Innovation in Sustainable Products: Cross-Cultural Analysis of Bi-national Teams

Autoria: Adriana Carla Avelino Mazza, Cleber José Cunha Dutra, Leonardo Mendes Lacerda de Menezes

Abstract

Innovation has been required as a vital asset for organizational survival in many areas, especially in the sustainability organizational field of concerns. Innovations represent an important element for changing production and consumption patterns in the world society. Changes in Brazilian consumers consumption are perceived from the growing demand for environmentally-friendly products and services which are pressuring companies to achieve environmental efficiency to obtain eco-labels. Tools as Cleaner Production, Sustainable Supply-Chain Management and Ecodesign are essential to help firms in this aim. However these tools require integration between different functions in a company, demanding that members with different expertise work together as a team. Governments of nations and managers of companies, who are engaged in the search of solutions to a sustainable world, devise strategies to combine their diversity in skills and knowledge, aiming at superior results in innovation development. Based on a long tradition of collaboration Germany is a potential partner to work with Brazil, combining expertise in the development of innovations aimed at more sustainable products. In today's global environment, transnational teams should become the most effective teams in an organization but, because of the potential for miscommunication and conflict, the management of these teams need special attention. Such view supports the formulation of questions, which were central to the development of the present paper. Cultural differences between German and Brazilian members of work teams represent risks/advantages for the management process of innovation development? The paper draws on previously reviewed studies to ground an analysis on cultural dimensions and national characters, within Brazilian-German teams. Through this analysis it is possible to notice that Germans and Brazilians have some cultural differences, which could lead to difficulties in managing tasks conducted by them when working together as a team. These differences can indicate a tendency to conflicting styles of management and decision-making, which will be more centralized and authoritarian to Brazilians and more participative to Germans. Strong differences between these two countries in relation to time orientation and situations of uncertainty and ambiguity suggest that difficulties may occur in reconciling the interests relating to deadlines and targets to be achieved by the team. As personality profiles of cultures can be operationalized as the mean trait levels of culture members and as cultures shape the expression of traits, different cultures shape different national personality traits. Probably very different national personality traits can bring problems to join individuals of different cultures. Brazil and Germany also have differences on patterns of personality profiles which suggest that managers need to take measures to mitigate any problems that could be caused by these differences. In essence, this study is an essay whose main aim is to open perspectives for further research and to support organizations in their sustainable management practices.

Introduction

Innovation has become mandatory for organizational survival in many areas. Specially in the sustainability organizational field of concerns, wherein governments, companies, and nongovernmental organizations have been developing initiatives to cope with goals of the United Nations Summit conferences, innovation has been required as a vital asset. In order to keep the human life conditions in bearable conditions in the coming decades, innovations represent the essential factor for changing production and consumption patterns in the world society. This message increasingly spreads to management areas of research.

Along with the challenges to innovate in diverse activity sectors, areas, and fields, the process of managing innovations in sustainability aspects, both in private and public organizations, constitutes a daring enterprise. Considering the multiple dimensions to be dealt with when establishing innovative changes in processes, services, products, aiming at higher standards of sustainable performance, the management of sustainable innovations could be regarded as one of the most complex tasks in the organizational field.

Although many investigative efforts have been made to support approaches to the management of innovations in technological, economic, strategical, among other aspects of organizational knowledge, even in the sustainability area, less development is observed in terms of collective behavioral aspects in organizations. Regarding this topic of study on innovation in sustainability as a quite unexplored field of research, this paper presents initial considerations on the subject of team work in the development of innovations aimed at more sustainable products. Since concrete initiatives have been promoted in the international bilateral collaboration between countries, in order to foster innovation in sustainability area, the paper explores behavioral aspects of management involving cross-cultural teams.

Governments of nations engaged in the search of solutions to a sustainable world devise strategies to combine their diversity in skills and knowledge, aiming at superior results in innovation development. Based on a long tradition of collaboration, Germany and Brazil promoted in 2010-2011 the Year of Science, Technology and Innovation, with establishment of programs supported by both countries. Funds offered to finance research projects called for bids presenting sustainability as main focus for their innovative proposals. One of a series of initiatives is the call made by the Brazilian Agency for Industrial Development (ABDI) and Fraunhofer-Gesellschaft (FhG). Their funds will encourage scientific and economic relations between these countries, involving research institutes and companies, whereby project teams with members from both nationalities (ABDI, 2011).

Such concrete initiatives support the formulation of questions which were central to the development of the present paper. Cultural differences between German and Brazilian members of work teams represent risks/advantages for the management process of innovation development? The paper draws on previously reviewed studies, while reflecting on relevant aspects of the issue. In essence, this study is an essay whose main aim is to open perspectives for further research and to support organizations in their sustainable management practices.

1. Approaches to sustainable environmentally-friendly products

In recent decades there has been a growing debate on environmental issues in international forums that bring together a significant number of governments and nongovernmental organizations from around the world. The interest in environmental issues stems from a recognition of the impasse in the interactions between humanity and the environment and the urgency to resolve this impasse. However, in order to achieve this goal and build a new model of society, regarding economic, social and environmental sustainability, the adoption of an environmental posture by industrial organizations is relevant. In this new social model, sustainability is shaped through changes in consciousness, which results in changes on consumer's behavior. Green consumer behavior implies on a

reduction of resource and energy use and purchases of green products (Jansson, Marell & Nordlund, 2010). Green (or sustainable environmentally-friendly) products are those that do not harm the environment and contain non potentially harmful elements (Borin, Cerf & Krishnan, 2011), i.e. products that strive to protect or enhance the natural environment by conserving energy and/or resources and reducing or eliminating use of toxic agents, pollution and waste (Dangelico & Pujari, 2010).

As a recent trend in this behavior, consumers have increased pressures on companies, demanding information on their products. Since the environmental consequences of the production and the consumption of a product are generally unobservable, eco-labels are the only way for consumers to access such information (Brécard, Hlaimi, Lucas, Perraudeau & Salladarré, 2009). So norms and standards, which were previously only advisory, are becoming more and more mandatory (Houé & Grabot, 2007, Fet, Skaar & Michelsen, 2009). Nevertheless, despite the rise in consumers' ecological consciousness in recent years (Brécard *et al*., 2009), one can observe the small range of Brazilian certified products in the market.

An alternative for companies that aim to provide green products for their consumers is to consider environmental perspectives during design phases (Bovea & Wang, 2007), in order to improve their environmental efficiency. Authors cite Cleaner Production (Frondel, Horbach & Rennings, 2007, Guziana, 2011), Sustainable Supply-Chain Management (Srivastava, 2007, Liu, Yang, Qu, Wang, Shishime & Bao, 2011) and Ecodesign (Bovea & Wang, 2007) as tools which assist companies in implementing approaches to environmental sound products.

Cleaner Production (CP) aims to minimize and avoid waste through the reuse and recycling of materials, using resources more efficiently, changing products and production processes (Frondel *et al.*, 2007). Srivastava (2007) defines Green Supply-Chain Management (GrSCM) as the integration of environmental thinking into supply-chain management, for product design, material sourcing and selection, manufacturing, processes, delivery of the final product to consumers as well as end-of-life management of the product after its useful life (see Korchi & Millet, 2011). The main goal of Ecodesign is to create environmentally-friendly products without compromising other traditional requirements (Kurczewski & Lewandowska, 2010) so products shall be environmentally adapted while functional and marketable (Bovea & Wang, 2007). Most definitions of sustainable product design (so-called Ecodesign) embrace the need for designers to recognize not only the environmental impact of their designs over time but their social impacts too (Fuad-Luke, 2007).

Ecodesign has been applied for over fifteen years — initially as a very technically oriented tool; nowadays it affects all business aspects and the entire value chain (Johansson *et al*., 2007). In this recent Ecodesign approach, efforts should be embedded into all business activities. Successful product development — in terms of short development time, low development/product cost and high product quality — requires integration between the major sectors in a company. Integration refers to the strategic and operational linking of persons belonging to different organizational units while preserving their individual orientation.

Regarding such integrative trends in management of Ecodesign and equivalent approaches, this study concentrates attention on personal aspects of working teams, since the reconciliation of various competing interests of persons involved in the innovation process must be essential to a successful management of the whole process.

2. Potential of Brazilian-German teams in developing sustainable products

Exploring the international market for “green” consumers, Cohn & Wolfe, Landor Associates, and Penn, Schoen & Berland Associates performed a conjoint research to discover this is a rapidly evolving market (Green Brands, 2009). In the survey 5,756 people in seven countries (Brazil, China, France, Germany, India, the U.K. and the U.S.) participated from

May 2nd to June 13th 2009. In Brazil, China, and India, respondents were limited to main cities. For Brazil, Green Brands 2009 survey's findings showed that: 73% of Brazilians are interested in green companies and plan to spend more on green products; 52% say that when they choose products it is very important that a company is "green".

Local research in Brazil has been performed by Akatu and Ethos Institutes in the past years. Their survey from July 2010 with 800 women and men in 12 metropolitan areas identified 23% of consumers as "engaged" and 5% as "conscious" (i.e., having a "good" and a "greater" degree of conscious consumption assimilation, respectively). Compared to previous results (2006), a positive aspect of this analysis and its variations is that the percentage of "conscious" consumers remained stable as 5% of the total. Considering the population represented in the two surveys, this represents an increase of approximately 500,000 "conscious" consumers (Akatu & Ethos, 2010). Additionally to this finding, the study showed that 63% of the participants agree that government should require companies to make society a better place for all; and 62% believe that laws should be created, requiring companies to provide clear instructions on use and disposal of products, and that it is important for consumers to pressure companies to avoid environmental damage.

These studies suggest that the Brazilian market for environmentally-friendly products should increase in coming years. Such high level of consumer's interest in environmentally-friendly products probably indicates that Brazilian consumers are becoming steadily aware of the damage being done to the environment through consumption and would look for less environmentally harmful products. If Brazilian consumers are about to increase the pressure on companies, demanding information on sustainable features of their products, manufacturers should begin to be concerned on place environmental claims on their goods. Eco-labels aim to identify and foment environmentally-friendlly products and companies and governments could use them in order to raise awareness of the higher ecological quality of a given product with respect to unlabeled goods (Brécard *et al*., 2009).

Considered as a country with a long and one of the highest environmental concern tradition, Germany also was the first country to introduce an official eco-label, in 1978. The Blue Angel, Germany's eco-label**,** fulfils the role of an instrument of environmental protection to a high degree by being limited to the relevant facts, carrying easily understandable information and by ensuring that the information originates from a neutral official source (Gertz, 2005). Around 10,000 products in 80 different product categories had been awarded the *Blue Angel* (Blauer-Engel, 2010). Such evidences also could represent corresponding expertise of German manufacturers in sustainable management designing, since the process to obtain an environment-related label impacts directly on products design and production process (Gertz, 2005), and helps to internalize the external effects on the environment of the production, consumption and disposal of products (Bougherara & Combris, 2009). Thus, Germany could represent a great potential partner of Brazil in sustainable innovations, conjointly developing products to meet the growing Brazilian demand for environmentally-friendly products.

Initiatives like the ones mentioned in the Introduction of this paper can stimulate the development of teams with Brazilian and German members (designers, engineers, managers etc.) to seek design and manufacturing processes solutions in projects of green products. Whereas a team as a group of individuals who have complementary skills and are committed to a common goal, one can question if members from these two countries, with different history and culture would efficiently work together. The following sections of the paper aims to investigate how cultural differences between Brazil and Germany can influence the integration and the decision-making process of teams focused on developing environmental products.

3. Cultural influences on integration of bi-national teams developing sustainable products

In the Team Management literature it is possible to identify various barriers to integration people as a team (Davison, 1994; Bartel-Radic, 2006; Wrigth, & Drewery, 2006; Johansson, Grief & Fleisher., 2007; Berg & Holtbrügge, 2010; Dexter, 2010; Gressgard, 2011). According to Gressgard (2011) efficient cooperation in teams depends on the existence of a shared understanding among the group members regarding the team issues. This includes mutual understanding of norms for collection, sharing and use of information, division of work and role/responsibilities and the social context for interpretation of information. Lack of clarity, and reward systems that do not reflect the inter-dependency of tasks and people's reluctance to change are examples of barriers (Johansson *et al*., 2007). Such barriers may lead to poor communication and cooperation, which in turn may result in a non-productive team.

Differences between representatives of different organizational units originate from, among other things, differences in training and background that result in different views regarding interpretation of company goals, time orientation, ambiguity tolerance, and other factors (Johansson *et al*. 2007). Differences in terminology may also exist. Whereas marketing professionals tend to speak in terms of product benefits and positions, product designers and manufacturing engineers use a technical language of specifications and performance.

However, beyond the need for integration between different units of a company to develop environmentally-friendly products, in this era of globalization, it is common for products to be designed in one culture, manufactured in another, and sold in yet another. Companies are increasingly using transnational project teams, with members working in several countries, between or beyond national boundaries, made up of several nations or nationalities (Müller, Spang & Ozcan, 2008). One of the most common situations in which different cultures may collide in today's global workplace is in work groups or teams (Humes & Reilly, 2008).

The influence of the different cultures makes the interpersonal interaction in a transnational team more complicated than within teams of one nationality (Jameson, 2007). It affects the way the team works together (Davison, 1994; Friedrich, Mesquita & Hatum, 2005). Intercultural teams have the potential to become the most effective and productive teams in an organization when their diversity becomes an asset and a productive resource for the team (Bartel-Radic, 2006; Berg & Holtbrügge, 2010). Functional intercultural teams bring more perspectives and more alternatives to a task as well as strengthen commitment to the group's task (Wrigth & Drewery, 2006). However, because of the potential for misunderstanding, miscommunication, and conflict, poorly managed intercultural teams can also become the least productive teams in an organization (Humes & Reilly, 2008). The group dynamics in an intercultural team may be complex and time-consuming, also adversely affecting the team's productivity (Gillam & Oppenheim, 2006). Furthermore, individuals from different cultures may experience the same behaviors differently in multicultural teams (Wright & Drewery, 2006), whether they are interacting virtually or face-to-face (Oertig & Buergi, 2006).

Inherent personality differences may exist among individuals representing different cultures (McCrae & Terracciano, 2006). National cultures affect the values they adopt (Kirkman & Shapiro, 2001). People make assumptions about the way things should be based on their cultural backgrounds, and these assumptions influence their behavior in individual, group, and organizational situations (Friedrich *et al*., 2005). When individuals become exposed to other cultures, situations may not turn out as expected based on these inevitable differences in cultural backgrounds (Humes & Reilly, 2008). Thus, intercultural teams

become more effective when team members are able to identify and bridge their cultural differences.

Therefore, considering Brazilian-German project teams for the development of innovative environmentally-friendly products becomes necessary to understand the cultural aspects of the groups' components, so that managers take actions to overcome existing barriers in the integration of members' teams, overcoming cultural differences and conflicts and improving communication between the various components.

4. Decision-making process in cross-cultural teams

Shetach (2009) regards decision-making process as crucial for all team management activity. According to Clifton (2009) decision-making is about creating a commitment to a future course of action. This is done through negotiating commitment to a solution related to a particular problematic issue. Mainstream organizational research has concentrated on rational models of decision-making whereby participants set goals and objectives; if decision makers have a problem reaching these goals, they search for information, set out and assess alternative courses of action, and evaluate possible outcomes in relation to their objectives and preferences (Clifton, 2009).

In many cultures managers widely believe that the decision-making process is based on objective analysis (Schramm-Nielsen, 2001). Managers who practice this belief make decisions based on accurate and relevant information, and they are prompt in reporting accurate data to all levels in the organization. Multinational corporations' controls over their subsidiaries in these societies are probably much looser than the controls over subsidiaries in societies which adhere to the opposite view point (see Dimitratos, Petrou, Plakoyiannaki & Johnson, 2011). And central managers probably feel more comfortable in making decisions based on information received from those subsidiaries than on information received from subsidiaries in societies with the opposite view (Rodrigues, 1998).

Differences in information and decision rules are both important sources of deep-level diversity, as they reflect differences in personal knowledge and cognitive decision schemas. These differences usually only emerge over time (Rink & Ellemers, 2010). Project managers in different countries run similar projects in different ways, for example, by assigning different priorities to success criteria and by communicating in very different ways (Müller *et al*., 2008). Nevertheless, classical theories lacks approaches to cultural aspects of decision-making, presenting decision-making as a generalized phenomenon, meaning that the principles of decision-making processes and practices are universal (Schramm-Nielsen, 2001).

The global business context comprises substantially varying cultural, political and legal environments, wherein management faces very different business practices and very difficult managerial tasks. Cultural context determines the meaning that managers and subordinates attribute to decision-making process. Furthermore, culture affects central decision-making process characteristics (Sagie & Aycan, 2003). Thus, management style adaptations must be made accordingly.

Aiming at understanding differences in German and Brazilian decision-making styles, and the meaning that managers and subordinates of these two countries attribute to decision-making process, the following section of the paper highlights cultural differences (Müller *et al*., 2008) between Brazil and Germany.

5. Influences of national culture and personality traits on cross-cultural decision-making

Culture is a term that can be attributed to different collectives such as nations, regions and organizations (Hofstede, 1980). This paper focus on the use of the concept for nations. National cultures are shared by the social environment in which children grow up; their stable

core consists of basic, largely unconscious values (Hofstede, Garibaldi, Malvezzi, Tanure & Vinken 2010). Studies have been conducted to assess national culture dimensions and its impact on behavior and attitudes in organizational settings (Koslowsky, Sagie & Stashevsky, 2002), showing the differences in values and behavior of people from different national cultures (Hall, 1960; Smith, Dugan & Trompenaars, 1996; Schwartz, 1999; Schwartz *et al*., 2001; Schramm-Nielsen, 2001; Hofstede & McCrae, 2004; Tanure, 2005; Müller *et al*. 2008; and Hofstede *et al*., 2010). As a general premise, behavior on workplace is "culture-bound" (Lachman, 1997, p. 317).

According to Hofstede, children growing up in a country acquire common personality characteristics in the process of their development (Hofstede & McCrae, 2004), while McCrae regards personality traits as rooted in biology, interacting with external influences, including culture, to shape skills, habits, tastes, and values of the individual (Hofstede & McCrae, 2004). For the purpose of this paper, the analyses herein adopt Hofstede's concept that culture explains aspects of personality traits (Hofstede & McCrae, 2004).

This section highlights the importance of studying both, national culture and personality traits, to better understand the behavior of individuals within organizations, specially while working in cross-cultural groups.

5.1 Cultural dimensions & decision-making in cross-cultural projects of sustainable products

For a general understanding of how cultural values influence the meanings that members of different societies attribute to work, culture-level value dimensions are appropriate (Hofstede, 1980). The unit of analysis for assessing the validity of culture-level dimensions is the society or cultural group, not the individual person (Schwartz, 1999).

In order to explore cultural aspects of bi-national teams working in the development of environmentally-friendly products, hypothetical cross-cultural groups will be the unit of analysis of this study. The phenomenon addressed is decision-making, including the cultural differences thereof. In this sense, the cultural differences between German and Brazilian team members become the central aspect in this part of the analysis. Its objective is to collect information that may facilitate to bridge differences when real groups of these two countries are carrying out projects as a single cross-cultural group.

Despite the existence of other studies on cultural dimensions, Hofstede's (1980) arguments have been more widely adopted and therefore his conceptual framework was used for the present analysis. This author proposes that national culture and values, as they affect the work environment and its management, could be categorized on the basis of five dimensions (Figure 1).

Power Distance (PD)	degree to which hierarchy, age, roles, and institutions' influence and power are accepted in a particular society;
Individualism / Collectivism (IDV)	degree to which people prefer to act as individuals rather than as a collective group;
Masculinity / Femininity (MAS)	degree to which values such as assertiveness, success, and competition are rated higher than values such as quality of life and personal relationships;
Uncertainty Avoidance (UAI)	extent to which people feel threatened by uncertain, ambiguous, and unstructured situations and therefore try to avoid such situations by controlling life as much as possible; and
Long-Term Orientation (LTO)	extent to which people view time as sequential, a series of passing events, or as synchronic, past, present, and future interrelated so ideas about the future and memories of the past shape present action.

Figure 1: Hofstede's Cultural Dimensions.

Hofstede proposed these dimensions based on a survey in 71 countries — including Brazil and Germany. In his studies he used a scale ranging from 0 to 100 to identify the impact of nationality on managerial practices. However, Hofstede's data for four dimensions were collected from 1967 to 1973 (over 35 years). Only the data for Long-Term Orientation dimension are more recent, collected in 1980 (Hofstede & McCrae, 2004). Tanure (2005) used Hofstede's cultural dimensions to perform a similar survey in 7 Latin American countries from 2000 to 2001. Tanure's data was added to this analysis, what allows to compare data over time and to verify if significant changes occurred.

Results of Hofstede's survey to Germany and Brazil and Tanure's survey to Brazil are displayed in Figure 2. In general the results to Brazil were similar to four dimensions, except for Uncertainty Avoidance (UAI) that presented lower levels in the Tanure's (2005) study. Based on compared results (Figure 2) some considerations can be presented about potential problems or facilities that cultural differences can bring to a hypothetical Brazilian-German team.

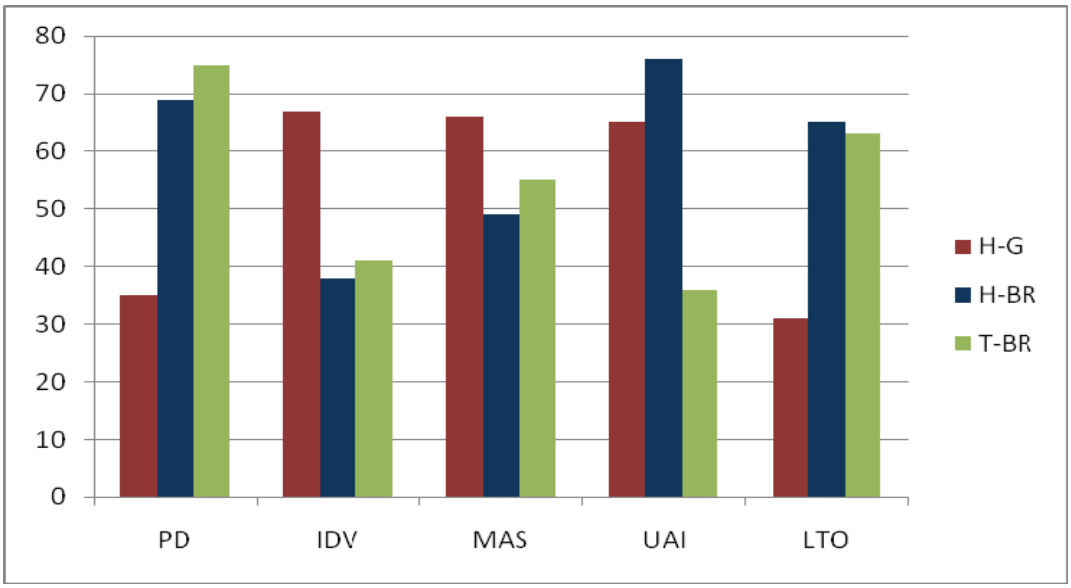

Figure 2: Comparison of Germany and Brazil cultural dimensions, according to Figure 1.
Note: H- Hofstede's data and T- Tanure's data for Germany (G) and for Brazil (BR).

Power Distance (PD). On this dimension Brazil (BR) scored higher than Germany (G) on Hofstede's research and even higher in the Tanure's study (PD-values by Hofstede: G: 35, BR: 69; and BR: 75 by Tanure). In cultures with high power distance (as in Brazil), individuals tend to accept centralized power, depending heavily on superiors for structure and direction: managers can believe that only a few people in the organization have the right to make decisions, and they probably wouldn't offer to subordinates the opportunity to grow and prove their decision-making ability (Waldman, Luque, Washburn, & House, 2006). So, it is possible that an authoritative decision-making leadership style work best in teams from these cultures. On the other hand, in nations with low power distance (like Germany), individuals often make organizational decisions without the boss's input because often managers adhere to "the wide sharing in decision-making" view point. They believe that members of a team in an organization need the responsibility of making decisions for ongoing development, and they give subordinates the opportunity to grow and to prove their ability, and decentralize decision-making as employees grow (Rodrigues, 1998). In this dimension, the strong cultural differences increase the probability of difficulties for a Brazilian-German team, since these differences could lead to conflicts and disagreements on the decision-making process.

Individualism/Collectivism (IDV). Germany scored higher than Brazil according to results of both researchers (IDV-values by Hofstede: G: 67, BR: 38; and BR: 41 by Tanure). Managers in cultures characterized by higher institutional collectivistic values should stress long-term relationships with stakeholders. Thus, the institutional nature of their collectivistic background would lead them to value greater, societal-level entities in their decision-making (Waldman *et al*., 2006). This aspect of collectivism could positively influence decision-making when developing environmentally-friendly products.

Furthermore, managers in collectivistic cultures, like Brazil, usually value relationships and dislike to manage conflicts openly (Tanure, 2005) and then apply less formalized organizational controls than managers of organizations in cultures with higher individualistic level, like Germany. Individuals in societies with high individualistic context tend to look primarily their own interests, thus teamwork cohesiveness is more feasible in collectivistic than in individualistic societies. In this sense, to reconcile individual and group interests can be a challenge for a manager of a Brazilian-German team in a context of decision-making process.

Masculinity/Femininity (MAS). On this cultural dimension Brazil and Germany scores are close, showing a tendency to be masculine cultures, especially if considering Tanure's data for Brazil (MAS-values by Hofstede: G: 66, BR: 49; and BR: 55 by Tanure). Individuals embedded in masculine societies may think that life significance lies in working diligently to gain success, money, material and social position (Jing & Bing, 2010). Males are expected to carry out assertive, ambitious, and competitive roles in the society; females are expected to care for non material quality of life, for children, and for the weak — to perform the society's caring roles (Rodrigues, 1998). Men and women will seek to improve job performance (Hofstede, & McCrae, 2004). So, team members from masculine cultures should be competitive, and this competitiveness needs to be managed by the team leader to increase performance and to avoid huge conflicts in the decision-making process.

Uncertainty Avoidance (UAI). Although Brazil and Germany scored close according to Hofstede (1980), Tanure's survey (2005) shows much lower values to Brazil on this dimension (UAI-values by Hofstede: G: 65, BR: 76; and BR: 36 by Tanure). Comparing Hofstede and Tanure's data over time one could conclude that Brazilians learned how to work under uncertainty, probably because of past years of high rates of inflation faced by Brazilians, when national government changed economic policies often (Tanure, 2005). Considering Tanure's results for Brazil, a task which tends to provide relatively more challenge and risk probably will be better dealt with by Brazilian members of the team, while a well-structured task, which tends to provide security, probably will work better to German members of the team. Thus, the team manager should carefully define responsibility in tasks, making clear what is expected of each team member and which responsibilities are in the process. Formalization has been associated with uncertainty avoidance in the literature and the need for rules in organizations of nations with high uncertainty avoidance assists individuals in feeling comfortable in structured business environments (Dimitratos *et al*., 2011).

Long-Term Orientation (LTO). Brazil scored higher than Germany according to Hofstede and Tanure's studies, showing a large disparity in this dimension (LTO-values by Hofstede: G: 31, BR: 65; and BR: 63 by Tanure). Long-term oriented cultures correlate with long-term commitments and respect for traditions. Thus, organizations in these societies rely less on formal controls and individuals prefer authoritative leadership and decision making (Müller *et al*., 2008). Managers tend not to adopt systems of shared management and power equalization within organizations. Rodrigues (1998) describe subordinates in these cultures as passive and preferring that others make decisions for them. Furthermore, in cultures ranking low on this dimension, change occurs more rapidly. The scores obtained by Brazil and

Germany in this dimension indicate that difficulties may occur in the implementation of joint activities in a German-Brazilian project teamwork, specifically regarding the definition and achievement of objectives and goals.

In this brief analysis it is possible to realize that cultural differences between Germany and Brazil could lead to difficulties in managing activities conducted by members from these two countries when working together as a team. Large differences found in the marks related to cultural dimensions for these two countries indicate tendency to different styles of management and decision-making, which should be more centralized and authoritarian to Brazilians and more participative to Germans. The great difference found in relation to time orientation could also point to difficulties in reconciling the interests relating to deadlines and targets to be met by the team. The different marks in Uncertainty Avoidance can suggest difficulties in the way of structuring tasks. Thus, members of an environmentally-friendly product project team from these two countries should be careful when trying to work together, regarding that it is indispensable to reconcile their individual and group interests.

5.2 Personality profiles of cultures & decision-making in cross-cultural projects

According to McCrae and Terracciano (2005, p. 407), "personality profiles of cultures can be operationalized as the mean trait levels of culture members". Neighboring countries tend to have, as a rule, similar personality means and regions that are separated geographically or historically have less similar means on personality trait scales (McCrae & Terracciano, 2006). Although the Five-Factor Theory (McCrae & Costa, 1996) asserts that traits are constructed based only in biological bases, McCrae believes that cultures shape the expression of traits. McCrae and Hofstede (2004) added that traits might be among the causes of culture-level differences in Hofstede's dimensions, which deal with values, interpersonal relations, and the control of affect.

McCrae and Terracciano (2005) examined geographical patterns in trait scores, replicating the NEO-PI-R — a 240-item questionnaire, to assess 30 specific traits or facets that define five basic factors of personality: neuroticism, agreeableness, conscientiousness, extraversion, and openness to experience, providing a comprehensive mapping of personality traits across cultures (Allik & McCrae, 2004). Neuroticism is the degree to which one is anxious, depressed and irritable; Agreeableness is whether one is generous, gentle and kind; Conscientiousness is whether one is dutiful, organized and reliable; Extraversion is the degree to which one is active, assertive and talkative; and Openness to Experience is whether one is creative, imaginative and introspective (McCrae & Terracciano, 2005).

Mean scores for the 30 NEO-PI-R facets were standardized across 51 cultures, then the authors showed the results obtained in a plot (Figure 3). The horizontal axis is positively associated with Extraversion and openness and negatively associated with Agreeableness. Along the vertical axis cultures toward the top of the figure are high values in Neuroticism and low ones in Conscientiousness (Allik & McCrae, 2004).

According to McCrae *et al*. (2005), cultures near the top of the plot (as Brazilian culture) are characterized chiefly as anxious, hostile, depressed and vulnerable. These cultures are also low on interpersonal trust and subjective well-being. Those cultures near the bottom (as German culture) are assertive, competent, achievement oriented, self-disciplined, and deliberate (Allik & McCrae, 2004). These results can be seen as positive for Brazilian-German teams whereas groups formed only with individuals from cultures with high levels of Neuroticism and low levels of Conscientiousness should present many conflicts between the group components. If the team members balance their personality traits, attenuating the Brazilians Neuroticism and highlighting the Germans characteristics, the group can become dynamic and disciplined as well.

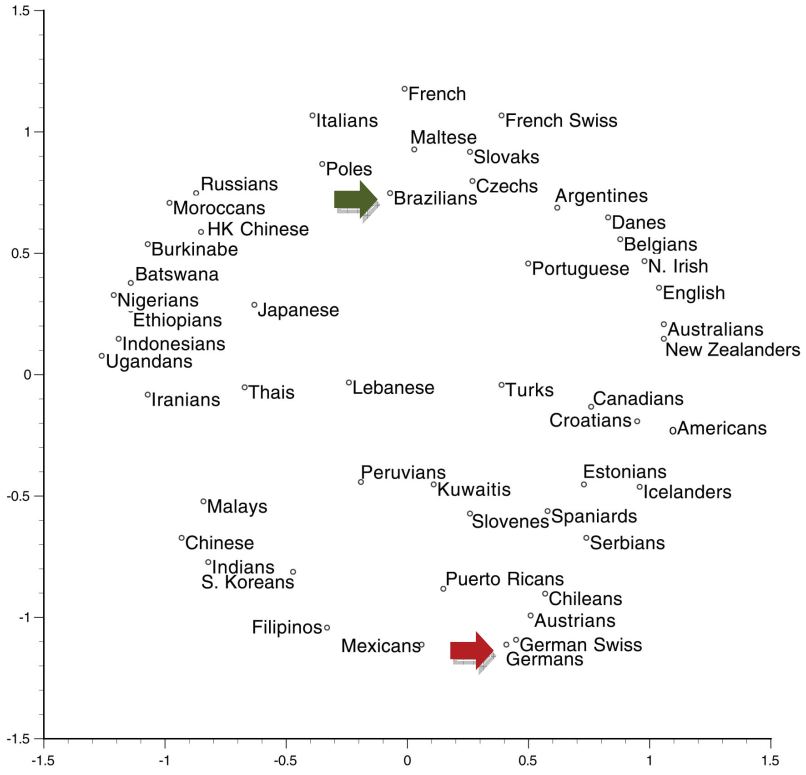

Figure. 3: Levels of Neuroticism and Extraversion for Brazil and Germany. The vertical axis is maximally aligned with Neuroticism, the horizontal axis with Extraversion.
From: McCrae, R. R., & Terracciano A. and 79 members of the Personality Profiles of Cultures Project. (2005). Personality Profiles of Cultures: Aggregate Personality Traits. *Journal of Personality and Social Psychology*. 89(3), 407–425.

Cultures on the right (as German Culture) are impulsive, warm, active, cheerful, imaginative, liberal, trusting, competent, organized, and self-disciplined, whereas those on the left tend to be self-conscious and vulnerable (McCrae & Terracciano, 2005). So, Germans should be outgoing and open to new experiences, what is important to work well in a cross cultural team, while Brazilians probably would need more encouragement to interact effectively with Germans, contributing to task effectiveness and positive outcomes.

Probably very different national personality traits can bring problems to join individuals of different cultures. But in a preliminary analysis one can conclude that, despite some differences in personality profiles, Brazilian and Germans have a potential to be successful working together in projects of environmentally-friendly products, but it will be necessary to develop adaptive skills to achieve effective cross-cultural interactions (see Thomas *et al*., 2008).

To determine whether certain patterns or profiles in personality exist across cultures, one possibility is not to look at trait means in isolation but simultaneously across the whole personality profile (Schmitt, Allik, McCrae & Benet-Martínez, 2007). Schmitt *et al.* (2007) investigated the assessment of the five personality dimensions across 10 geographic world regions. North America, South America, Western Europe, Eastern Europe, Southern Europe, Middle East, Africa, Oceania, South and Southeast Asia, East Asia. The South America region included Brazil (97), Argentina (246), Bolivia (181), Chile (312) and Peru (206) with 1.042 respondents. The Western Europe sample represented Austria (467), Belgium (522),

Finland (122), France (136), Germany (790), Netherlands (241), Switzerland (214) and the United Kingdom (483) totalizing 2,975 respondents. The self-report ratings were made on a scale from 1 (disagree strongly) to 5 (agree strongly). Figure 4 summarizes the results of Schmitt *et al*. (2007) research.

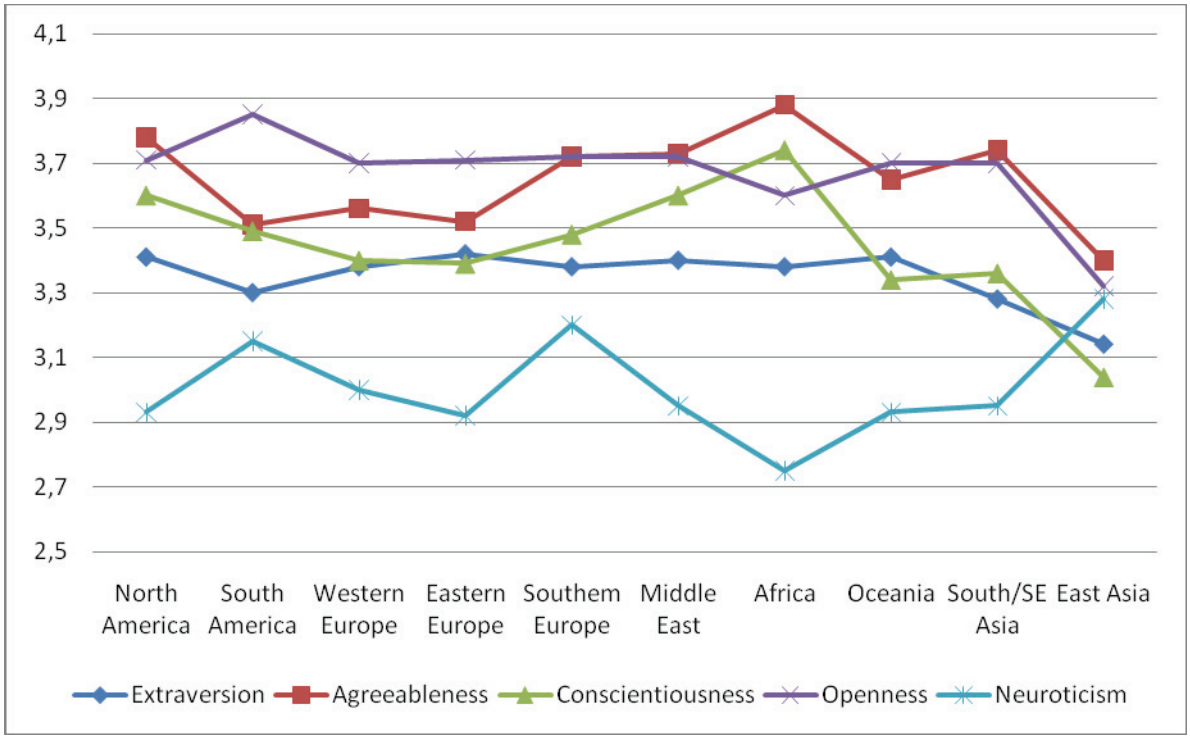

Fig. 4: Patterns in personality traits across cultures. Adapted by the authors from Schmitt *et al.* (2007). From: Schmitt, D. P., Allik, J., McCrae, R. R., & Benet-Martínez, V. (2007). The geographic distribution of big five personality traits: patterns and profiles of human self-description across 56 Nations. *Journal of Cross-Cultural Psychology*, 38(2), 173-212.

Extraversion levels were much lower in East Asia than in most other world regions and South America and South and Southeast Asia were also lower on Extraversion than the rest of the world, which have similar levels (Schmitt *et al*., 2007). However, South America and Western Europe show a slight difference on this dimension.

As seen in Figure 4, nations from Africa scored significantly higher on Agreeableness and the regions of South America, Western Europe, and Eastern Europe were significantly different from all other regions (Schmitt *et al*., 2007), showing a similar level between them but lower than the others, except for East Asia.

In terms of Agreeableness, Africa scored higher and East Asia scored significantly lower on Conscientiousness than all other world regions (Schmitt *et al*., 2007). South America reached a level slightly higher than Western Europe.

As shown in Figure 4, the East Asia scored significantly lower on Openness than all other regions, whereas South America scored significantly higher (Schmitt *et al*., 2007). On this dimension South America and Western Europe had different scores. Conscientiousness and Openness are traits that can favor the development of environmentally friendly products.

In somewhat of a contrast to the regional trends in Conscientiousness, Africa scored significantly lower on the Neuroticism scale, whereas East Asia scored higher than did all other world regions. Figure 4 shows that South America and Southern Europe scored higher

than did all regions except East Asia (Schmitt *et al*., 2007). South America and Western Europe had slightly different scores on Neuroticism.

Despite the limitations of analyzing so wide regions of the world, the study by Schmitt *et al*. (2007) helps to identify differences and similarities between patterns of personality profiles, assisting managers in mitigating problems that may be caused by these differences of national personality. Despite some differences (based on values in Figure 4), South America (Brazil's world region) and Western Europe (Germany's world region) presented relevant similarities, as on Extraversion, Agreeableness and Openness, and probably their differences could be overcome, if the development of good interpersonal relationships is promoted.

Discussion and final considerations

The growing number of Brazilian consumers interested in environmentally-friendly products probably will result in an increased demand for clear information on saving resources and reducing pollution and waste in the production process or even on the most sustainable use and disposal of products. Eco-labels represent a useful alternative to industries to improve their communication with consumers. In this context, tools as Cleaner Production, Sustainable Supply-Chain Management and Ecodesign are essential to help firms to become more environmental efficient and to obtain the certification for their Eco-labels.

However, these tools, especially Ecodesign, require integration of different functions in a company, demanding that members with different expertise work together as a team. Sometimes, to achieve a specific knowledge, members of different countries are call up to work together, which could result in a complicated interaction because of cultural differences.

Considering Germany as a potential partner to work with Brazil, combining expertise to develop environmental sound products, this study performed a brief analysis from data of previous research into cultural dimensions and national characters, in order to investigate the potentialities and the probable difficulties in the decision-making processes within groups formed by members of these two countries.

Grounded in this analysis, it is possible to notice that Germany and Brazil have some cultural differences, which could lead to difficulties in managing tasks conducted by members from these two countries when working together as a team. These differences can indicate a tendency to conflicting styles of management and decision-making, which will be more centralized and authoritarian to Brazilians and more participative to Germans. Strong differences between these two countries in relation to time orientation and situations of uncertainty and ambiguity suggest that difficulties may occur in reconciling the interests relating to deadlines and targets to be achieved by the team.

Despite cultural differences the analyses of national personality traits of Brazil and Germany also indicates favorable prospects. Results suggest that the interaction between team members of these two countries might be promoted. Probably for Brazilian-German teams to be effective and to achieve good results in projects of environmentally-friendly products, members of these teams should be exposed to situations that foster interpersonal interactions, so they can have a better understanding of their cultural differences.

Because different cultures have different views, institutions, values, beliefs and norms, cultural context determines the meaning that managers and subordinates attribute to decision-making process. Furthermore, culture affects characteristics of central decision-making process. Therefore, cultural aspects of different nations should be considered with special managerial attention when building transnational project teams for the development of environmentally-friendly products. Cross-cultural teams have the potential to become the most effective and productive when their diversity becomes an asset and the different perspectives of the team bring more alternatives to a task.

This preliminary study is aimed at encouraging research efforts which could open perspectives to a possible broader understanding of the process of developing innovative products in multidisciplinary transnational teams. Taking into account the current era of globalization, this possibilities become increasingly real. Innovations in sustainability, as stressed in the beginning of this paper, become more and more mandatory for private and governmental organizations. Thus, research initiatives dealing with the most complex aspects of the process of innovating products represents an urgent topic, since this might be a socially and academically relevant theme.

With the outcomes herein presented this paper might offer insights to studies in an area of knowledge, which seems to be unexplored yet, according to the literature review performed during the present study. Despite the strong development of research in Innovation and Sustainability, the topics covered in this paper initiate reflections upon an incipient field of investigations and therefore might be of valuable support to further research and to assist organizations in their sustainable management practices.

References

ABDI – Agência Brasileira de Desenvolvimento Industrial. Retrieved April, 14, 2011, from http://www.brasil.gov.br/news/history/2011/03/23/brazilian-and-german-businesspeople-seek-bilateral-partnerships-and-discuss-innovation/newsitem_view?set_language=en.

Akatu & Ethos - Instituto Akatu & Instituto Ethos. Pesquisa 2010. Responsabilidade Social das Empresas / Percepção do Consumidor Brasileiro. Retrieved April, 27, 2011, from http://www.akatu.org.br/Content/Akatu/Arquivos/file/10_12_13_RSEpesquisa2010_pdf.pdf

Bartel-Radic, A. (2006). Intercultural Learning in Global Teams. *Management International Review*-MIR, 46, 647 – 677.

Berg, N., & Holtbrügge, D. (2010). Global teams: a network analysis. *Team Performance Management,* 16(3/4), 187-211.

Blauer-engel. Retrieved November, 20, 2010, from http://www.blauer-engel.de/_downloads/publikationen/imagebroschuere.pdf .

Borin, N., Cerf, D. C., & Krishnan, R. (2011). Consumer effects of environmental impact in product labeling. *Journal of Consumer Marketing*, 28(1), 76–86.

Bougherara, D., & Combris, P. (2009). Eco-labelled food products: what are consumers paying for? *European Review of Agricultural Economics*, 36(3), 321–341.

Bovea, M.D., & Wang, B. (2007). Redesign methodoly for developing environmentally conscious products. *International Journal of Production Research*, 45(18/19), 4057-4072.

Brécard, D., Hlaimi B., Lucas S., Perraudeau, Y., & Salladarré, F. (2009). Determinants of demand for green products: an application to eco-label demand for fish in Europe. *Ecological Economics*, 69, 115–125.

Clifton, J. (2009). Beyond taxonomies of influence: "doing" influence and making decisions in management team meetings. *Journal of Business Communication*, 46(1), 57-79.

Dangelico, R. M., & Pujari, D. (2010) Mainstreaming Green Product Innovation: why and how companies integrate environmental sustainability. *Journal of Business Ethics,* 95, 471–486.

Davison, S. C. (1994). Creating a high performance international team. *Journal of Management Development*, 13(2), 81-90.

Dexter, B. (2010). Critical success factors for developmental team projects. *Team Performance Management,* 16(7/8), 343-358.

Dimitratos, P., Petrou, A., Plakoyiannaki, E., & Johnson, J. E. (2011). Strategic decision-making processes in internationalization: does national culture of the focal firm matter? *Journal of World Business,* 46, 194–204.

Fet, A. M., Skaar, C., & Michelsen, O. (2009). Product category rules and environmental product declarations as tools to promote sustainable products: experiences from a case study of furniture production. *Clean Techn Environ Policy,* 11, 201–207.

Friedrich, P., Mesquita, L., & Hatum A. (2005). The meaning of difference: beyond cultural and managerial homogeneity stereotypes of latin America. *Management Research,* 4(1), 53–71.

Frondel, M., Horbach, J., & Rennings, K. (2007). End-of-pipe or cleaner production? An empirical comparison of environmental innovation decisions across OECD countries. *Business Strategy and the Environment.* 16, 571–584.

Fuad-Luke, A. (2007). *The eco-design handbook*: a complete sourcebook for the home and Office (2nd ed.). London: Thames & Hudson.

Gertz, R. (2005). Eco-labelling: a case for deregulation? *Law, Probability & Risk* , 4(3), 127 - 141.

Gillam, C., & Oppenheim, C. (2006). Reviewing the impact of virtual teams in the information age. *Journal of Information Science*, 32(2), 160-175.

Green Brands Global Insight: Findings from the 2009. Image Power Green Brands Survey. Retrieved November, 20, 2010, from http://www.landor.com/pdfs/k9/GreenBrandsGlobalInsights_28Sept09.pdf .

Gressgard, L. J. (2011). Virtual team collaboration and innovation in organizations. *Team Performance Management,* 17(1/2), 102-119.

Guziana, B. (2011). Is the Swedish environmental technology sector 'green'? *Journal of Cleaner Production.* 19, 827-835.

Hall, E.T. (1960). The silent language in overseas business. *Harvard Business Review*. 38(3), 87-96.

Hofstede, G. (1980). *Culture's consequences:* International differences in work-related values. Beverly Hills, CA: Sage.

Hofstede, G., Garibaldi, A. V. H, Malvezzi, S., Tanure, B., & Vinken, H. (2010). Comparing regional cultures within a country: lessons from Brazil. *Journal of Cross-Cultural Psychology,* 41(3), 336–352.

Hofstede G., & McCrae, R. R. (2004). Personality and culture revisited: linking traits and dimensions of culture. *Cross-Cultural Research*, 38(1), 52-88.

Houé, R., & Grabot, B. (2007). Knowledge modeling for eco-design. *Concurrent Engineeri,.* 15(1), 7-19.

Humes, M., & Reilly, A. H. (2008). Managing intercultural teams: the Eorganization exercise. *Journal of Management Education* , 32(1), 118-137.

Jameson, D. A. (2007). Reconceptualizing cultural identity and its role in intercultural business communication. *Journal of Business Communication*, 44(3), 199-235.

Jansson, J., Marell, A., & Nordlund, A. (2010). Green consumer behavior: determinants of curtailment and eco-innovation adoption. *Journal of Consumer Marketing*, 27 (4), 358-370.

Jing, S., & Bing, X. (2010). A study on transnational enterprise faces cultural difference and trans-culture management under economic globalization background. *Cross-Cultural Communication,* 6(2), 48-56.

Johansson, G., Grief, A., & Fleisher G. (2007). Managing the design/enviroment interface: studies of integration mechanisms. *International Journal of Prodution Reserch*, 45 (18/19), 4041-4055.

Kirkman, B. L., & Shapiro D. L. (2001). The impact of team members' cultural values on productivity, cooperation, and empowerment in self-managing work teams. *Journal of Cross-Cultural Psychology*, 32(5), 597-617.

Korchi, A. E., & Millet, D. (2011). Designing a sustainable reverse logistics channel: the 18 generic structures framework. *Journal of Cleaner Production,* 19, 588-597.

Koslowsky, M., Sagie, A., & Stashevsky, S. (2002). Introduction: cultural relativism and universalism in organizational behaviors. *Cross Cultural Management*, 2(2), 131-135.

Kurczewski, P., & Lewandowska A. (2010). ISO 14062 in theory and practice: ecodesign procedure. Part 2: practical application. *The International Journal of Life Cycle Assessment,* 15(8), 777–784.

Lachman, R. (1997). Taking another look at the elephant: are we still (half) blind? Comments on the cross-cultural analysis of achievement motivation by Sagie et al. (1996). *Journal of Organizational Behavior*, 18, 317-321.

Liu, X., Yang, J., Qu, S., Wang, L., Tomohiro, S., & Bao, C. (2011). Sustainable production: practices and determinant factors of green supply chain management of Chinese companies *Business Strategy and the Environment*.

McCrae, R. R., & Costa P. T., Personality Trait Structure as a Human Universal. *American Psychologist* (1997) Vol. 52, No. 5, 509-516.

McCrae, R. R., & Terracciano A. and 79 members of the Personality Profiles of Cultures Project. (2005). Personality Profiles of Cultures: Aggregate Personality Traits. *Journal of Personality and Social Psychology.* 89(3), 407–425.

McCrae, R. R., & Terracciano A. (2006). National character and personality. *Current Directions In Psychological Science*, 15 (4), 156-161.

Müller, R., Spang, K., & Ozcan, S. (2008). Cultural differences in decision making in project teams. *International Journal of Managing Projects in Business,* 2(10), 70-93.

Oertig, M., & Buergi, T. (2006). The challenges of managing cross-cultural virtual project teams. *Team Performance Management*, 12(1/2), 23-30.

Rink**,** F., & Ellemers N**.** (2010). Benefiting from deep-level diversity: how congruence between knowledge and decision rules improves team decision making and team perceptions. *Group Processes & Intergroup Relations,* 13(3), 345–359.

Rodrigues, C. A. (1998). Cultural classifications of societies and how they affect cross-cultural management, *Cross-Cultural Management*, 5(3), 29-39.

Sagie, A., & Aycan, Z. (2003). A cross-cultural analysis of participative decision-making in organizations. *Human Relations*, 56(4), 453–473.

Schmitt, D. P., Allik, J., McCrae, R. R., & Benet-Martínez, V. (2007). The geographic distribution of big five personality traits: patterns and profiles of human self-description across 56 Nations. *Journal of Cross-Cultural Psychology*, 38(2), 173-212.

Schramm-Nielsen, J. (2001). Cultural dimensions of decision making: Denamark and France compared. *Journal of Managerial Psycology*, 16(6), 404-423.

Schwartz , S. H. (1999). A Theory of cultural values and some implications for work. *Applied Psychology: An International Review*, 48 (l), 23-47.

Schwartz, S. H., Melech G., Lehmann, A., Burgess, S., Harris, M., & Owens, V. (2001). Extending the cross-cultural validity of the theory of basic human values with a different method of measurement. *Journal of Cross-Cultural Psychology,* 32, 519.

Shetach, A. (2009). The revised decision-square model (RDSM): a tool for effective decision-implementation in teams. *Team Performance Management*, 15(1/2), 7-17.

Smith, P. B.; Dugan, S., & Trompenaars, E. (1996). National culture and the values of organizational employees. *Journal of Cross-Cultural Psychology*, 27(2), 231.

Srivastava, S. K. (2007). Green-supply-chain management: a state-of-the-art literature review. *International Journal of Management Reviews*, 9 (1), 53-80.

Tanure, B. (2005) *Gestão à Brasileira*: somos ou não diferentes?: uma comparação com América Latina, Estados Unidos, Europa e Ásia. (2nd. ed.). São Paulo: Atlas.

Thomas, D. C., Stahl, G., Ravlin, E. C., Poelmans, S., Pekerti, A., Maznevski, M., Lazarova, M. B., Elron, E, Ekelund, B. Z., Cerdin, J., Brislin, R., Aycan, Z., & Au, K. (2008). Cultural Intelligence Domain and Assessment. *International Journal of Cross Cultural Management*, 8(2), 123–143.

Waldman, D. A., Luque, M. S., Washburn, N., & House, R. J. (2006). Cultural and leadership predictors of corporate social responsibility values of top management: a GLOBE study of 15 countries. *Journal of International Business Studies,* 37, 823-837.

Wright, N. S., & Drewery, G. P. (2006). Forming cohesion in cultural heterogeneous teams: differences in Japanese, Pacific Islander, and Anglo experiences. *Cross-Cultural Management*, 13(1), 43-53.