

Sustainable Development in Iran: An Exploratory Study of University Students' Attitudes and Knowledge about Sustainable Development^a

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ABSTRACT

In this paper, we explore the perceptions of Iranian undergraduate college students of the concept of sustainable development (SD). In so doing, we measure students' attitudes and knowledge on the various aspects of the SD paradigm. The results indicate that while most Iranian students surveyed have a positive perception of SD, their attitudes and knowledge about it is linked to certain demographic characteristics. For example, Iranian female college students are more knowledgeable about SD than their male Iranian counterparts. Implications of these findings are further explored. Copyright © 2012 John Wiley & Sons, Ltd and ERP Environment.

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Introduction

ACCORDING TO THE BRUNDTLAND REPORT PUBLISHED BY THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (WCED, 1987, p. 43), also known as 'Our Common Future', sustainable development (SD, or sustainability) refers to 'development that meets the needs of the present [generation] without compromising the ability of future generations to meet their needs'. More specifically, SD is understood as that which rests within the three interrelated dimensions of social, environmental and economic progress (Hardi and Zdan, 1997; Barton, 2000; du Plessis, 2000).

SD has received more attention in recent years due to the growing evidence that current development strategies embraced by many nations are not sustainable into the future (Meadows *et al.*, 1992; Earth Charter, 2002). The United Nations Conference on Environment and Development in 1992 made several recommendations to accelerate the move toward SD. Agenda 21 of the Earth Summit (UNCED, 1992, p. 1) states: 'education is critical for promoting sustainable development and improving the capacity of the people to address sustainable development issues.' Ten years later, at Johannesburg, South Africa, the World Summit on Sustainable Development (WSSD, 2002, p. 5) proposed 'adopting a decade of education for sustainable development starting in 2005'.

Among several directives, the WSSD (2002) report urges member nations to redirect some educational outcomes in order to promote a better understanding of SD. Specifically, it urges nations to provide environmental and developmental education through formal and non-formal channels to all age groups. The hope is that SD education

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would lead to behavioral changes conducive to its goals. These SD goals, in turn, would be congruent with those espoused by the United Nations, through the United Nations Global Compact.

To this end, researchers have begun to gauge the level of university students' knowledge and attitudes about sustainability. The results of such research have provided important insights into students' views on the issue of sustainability and their understanding about this concept. However, most of these studies have limited their attention to the developed world (Onuki and Mino, 2009; Fernández-Fernández and Bajo-Sanjuán, 2010; Von Der Heide and Lamberton, 2011). Nevertheless, we also need to be aware that understanding the effect of education; and indeed, how the overall perception of how the SD concept is understood in the developing world is paramount. After all, 85% of the human population lives in developing countries. And as social progress permeates through these world regions, citizenry from emerging markets perception about sustainability can result in a grimmer or more hopeful global outlook.

With this in mind, the present paper serves as a first attempt to explore the perception (i.e. attitudes and knowledge) of Iranian students toward SD concepts and, consequently, the progress that Iran has made in moving toward meeting the educational needs of sustainability. The rest of the paper is organized as follows. First, we present a review of the extant literature concerning student attitudes and knowledge about SD. In so doing, we also briefly introduce the Iranian context, specifically as it relates to sustainable development. Next, we present our research methodology, along with our findings. Lastly, in the discussion/conclusion section, we elaborate on the implications of our research effort.

Literature

Research on students' attitudes toward and knowledge of sustainability is scant, but there seems to be consistent findings in the limited number of studies conducted in recent years (Kagawa, 2007). In particular, the existing research shows that while the vast majority of students show positive attitudes toward sustainability, they lack specific knowledge about the topic (Carew and Mitchell, 2002; Darnton, 2004; Summers *et al.*, 2004; Azapagic *et al.*, 2005; Stir, 2006; Kagawa, 2007). Among the most comprehensive studies in this area is the Azapagic *et al.* (2005) multi-country investigation of engineering students on attitudes toward sustainability. Their findings showed that all students surveyed had positive attitudes toward SD and indicated that it is an important concept. Yet, the data also indicated that the students' knowledge and understanding of sustainability concepts was not satisfactory and suggested that much more work was needed in educating engineering students as to the concept of sustainability. Moreover, Azapagic *et al.* (2005) found that students were more knowledgeable about the environmental dimension of sustainability and less so on the social and economic aspects.

Similar results were reported by Kagawa (2007) in his study of university students at the University of Plymouth in the United Kingdom. He found that students' attitudes and understanding of sustainability was unidimensional and centered on environmental issues. Moreover, the students in general reported positive 'pro-sustainability' attitudes and showed a willingness to change personal behaviors (e.g. recycling, purchasing habits,) to promote sustainability. Stir's (2006, p. 830) research with Australian students illustrated that the students' understanding of social and economic aspects of sustainability was 'quite superficial'.

In short, the findings of this limited research suggest that while many university students think sustainability is 'a good thing', it seems they are not sufficiently familiar with the concept and its dimensions. Such related and deeper-meaning topics as the triple bottom line (Elkington, 1998) and stakeholder influences (Freeman, 1984) are even more distant concepts. In addition, as Kagawa (2007) and Summers *et al.* (2004) have reported, most respondents associate SD solely with environmental issues and to a much lesser extent with its economic and social dimensions.

The paucity of research in this area is much more pronounced in developing countries. A notable exception is the Azapagic *et al.* (2005) study including students from Brazil and Vietnam. But the sample consisted of only engineering students and the analysis was based on aggregate data of all participating students from different countries. Hence, no explicit country effect was reported on the attitudes and understandings of students. Because SD is a global issue, to obtain world-wide traction and to bring positive results, the world's population requires a better understanding and appreciation of the SD concept and its dimensions.

In this regard, we undertook this research project in Iran, an understudied developing country in a key area of the world, to better understand how the future (next) generation of decision-makers in that important region of the world perceives the concept of sustainability. Thus, our study contributes to the extant literature by: (1) shedding light on the importance of sustainability for future generations of decision-makers; (2) recognizing the impact of sustainable development education on people's attitudes and knowledge toward this concept; and (3) highlighting the role of various demographic characteristics (i.e. gender, income) on attitudes towards and knowledge of sustainability, all within the national context of Iran.

Iranian SD context

In order to develop policies and coordinate development strategies consistent with Rio's Earth Summit declarations, the Iranian government, as a signatory to the declarations, established the National Committee for Sustainable Development (NCSDD) in 1992. The Committee's objectives, among others, included the development of a unified framework to meet the requirements of Article 21 of the Summit. Among this article's directives was the emphasis placed on the role of education in promoting the understanding and the capacity to work toward sustainable development goals (Maknoon, 2006).

These directives, undertaken by the Iranian Department of the Environment, are indeed encouraging given the various economic (Bahae and Pisani, 2009), social, and environmental challenges that the country is facing. The government has completed two national initiatives – the National Plan for the Protection of the Environment and the National Strategy for Sustainable Development – with concomitant plans for promoting these initiatives through public awareness campaigns and public education. For a detailed discussion of these plans and challenges (which are beyond the scope of this paper), readers can refer to the Human Development Report (2009); Iran Pollution Report (2004), and Ghazinoory (2005). It is also important to note that the Iranian government exerts substantial control over the economy both directly and through semi-private entities such as foundations (known locally as *bonyads*), mutual funds, pension funds, and companies linked to military organizations. While the estimates vary as to exactly how much of the economy is under state control, Naghshineh-Pour (2008) affirms it has a dominant influence on the Iranian economy.

In contrast to a free market economy, where influential stakeholder groups sway firm decision toward sustainable development initiatives (Mitchell *et al.*, 1997; Henriques and Sadosky, 1999; Fernández-Gago and Nieto-Antolín, 2004; Pérez-Batres *et al.*, 2010, 2011), in state-controlled economies such as Iran, the government is the major player in moving the society toward such goals. State-controlled economies, despite their highly concentrated economic and political power, still need to chart some path toward sustainability which may be influenced by tomorrow's national leaders (a policy that Iran has signed on to through global accords). The chosen path may have important national and international repercussions for the future. With this in mind, in this exploratory research and given the importance of all society's awareness and understanding of SD, and consistent with the existing research in the field, we focus our examination on the opinions of Iranian college students toward sustainability.

Methodology

Sample and Survey Instrument

Based on the review of the limited existing research in this area, we developed a survey instrument to measure Iranian college students' knowledge of and attitude toward SD. To this end, we followed the logic set forth by Azapagic *et al.* (2005). Our survey instrument grouped questions into two sections – section one covered standard demographic data and section two focused on student attitudes and knowledge of SD concepts. The original English-language version of the instrument was translated into the Persian (Farsi) language by two Iranian expatriates independently (as suggested by Brislin, 1980). These translations then were integrated by the authors, fluent in both Farsi and English. Back translation revealed minor discrepancies which were addressed. Minor

changes were made after a small pilot test of the survey for the final Persian version. The questionnaires were administered to 429 students, from various disciplines, who participated voluntarily during the 2008 academic year at a major public University in Iran.

The sample was nearly evenly divided as to gender (51.5% female) and most respondents were nearing completion of their university studies. A majority of respondents were mono-lingual Persian speakers with some exposure to English and were nearly evenly divided among majors in business, engineering, humanities, and medicine. Lastly, about one in four respondents had had some environmental education in high school (Tables 1 and 1b show demographic means and the corresponding correlation tables for student knowledge and attitudes toward the concept of SD).

Survey Instrument Factor Analysis

In validating our exploratory survey about student perceptions on SD, we factor analyzed two distinct areas – students' knowledge of SD and students' attitudes toward SD. The 34 SD knowledge items were divided into four factors: (1) Environmental Non-Technical (e.g. acid rain); (2) Social Fairness (e.g. gender equity, fair trade); (3) Environmental Technical (e.g. ECO labeling, fuel cells); and (4) Public Welfare (e.g. HIV/aids, poverty). While each extracted factor possessed an Eigenvalue larger than one, we also used the Scree test of Eigenvalues plotted against factors to determine the adequate number of factors (Tabachnick and Fidell, 2001). Table 2 shows the component matrix for SD knowledge.

Table 3 reports the results of the factor analysis for SD attitudes. Thirteen declarative statements concerning sustainable development yielded four extracted factors: (5) Importance of SD; (6) Global Environmental Crisis; (7) Business Development; and (8) Changing Behavior for the Environment. Factor 5 presents respondents' personal opinion about how Iranian students view SD and how they believe other members of society perceive this concept. Factor 6, which is reverse scored, exhibits a clear interpretation that the Earth's resources are limited and in jeopardy of not sustaining future generations. Factor 7 links business activity to economic development and Factor 8 relates to the need to change society's behavior to improve sustainable development outcomes. Here too, the factors are listed in order of variance explained (25%, 43%, 52% and 61%). Each extracted factor possessed an Eigenvalue larger than one. Also, the Scree test of Eigenvalues plotted against factors confirmed the need for four factors. Table 3 and shows the component matrix for SD attitudes.

Dependent Variables

SD Knowledge

Following the results from our factor analysis run (Table 2), we included each one of the four factors as dependent variables (the preceding paragraph, and Table 2, label the four factors and explain the concepts that integrate each one of them). Also, because Factors 1–4 integrate specific groups of questions, we needed to aggregate the question value for each one of them (i.e. dependent variables). Next, to make these results comparable, we rescaled the value of the answers. Descriptive statistics for each of the four dependent variables (i.e. Factors 1–4) are reported in the correlation matrix, shown in Table 1.

SD Attitudes

Following the results from our factor analysis run (Table 3), we included each one of these three factors, Factors 5–8, as dependent variables (the survey instrument factor analysis subsection, and Table 3, labels the four factors and explains the concepts that integrate each one of them). Furthermore, because Factors 5–8 integrate specific questions, we needed to aggregate the question value for each one of the factors (i.e. dependent variables). Next, to make these results comparable, we rescaled the value of the answers. Descriptive statistics for each of the four dependent variables (i.e. Factors 5–8) are reported in the correlation matrix, shown on Table 1b.

Explanatory Variables

- **Gender.** Dichotomous variable where Male = 1.
- **Area of Academic Study.** Where the following numbers indicate a particular area: 1 = Agriculture; 2 = Business; 3 = Medicine; 4 = English; 5 = IT; 6 = Literature (liberal arts).

	Mean	s.d.	Max	Min	1	2	3	4	5	6	7	8
1 F1 Env. Non-Technical	24.28	5.36	36	9	1							
2 F2 Social Fairness	19.37	5.69	36	9	0.38*	1						
3 F3 Env. Technical	14.68	5.23	32	8	0.33*	0.53*	1					
4 F4 Public Welfare	19.97	5.04	32	8	0.55*	0.67*	0.45*	1				
5 Gender	0.48	0.50	1	0	-0.14*	-0.12*	-0.03	-0.29*	1			
6 Area of study	3.37	1.48	6	1	0.03	-0.04	0.03	-0.02	-0.01	1		
7 # years university studies	3.78	1.57	6	1	0.07	0.07	0.08	0.03	-0.04	0.15*	1	
8 Language	2.12	0.75	3	1	-0.03	0.02	0.00	0.00	0.02	-0.18*	-0.02	1
9 SD Ed. in High-School	0.24	0.43	1	0	0.06	0.16*	0.17*	0.10*	-0.06	-0.15*	0.02	-0.04

	Mean	s.d.	Max	Min	1	2	3	4	5	6	7	8
1 F5 Importance of SD	15.75	3.63	20	5	1							
2 F6 Global Env Crisis	6.63	2.10	10	2	0.30*	1						
3 F7 Business Development	4.43	1.67	10	2	-0.03	-0.06	1					
4 F8 Change in Behavior	8.76	2.50	20	4	-0.07	0.15*	0.28*	1				
5 Gender	0.48	0.50	1	0	-0.05	-0.07	0.01	0.03	1			
6 Area of study	3.36	1.48	6	1	0.04	0.07	-0.07	-0.04	-0.01	1		
7 # years university studies	3.78	1.57	6	1	0.12*	0.14*	-0.10*	-0.08	-0.04	0.14*	1	
8 Language	2.12	0.75	3	1	-0.02	-0.06	0.02	0.02	0.02	-0.18*	-0.02	1
9 SD Ed. in High-School	0.24	0.43	1	0	0.04	-0.11	0.07	0.11*	-0.06	-0.15*	0.02	-0.04

Table 1. Correlation Table on Iranian Student Knowledge towards Sustainable Development
 Notes: Demographic and factor definitions appear in the text.

Components Matrix								
Environment	Non-Technical (1)	Social Fairness (2)	Environment Technical (3)	Public Welfare (4)				
Acid rain		.594	Micro finance	.566	Eco labeling	.715	HIV/AIDS	.735
Air pollution		.743	Tech transfer	.651	Clean tech	.613	Maternal health	.751
Climate change		.661	Preferential trade access	.522	Fuel cell	.765	Generational equity	.684
Deforestation		.664	Fair trade	.724	Life cycle assessment	.595	Poverty/consumption	.661
Global warming		.689	Debt relief	.648	Renewable energy tech	.732	Earth moving capacity	.545
Natural res. depletion		.702	CSR	.500	Waste minimization	.547	Population growth	.472
Ozon depletion		.458	Gender equity	.532	Design for environment	.695	Child mortality	.530
Portable drinking water		.701	Good governance/transparency	.670	Industrial ecology	.736	Primary education	.488
Human sanitation		.666	Poverty reduction	.631				
A		.864		.858				.869

Table 2. Factor Analysis (Rotated Component Matrix); for Knowledge Questions about SD

Components Matrix		Global Environmental Crisis (6)		Business Development (7)		Change in Behavior (8)		
Importance of SD (5)								
You Personally		.811	Earth has plenty of natural resources	.798	Profit and eco development linked	.865	Change way of life	.476
You as a Student		.842	Ecological crisis exaggerated	.791	Job growth linked to business investment	.807	Animals have rights	.782
Your Country		.672					Avoid buying from non eco friendly companies	.676
The Society World Wide		.727					I purchased fair trade goods	.547
Future Generation		.736						
α		.827		.642		.656		.573

Table 3. Factor Analysis (Rotated Component Matrix); for Attitudinal Questions about SD

- **Years of University Studies.** This variable ranges 1–6.
- **Foreign Language ability.** Ranges from 1–3: where 1 means very well, 2 means not so well and 3 means barely / not at all.
- **Monthly Household Income.** Ranges from 1–4: where 1 = less than \$400; 2 = \$400–\$800; 3 = \$801 – \$1,600; and 4 = more than \$1,600.
- **Environmental Education in High School.** Dichotomous variable where 1 = yes.

Statistical Analysis

Within the social sciences, there are instances in which we encounter dependent variables that are dichotomous rather than continuous (e.g. whether students know about SD; whether students have a positive/negative attitude toward SD). Under this condition, the OLS regression cannot appropriately calculate the relationships due to heteroskedasticity and normality problems (Long, 1997). Thus, to properly calculate a dichotomous dependent variable, researchers should use logistic regression models (Davis *et al.*, 2007).

However, the use of logistic regressions is not limited to binary dependent variables but can be extended to ordinal dependent variables. An ordinal variable is one that is categorical and hierarchically ordered. For instance, ‘not heard’, ‘heard’, ‘have some knowledge’, and ‘know a lot’ can be the answers to a question about student knowledge on Fair Trade. Thus, for when the dependent variable is not continuous but hierarchically ordered, the use of ordinal logistic regression is recommended (Long, 1997). To this end, Pérez-Batres *et al.* (2011) recently used an ordered logistic methodology to test the relationship between a dependent variable with three categories (i.e. firm not registered with a given SD initiative, firm with 1 registration, and firm with 2 registrations) and a set of explanatory variables. In short, we believe these explanations justify our selecting the ordered logistic regression.

Results

SD Knowledge

To determine the level of SD knowledge of Iranian undergraduate students, we used a survey instrument consisting of 51 questions. Table 2, the factor analysis table, shows the individual questions and their loading factors. As described in the Methods section, the following aim was to test the relationship of each one of the factors (or dependent variables) with the set of demographic characteristics (exploratory variables) encompassed by: gender, area of academic study, years of university study, foreign language ability, household income, and environmental education in high school (Table 4).

For Factor 1, the dependent variable about SD-popular environmental knowledge, the gender variable is highly statistically significant and negatively related to men ($p > 0.01$). That is, women self-identify to be much more knowledgeable than men. For Factor 2 (Social Fairness), women also appear to be much more knowledgeable than men as the gender variable is statistically significant and negatively related to men ($p > .05$). Also, high school education is statistically significant and positively related to knowledge about social fairness issues ($p > 0.01$). For Factor 3, Technical Environmental Knowledge, only the high school education variable was highly statistically significant and positively related to technical knowledge about the environment ($p > 0.001$). And for Factor 4, Public Welfare, women also self-identify to be much more knowledgeable than men about public welfare issues ($p > 0.001$). And high school education on SD was marginally statistically significant and positively related to self-identify knowledge about public welfare issues ($p > 0.08$). Taken in their entirety, these results suggest that women are more knowledgeable than men about the SD concept. Also, high school environmental education and years of university studies had a positive effect on SD knowledge.

SD Attitude

To determine the attitudes of Iranian students, we followed the same format used for the SD-knowledge analysis. For Factor 5, the dependent variable about the value of SD to the individuals themselves and the larger society,

	Coef.	Std. Error	Z	P > z	95% Conf. Interval
Factor 1- Environment non-Technical					
Independent Variables					
Gender	-0.44	0.18	-2.49	0.01	-0.79 -0.09
Area of Study	0.02	0.06	0.40	0.69	-0.10 0.14
Years of Univ. Study	0.05	0.06	0.86	0.39	-0.06 0.16
Foreign Language	-0.03	0.12	-0.28	0.78	-0.27 0.20
SD in High School	0.25	0.22	1.16	0.25	-0.17 0.67
Model Statistics: N = 429; Log likelihood = -669.36; Pseudo R ² = 0.01; Prob > Chi Square = 0.10					
Factor 2 – Fairness					
Gender	-0.35	0.17	-2.00	0.05	-0.69 -0.01
Area of Study	-0.02	0.06	-0.30	0.77	-0.14 0.10
Years of Univ. Study	0.07	0.06	1.21	0.23	-0.04 0.18
Foreign Language	0.09	0.12	0.74	0.46	-0.14 0.31
SD in High School	0.67	0.20	3.30	0.00	0.27 1.07
Model Statistics: N = 429; Log likelihood = -705.20; Pseudo R ² = 0.01; Prob > Chi Square = 0.00					
Factor 3 – Environmental Technical Knowledge					
Gender	0.04	0.17	0.24	0.81	-0.30 0.38
Area of Study	0.06	0.06	1.00	0.32	-0.06 0.18
Years of Univ. Study	0.07	0.06	1.29	0.20	-0.04 0.18
Foreign Language	0.12	0.12	1.04	0.30	-0.11 0.35
SD in High School	0.79	0.21	3.83	0.00	0.38 1.19
Model Statistics: N = 429; Log likelihood = -695.90; Pseudo R ² = 0.01; Prob > Chi Square = 0.00					
Factor 4 – Public Welfare					
Gender	-0.99	0.18	-5.57	0.00	-1.34 -0.64
Area of Study	0.00	0.06	0.03	0.98	-0.12 0.12
Years of Univ. Study	0.00	0.06	0.05	0.96	-0.11 0.11
Foreign Language	0.06	0.12	0.52	0.60	-0.17 0.29
SD in High School	0.37	0.21	1.81	0.07	-0.03 0.78
Model Statistics: N = 429; Log likelihood = -693.61; Pseudo R ² = 0.02; Prob > Chi Square = 0.00					

Table 4A. SD Knowledge

	Coef.	Std. Error	Z	P > z	95% Conf. Interval
Factor 5 – SD Value					
Independent Variables					
Gender	-0.14	0.17	-0.80	0.43	-0.48 0.20
Area of Study	0.03	0.06	0.53	0.59	-0.09 0.16
Years of Univ. Study	0.13	0.06	2.28	0.02	0.02 0.24
Foreign Language	-0.02	0.12	-0.16	0.87	-0.25 0.21
SD in High School	0.23	0.21	1.10	0.27	-0.18 0.64
Model Statistics: N = 429; Log likelihood = -692.02; Pseudo R ² = 0.01; Prob > Chi Square = 0.15					
Factor 6 – Global Environmental Crisis					
Independent Variables					
Gender	-0.29	0.17	-1.68	0.09	-0.62 0.05
Area of Study	0.04	0.06	0.70	0.49	-0.08 0.16
Years of Univ. Study	0.16	0.06	2.77	0.01	0.05 0.27
Foreign Language	-0.12	0.12	-1.04	0.30	-0.35 0.11
SD in High School	-0.49	0.21	-2.36	0.02	-0.89 -0.08
Model Statistics: N = 429; Log likelihood = -857.75; Pseudo R ² = 0.01; Prob > Chi Square = 0.00					
Factor 7 – Business Development					
Independent Variables					
Gender	0.05	0.17	0.30	0.77	-0.29 0.39
Area of Study	-0.08	0.06	-1.38	0.17	-0.20 0.04
Years of Univ. Study	-0.10	0.06	-1.86	0.06	-0.21 0.01
Foreign Language	-0.01	0.12	-0.05	0.96	-0.23 0.22
SD in High School	0.30	0.21	1.46	0.14	-0.10 0.70
Model Statistics: N = 429; Log likelihood = -756.92; Pseudo R ² = 0.01; Prob > Chi Square = 0.11					
Factor 8 – Attitude Change					
Independent Variables					
Gender	0.07	0.17	0.42	0.68	-0.27 0.41
Area of Study	-0.01	0.06	-0.09	0.93	-0.13 0.12
Years of Univ. Study	-0.10	0.06	-1.84	0.07	-0.21 0.01
Foreign Language	0.08	0.12	0.70	0.49	-0.15 0.31
SD in High School	0.19	0.21	0.93	0.35	-0.21 0.60
Model Statistics: N = 429; Log likelihood = -694.27; Pseudo R ² = 0.00; Prob > Chi Square = 0.40					

Table 4B. SD Attitude

we find the number of years of university education statistically significant and positively related to SD-value ($p > 0.03$). About Factor 6, Global Environmental Crisis, we find that years of university education have a positive relationship to student perception of a global environmental crisis ($p > 0.01$). And women are more likely than men to think that there is an environmental crisis; the results though are only marginally statistically significant ($p > 0.10$). Also, those who received some environmental education in high school believe there is a contemporary environmental crisis more so than those high school students who were not exposed to any environmental education ($p > .002$). For Factor 7, an increase in the number of years of university studies was positively related to the perception that business development brings material prosperity ($p > .06$). For the final factor, Factor 8, the number of years of university education was positively related to the student perception as to the need for attitudinal changes toward SD (reverse scored, $p > .07$).

In summary, more years of college impacts attitudes in a positive fashion concerning the value of SD, the feeling of environmental crisis is at hand, the possibility that SD and business development are not mutually exclusive, and that higher education may help create a belief that there is a national need for attitudinal change toward SD. Women have a more heightened sense of environmental crisis. Also, those who studied the environment in high school believe that an environmental crisis is at hand.

Discussion and Conclusion

The purpose of this research was to investigate the attitudes and knowledge of Iranian students toward the multi-faceted SD concept. About SD knowledge, our results show that gender (Iranian women), SD education in high school, and university experience (years of study) were variables with a positively relationship to the concept of SD. Specifically about undergraduate Iranian women, our analysis revealed that they are more knowledgeable than Iranian men about non-technical environmental issues, social fairness, and the public welfare dimensions (factors) of the SD concept; yet, there is no difference between Iranian men and women about the technical environmental factor. Perhaps, the greater awareness and knowledge on the part of Iranian female university students reflects the increasing participation rates of women in higher education. Because admission to universities in Iran is limited and very competitive, the higher rate of female admissions may indicate a broader educational skill set, hence, female student awareness and knowledge of emerging global issues such as sustainability. Additionally, traditional female roles, such as caring and raising children, may also better relate to the survey questions concerning gender equity, child mortality, and maternal health. Quite possibly, this level of awareness and knowledge may be an issue of self-interest because sustainable development may improve the condition and position of Iranian women in Iranian society.

Our research also showed that respondents with SD education in high school and more university experience were more knowledgeable about some aspects of sustainability concepts than their peers with no SD high school education and less university experience, respectively. Indeed, these results underscore the important role of education both formative (i.e. high school) and career focused (i.e. university) in enhancing the understanding of the emerging generation and future leaders toward sustainable development in Iran. This important finding, noting the contribution of the link between education, environmental study, and SD knowledge and attitudes, may significantly matter. It could be that through the educational enterprise SD becomes a more salient national issue in Iran.

Worth noting is the fact that our results show only students' opinion. They do not reflect respondents' behaviors. Because students indicated a positive attitude toward SD and were knowledgeable about some SD concepts does not mean their behavior is consistent with SD goals. Future research should investigate the degree to which respondents' expressed attitudes and understanding about SD is consistent with their actions.

This research has made several contributions to the subject of sustainable development. First, the results show that sustainable development has a global appeal and viewed very positively not only in industrialized and developed economies (Kagawa, 2007), but also in developing nations. This positive attitude toward SD, while not sufficient, it is a necessary pre-condition to create behavioral change toward creating a world-wide sustainable society. Indeed, for a broader understanding of attitudes toward sustainability, more research is needed in other developing economies.

Second, perhaps the most significant contribution of this research is the findings related to the effects of various demographic variables such as gender and education on respondents' attitudes and understanding of sustainability. Specifically, the fact that SD education showed a significant positive impact on respondents' attitudes and knowledge of sustainable development validates and reaffirms the important role of education in promoting sustainability as declared in the Agenda 21 of the Earth Summit (UNCED, 1992).

Finally, this study was conducted in Iran, a hostile environment to conduct social science research as evidenced by the recent government restrictions on the field (Karimi, 2010). Given this context, and the already sparse research activities from this region, the value and the contributions of our research become even more evident.

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