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VALUES AND ATTITUDES TOWARDS INNOVATION AMONG CANADIAN, CHINESE AND RUSSIAN STUDENTS

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This study investigated relations of basic personal values to attitudes towards innovation among students in Russia, Canada, and China. Participants completed a questionnaire that included the SVS measure of values (Schwartz, 1992) and a new measure of attitudes towards innovation (Lebedeva, Tatarko, 2009). There are significant cultural and gender-related differences in value priorities and innovative attitudes among the Canadian, Russian, and Chinese college students. As hypothesized, across the full set of participants, higher priority given to Opennes to change values (self-direction, stimulation) related to positive attitudes toward innovation whereas higher priority given to Conservation values (conformity, security) related negatively. This is compatible with the results reported by other researchers (Shane, 1992, 1995; Dollinger, Burke & Gump, 2007). There were, however, culture-specific variations in some of these associations, which may be explained by cultural differences in value priorities or meanings and in implicit theories of creativity and innovation. Applying the Multiple-Group Multiple Indicators Multiple Causes Model (MGMIMIC) (Muthen 1989) has shown that the type of Values-Innovation mediation is different in the three countries. Whereas in Russia and Canada the effects of gender and age are fully mediated by the values, this is not true for China, where a direct effect of gender on innovation was found. The cultural differences in values, implicit theories of innovation, and their consequences for attitudes to innovation and personal well-being is finally discussed.

JEL Classification: A13.
Keywords: culture, values, innovation, attitudes, cross-cultural comparison, Multiple Group MIMIC Model.

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Introduction

Cross-cultural studies in contemporary social science have shed light on a range of social issues and their cultural variability. Researchers have shown that culture plays a significant role not only in a country's economic development, but also in its citizens' state of health, life expectancy, sense of well-being, and happiness. An additional and very important dimension tied to culture is the level of inquisitiveness and tolerance regarding new ideas (Harrison & Huntington, 2000, Inglehart & Baker, 2000; Diener, 1996; Shane,1992, 1995; Dollinger, Burke & Gump, 2006, Kharkhurin, Motalleebi, 2008).

One aspect of such cross-cultural research that has received little attention concerns relationships between individual values of people from different national and ethnic backgrounds and the attitudes towards innovation and inventiveness (Leung, Morris, 2011). These relationships are the subject of this study. Specifically, we explore the question: Can value priorities serve as universal or cultural-specific predictors in favor of, or against, innovations? These questions are not idle or abstract: In an increasingly complex and changing business environment, creativity and innovations are a critical factor for the success of organizations and even whole nations. In the postindustrial era, the social and economic development of countries depends to a large extent on the ability to develop knowledge, that requires new approaches and solutions.

In addition we test whether the effects of gender and age on attitude towards innovation are fully mediated by individual values. Both demographic variables are used in a lot of studies as direct predictors of innovation without testing for the possible mediation via personal values (Rogers 1995). Despite the fact that creativity and innovation is an increasingly studied topic (Zhou & Shalley, 2003) we agree with Leung and Morris (2011) that there is limited research investigating it outside of Western cultures or comparatively across cultures.

In this paper we study the relationships of values and attitudes towards innovation in three groups of students with two of them from non-Western cultures (China and Russia). We also try to 'unpackage' the influence of culture (Leung and van der Vijver, 2008) into the influence of implicit culture-specific gender norms through testing the direct impact of gender on attitudes to innovation.

In the paper we firstly address the theoretical background of the relationship between values and innovations and the setting of the study. Then we describe the samples, the measurement instruments and the descriptive empirical results like means, standard deviations and correlations. The test of the propositions for the three countries is performed by a multiple - group Multiple Indicators Multiple Causes Model (MGMIMIC), which allows a simultaneous

test of all parameters in the three countries (Muthen 1989). Finally we summarize the results and discuss strengths and weaknesses of the study.

Theoretical background
The Importance of Innovation and the setting of the study

In recent years, the world has witnessed the power of innovation and its various constituents in revolutionizing the business and economic landscape. With the advancement of the knowledge-based economy, the world is also seeing how innovation empowers individuals, communities and countries with a profound impact on business, politics, and society. What is equally evident is the increasing role that innovation plays in accelerating economic growth and promoting development.

Therefore, more than ever, in the current global economic situation, policy makers and business leaders recognize the need to create an enabling environment to support the adoption of innovations, check their possible side effects and spread their benefits across all sectors of society.

The importance of innovation readiness, especially at the national level, has achieved prominence on the public policy agenda, with the realization that the right policies, inputs and enabling environment can help countries fulfill their national potential and enable a better quality of life for their citizens.

According to the INSEAD' Global Innovation Index[4] 2009/10 report (see table 1) the American continent houses traditional innovators such as the USA (11th) and Canada (12th), which is not surprising.

Table 1: Indices of Innovation

Country	Rank	Global Index (factor scores)	Innovation Capacity Index (ICI)
Canada	11	1,56023	74,8
China	41	-0,01059	49,5
Russia	55	-0,32739	52,8

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[4] Global Innovation Index INSEAD (GII_INSEAD) includes 7 subindexes: Institutes and a policy; Personnel potential; Infrastructures (General and IT); Competitiveness of the markets, Competitiveness of the companies; Creative Results; Results of scientific researches. The given subindexes include 94 variables.

The emerging economy of China holds 15th position in the Asia zone. The Chinese economy is the third largest in the world and one of the fastest growing economies. Though the Chinese economy has expanded at a good rate in the past decades with the opening up of its markets, income inequality is still very high. One problem that continues to face the economy of China is that of brain drain, where a major portion of its highly skilled population migrates to other lucrative destinations. Innovation has therefore tended to be focused outside the country in some measure, though in recent times, this trend is slowly reversing.

Russia over the decades has produced a large number of scientists and inventors. Traditionally, space technology and exploration, nuclear technology, air craft production and the arms industry have been among the key areas of competence for the Russian economy. The 1990s crisis that struck all the post-Soviet countries affected R&D by cutting down government expenditure in science and technology. It also led to a large number of Russian scientists and researchers leaving their country for better destinations for research. Russian scientists and inventors largely tend to apply only for Russian patents, avoiding patent registration abroad, which may also be explained by the low level of English proficiency.

According to The INSEAD' Global Innovation Index 2009/10 report, Russia occupies 55th place in the world rating's of innovative activity among such countries as Costa Rica (54th place), Saudi Arabia (53th), Kazakhstan (56th). China occupies 41th place, outstripping Russia. It depends on systemic approach to the innovative development of China, according to the opinion of Russian sociologist Davidov (Davidov, 2010).

From table 1 it is clear that the Innovation Capacity Index of Russia is a little bit higher while the rank of Global Innovation Index is lower. It tells us, that the potential for innovations in Russia is not sufficiently exploited.

There are many different explanations as to why some countries are more inventive and innovative than others. For example, economy-related explanations regard inventions and innovations resulting from public and governmental support; imitation; the level of demand; the intensity of research; the stages of a product's life cycle and many other causes (see the review in Shane, 1992).

Besides these factors, cultural differences influence the levels of inquisitiveness and tolerance in respect to new ideas (Wallace, 1970). Cultures differ in their attitudes towards business formation (Shapero and Sokol, 1982); the *per-capita* number of Nobel Prize winners in the sciences differs across countries; the level of individualism and lack of power distance are related to innovation and invention at the level of organizations (Shane, 1992).

Shane showed how differences in values among various nations influence the levels of innovation and invention at the organizational level, making some societies comparatively more

inventive than others. According to Shane, two aspects of culture strongly influence inventiveness, the level of social hierarchy and individualism. This study examined the per capita number of invention patents granted to nationals of 33 countries in 1967- 1980 and compared it with an index of the values of power distance (social hierarchy) and individualism, compiled from a survey of 88,000 IBM employees by Geert Hofstede in the late 1960s and early 1970s. The results showed that individualistic and nonhierarchical societies are more inventive than other societies (Shane, 1992). Another cross-cultural study of Kharkhurin and Motalleebi (2009) presents evidence for the impact of the sociocultural environment on the creative potential. The study revealed that, compared to the Iranians, Americans and Russians have superior abilities to consider a problem from different perspectives and to generate original solutions to a problem. The performance differences on the originality measure of the representatives of the Western and Eastern countries calls for the possible revisions of the traditional definition of creativity as a construct emphasizing originality in thinking. Although originality and innovation are inherent properties of creative behavior in the Western thought, it might have a lower value in the East.

Different conceptions of creativity and novelty, rooted in implicit theories of creativity and innovation, has been stressed by other researchers too (Amabile, 1996; Khaleefa *et al.*, 1996, 1997; Kuo,1996; Abou-Hatab, 1997; Cheng, 1999; Oner, 2000; Baldwin, 2001, Rudowicz, Yue, 2000; Rudowicz, 2003; Leung, Morris, 2011). Studies of the implicit theories people hold about creativity and innovation have revealed differences between the views in Western (USA and Europe) and Eastern (China, Japan, Korea) cultures. For example, implicit theories in the West see innovation as based on ingenuity, novelty, originality, and an orientation to self-expression. In contrast, in the East implicit theories understand innovation as interpretation of existing traditions and actions [Lubart, 1999]. Such differences may affect interpersonal judgments, the types of educational systems, skill training, etc. in societies. These differences in implicit theories of innovation may reflect differences in prevailing basic values in the culture.

Since the early 1990s, much of the researches on research of values have been based on Schwartz's (1992) theoretical and methodological approach, which was grounded in Rokeach's work. Values of individuals are assessed in terms of motivational goals or personal principles by which one lives (Schwartz, 1992). Schwartz theorized that basic human values are cognitive representations of biological needs, social interaction needs, and group welfare needs (1992, 1994; Schwartz & Sagiv, 1995). He and colleagues postulated and found ten human value types across cultures (see Figure 1): *power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security.*

These 10 value types can be further grouped into two bipolar dimensions (matching four higher-order value types), **Openness to change** versus **Conservation** and **Self-transcendence**

versus **Self-enhancement** (Schwartz, 1992). The former refers to values emphasizing self-direction and stimulation versus security, conformity, and tradition, whereas the latter refers to universalism and benevolence versus power and achievement. Presently the number of values and the corresponding items are increased (Schwartz, in press) but these new developments will only be available in 2012.

Figure 1. The model of value's organization (Schwartz, 1992)
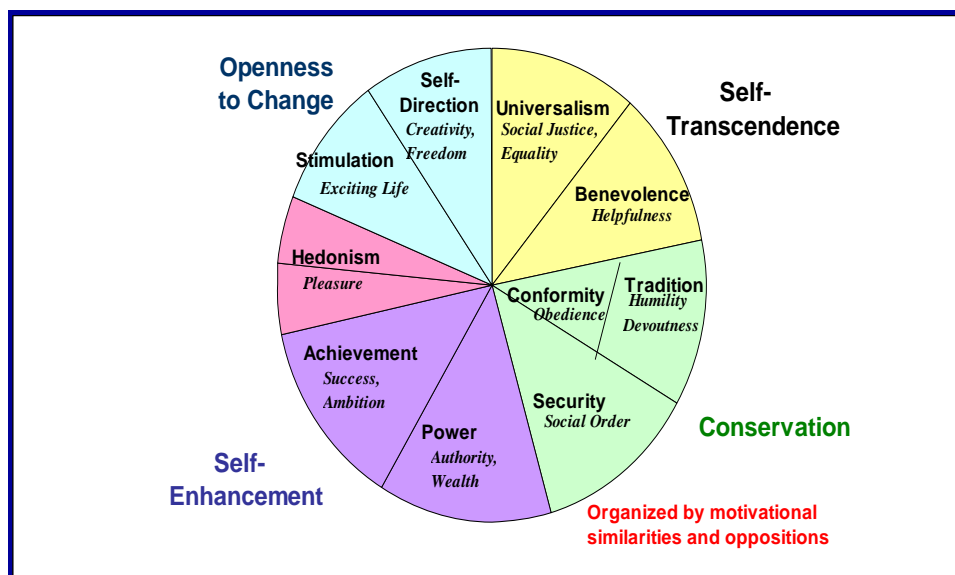
The mechanism underlying the relationship between values, innovation, and creativity can be specified as follows by using the Dual Pathway to Creativity Model (DCPM) (De Dreu et al.2008; De Dreu et al 2011) Self-Direction and Stimulation may be motivational forces to lead to more cognitive flexibility and more cognitive perseverance. These factors lead according to the DCPM model to a higher creative fluency and originality. On the other hand, high values on conformity and tradition lead via a bad mood to lower cognitive flexibility and less cognitive perseverance, which leads then to lower creative fluency and originality.

As striving for and introducing an innovation is one specific form of creative behavior, we postulate that the same mechanism is also true for the introduction of innovations. For the diffusion of innovation however one needs additional explanatory variables (see Rogers 1995). Schwartz (2008) found that adopting technological innovations correlated positively with Stimulation and Self Determination and negatively with Security, Tradition and Conformity.

As De Dreu et al (2011, p. 298) argue creativity and innovation are often used interchangeably but to do so misses some important nuances. Therefore we introduce explicitly the following two definitions for creativity and innovations which they propose based on the following works (Amabile, 1996, Runco, 2004, West and Farr, 1990):

D 1 Creativity can be defined as the generation of ideas, problem solutions, or insights that are novel and appropriate.

D 2 Innovation can be defined as the intentional introduction and application within a role , group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption , designed to significantly benefit the individual, the group, , the organization or wider society.

Furthermore according to some research, the identification of attitudes towards creativity and innovations are important mechanisms for organizations to encourage innovation across all employees **(**Basadur, Hausdorf, 1996).

Let us now refer to the relationship between the demographic attributes age and gender and innovation. According to Rogers (1995) there is inconclusive evidence for the effects of gender and age on innovation adoption. It seems to depend on the specific innovation studied and the social context, how and whether gender and age influence innovation (see the discussion on possible underlying mechanisms in Kaufmann/Schmidt 1976). The relationship between gender and age on the one hand and values on the other hand is according to the findings by Meuleman et al. (2012) on the basis of the analysis of data of the European Social Survey as follows: Men are higher in Stimulation and Self Determination, whereas gender has no significant effect on Tradition and Conformity. Increasing age is positively connected to Conformity and Tradition whereas it is negatively related to Stimulation and Self-Determination. Therefore one can deduce that men should be more positive in their attitude towards innovation than women and that with increasing age the attitude towards innovation becomes more negative and less innovative behavior is shown.

Present Study: Research Questions and hypotheses

Our study investigates how individual values of people from different cultures relate to their attitudes towards innovation. We chose Canada, Russia and China because of several reasons. Firstly, Russia is similar to Canada with regard to its geographical location and the size of the territory it occupies and thus, is comparable to it with regard to this geographical dimension. Secondly, despite this similarity, Canada and Russia have very different social systems which have been established based on different historical and cultural premises. Russia and China have also some similarities (the size of territory and similar social system in their past) and differences in their historical and cultural background as well as vectors of their future development. Therefore it is especially interesting to compare in these groups, the influence of values on the attitudes towards innovations in three different countries

We have chosen student's youth as under our previous data the students have the most positive attitudes towards innovations in comparison with adults (Lebedeva, 2008). The role of young generations in the development of the economy of knowledge seems crucial in these countries. Therefore it is especially interesting to compare influence of values on the attitudes towards innovations in three different national student samples.

Specifically, our central research questions are:

1) Which of the ten values have an effect on attitude towards innovation and how strong is it?

2) To test the invariance of the relationships between individuals' values and attitudes to innovations in three different cultural groups - Canadian, Russian and Chinese college students, that is to test the extent to which the values promoting positive attitudes towards innovations in the three groups are universal or culturally specific.

3) To test whether the level of values and attitude towards innovation is different in the three countries.

4) To test whether the effects of gender and age on attitude towards innovation are fully or only partially mediated by values and whether they operate in the three countries in the same way..

Research Hypotheses:

- There are cultural differences in value priorities and attitudes towards innovation among Canadian, Russian and Chinese college students.
- The values of Openness to change (self-direction and stimulation) determine positively, and those of Conservation (security, conformity and tradition) negatively, attitudes towards innovations
- Values promoting positive attitudes towards innovations are universal as well as culturally specific
- The effects of age and gender on innovation are fully mediated by values.
- Age has a positive effect on Conservation values and a negative effect on Openness to change values, whereas gender has no effect on Conservation but does have an effect on Openness to change.

Method

Participants. In our study we used the following samples: College students from Canada, Russian Federation and China. The data were collected in 2009 year (spring semester) among students of different departments from the three below mentioned universities

The sample embraced 444 college students from:

a) Saskatchewan University, Saskatoon, Canada; Canadians (born in Canada), N=207;

b) National Research University 'Higher School of Economics', Moscow, Russia; ethnic Russians, N=137;

c) Harbin Normal University, Harbin, China, Chinese, N=100) [see Table 2 for the description of the samples].

Table 2. Description of the Sample

Cultural groups	Students (Number/Mean age)	Male (%)	Female (%)
Russians	137 / 20,6 years	39	61
Chinese	100 / 22,5 years	50	50
Canadians	207/ 21,6 years	41	59
Total	444	43	57

Measures. The study was a cross-sectional survey using self-administered questionnaires presented in English, Russian and Chinese (Mandarin) respectively.

Cultural predictor variable

1. Schwartz Value Survey (SVS). The Schwartz Values Survey (Schwartz, 1992) is a 56-item measure now validated in more than 60 countries. Participants rate the importance of 56 values on a scale from -1 (*opposed to my values*) to +7 (*of supreme importance*). Each value item provides a key phrase plus a parenthetical elaboration. To illustrate, self-direction includes the item "*CREATIVITY (uniqueness, imagination)*" and universalism includes the item "*A WORLD OF BEAUTY (beauty of nature and the arts)*." Forty-five of the 56 values are grouped into the 10 composites and several additional items are counted in the higher-order dimensions. Analyses of SVS data are possible at three levels: (1) individual items, (2) the 10 cross-culturally meaningful values composites, and (3) two higher-order dimensions of Self-transcendence (universalism, benevolence) vs. Self-enhancement (achievement, power); and Openness to change (self-direction, stimulation) vs. Conservation (tradition, conformity, security).

Outcome Variables

2. Self-assessment of personality's innovative qualities (Lebedeva, Tatarko, 2009) -15 items includes short verbal portraits of different people. Each portrait describes a person's goals, aspirations, or wishes that point implicitly to the importance of innovations, so we regard it as a measurement of person's attitudes towards innovations.

3 scales were obtained by exploratory factor analysis:

a) *Creativity* (6 items, for example: 'He likes to do things in his own original ways', α = 0,80);

b) *Taking Risk for achievement* (4 items, for example 'He is ready to take risks for the sake of achievements', α = 0,69);

c) *Orientation to the future* (4 items, for example: 'Current losses, in his opinion, are not necessarily bad for the future', α = 0,74);

The mean score of the three scales forms the *Integral Index of Acceptance of Innovations* (α = 0,79 for Russians; 0,80 for Chinese; 0,76 for Canadians).

The method was validated in three previous researches (N=1354 respondents), the first one has been conducted in 2007 (637 respondents: 360 Ethnic Russians and 267 North Caucasians, the other two have been conducted in 2008 (416 managers of international companies in Russia and 200 students in Canada). In each sample an independent exploratory factor analysis was proceeded which results are: in the group of Ethnic Russian: KMO = 0. 79, % of explained dispersion is 50.7; in the group of the people of the North Caucasus: KMO = 0.87, % of explained dispersion is 53.0; in the group of managers of the international companies: KMO =0.74, % of explained dispersion is 52.6; in the group of Canadian students KMO = 0.70, % of explained dispersion is 50.1.

Results of the test of this technique on cross-cultural validity and reliability of scales have shown that the given technique has sufficient reliability and high cross-country-cultural validity as the same items with high frequency were included in the same factors in four different cultural and national samples in Russia and Canada. Technique scales have a satisfactory reliability which has been demonstrated by the coefficients of α-Kronbah.

Data analyses strategy

We began by conducting mean-level analyses of the main variables across the samples, using a t-test for independent samples. These were complemented by the analyses of relationships, using correlation (Spearman's rank correlation method) and standard multiple regression analysis (enter method). For the controlling of sample size effect we have used Cohen's d coefficient [Cohen, 1988]. The term effect size can refer to standardized measures of effect (such as Cohen's d), or to an unstandardized measure. Cohen's d is defined as the difference between two means divided by a standard deviation for the data.

$$d = \frac{\bar{x}_1 - \bar{x}_2}{s},$$

Cohen's d is frequently used in estimating sample sizes. A lower Cohen's d indicates a necessity of larger sample sizes, and vice versa, as can subsequently be determined together with the additional parameters of desired significance level and statistical power [Kenny, 1987] .

Using Cohen's d coefficient allows solving a problem of power of the sample. This coefficient means whether significant differences are obtained due to the big size of the samples or not. And on the contrary if significant differences are not revealed, but Cohen's d coefficient is more than 0,7 we can conclude that the effect size is present. So, if we will increase the size of the samples, we will definitely receive significant differences between them.

For the computation of results SPSS (11.0 version) was used. The pair wise method of taking into account missing values was used. 2 % of the values were missing in the combined sample.

The results of the study

1. Mean differences between samples

Firstly we consider the value differences between Russian and Canadian students (see Table 3.

Table 3. Cultural Differences in Values between Russian and Canadian Students

Groups	Russians		Canadians		Effect size
Values	**Mean**	**SD**	**Mean**	**SD**	**d Cohen**
Security	4.04***	0.77	3.66***	0.67	0.48
Conformity	3.83	0.79	3.93	0.71	
Tradition	2.75*	0.92	2.99*	0.91	
Benevolence	4.42**	0.70	4.66**	0.70	0.30
Universalism	3.52***	0.77	3.95***	0.75	0.51
Self-Direction	4.70***	0.76	4.43***	0.64	0.30
Stimulation	3.70	1.13	3.89	1.03	
Hedonism	4.26	1.24	4.23	0.99	
Achievement	4.20**	0.80	4.48**	0.66	0.43
Power	3.32***	1.31	2.42***	1.18	0.81
CONSERVATION	3.54	0.51	3.53	0.52	
OPENNESS TO CHANGE	4.21	0.73	4.16	0.55	
SELF-TRANCENDENCE	3.97***	0.52	4.30***	0.54	0.61
SELF-ENHANCEMENT	3.93**	0.73	3.71**	0.67	0.30

*** - p<0,001, **- p<0,01, *- p<0,05

Russian students prefer the values of security, self-direction, power and self-enhancement more often than the Canadians, but the latter, in turn, prefer universalism, benevolence, tradition, achievement and the value composite of Self-Transcendence more often than the Russians.

Next, we compare the value differences between Russian and Chinese students (table 4).

Table 4. Cultural Differences in Values between Russian and Chinese Students

Croups	Russians		Chinese		Effect size
Values	M	SD	M	SD	d Cohen
Security	4.04***	0.77	4.52***	0.73	0.81
Conformity	3.84***	0.79	4.17***	0.63	0.74
Tradition	2.75	0.92	2.91	1.00	0.53
Benevolence	4.42	0.71	4.56	1.48	
Universalism	3.52***	0.77	4.05***	0.61	0.89
Self-Direction	4.70***	0.76	4.30***	0.62	0.55
Stimulation	3.70***	1.13	2.58***	1.14	0.86
Hedonism	4.26***	1.24	3.61***	1.26	0.43
Achievement	4.20	0.80	4.07	0.76	
Power	3.31***	1.31	2.75***	1.24	0.43
CONSERVATION	3.55***	0.51	3.87***	0.43	0.67
OPENNESS TO CHANGE	4.21***	0.73	3.44***	0.73	0.43
SELF-TRANCENDENCE	3.97***	0.52	4.30***	0.86	0.47
SELF-ENHANCEMENT	3.93***	0.73	3.48***	0.74	0.60

*** - p<0,001, **- p<0,01, *- p<0,05

Chinese students prefer values of **Conservation** (security, conformity) as well as values of **Self-Transcendence** (universalism) more often than the Russian students. The Russians, in turn, prefer values of **Openness to Change** (self-direction, stimulation) and Self-Enhancement (hedonism, power) more often than Chinese students.

Table 5 shows the value differences between the Canadian and the Chinese students.

Table 5. Cultural Differences in Values between Canadian and Chinese Students

Groups	Chinese		Canadians		Effect size
Values	M	SD		SD	d Cohen
Security	4.52***	0.73	3.66***	0,67	0.89

Conformity	4.17**	1.03	3.93**	0,71	0.31
Tradition	2.90**	1.00	2.99*	0,91	0.20
Benevolence	4.56	1.38	4.66	0,70	
Universalism	4.04	0.61	3.95	0,75	
Self-Direction	4.30	1.08	4.43	0,64	
Stimulation	2.58***	1.14	3.89***	1,03	0.81
Hedonism	3.61***	1.26	4.23***	0,99	0.74
Achievement	4.07***	0.76	4.48***	0,66	0.61
Power	2.75*	1.24	2.42*	1,18	0.50
CONSERVATION	3.87***	0.43	3.53***	0,52	0.64
OPENNESS TO CHANGE	3.44***	0.73	4.16***	0,55	0.99
SELF-TRANCENDENCE	4.30	0.86	4.30	0,54	
SELF-ENHANCEMENT	3.48***	0.74	3.71**	0,67	0.31

*** - p<0,001, **- p<0,01, *- p<0,05

As table 5 shows, the Chinese students prefer values of **Conservation** (security, conformity, tradition) and power more often than the Canadians. The Canadians prefer values of **Openness to Change** (stimulation) and **Self-Enhancement** (hedonism, achievement) more often than Chinese students.

Let us further compare the means of attitudes towards innovations between the three groups of our respondents (tables 6-8).

Table 6. Cultural Differences in Attitudes towards Innovations for Russians and Canadians

Groups	Russians		Canadians		Effect size
Attitudes towards innovations	**Mean**	**SD**	**Mean**	**SD**	**d Cohen**
Creativity	3.81***	0.83	3.48***	0.67	0.43
Taking Risk for Achievements	3.12	0.83	3.14	0.69	
Orientation to Future	3.39	0.66	3.47	0.61	
Index of Acceptance of Innovations	3.44	0.63	3.37	0.52	

*** - p<0,001, **- p<0,01, *- p<0,05

We see significant intergroup differences regarding the value of Creativity for Canadians and Russians.

Table 7. Cultural Differences in Attitudes towards Innovations for Russians and Chinese

Groups	Russians		Chinese		Effect size
Attitudes towards innovations	**M**	**SD**	**M**	**SD**	**d Cohen**
Creativity	3.81***	0.83	3.23***	0.68	0.74
Taking Risk for Achievements	3.12*	0.83	2.86*	0.69	0.31
Orientation to Future	3.39	0.66	3.34	0.57	
Index of Acceptance of Innovations	3.44***	0.63	3.15***	0.52	0.50

*** - p<0,001, **- p<0,01, *- p<0,05

One can see that such indicators as Creativity, Taking Risk for Achievements and the Integral Index of **Acceptance of** Innovations are significantly higher for Russian students than Chinese students.

Table 8. Cultural Differences in Attitudes towards Innovations for Canadians and Chinese

Groups	Chinese		Canadians		d Cohen
Attitudes to innovations	**M**	**SD**	**M**	**SD**	
Creativity	3.23**	0.68	3.48**	0.67	0.36
Taking Risk for Achievements	2.86*	0.69	3.14**	0.69	0.36
Orientation to Future	3.34	0.57	3.47	0.61	
Index of Acceptance of Innovations	3.15**	0.52	3.37**	0.52	0.40

*** - p<0,001, **- p<0,01, *- p<0,05

From the data in table 8, it is evident that such indicators as Creativity, Taking Risk for Achievements and the Integral Index of **Acceptance of** Innovations are significantly higher for Canadian students than Chinese students.

Now we want to refer to possible differences for gender. In Table 9 one finds that women tend to be more benevolent and universalistic whereas men are more self-directed, hedonistic and power and stimulation oriented.

Table 9. Gender Differences in Value Priorities (entire sample)

Values	Males (157)		Females(254)		Effect size
	M	SD	M	SD	d Cohen
Security	3.92	0.77	3.96	0.75	
Conformity	3.96	0.79	4.00	0.75	
Tradition	3.11	0.99	2.96	1.11	
Benevolence	4.24***	0.72	4.58***	0.78	0.31
Universalism	3.61**	0.77	3.83**	0.69	0.30
Self-Direction	4.57**	0.83	4.37**	0.72	0.30
Stimulation	4.03***	1.10	3.55***	1.27	0.57
Hedonism	4.00*	1.21	3.76*	1.16	0.40
Achievement	4.25	0.85	4.12	0.79	
Power	3.53***	1.09	3.03***	1.17	0.51
CONSERVATION	3.64	.54	3.59	.50	
OPENNESS TO CHANGE	4.09	75	3.95	76	
SELF-TRANCENDENCE	4.12*	54	4.25*	69	0.27
SELF-ENHANCEMENT	3.87*	.71	3.66*	.73	0.30

*** - p<0,001, **- p<0,01, *-p<0,05

The results presented in table 10 demonstrate than men are higher in the indices of Creativity, Taking risk for achievement and the overall Index of **Acceptance of** Innovations.

Table 10. Gender Differences in Attitudes towards Innovations (all sample)

Attitudes to Innovations	Males (156)		Females (250)		**Effect size**
	M	SD	M	SD	d Cohen
Creativity	3.65***	0.68	3.37***	0.79	0.30
Taking Risk for Achievements	3.48***	0.74	3.05***	0.75	0.47
Orientation to Future	3.42	0.73	3.34	0.75	
Index of **Acceptance of** Innovations	3.50***	0.31	3.36***	0.38	0.30

*** - p<0,001, **- p<0,01, *-p<0,05

More detailed gender-related comparisons in the groups have shown that the gender inequality in values and attitudes towards innovations is the highest for Chinese students, the lowest for Russian ones.

Are the cultural differences revealed so far related to differences in value priorities?

2. Relations between cultural values and attitudes towards innovations

We tested the relations using Spearmen rank correlation and multiple regression analysis with control over demographic variables as well as the interaction of independent variables. The results are presented in tables 11-14.

Table 11. Correlations of values and attitudes towards innovations among Russians

Values	Creativity	Taking Risk for Achievements	Orientation to Future	Index of Acceptance of Innovations
Security	-,204*	-,120	-,085	-,170
Conformity	-,177*	-,190*	-,081	-,205*
Tradition	-,332***	-,260**	-,225**	-,352***
Benevolence	-,068	-,061	,146	-,053
Universalism	-,137	-,113	,037	-,126
Self-Direction	,337***	,175*	,232**	,309***
Stimulation	,405***	,415***	,169	,408***
Hedonism	,130	,043	-,230**	,024
Achievement	,141	,194*	,140	,191*
Power	,115	,117	-,188*	,071
CONSERVATION	-,421***	-,344***	-,227**	-,428***
OPENNESS TO CHANGE	,492***	,406***	,279***	,482***
SELF-TRANCENDENCE	-,127	-,104	,147	-,112
SELF-ENHANCEMENT	,179*	,181*	-,171*	,137

*** - $p<0,001$, **- $p<0,01$, *- $p<0,05$

There are strong positive correlations of attitudes towards innovations with values of self-direction, stimulation, achievement and value composite of **Openness to Change,** and negative correlations – with values of security, conformity, tradition and value composite of **Conservation** among Russian students.

Table 12. Correlations of values and attitudes towards innovations among Canadians

Values	Creativity	Taking Risk for Achievements	Orientation to Future	Index of Acceptance of Innovations
Security	-,104	,006	-,017	-,049
Conformity	-,072	,085	-,023	,000
Tradition	-,129	-,105	-,117	-,167*
Benevolence	-,102	-,171*	-,124	-,182**
Universalism	,062	-,016	,009	,030
Self-Direction	,358***	,096	,165*	,268***
Stimulation	,191**	,234***	,160*	,251***
Hedonism	,006	,028	,015	,053
Achievement	,030	,055	,130	,095
Power	-,027	,145(*)	,038	,081
CONSERVATION	-,187**	-,027	-,093	-,139*
OPENNESS TO CHANGE	,340***	,232***	,213**	,344***
SELF-TRANCENDENCE	,015	-,117	-,066	-,076
SELF-ENHANCEMENT	-,006	,110	,070	,092

*** - p<0,001, **- p<0,01, *- p<0,05

Among Canadian students, attitudes towards innovations correlate positively with values of self-direction, stimulation, and the value composite of **Openness to Change,** and negatively – with values of tradition, benevolence and value composite of **Conservation.**

Table 13. Correlations of values and attitudes towards innovations among Chinese students

Values	Creativity	Taking Risk for Achievements	Orientation to Future	Index of Acceptance of Innovations
Security	-,296**	-,164	-,044	-,229*
Conformity	-,215*	-,072	-,018	-,130
Tradition	-,028	-,121	-,075	-,078
Benevolence	,041	,099	,104	,097
Universalism	,038	-,056	,052	,021
Self-Direction	,227*	,194	,036	,182
Stimulation	,318***	,368***	-,019	,288**
Hedonism	-,020	-,153	-,139	-,166
Achievement	-,026	,163	,121	,117
Power	-,072	-,114	-,108	-,119

CONSERVATION	-,323***	-,203*	-,085	-,263**
OPENNESS TO CHANGE	,352***	,373***	,040	,316**
SELF-TRANCENDENCE	,059	,024	,084	,066
SELF-ENHANCEMENT	-,060	-,079	-,094	-,108

*** - $p<0{,}001$, **- $p<0{,}01$, *- $p<0{,}05$

The Chinese sample revealed positive correlations of attitudes towards innovations with values of stimulation and **Openness to Change,** and negative ones with values of security, conformity and the value composite of **Conservation.**

Then we test the relations between value composites and the Integral Indices of Innovation in the unified sample and in the three samples independently using multiple regression analysis (step-wise method), the results are presented in table 14.

Table 14. The relations of values composites and the Integral Indices of Acceptance of Innovations

		Independent variables				
Groups	Dependent variable	Conservation B	Openness to Change β	Self-Transcendence β	Self-Enhancement β	R^2
Unified	Index of **Acceptance of** Innovations		.46***			.23
Russians	Index of **Acceptance of** Innovations	-.18*	.40***			.33
Canadians	Index of **Acceptance of** Innovations		.38***			.14
Chinese	Index of **Acceptance of** Innovations		.43***	.30**		.24

  * $p<0.05$; ** $p<0.01$; *** $p<0.001$;

Multiple regressions, revealed a universal positive relationship between the value composite **Openness to Change** and the **Integral Index of Acceptance of Innovations** in the unified sample as well as in the independent samples of Russian, Canadian and Chinese students.

A Multi-Group MIMIC Model for the Prediction of Attitude towards Innovation: Comparison of the Canadian, Chinese and Russian Samples.

In this section we want to report the results of a test of a multigroup MIMIC model which includes gender and age as additional predictors for innovation and values. By employing this method we want to reach the following research goals (Muthen 1989):

1. Such a model allows us to test systematically full vs. partial mediation of the effects of gender and age on attitude towards innovation via values. The issue of mediation has a long tradition in psychology (MacKinnon/Fairchild 2009) As soon as one assumes that there are intervening variables in a given model this problem arises. In our model, for example, we do not know for sure whether age and gender influence the attitude towards innovation only via the ten values or a subset of them(full mediation) or whether they also have direct effects on the attitude towards innovation(partial mediation). In the last years the structural equation approach has been used more and more often to test full vs. partial mediation in a straightforward and more elegant way compared with the classical approaches (MacKinnon/Fairchild 2009) Therefore we use this approach here.

2. The multi-group procedure allows to test statistically whether the relationships between gender, age and values on the one hand and innovation on the other hand are invariant over the three countries Canada, China and Russia. This approach allows to test cross-sample constraints such as the test of equality of coefficients between groups. In our case, we want to test whether, for example, the effects of gender and age on values are invariant over the three countries. Furthermore one can test whether metric invariance is given for the measurement instruments, which means that in the case of partial metric invariance at least two items per construct have equal factor loadings beside random fluctuations (Byrne et al. 1989).

3. The MIMIC Model itself allows to model both the effects of demographic variables as formative indicators (see Jones 2006, Woods 2009) and the effect of latent endogenous (dependent) on their reflective indicators. These formative indicators or " cause" variables like age and gender influence values and innovation as constructs measured by reflective indicators.

Our model is a combination of a mimic model and the multiple group procedure of structural equation modeling, which allows for the adequate testing of our research questions. It can be seen as a special case of the generalized latent variable model (Skrondal/Rabe-Hesketh, 2004).

As the sample size for every country was not very high, we could not test the invariance of the factor loadings of the SVS over the three countries. However, we applied a confirmatory factor analysis to the innovation scale and deleted 6 items because of low loadings. For the resulting items metric invariance could be established, which allows the comparison of regression coefficients over the three countries (Vandenberg/Lance 2000). The model specifications for the fully and partially mediated models are given in Figures 1 and 2.

Figure 2. Fully mediated model

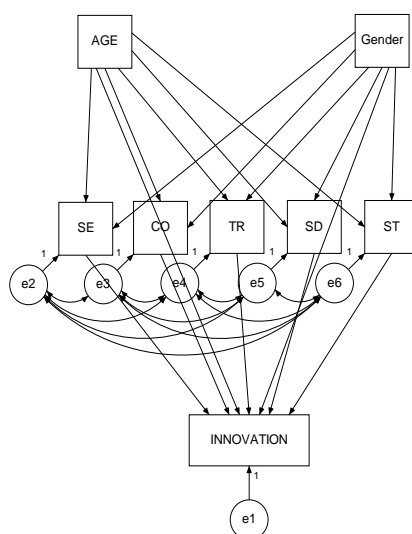Values and Innovation: Fully mediated model
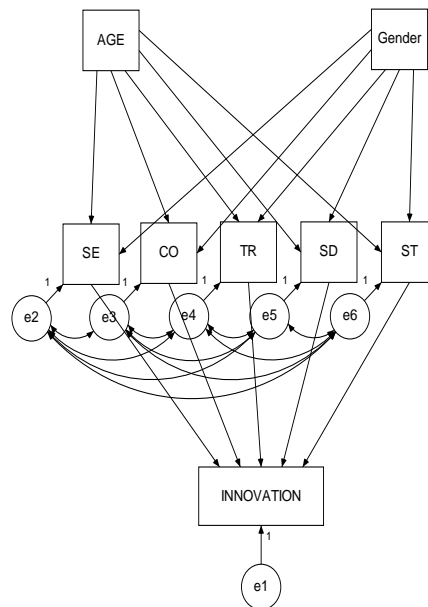
Figure 3. Partially mediated model

Values and Innovation: Partially mediated model

In figure 2 (fully mediated model) one can see that age and gender have no direct relationships(paths) with innovation. The basic theoretical idea is that the effect of age and gender is only operating via their influence on the values Security, Conformity, Tradition, Self-Determination and Stimulation. Therefore, there are only paths leading from the demographic variables to these five values. In contrast to that one can see in figure 3 that according to this model age and gender have an indirect effect on attitude towards innovation such as in the model in figure 2. However, in addition we see in figure 3 that both gender and age have also direct and significant direct effects symbolized by the directed paths on attitude towards innovation. Finally, we want to test whether the models in figures 2 and 3 and the estimated coefficients are equal by using the multiple group technique within structural equation modeling. As the fully mediated and the partially mediated model are nested models, we used the chi square difference test as a criterion to decide between them. In addition, we employed as a criterion the CFI difference of .01 proposed by Cheung/Rensvold, 2002.

The partially mediated model corresponds with both the above mentioned criteria.. Therefore we now present the estimates only for this model. In Table 14, one finds the standardized regression coefficients for the whole model based on the maximum-likelihood estimation using the program AMOS 18. One can see, that the higher the age, the higher the Security and Tradition values both in Canada and China but not in Russia. However, only in China does age have a positive significant effect on Conformity value. The effect of age on Stimulation is positive in China whereas in it has a negative effect. In Canada there is no effect at

all. Gender only has an effect on Stimulation and Conformity in Canada and on Security in China.

Only in Russia does Tradition a negative significant effect on attitude towards innovation, whereas Stimulation has a significant and substantial effect in all three countries. Self Determination has, as predicted, a positive effect on attitudes towards innovation. However this effect is not significant at the 5% level in China. Age has no significant effect in all countries but this may be due to the composition of the sample, which has only a small range and variance of age. Gender has only a direct effect in China on attitude towards innovation, which means that in China, men have a more positive attitude towards innovation. This is the only direct effect of the two demographic variables on attitude towards innovation. In all other cases the effects of gender and age are fully mediated by values. All coefficients are at least significant at the 5% level.

Table 14. Standardized Coefficients for the MIMIC Model

	Model 2 PM		Model 2 PM		Model 2 PM
Standardized	Canada		China		Russia
	Estimate		Estimate		Estimate
SE <--- age	0,135		0,214		0,001
CO <--- age	0,084		0,28		-0,112
TR <--- age	0,182		0,208		-0,017
SD <--- age	0,046		0,147		-0,136
ST <--- age	0,111		0,211		-0,281
ST <--- sex	-0,15		-0,063		-0,131
SD <--- sex	-0,126		0,057		0,007
TR <--- sex	-0,034		0,026		0,002
CO <--- sex	-0,134		0,076		0,099
SE <--- sex	-0,121		0,286		0,074
INNOVN <--- SE	-0,115		-0,026		-0,029
INNOVN <--- CO	0,168		-0,15		-0,003
INNOVN <--- TR	-0,095		-0,101		-0,238
INNOVN <--- SD	0,309		0,22		0,336
INNOVN <--- ST	0,307		0,276		0,415
INNOVN <--- age	0,078		-0,037		0,102
INNOVN <--- sex	-0,053		-0,262		-0,096

Discussion of Results

Our research revealed cultural differences in values as well as in innovation attitudes between respondents in the three cultural groups. The cultural differences in value priorities and innovation attitudes are compatible with each other, reflecting differences in the Traditionalism-versus-Modernism continuum, with the culture of China tending to be closer to the pole of Traditionalism (the values of **Conservation and Self-Transcendence**, promoted the group interests in survival and harmony), whereas the cultural patterns of Russians and Canadians lean closer towards Modernism (the values of **Openness to Change and Self-Enhancement** promoted the individual interests in self-development). The attitudes towards innovations are more salient among the Canadians and Russians, than among the Chinese. From this it follows that the more modernized a culture is, the more innovative its members are.

Besides that proposition it should be explained why Chinese attitudes towards innovations are less salient in comparison with Canadians and Russians from a Chinese perspective (see Leung and Morris, 2011). Low levels of innovative attitudes among Chinese students and the absence of its' relations with values of Self -direction may be explained by the fact that striving for innovation is hardly a high value in more traditional cultures, and because of this, one's innovative behavior cannot ensure a sense of fullness of life. This explanation is compatible with Lubart's suggestion that the element of novelty may not be well suited to non-Western cultures (1999). The Western conception of creativity is primarily concerned with innovations, whereas the Eastern conception of creativity is more dynamic, involving the reuse and reinterpretation of tradition rather than breaks in tradition (Raina, 1999; Paletz, Peng, 2008). Yao, Yang, Dong, and Wang (in press) argued that the Chinese may be unwilling to express creative ideas because of the collectivist pressure for conformity and the need to take instructions from superiors as a result of high power distance. Research in China shows that the positive relationship between creative ideas and innovative behavior was moderated by *zhong yong* (the preference for moderation and the avoidance of extreme positions) and shyness. Specifically, high *zhong yong* and shyness tend to suppress the expression of creative ideas (Leung, Morris, 2011).

Leung, Chen, Zhou, and Lim (2009) examined the implications of two Chinese cultural constructs, face and *renqing,* for innovative behavior. Face refers to the concern for a positive self- and public image, and *renqing* refers to the tendency to be compassionate toward others and to offer them favors. People with a positive face are likely to offer and receive *renqing,* and these two constructs are often viewed as two related facets of the Chinese relational orientation (Cheung et al., 1996). These findings might explain the higher significance of Self-

Transcendence values for Chinese students (especially for women) and, possibly, their positive impact on the attitudes to innovations among Chinese students.

The results of gender differences in values confirm most other studies (Schwartz, Rubel, 2005; Meuleman et al. 2012) which imply that women tend to be more benevolent and universalistic whereas men are more self-directed, hedonistic and power and stimulation oriented. According to evolutionary perspective and social roles theory, men prefer self-direction and stimulation values more than women due to greater male competitiveness and the different placement of the sexes in the occupational world. It is reflected in behaviour such as self-reliance, independence, risky behavior and innovation (Schwartz, Rubel, 2005). The results of the multi-group MIMIC model confirmed this fact demonstrating the direct effect of gender in China on attitude towards innovation, which means that in China, men have a more positive attitude towards innovation. We may suppose the culture influence attitudes towards innovations through gender-related cultural norms, which don't encourage female's strivings for novelty and originality, supporting cultural norms of *zhong yong* and shyness and not taking into account the level of individual values. It is an example of unpackaged culture's impact on social behavior.

To what extent are the attitudes towards innovations related to value priorities? Our research has shown that there are strong positive relationships between the values of **Openness to Change** (self-direction, stimulation) and attitudes towards innovations. This finding agrees well enough with the results obtained by others (Shane, 1992, 1995; Dollinger, Burke & Gump, 2006).

The suggested explanations need to be tested and verified in further research.

In any case, however, the fact that there are culturally specific relations of values with attitudes about innovation highlights the fact that we must consider specific features of a culture when introducing innovative patterns to it.

Conclusion

In general, the results supported our hypotheses.

1. There are cultural differences in value priorities: Russians prefer the values of **Self-Enhancement** more often than the Canadians, but the latter prefer values of **Self-Transcendence** more often than Russians. Chinese students prefer values of **Conservation** more often than the Russians and Canadians.

2. Russians and Canadians prefer values of **Openness to Change** more often than Chinese students. These differences, in our opinion, reflect differences in the Traditionalism-vs.-Modernism continuum, with the Chinese culture tending to be closer to the pole of

Traditionalism, whereas the cultural patterns of Russians and Canadians lean towards Modernism.

3. There are significant cultural differences i**n innovative attitu**des among Canadian, Russian and Chinese college students. The Canadians' and Ethnic Russians' attitudes towards innovations are more positive, while the Chinese' ones are less positive. It might be explained by different conceptions of creativity and innovations in Western and Eastern traditions (Raina, 1999; Paletz, Peng, 2008) and implicit cultural norms and behavior prescriptions in the Chinese culture (Leung and Morris, 2011).

4. There are certain universal relationships in the three cultural groups, with the values of Openness to Change being conducive to innovative attitudes, and the values of Conservation impeding them. This conclusion is compatible with the results obtained by other researchers (Shane, 1992, 1995; Dollinger, Burke & Gump, 2007).

5. There are culturally specific features in some relations of values and innovative attitudes: thus, among Russians the values of Achievement are positively related with innovative attitudes, among Canadians, values of Benevolence are negatively related with innovative attitudes and among Chinese values of Self-direction have no relations with attitudes towards innovations. It might be explained by culturally specific values priorities and implicit theories of creativity and innovations.

6. The type of Values-Innovation mediation is different in the three countries. Whereas in Russia and Canada the effects of gender and age are fully mediated by the values, this is not true for the effect of gender in China, which also has a direct effect on innovation.

7. The regression coefficients of age and gender on values differ between Canada, China and Russia, which reflects cultural differences in the impact of age and gender on value priorities.

We fully recognize the serious limitations of this exploratory study: small students' samples, low heterogeneity in socio-demographic characteristics, first of all in age, different types of universities and their location (the capital in Russia and the provincial towns in Canada and China). Among the method's limitations are very close measurements of values and attitudes towards innovations and measurement of the only attitudes towards innovations, not the creative (innovative) behavior.

Incidentally, this exploratory study pushes us to investigate culturally specific implicit theories of innovation and ascriptions of innovators' psychological qualities, which can help us to understand the socio-psychological roots of accepting and rejecting innovations in different socio-cultural contexts. Further research is needed to study the relationships revealed between culture and innovations in a more profound way.

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