in operation, the proposed project will not meet the current environmental protection standards

Table 2
Risk factor levels[a]

Technological/Technical risk	T_i	T_p
20% Chance that the proposed technology will be 5% less cost-effective than projected	H	L
5% Chance that the proposed technology will be 5% less cost-effective than projected	L	L
20% Chance that the proposed technology will be 20% less cost-effective than projected	H	H
5% Chance that the proposed technology will be 20% less cost-effective than projected	L	H
Market risk	M_i	M_p
20% Chance that market demand will be 5% below the break-even level	H	L
5% Chance that market demand will be 5% below the break-even level	L	L
20% Chance that market demand will be 20% below the break-even level	H	H
5% Chance that market demand will be 20% below the break-even level	L	H
Environmental/Institutional risk	E_i	E_p
20% Chance that new environmental protection standards will be applied in a 5 to 10 year time frame. The project would not meet them	H	L
5% Chance that new environmental protection standards will be applied in a 5 to 10 year time frame. The project would not meet them	L	L
20% Chance that, once in operation, the proposed project will not meet the current environmental protection standards	H	H
5% Chance that, once in operation, the proposed project will not meet the current environmental protection standards	L	H

[a] In the two columns on the left hand side of the table, the indices *i* and *p* refer to the impact and probability dimension of risk respectively.

The instructions, the English version of the risk profiles and of the classification questionnaires were translated in Chinese and in French. The back translation procedure was used to ascertain the linguistic equivalence between the translated versions of the instruments [12]. Students were invited to participate on a strictly voluntary basis and, at the end of the exercise, they were asked to return the questionnaire only if they felt comfortable with the way they performed the paired-comparison process. The questionnaires were anonymous and confidentiality was assured to respondents. The whole task, from instructions to completion lasted between 25 and 35 minutes. After the exercise, a debriefing was given to the participating students to explain the rationale of the study, to present the conceptual framework and to discuss the methodology. While several students indicated that they found the task challenging, the consensus was that they were confident that the choices they made reflected their perception of the levels of risk featured in the paired comparisons.

4.3. Analytical method

In order to keep the number of risk profiles presented to respondents to a manageable level, only three risk factors were retained. The first one combined technological and technical risks, the second one addressed market risk and the third one combined environmental and institutional risks. While these were only a subset of the possible risks, they were presented to respondents as the salient risks for this project, as identified by experts. Two levels (high and low) were used for the two components of each risk factor (probability of occurrence and impact). Table 2 shows how these elements were combined to define four levels of risk for each factor.

The overall risk profile of a project is in turn a combination of these individual risk levels and there are 64 such possibilities. Because this number would be too high for respondents to handle in a valid fashion, an orthogonal array design[3] was used to reduce that number to 8. The reduced set of profiles is displayed in Table 3.

Table 3
Orthogonal array for the project risk perception exercise

Project Risk Profile	Ti	Tp	Mi	Mp	Ei	Ep
1	H	H	H	H	H	H
2	H	H	H	L	L	L
3	H	L	L	H	H	L
4	H	L	L	L	L	H
5	L	H	L	H	L	H
6	L	H	L	L	H	L
7	L	L	H	H	L	L
8	L	L	H	L	H	H

A pre-test was conducted to find out whether target respondents (students in a Masters Program in Project Management) would feel comfortable scoring or ranking these projects in terms of their overall level of risk. As the pre-test was not conclusive, a pair-wise comparison process was developed requiring respondents to select the project in the pair that they perceived as being the most risky. This procedure proved to be feasible and it was selected for this investigation. A risk score for each project was computed for each subject by counting the number of times each project was selected as being more risky (or of equal risk) across all paired comparisons.

Conjoint analysis is a multivariate technique that was developed to analyze people's perceptions or judgments. It requires respondent to choose among a set of options and, from that data, the conjoint procedure infers which factors influenced the respondent's choices by estimating utility scores – called part-worth – for each of the factors. Utility scores are a measure of how important each factor is to the person's choice, preference or judgment. These utility scores are analogous to regression coefficients. They

[3] An orthogonal array is a type of design in which only main effects are considered. Interactions – where the part worth of one factor depends on the level of another factor – are assumed to be negligible.

are computed through a set of regressions of the respondent's choices (measured by scores or rankings) on the factor profiles of the various options.

In this research, the options presented to respondents were a series of risk profiles (projects) featuring a combination of levels of several factors (risk factors, probability of occurrence and impact on the project). From the results of the paired comparisons, a risk score was obtained for each project. Conjoint analysis was used to infer from the risk scores of each respondent the *relative importance* that he or she attached to each of the variables featured in the risk profiles. In other words, the conjoint analysis provides a measure (relative utility) of the extent to which an individual relies on each variable (type of risk, probability and impact) in deciding which project in a pair was deemed more risky. The conjoint analysis resulted in the creation of five *relative importance* variables for each respondent:

– Relative importance of the technological/technical risk.
– Relative importance of the market risk.
– Relative importance of the environmental/institutional risk.
– Relative importance of the probability component of risk.
– Relative importance of the impact component of risk.

The final analytical task was to test whether the mean of each of the above importance variables was significantly different between the China and the Canada groups. A one-way analysis of variance was conducted first. However, because individual factors are expected to influence risk perception, it was necessary to examine whether variables other than 'Nationality' could account for the difference. To that effect a series of stepwise regressions were run with the above importance variables as dependent variables and the following independent variables:

– *Nationality*: This was defined as a dummy variable to represent two groups: (a) The group of respondents surveyed in Mainland China and who reported their nationality as 'Chinese' and (b) The group of respondents surveyed in Eastern Canada and who reported their nationality as 'Canadian'.
– *Sex*: This was defined as a dummy variable.
– *Age*: This was defined as a ratio variable.
– *Occupation*: This was defined as a dummy variable to differentiate between respondents that had a technical or scientific type of occupation (engineering, informatics, physics, chemistry, etc.) and those who had a non technical type of occupation (administration, education, sales & marketing, finance, legal, etc.).

5. Results

The research exercise was administered in the fall of 2005 and winter of 2006 by the authors in five universities where the Masters in Project Management of the University of Quebec is offered: Two Chinese universities (the Zhejiang Gongshang University in Hangzhou and the Tianjin University of Technology in Tianjin) and in three Canadian universities (University of Quebec in the Outaouais, University of Quebec in Chicoutimi and University of Quebec in Trois-Rivières). A total of 138 usable questionnaires were obtained.

Because they were enrolled in the same Masters program in project management, the respondents had similar levels of academic achievement and project management experience. The profiles of the two groups (China and Canada) in terms of other classification variables were also quite similar, as shown in Table 4.

The SPSS program was used for the conjoint analysis. Part-worth scores (utilities) were derived for all the 138 respondents. The Pearson's R and Kendall's tau displayed in Table 5 provide indicators of the goodness of fit between the part-worth scores estimated by the conjoint procedure and the project risk scores that were used as input to the analysis. The high correlation between the two sets of scores suggests that the conjoint analysis was a reliable approach for analyzing the respondents' process of comparing the level of risk of the eight projects profiled in the simulation exercise.

Table 4
Respondents' profile

		Nationality groups				
		China		Canada		Total Count
		Count	(%)	Count	(%)	
Sex	Male	45	53	40	61	85
	Female	27	33	26	39	53
	Total	72	100	66	100	138
Age	<25	7	10	3	4	10
	25–35	40	57	33	51	73
	36–45	20	29	20	31	40
	>45	3	4	9	14	12
	Total	70	100	65	100	135
Occupation	Technical	18	25%	27	41%	45
	Other	53	75%	39	59%	92
	Total	71	100%	66	100%	137

Table 5
Goodness of fit statistics for the conjoint analysis

	Level	Significance
Pearson's R	0.998	0.0000
Kendall's tau	0.929	0.0006

Table 6
Test of homogeneity of variances

Factor	Levene statistic	df1	df2	Significance
Technological risk	2.29	1	136	0.1
Market risk	2.21	1	136	0.1
Environmental risk	0.01	1	136	0.9
Probability component	1.01	1	136	0.3
Impact component	1.01	1	136	0.3

Table 7
Level of importance of factors used by subjects to compare the risk of alternative projects

Factor	Group	Mean	Standard deviation	*F* Statistic	Significance level
Technological risk	China	20.4	12.8	2.3	0.13
	Canada	23.5	10.4		
Market risk	China	32.6	14.4	12.5	0.001
	Canada	42.0	16.6		
Environmental risk	China	46.9	15.9	20.8	0.000
	Canada	34.6	15.9		
Probability component	China	52.2	13.8	5.0	0.027
	Canada	57.8	15.8		
Impact component[b]	China	47.8	13.8	5.0	0.027
	Canada	42.2	15.8		

[b] The variances and the *F* statistics for the probability and the impact components are identical because it is the *relative* importance between the two that was computed.

As explained earlier, importance scores were computed from the individual part-worth scores for each one of the risk factors and risk components. The next analytical step was to examine whether the two groups differed in the way they used the information provided to compare the risk of the various projects. An analysis of variance was performed in order to test whether the average importance score on each of the three risk factors (technological/technical risk, market risk, environmental/institutional risk) and on the two risk components (probability and impact) differed significantly between the two groups (China and Canada). The Levene test for homogeneity of variance reported in Table 6 indicates that this requirement for comparing variances is met.

The *F* test results reported in Table 7 indicate that the importance scores differ significantly between the two groups except for technological risk. In terms of the risk factors, the most useful information for respondents in the China group was that on environmental/institutional risk whereas it was that on market risk for the respondents in the Canada group. In terms of the risk components, the probability information was considered to be more important than the impact information in both groups, but to a significantly lesser extent in the China group.

The last step in the analysis was to ascertain whether those differences could be accounted by variables other than the nationality of the subjects.

Table 8 displays the correlation matrixes between the five dependent variables on the one hand and the four independent variables on the other. It is striking that the only significant correlations are between the dependent variables and 'nationality'. In other words, the other variables (sex, age and occupation) do not account for any of the variance in the importance variables. Therefore, it is not surprising that, when stepwise regressions were performed, the only dependent variable that entered the regression was 'nationality'[4].

6. Discussion

Two hypotheses were addressed in this empirical investigation:

Hypothesis 1: *When they evaluate the overall risk of a project, decision makers in China differ from decision makers in Canada in terms of the relative importance they attach to the various risk factors.*

Hypothesis 1: *When they evaluate the overall risk of a project, decision makers in China differ from decision makers in Canada in terms of the relative importance they attach to the probability and impact components of risk.*

The results of the analysis reported here provide evidence in support of the two hypotheses. There are, however, several methodological issues that limit the extent to which these findings can be generalized:

1. While the Chinese sample was fairly homogeneous in terms of cultural background, the Canadian sample included English Canadians, French Canadians and Neo-Canadians born in a wide diversity of countries[5].
2. Only a subset of possible risk factors was featured in the simulation exercise and some of these factors were presented as a combination of risk factors. For example the impact of the environmental risk was expressed in institutional terms (meeting environmental norms).
3. Because of the orthogonal design, only main effects were taken into account. The possibility of interaction effects (for example, could environmental risk be per-

[4] Because only one variable entered the stepwise regressions, all the useful information is available in the correlation matrices and, consequently there is no need to report regression results.

[5] It should be noted, however, that because of the specific cultural comparison featured in this study (China vs. Canada), the Canadian respondents of Asian origin were *not* included in sample.

Table 8
Correlation matrices between dependent and independent variables

Dependent variables		Independent variables			
		Nationality	Sex	Age	Occupation
Importance of technological risk	Pearson R	0.127	−0.067	−0.099	−0.011
	Significance	*0.072*	*0.220*	*0.127*	*0.449*
Importance of market risk	Pearson R	**0.290**	0.044	0.022	−0.031
	Significance	***0.000***	*0.307*	*0.399*	*0.363*
Importance of environmental risk	Pearson R	**−0.361**	0.004	0.047	0.037
	Significance	***0.000***	*0.480*	*0.295*	*0.337*
Importance of probability	Pearson R	**0.221**	0.074	0.002	0.009
	Significance	***0.005***	*0.197*	*0.489*	*0.457*
Importance of impact[c]	Pearson R	**0.221**	0.074	0.002	0.009
	Significance	***0.005***	*0.197*	*0.489*	*0.457*

[c] The Pearson R for the probability and the impact components are identical because it is the *relative* importance between the two that was computed.

ceived as important only when all the other risks are perceived to be low?) could not be factored in the analysis.
4. The sample used for this investigation was not large enough to test the stability of the results.

While these issues need to be addressed in further studies, the results of this investigation appear to have face validity. For example, it could be expected that Chinese subjects would attach less importance to market risk than their Canadian counterparts: In a centralized economy where a multi-year plan rather than market forces have been used to allocate resources, people are less sensitized to the notion of demand than in a market economy.

Since Chinese people value living in harmony with the environment whereas North Americans aspire to dominate their environment, it is not surprising that, in this study, Chinese subjects gave more weight to environmental risk when comparing the various projects.

The finding that Canadian subjects attach relatively more importance to the probability component of risk is also consistent with the results of other empirical studies. For example, according to a study reported by Adler [1, p. 180] "*Chinese executives believe that there is an element of 'joss' or luck involved in all transaction (external attribution). By contrast most American managers believe that effective problem solving and hard work will get the job done (internal attribution)*". This finding is also consistent with the results of value surveys where Chinese were found to evaluate *self-mastery* (independent, ambitious, daring, capable) higher and *uncertainty avoidance* somewhat lower that in Western societies.

From a project management point of view, the significance of such differences in risk perception can be appreciated by looking at which projects would have been recommended if the paired comparison approach had been used with a task force similar to the one simulated in this exercise. The average project risk ratings resulting from the paired comparisons that are displayed in Table 9 show

Table 9
Average project risk scores in the two groups[d]

Project #	Group	Mean	Standard deviation	F Statistic	Significance level
2	China	4.7	2.5	17.9	0.000
	Canada	6.6	2.7		
3	China	6.4	2.4	7.3	0.008
	Canada	7.6	2.6		
4	China	4.6	2.8	4.2	0.043
	Canada	3.6	2.6		
5	China	6.3	2.4	8.5	0.004
	Canada	4.9	2.8		
6	China	5.2	2.7	2.6	0.109
	Canada	4.4	2.8		
7	China	5.2	2.6	9.0	0.003
	Canada	6.7	3.0		
8	China	9.7	2.8	9.6	0.002
	Canada	8.2	2.8		

[d] As shown in Table 3, Project 1 was profiled as the highest risk project. As a result, because its risk score was identical in both samples, it was not subjected to the *F* test.

statistically significant differences between the two groups for all the projects but one.

Based on those ratings, both the Chinese and the Canadian task forces would have picked project 4 as being the less risky. This is not surprising because it was defined as a low risk project on the risk factors deemed important in the two groups. However, the second less risky would have been project 2 for the Chinese task force and project 6 for the Canadian task force and, the third less risky would have been project 6 for the Chinese task force and project 5 for the Canadian task force. In other words, project 2 would have not made the short list of the three less risky projects in the Canadian group while project 5 would not have made it in the Chinese group.

6.1. Conclusion

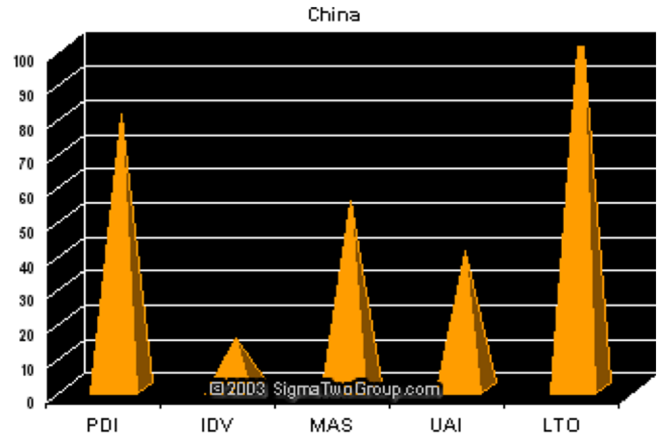
The results reported in this study support the belief that there are significant differences in the way people in different societies perceive and evaluate the risk of a complex project. From a project management perspective, since those differences could influence which project ends up being selected, this finding appears to have practical value. Therefore, the issue of project risk perception deserves further attention because "*cultural blindness – choosing not to see cultural differences – limits our ability to benefit from diversity; that is, it precludes our ability to minimize the problems caused by cultural diversity and to maximize the potential advantages it offers*" [1, p. 107].

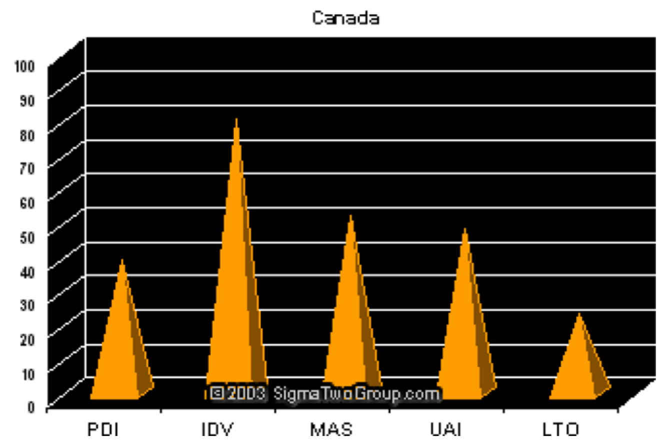
Two avenues for further research are suggested:

– Investigate risk perception differences between other cultural groups with a view of cross validating the findings of this study.
– Explore the existence of relationships between cultural variables (e.g., cultural values) and the risk components that influence an individual's perception of project risk (exogenous and endogenous risk factors, the probability of these factors impacting the project and, the perceived magnitude of their impact on the viability and/or performance of the project). The knowledge from such research would allow project management people to:
  (a) develop a risk profile analysis method for estimating the chances of a risky project being accepted by a group of culturally diverse sponsors, before having to undertake expensive feasibility studies and,
  (b) develop marketing strategies for communicating effectively the risk information required by those sponsors for making an enlighten project decision.

Appendix

China and Canada scores on Geert Hofstede™ Cultural Dimensions





Power Distance Index (PDI) focuses on the degree of equality, or inequality, between people in the country's society.

Individualism (IDV) focuses on the degree the society reinforces individual or collective achievement and interpersonal relationships.

Masculinity (MAS) focuses on the degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control, and power.

Uncertainty Avoidance Index (UAI) focuses on the level of tolerance for uncertainty and ambiguity within the society - i.e. unstructured situations.

Long-Term Orientation (LTO) focuses on the degree the society embraces, or does not embrace, long-term devotion to traditional, forward thinking values.

Source: http://www.geert-hofstede.com/.

References

[1] Adler NJ. International dimension of organizational behavior. fourth ed. Cincinnati: South Western; 2002.
[2] Ashkanasy NM, Wilderom CP, Peterson MF, editors. Handbook of organizational culture & climate. London: Sage; 2000.
[3] Astebro T, Michela JL. "Predictors of the Survival of Innovations". J Prod Innovat Manage 2005;22(4):322–35.
[4] Aubert BA, Bernard JG, editors. Mesure intégrée du risque dans les organisations. Montréal: Presses de l'Université de Montréal; 2004.

[5] Boehm BW. Industrial software metrics top 10 list. Quality Time, IEEE Software 1987:26–37.
[6] Bond MH. Finding universal dimensions of individual variation in multicultural studies of values: the Rokeach and Chinese value surveys. J Pers Social Psychol 1988;55(6):1009–15.
[7] Bond MH. Chinese values and health: a cultural level examination. Psychol Health Int J 1991;5:137–52.
[8] Cote J, Patriya S, Tansuhaj PS. Culture bound assumptions in behavior intention models. In: Srull TK, editor. Adv Consum Res, vol. 16. Assoc Consum Res; 1989. p. 826–32.
[9] Dalla Coletta G, and de Camprieu R. ''Analyse de la relation entre le degré d'effort investi dans l'analyse du risque des projets de développement d'innovation et le degré de succès de ces projets'', Colloque en gestion de projet 2004, Université du Québec à Montréal. 2004.
[10] Davis CR. ''Calculated risk: a framework for evaluating product development'', MIT Sloan. Manage Rev, Summer, 2003; 73.
[11] Debia M, Zayed J. Les enjeux relatifs à la perception et à la communication dans le cadre de la gestion des risques sur la santé publique. VertigO – La revue en sciences de l'environnement sur le Web 2003;4(1).
[12] Deutscher I. Asking questions cross-culturally: some problems of linguistic comparability. In: Warwick D, Osherson S, editors. Comparative research methods. New Jersey: Prentice Hall; 1973. p. 163–88.
[13] Douglas M, Wildavsky A. Risk and culture, an essay on the selection of technological and environmental dangers. Berkeley: University of California Press; 1983.
[14] Faucher P. (editors), 1999. Grands projets et innovations technologiques au Canada, Montréal: Presses de l'Université de Montréal.
[15] Gentry JW, Tanshuhaj P, Manzer L, John J. Do Geographic Subcultures Vary Culturally? In: Houston MJ, editor. Adv Consum Res, vol. 15. Assoc Consum Res; 1998. p. 411–7.
[16] Hofstede G. Culture's consequences: international differences in work-related values, abridged version. London: Sage; 1984.
[17] Hofstede G. The universal and the specific in 21st-century global management. Organizational Dynamics, Summer 1999; p. 34–43.
[18] Hofstede G, Peterson MF. National values and organizational practices. In: Ashkanasy NM, Wilderom CP, Peterson MF, editors. Handbook of organizational culture & climate. London: Sage; 2000. p. 401–5.
[19] Juergen H. ''Decision taking in complex innovation processes'', 16th IPMA World Congress in Berlin, 2002; p. 207–216.
[20] Kavadias S, Loch CH. Project selection under uncertainty: dynamically allocating resources to maximize value, vol. 30. Boston: Kluwer Academic Publishers; 2004.
[21] Kim U, Triandis HC, Kagitcibasi C, Choi S, Yoon G. Individualism & collectivism: theory, method and application. Thousand Oaks: Sage; 1994.
[22] Marshall MB. The Chinese value survey: an interpretation of value scales and consideration of some preliminary results. International Education Journal 2000; p. 1–2.
[23] Mc Sweeney B. Hofstede's model of national cultural differences and their consequences: a triumph of faith – a failure of analysis. Human Relations 2002;55(1):89–118.
[24] Miller R, Lessard D. The strategic management of large engineering projects: shaping institutions, risks, and governance. Cambridge, MA: The MIT Press; 2000. 17,33.
[25] O'Shaughnessy W. La faisabilité de projet : une démarche vers l'efficience et l'efficacité, Trois-Rivières: Les éditions SMG, 1992.
[26] Ralston DA, Holt DH, Terpstra RH, Yu KC. ''The impact of national culture and economic ideology on managerial work values: a study of the United States, Russia, Japan, and China''. J Int Bus Studies, First Quart 1997:177–207.
[27] Rokeach M. The nature of human values. New York: The Free Press; 1973.
[28] Roure JB, Keeley RH. Predictors of success in new technology based ventures. J Bus Venturing 1990;5(4):201.
[29] Sarros JC, Santora JC. Personal values and executive leadership: global comparisons and practical implications, academy of business and administrative sciences international conference, Quebec City: Canada, 2001.
[30] Schwartz SH. Beyond individualism/collectivism: new cultural dimensions of values. In: Kim U et al., editors. Individualism & collectivism: theory method and application. Thousand Oaks: Sage; 1994. p. 85–119.
[31] Schwartz SH, Bilsky W. Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. Journal of Personality and Social Psychology 1990;58:878–91.
[32] Simon HA. The new Science of Management Decision. New York: Harper & Row; 1960.
[33] Soutar GN, Grainger R, Hedges P. Australian and Japanese value stereotypes: A two country study. Journal of International Business Studies 1999;30(1):203–16.
[34] Tao J, Brennan A. Confucian or liberal ethics for public policy: Holistic or Atomistic? Journal of Social Philosophy 2003;34(4): 572–89.
[35] Wallerstein I. Culture as the ideological battleground of the modern world-system. Theory, culture & society 1990;7:34.
[36] Westwood RI, Posner BZ. Managerial values across cultures: Australia, Hong Kong and the United States. Asia Pacific Journal of Management 1997;14:31–66.
[37] Whittaker B. What went wrong? Unsuccessful information technology projects''. Information Management & Computer Security 1999;1:23–9.