

Relationships among Cultural Dimensions, National Gross Domestic Product, and Environmental Sustainability

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The relationship between national wealth and national culture has been studied extensively. Economic development has been found to be related to cultural values. Other studies have found a relationship between culture and environmental sustainability. We contribute to this literature by studying the relationship between national culture and a new dependent variable: gross domestic product per capita balanced with environmental sustainability (Weighted GDPC). As predicted, we found that power distance was negatively related to weighted GDPC, whereas individualism was positively related to weighted GDPC. Implications and future research are discussed.

INTRODUCTION

The relationship between national wealth and national culture has been studied extensively in the literature. Economic development has been found to be related to cultural values with disadvantaged countries placing a higher value on economic and physical security, and developed countries placing a higher value on nonmaterial needs like freedom and quality of life. Other studies have found a relationship between culture and environmental sustainability. There exists little empirical research that investigates relationships among national culture, economic development, and environmental sustainability. Tribunella & Friedman (2010) proposed a model that incorporates both national economic and environmental needs. We build on their research by exploring the relationship between national culture and a new dependent variable: gross domestic product per capita balanced with environmental sustainability.

LITERATURE REVIEW

National Culture and Economic Development

Tang & Koveos (2008) offer an extensive literature review of the relationship between national wealth and national culture. They found economic development was related to cultural values. Research

has found economically disadvantaged countries place higher value on economic and physical security, and developed countries place higher value on nonmaterial needs like freedom, self-expression, and quality of life (Inglehart & Abramson, 1994; Leung, 2006). Other research has examined the impact of economic development on Hofstede's (1980, 2001) cultural dimensions: power distance, individualism, uncertainty avoidance, masculinity, and long-term orientation. For example, economic development in China has been linked to changes in work values with the new generation of Chinese managers placing a higher value on individualism and less importance on Confucian values than older generations of managers (Ralston, Egri, Stewart, Terpstra, & Yu, 1999). Hofstede (1980, 2001) found a significant relationship between GNP per capita and power distance and individualism. GNP per capita was positively related to individualism and negatively related to power distance. Franke, Hofstede, & Bond (1991) found cultural values were factors in economic performance, explaining more than half the cross-national variance in economic growth for two periods of samples of 18 and 20 nations (p. 165). Dodor & Rana (2007) found partial support for their hypothesis that national cultural differences (as measured by Hofstede's framework) would predict variations in resources allocation efficiency and wealth distribution among countries. The authors' results supported their hypotheses for individualism, power distance, and uncertainty avoidance, but provided no support for masculinity and long term orientation.

Based on previous research (Kuznets, 1955; Barry, 1994; and Read, 1993), Tang & Koveos (2008) proposed a curvilinear relationship between national wealth (measured by GDP per capita) and Hofstede's dimensions. They found that power distance first increases and then decreases with GDP per capita; individualism first decreases and then increases with GDP; and long-term orientation first decreases and then increases with GDP. The authors proposed a similar curvilinear relationship for uncertainty avoidance and GDP, hypothesizing that uncertainty avoidance would first increase and then decrease. For uncertainty avoidance, the results, while in the proposed direction, were insignificant. No support was found for a relationship between masculinity and GDP per capita. The researchers concluded that uncertainty avoidance and masculinity are relatively stable cultural values in comparison to the other three Hofstede dimensions. An updated framework of Hofstede's indices, based on the changing economic environment within countries was provided.

Based on the literature, there is consistent evidence that at least some cultural values change over time, and that economic development may be the source of cultural change. As demonstrated by Tang & Koveos (2008) the relationship between economic development and cultural change is complex, with cultures initially becoming less egalitarian, less individualistic, and more long-term in orientation as GDP per capita increases. Tang & Koveos contend that economic development initially leads to increased inequality (power distance) due to urbanization and increased saving among the upper class. Over time, however, government policy, entrepreneurial activities, and technological change drive economic development and a decline in power distance (p. 1050). This explanation is based on an economic theory known as the Kuznets effect (Kuznets, 1955). The initial decrease in individualism followed by an increase is explained by changes in subsistence patterns. An initial shift to state authority occurs as modernization and industrialization demand increased conformity to social norms. With further economic growth and a shift to a more service oriented economy, the requirement for social conformity decreases, and the culture places a higher value on individual freedom and self-expression. Long-term orientation is proposed to initially decrease and then increase with economic development due to the changing value cultures place on saving. With an increase in income, individuals tend to initially increase spending and decrease savings. As GDP per capita continues to improve living conditions and longevity, individual savings must increase to accommodate retirement needs. See Tang & Koveos (2008), for a complete discussion of the literature and their empirical findings.

National Culture and Environmental Sustainability

Previous research has focused on the relationship between economic development and environmental sustainability. Developing nations may not have the money to invest in the technology necessary for environmental sustainability, and environmental degradation may exist in the absence of legal constraints. As economic development increases, the social and institutional capacity of a country for environmental

sustainability may also increase (Husted, 2005). The pollution-haven hypothesis argues that free trade, open markets, and increased foreign direct investment encourages the flow of polluting industries to developing nations, triggering an environmental “race to the bottom” (Park, Russell, & Lee, 2007, p. 104). An alternative “pollution-halo” view suggests trade liberalization and FDI may be related to higher environmental standards through technology transfer and environmentally sound management practices (Park, Russell, & Lee, 2007, p. 104). Grossman & Krueger (1995) found an inverted U-shaped relationship between income growth and environmental conditions. Called the Environmental Kuznets Curve (EKC), environmental conditions seem to worsen with initial increases in income in developing nations. Once a critical level of income is reached, environmental conditions improve and appear to benefit from economic development. However, subsequent research suggests the EKC is far from universal (Park, Russell, & Lee, 2007; Stern & Common, 2001).

Husted (2005) argues that the focus on economic causes of environmental sustainability is not enough and that national culture should be considered (p. 349). He examined the relationship among Hofstede’s dimensions and environmental sustainability and found support for the following relationships:

- Higher levels of power distance in a country are related to a lower social and institutional capacity for environmental sustainability.
- Higher levels of individualism in a country are related to a higher social and institutional capacity for environmental sustainability.
- Higher levels of masculinity in a country are related to a lower social and institutional capacity for environmental sustainability.

Husted concluded that “the respect for authority in high power distance countries leads to a weaker capacity for debate and weaker private sector responsiveness to social issues generally including environmental problems”, and pursuit of economic growth by masculine cultures may lead to slower adoption of costly environmental technology and reduced responsiveness to environmental problems (Husted, 2005, p. 253). Husted cited research by Katz, Swansons, & Nelson (2001) that suggested environmental activism may be more widespread in individualistic cultures than in collective cultures, and, thus, individualistic cultures should have a greater social and institutional capacity to respond to environmental problems. The author also predicted that high uncertainty avoidance would result in lower social and institutional capacity, but found no support for this hypothesis.

Husted (2005) measured social and institutional capacity for environmental sustainability using the Environmental Sustainability index (ESI) developed by Global Leaders (2001). Economic development (using purchasing power parity estimates of GNP per capita) and population growth (World Bank data) were control variables in the study. Husted (2005) predicted that economic development would be related to increased capacity for environmental sustainability, and that population growth would be related to a decreased capacity for environment sustainability. Using regression analysis, he first examined the impact of the control variables on the dependent variable (social and institutional capacity for environmental sustainability). Economic development was significantly related to the dependent variable; population growth was not.

Husted (2005) then added cultural variables as independent variables and found individualism, masculinity, and power distance to be related to social and institutional capacity in the expected direction. Uncertainty avoidance was not significant. The introduction of cultural variables into the model increased the explanatory power of the model significantly. A third model was tested examining the moderating effect of economic development on the cultural variables. Power distance was found to have a greater impact at higher levels of economic development. Masculinity was found to have a greater impact at lower levels of economic development. Economic development did not have a significant impact on the individualism/social and institutional relationship.

Husted concluded that while economic development is the main driver of environmental sustainability, power distance, masculinity-femininity, and individualism-collectivism are also related. He concludes: “...it appears that countries with low levels of power distance, high levels of individualism, and low levels of masculinity, have higher social and institutional capacity. These egalitarian,

individualist, and feminine values appear to constitute 'green' or 'sustainable' values. ...In addition, the impact of power distance and masculinity on the social and institutional capacity appears to vary with economic development" (p. 356).

Park, Russell, & Lee (2007) also examined the significance of culture (measured by four of Hofstede's dimensions – uncertainty avoidance, individualism-collectivism, power distance, and masculinity-femininity) in the relationship between per capita income (GNP per capita) and environmental sustainability (Environmental Sustainability index). They suggested, "If people are more culturally conscious of environmental conditions, a higher level of environmental sustainability can be maintained, and if environmental damages occur, they can be restored more quickly. In this scenario, national culture is expected to influence how people utilize their natural resources and environments by shaping their attitudes and perceptions" (p. 105). They proposed the following hypotheses:

- Higher risk-avoidance (uncertainty avoidance) cultures will exhibit higher levels of environmental sustainability.
- Higher collectivist cultures will exhibit higher levels of environmental sustainability
- Low power distance cultures will exhibit higher levels of environmental sustainability
- More feminine cultures will exhibit higher levels of environmental sustainability

The researchers also predicted that higher income, with cultural variation controlled for, would be associated with higher levels of environmental sustainability. They provided the following basis for their hypotheses (p. 108):

Managing the environment is almost always a collective enterprise...in which small benefits accruing to many individuals are implicitly or explicitly found to outweigh the costs to a small number of polluters or exploiters, in which arguments about uncertain outcomes are often used to justify the acceptance of present sacrifices, and in which the goal is often described as *quality of life*.

Similar to the research conducted by Husted (2005), no significant relationship was found between uncertainty avoidance and environmental sustainability. Unlike Husted's research that found that more individualistic countries exhibit greater environmental sustainability records, no relationship was found between individualism-collectivism and environmental sustainability. Like Husted, low power distance and femininity countries were found to have significantly higher levels of environmental sustainability.

Park et al. (2007) also found a significant positive relationship between level of education and environmental sustainability. Higher income, with cultural variation controlled for, was not found to be significantly associated with higher levels of environmental sustainability. A second model was tested excluding the two significant cultural variables (power distance and masculinity-femininity). Upon exclusion of these variables, the coefficient of per capita GNP became significant. A third model, in which power distance and education level were dropped, similarly yielded a significant coefficient for per capita GNP. The researchers then investigated the possibility that a non-linear relationship (e.g. – Environmental Kuznets Curve) between income and environmental sustainability may be in effect. The third model did not support this hypothesis. The authors conclude: "Overall, our findings show that the popular EKC phenomenon can be seen as mere artifacts that may be shown when the effect of cultural variables is not taken into account" (p. 114).

Gross Domestic Product per Capita and Environmental Sustainability

Tribunella & Friedman (2010) proposed a model that incorporates both national economic and environmental needs. They also asserted that productivity and environmental sustainability are not independent and must be considered concurrently. Economic growth in the absence of concern for the environment is not sustainable. On the other hand, concern for the environment in the absence of developing national wealth is neither desirable nor practical. A perfect world would be both clean and

prosperous. Porter and Linde (1995) also pointed out that economic activity that increases efficiency might lead to more sustainable environment. Tribunella & Friedman (2010) proposed a new dependent variable: Gross Domestic Product Per Capita (GDPC) weighted by the nation's ability to maintain environmental sustainability (weighted GDPC). Friedman, Cox, & Tribunella (2010) examined the relationships among world governance indicators (voice and accountability, political stability, government effectiveness, regulatory effectiveness, rule of law and control of corruption) (weighted GDPC). Their research showed world governance indicators to be positively related to a nation's ability to co-manage economic concerns with maintenance of its environment. We build on previous research by exploring the relationship between national culture and gross domestic product per capita balanced with environmental sustainability (weighted GDPC). Based on our review of the literature, we propose the following hypotheses:

Hypothesis 1

There will be a significant negative relationship between power distance and countries' weighted GDPC.

This hypothesis is based on previous research (reviewed above) that found a negative relationship between power distance and both economic wealth and environmental sustainability. Cultures that are more egalitarian are associated with greater economic wealth. In high power distance cultures, environmental accountability may be ignored for the interests of the power holders. The focus may be more on internal politics at the expense of environmentally sound policies.

Hypothesis 2

There will be a significant positive relationship between individualism and countries' weighted GDPC.

Previous research supports a positive relationship between individualistic cultures and both economic wealth and environmental sustainability. Highly individualistic cultures value individual initiative and freedom of expression and, thus, may be more conducive to the promulgation of environmental interest groups and the adoption of environmentally sound policies than collectivist cultures.

Hypothesis 3

There will be a significant negative relationship between masculinity and countries' weighted GDPC.

Hofstede's masculinity-femininity dimension refers to a focus on masculine values such as material success versus feminine values like concern for the quality of life (Hofstede, 1997). As countries become wealthier, quality of life concerns like environmental sustainability become paramount. Materialistic, masculine values like the pursuit of economic growth may lead to slower adoption of costly technology necessary for environmental sustainability.

Hypothesis 4

There will be no significant relationship between uncertainty avoidance and countries' weighted GDPC.

While some studies have found a significant relationship between GDPC and uncertainty avoidance (Dodor & Rana, 2007); other studies have found no relationship (Tang & Koveos, 2008). Both Park et al. (2007) and Husted (2005) found no relationship between uncertainty avoidance and environmental sustainability. Thus, we do not expect to find a significant relationship between uncertainty avoidance and weighted GDPC.

METHOD

Sample

Economic productivity is measured here as national gross domestic product per capita (GDPC). We obtained 217 nation's GDPC from the Nation Master database (NationMaster, 2010). The Yale Center for

Environmental Law and Policy (YCELP) and the Center for International Earth Science Information Network (CIESIN) of Columbia University, in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission collects and computes the Environmental Sustainability Index (SEDAC, 2010). Benchmarking National Environmental Stewardship (2010) contains a detailed description of the statistical methodology used to compute the Environmental Sustainability Index (ESI). Power distance, individualism, masculinity, and uncertainty avoidance cultural dimension scores for 69 countries were obtained from research conducted by Hofstede (2001). See Table 1 below for definitions of the Hofstede cultural dimensions used in this study (Hofstede, 1997). Long-term orientation was not examined as a variable in this study as only twenty-four observations (24 countries) were available in the data.

TABLE 1
HOFSTEDE'S CULTURAL DIMENSIONS

DIMENSION	DEFINITION
POWER DISTANCE	Extent to which a society allows inequalities of physical and intellectual capabilities between people to grow into inequalities of power and wealth.
INDIVIDUALISM versus COLLECTIVISM	Extent to which a society teaches individuals either to prize personal achievement or to conversely look after the interests of their collective first and foremost.
UNCERTAINTY AVOIDANCE	Extent to which cultures socialize members to accept ambiguous situations and to tolerate uncertainty.
MASCULINITY versus FEMININITY	Extent to which a society differentiates and emphasizes traditional gender and work roles; a masculine characterization means there is more differentiation, whereas a feminine level means there is less. In masculine cultures, the dominant values in society are success, money, and things. In feminine cultures, the dominant values in society are caring for others and the quality of life.

Analysis

The level of analysis for all variables in this study is national. We used 2004 data for all dependent and independent variables (2004 is the most recent ESI data collected). The dependent variable is the cross product between GDPC and ESI; that is, weighting each nation's GDPC by their environmental sustainability index (ESI x GDPC). We therefore used GDPC weighed by ESI as the dependent variable ("weighted GDPC"). Pearson correlations between the dependent and independent variables were computed. The dependent variable was then regressed onto the cultural dimensions.

RESULTS

The correlation between GDPC and ESI was $r = .42$ ($p \leq .001$). As these two variables shared only 17% of their variance, the authors used their cross product as the dependent variable (see Table 2 below).

TABLE 2
CORRELATIONS AMONG ENVIRONMENTAL SUSTAINABILITY INDEX AND GROSS DOMESTIC PRODUCT PER CAPITA

	ESI	GDPC	ESI x GDPC
Environmental Sustainability Index (ESI)	1	.42***	.56***
Gross Domestic Product per Capita (GDPC)		1	.97***

*** $p \leq .05$

Table 3 contains the means, standard deviations and inter-correlations among the dependent and independent variables. Correlations ranged from $-.71$ to $.72$. The negative correlation between a nation's weighted GDPC and power distance supports hypothesis 1 ($r = -.71$, $p \leq .001$). Conversely, the positive relationship between a nation's weighted GDPC and individualism supports hypothesis 2 ($r = .72$, $p \leq .001$). Hypothesis 3 was not supported, as the correlation between the dependent variable and masculinity was in the right direction (negative) but insignificant ($r = -.07$, ns). As predicted, there was not a significant relationship between uncertainty avoidance and weighted GDPC ($r = -.15$, ns).

TABLE 3
MEANS, STANDARD DEVIATIONS, AND CORRELATIONS AMONG ENVIRONMENTAL SUSTAINABILITY INDEX, GROSS DOMESTIC PRODUCT PER CAPITA AND THE CULTURAL DIMENSIONS

	<i>Mean</i>	<i>Standard Deviation</i>	<i>Power Distance</i>	<i>Individualism</i>	<i>Masculinity</i>	<i>Uncertainty Avoidance</i>
Environmental Sustainability Index (ESI)	49.86	8.55	-.51***	.39***	-.22	.01
Gross Domestic Product per Capita (GDPC)	11095.29	11973.42	-.65***	.70***	-.01	-.11
ESI x GDPC	596617.17	710955.30	-.71***	.72***	-.07	-.15
Power Distance	60.14	22.18	1	-.58***	.01	.28***
Individualism	42.44	23.07		1	.09	-.27***
Masculinity	50.23	17.25			1	.02
Uncertainty Avoidance	67.87	20.98				1

*** $p \leq .05$

Table 4 contains the results of three multiple regression analyses whereby ESI, GDPC, and weighted GDPC were separately regressed on the cultural dimensions. The regression using weighted GDPC as the dependent variable resulted in the highest variance accounted for ($R^2 = .67, p \leq .001$). In this regression equation, power distance and individualism beta weights were significant and in the hypothesized direction.

TABLE 4
GROSS DOMESTIC PRODUCT PER CAPITA (GDPC) WEIGHTED BY ENVIRONMENTAL SUSTAINABILITY (ESI), ESI, AND GDPC REGRESSED ON CULTURAL DIMENSIONS
(N = 69)

	<u>Dependent Variables</u>					
	ESI x GDPC ¹		ESI ²		GDPC ³	
	β	t	β	t	β	t
Power Distance	-.44	-4.97 ***	-.44	-3.58 ***	-.39	-3.96 ***
Individualism	.49	5.47 ***	.21	1.71	.51	5.18 ***
Masculinity	-.12	-1.68	-.24	-2.47 *	-.05	-.65
Uncertainty Avoidance	.10	1.40	.20	1.96 *	.14	1.69

¹ $R^2 = .67$, $F_{(4, 64)} = 32.16$ ($p \leq .001$)

² $R^2 = .37$, $F_{(4, 64)} = 9.49$ ($p \leq .001$)

³ $R^2 = .60$, $F_{(4, 64)} = 24.14$ ($p \leq .001$)

DISCUSSION

An understanding of the impact of culture on a nation's ability to co-manage the need to create wealth with environmental protection is important for several reasons. Increases in nation's wealth may increase a culture's focus on quality of life issues with increased individual income, more employment opportunities, greater availability of goods and services, and better educational systems. Quality of life may be problematic, however, without a concern for the environment. With increased wealth, cultures may focus more on individualistic values like freedom and individual initiative. Environmental activism is more conducive to cultures where freedom of expression and egalitarianism are valued. As economic wealth improves there may be a shifting in the priorities of nations and their citizens from survival needs to concern for environmental regulation. With increased wealth and lower power distance, citizens may have greater access to education and information, and, thus, may be more aware of the importance of both wealth creation and environmental sustainability. Pressure may be put on governments by the public for greater environmental regulation. Stronger government laws and regulation with respect to the environment may result as citizens become more concerned with environmental sustainability, and have the freedom and rights to voice concern over quality of life issues like protection of the environmental.

We did not find a significant relationship between masculinity-femininity and weighted GDPC, nor did we find a significant relationship between uncertainty avoidance and weighted GDPC. Tang & Koveos (2008) did not find a significant relationship between uncertainty avoidance and GDPC. They also did not find a significant relationship between masculinity-femininity and GDPC. Similar to previous research (Husted, 2005; Park et al., 2007), our research also suggests that these two Hofstede dimensions are unrelated to environmental sustainability. It may be as Tang & Koveos conclude: the uncertainty

avoidance and masculinity-femininity dimensions may be relatively stable cultural values in comparison to individualism-collectivism and power distance.

Research Limitations

Environmental sustainability measured by the ESI has several limitations. First, the data is perceptual and, therefore, subject to the usual measurement errors associated with survey responses that rely on respondents' perceptions. Second, future research should use a more current measure of environmental sustainability. Agostino, Ortega, and Romeiro (2008) concluded that a completely satisfactory sustainability index has yet to be developed.

CONCLUSIONS

This research shows that culture is associated with a nation's ability to co-manage economic concerns with maintenance of its environment. Specifically, lower power distance, individualistic cultures (cultures placing a greater value on egalitarianism, freedom of expression, and individual initiative) may be more concerned with balancing economic wealth with environmental sustainability. As concern for quality of life issues increase, citizens may focus on a more perfect world that is both clean and prosperous. This research suggests that while developing nations may initially focus on improving economic wealth at the expense of environmental protection, as these nations become more economically sustainable, a shift in cultural values may occur resulting in a focus on balancing economic prosperity with environmental sustainability. While this study is a sound beginning, future research should focus on a deeper understanding of the relationships between culture, economic concerns, and environmental sustainability. Future research should also investigate the relationship between economic freedom and culture—which has a greater impact on gross domestic product and environmental sustainability? In addition, this research did not measure the relationship between long-term orientation and weighted gross domestic product. Future research might investigate whether a significant relationship exists between these two variables.

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