
The cultural values embedded in building environmental assessment tools: a comparison of LEED®- Canada and CASBEE

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This paper examines two different contexts – Canada and Japan – to illustrate how these cultures understand nature, technology and building controls, and how this understanding is manifest in their corresponding environmental assessment methods – LEED-Canada and CASBEE. It explores culturally specific values by analyzing the expected interactions between inhabitants and buildings in Canada and Japan and the technological approaches that support this interaction. The work supports the argument that the assessment methods are culturally bound and their importation and exportation should be carefully considered from this standpoint.

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Introduction

Attitudes towards technology are culturally bound – they are both derived from the cultural context and evolve with it. Moreover, attitudes toward technologies supporting the environmental control and performance of buildings are equally shaped by the attitudes towards and, responses to, “nature” in their specific locales.

This paper examines how Canadian and Japanese cultural attitudes towards building controls and the methods of engaging them – from full automation to manual operation – are embedded in their respective environmental assessment methods – LEED-Canada and CASBEE. Firstly, it explores how the attitudes towards nature in both countries shape qualitatively different understandings of the human role and analyses tendencies to ascribe vertical and horizontal relationships (1) among the humans and (2) between the humans and nature. Secondly, drawing on Verbeek’s (2006) speculations that technologies can be described not simply in terms of their obvious functionality – but also as mediating the subjective and objective relation between human beings and their world, the arguments are presented to illustrate (1) the variety of interpretations of the role of technology and expectations towards it and (2) the impossibility to define technology as the “other” opposite pole of nature in the dichotomous understanding. Diverse perspectives are organized and summarized by positioning them along the continuum and, by doing so, exposing not only the complexity, but inherent interrelationship with attitudes towards nature. Finally, in order to analyze how cultural values both influence and are embodied within assessment methods without losing the intrinsic complexity evidenced in the understanding of technology, technology is referred to by its indirect and direct consequences. The former approach is based on the notion that the assessment methods can be understood as “techniques” for the designer in a similar manner to how technical devices are considered in buildings. The focus here, therefore, is on the formulation and structure of the assessment methods. The latter looks at technical approaches that support the interaction between inhabitants and the building. Cultural comparisons of attitudes towards nature and technology continuum serve as conceptual underpinnings that help to distill the emphases prevalent in the building environmental assessment methods. As a result – the analysis enables exposing the differences that bear the particularities of their cultural contexts.

Nature in CANADA and JAPAN: dichotomy vs. continuum

Canadian and Japanese attitudes towards nature have directly and indirectly shaped how the relationship between the natural and built environments have evolved in the two countries. While the demarcation of human and natural worlds is evident in the prevailing Canadian understanding, a more ambiguous, contextual, and linear relationship is observed in Japan. These cultural emphases have consequently effected different distributions of vertical-horizontal relationships between humans and nature.

Humans separate from nature

The prevailing Western world-view still emphasizes humans as separate from nature. Nature is considered as a commodity – valued primarily in terms of the services it provides and as a “constellation of waste disposal services, with the nature of those services being defined in terms of what we need from nature” (Bromley, 2008 p.13). Such beliefs, White suggests, led Western cultures to view themselves as “superior to nature, contemptuous of it and willing to use it for our slightest whim” (1968 p.90). The roots for this split, Worster notes, lie deep in Judeo-Christian traditions and in the philosophical questions posed by the Enlightenment (1985). These were consolidated into scientific thought and practice with Descartes’ proposition that the subjective and objective can be separated, are independent, and therefore subject to deductive reasoning. Watsuji Tetsuro – one of the most influential Japanese philosophers – acknowledged that this dichotomy in particular, was the main reason why the Marxist and Christian positions failed to be fully accepted in Japan. In his analysis of Watsuji Tetsuro’s seminal work – *Climate (fudo)* – Harumi Benu references “...fault[ing] Marxism for not being able to establish firm ground in Japan [due to] its neglect of environmental considerations... [and] (in considering the failure of Christianity in seventeenth-century Japan)...blam[ing] the Jesuits’ unawareness of environmental relevance for religion” (2004 p.113).

The understanding of nature in Canada

Qualities assigned to nature in Canada emphasize two main ideas: (1) nature as a powerful, great wild North – a source for the human spiritual and physical well being (regenerative power) as well as society’s wealth and (2) nature as a unifier, something distinctive that becomes (or rather is conceived to be) the basis for the national identity.

In Canadian culture, nature has served “...as a signifier of “Canadian-ness” (Payne, 2007), [enunciated as] ...a function of nordicity... (Stacey, 2007) a distinct race found in the wilderness... (Housser, 1926) cover[ing] the total expanse of Canadian geography” (Lamourex, 2007). These attitudes not only ascribed the predominant values of the “...individualistic, conservative, loyal, independent, virile, industrious, dignified...” (O’ Brian, 2007) nation, but it also positioned the Canadian as the controller or the owner of all the goods in nature. It was assumed that the “...wealth and the hope of her [Canada] future lie in the wilderness (Reid, 2007), [which is] a cornucopia overflowing with natural resources...(Walton, 2007), “empty” land for the taking...(O’ Brian and White, 2007) the Land that has everything (Payne, 2007) [and therefore] promising unlimited growth...” (Walton, 2007).

Nature as understood in Canada, stands apart from the human beings as “the other”. Human beings are considered as superior to nature since they have seemingly managed to conquer it by being united and equal among each other or, as in the environmental discourse – as intruders/ destroyers of nature. In one way or the other, the clear distinction between the humans and nature is evident, reinforcing not only the dichotomy, but also – a hierarchical understanding of the relationship between them.

The understanding of nature in Japan

In Japan, nature generally is interpreted to be closely associated with the life of the human beings. As a result, the discussion is not so much about defining the qualities and the role of humans as opposed to nature, but rather about defining the interaction between humans and nature. And this interaction is twofold. On the one hand, nature is altered to be part of the human world by “taming” it and hence enabling an indication of an “insider”, that is, by changing the “other” so that it could be idealized for the beauty and aspired as an ideal. On the other hand, humans themselves are taught to accept the changeability or the evanescence of things by observing and understanding nature. Both processes require a set of ways, methods, techniques that have been forwarded from generation to generation from as early as the Taoist thought reached Japan and has been sculpted and molded into a unique style. These ways, methods, techniques are often known as a “Way”=‘dou’ (‘tao’ from Taoism in Chinese), and popularly recognized overseas through the activities like tea ceremony=‘sadou’, bushidou, etc. (Obayashi, 2005)

Japanese approaches aimed at harmonizing the coexistence of what was considered as “separate categories” in the Western world are not so much based on analyses and understanding, but rather on the set of activities that involved the whole experience – perceptual as well as social. As such, they defined how one should relate to his/her surrounding context. When the set of practices assigned to human were perfected, any contextual change could be encountered without losing one’s inner peace. In other words, these strictly defined approaches are not questioned until they become one’s second nature and manifest “naturally” or spontaneously without a second thought.

Consequently, learning these approaches inscribes hierarchical structure in the society in order to keep it very "civilized, orderly and polite" (Inoue, 2008). This is further enhanced by explicitly communicating that the human world (referred to as "inside"/uchi) is inseparable/exists within the larger, natural world (or the "outside"/soto). The "outside" can become dangerous, and therefore the cooperation and agreement among the members of the "inside" – stabilized and strengthened by the hierarchical order – is considered to be necessary for reaching the harmonious interaction with the "outside". These attitudes "...are the inherent part of the collective understanding, [with uchi and soto being] inclusively recursive... [and] moving from Japan as uchi and the world as soto down through regional identities and intimate social relations" (Ball, 2004 p.375).

Differences between the Canadian and Japanese understandings

In contrast to Canada, there is an obvious difficulty when one attempts to define natural versus cultural/human-made in Japan. Everything in accord with the context can be perceived as natural, and a number of ways, methods, techniques are employed to "polish" the surroundings in order to achieve this "natural" state. In Japan, it is difficult to find "...an opposition between culture and nature... Rather, nature and culture are inscribed on each other. Contextual variations in culture, including social relations, are understood in terms of variations in nature" (Rosenberger, 2004 p.147). Kyburz (2004) reinforces that there "...exist[s] a fundamental difference in the way Western and Japanese cultures each conceive the world and existence. He argues that "...Japanese culture is not characterized by the conceptual fracture which in Western consciousness and anthropological usage opposes 'culture' as a distinctively human sphere, and 'nature' as that which lies outside of it." (p.258) Moreover "... the Japanese world view does not conceive of man and nature as polarities, but as mutual parts of an all-comprehensive whole... [and] mankind... is felt to be one of the numerous potential forms of existence, with no particular vocation for supremacy" (Kyburz, 2004 p.258). This can be illustrated through a "nature continuum" and vertical-horizontal relationships.

The nature continuum

Japanese perception tends to emphasize the continuum rather than mutual exclusion composed of "...pairs which in their ideal states are to be found at opposite poles of a continuum, with actual cases located somewhere in between depending on the context... [and] the emphasis is placed on processes... something being or becoming... always in the making... [and therefore regarded as] more important than the absolute state" (Kalland and Asquith, 2004 pp.11-12). This continuum is illustrated in Figure 1 which shows the binary division of the opposite poles as commonly interpreted in the West. Simultaneously, however, it also suggests a range of "in betweens" that take on different meanings with the changing context.



Figure 1. The Nature Continuum (Kalland and Asquith, 2004)

Vertical-horizontal relationships

The predominant vertical-horizontal relationships also differ between Japan and Canada. Equality among humans is valued in Canada (horizontal), and the vertical relationship exists between the human world and nature. In Japan – the relationships among humans in the "inside" tend to be more hierarchical (vertical), but the horizontal interaction between the "inside" and the "outside" is implied.

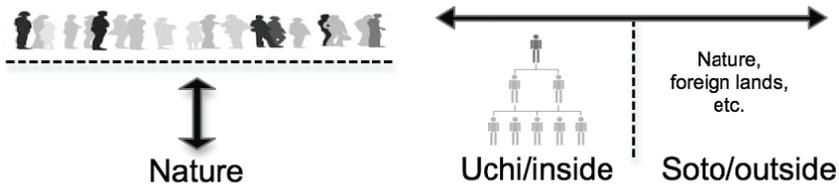


Figure 2. Vertical and Horizontal relationships in Canada (left) and Japan (right)

Technology in Canada and Japan: an understanding derived from the attitudes towards Nature

The qualitatively different understanding of human-nature relationships in Canada and Japan represent one of the key ways that cultural complexity can be described and analyzed. Further, these differences suggest that the resulting interpretations of technology have developed to reflect the cultural emphases. Technology therefore acts as a lens through which organizational practices and corresponding systems and processes can be compared in the two countries.

Deriving the technology continuum

It can be argued that technology per se is universal and widely adopted in almost every country around the world. However, a variety of interpretations have been proposed regarding the role of technology and expectations towards it by presenting a number of qualities that define the interaction between the technology and humans. Further, as Ihde (2008) emphasizes, two prevailing conceptions of technology – utopian views that technology is capable to solve humanities problems of any kinds and dystopian views that technology is having potentially negative longterm consequences. Both "...tend to be rooted in misunderstandings of the complexities..." (Riis, 2008) such as technology's "...concrete specificity, variability, context dependency, tendency to defy prediction, historical and cultural 'embeddedness'". (Rosenberger, 2010, pp.133-4). It is therefore evident that technology cannot be simply defined as a separate category, because technology can take on both roles – influencing the cultural context it is applied to and consequently changing according to the expectations prevalent in that cultural context.

In order to illustrate the variety of interpretations of the role of technology and expectations towards it and the impossibility to define technology as the "other" opposite pole of nature in the dichotomous understanding, qualities assigned to technology are organized by positioning them along the continuum. Table 1 summarizes a variety of qualitative aspects of technology in six categories. These are then positioned along the technology continuum similarly to the nature continuum: the left side being 'automated' as corresponding to the "cooked, bound/ wrapped, tamed/ domesticated" nature and the right side being 'manual' as the "raw/ uncooked, unbound/ unwrapped, wild" nature (Figure 3).



Figure 3. The Technology Continuum

Table 1. Qualitative aspects of Technology.

Selected Attributes	References	Keyword(s)
Cultural, Unifying, Embedded within historical and cultural context		Cultural
Intrusive, Invading, Autonomous, Modifying, Translating, Inflecting, Influential, Mediating, Altering, Alienating, Destructive, Compelled to dislodge, Engendering	Vesely, 2004; Merleau-Ponty, 1962; Smith, 2008; Ellul, 1964; Latour, 2002; Riis 2008; Thackara, 2001; Bakker, 1965 in Vijioen 2009; Ihde 1983, 1986, 1979, 2009;	Modifying
Connecting, [causing] global autism, Tiding in a sort of anonymous existence, Universal, Trans-cultural, Applicable to different cultures and contexts	Takeo, 1972; Heidegger, 1977; Gibson, 1986;	Anonymous connectivity
Opaque, Forgetting, Habitual, Familiar, Layered labyrinth, Tending to defy prediction, A comfortable cocoon, Encompassing all dimensions of our relations, One-sidedness/ narrowness, inability to think and see the essence of things and happenings		Opaque
Correct, Trustworthy, [Assuring] the continuity of our actions, Uniform, Ordered, Shaped, Enframing, Rational, Money-generating		Stable/ safe
Innovative, Opening new possibilities, Empowering, Intelligent, Service-oriented, Adaptable to the new environment, Flowing, Speedy, Mobile, Playful, Intuitive, Moving, Surprising, Fun		Innovation & Empowerment

On the far right of the continuum (1st row, Table 1) are the most "local" or place-specific qualities. They communicate the direct needs of the particular place, are relatively simple and therefore can be controlled manually by the individual. Then follows the understanding of technologies as capable to "intrude" and alter the precious cultural environment of the place (2ⁿ row, Table 1). Technologies are perceived as being beyond the human capacity to easily take control of them and therefore as dangerous. However, besides the number of fairs, the inescapability and some degree of universality of technologies are acknowledged (3rd row, Table 1). The views are simultaneously positive (the development of new things could be encouraged) and negative (due to "global autism" and increasing "anonymity").

When technologies become so pervasive that the origins are no more visible, interaction with technologies is "habitual" and "forgetful" (4th row, Table 1). As a result, the human beings are not capable to "see through it" or to control it. Massive adoption of and reliance on the technological devices, though, creates a sense of stability and safety (5th row, Table 1). The continuous shaping, ordering and framing are thus favored to assure accuracy and predictability.

Lastly, when the stable and safe framework is established, creativity can be unleashed to foster innovation and empowerment (6th row, Table 1). Especially in the Japanese culture, Inoue affirms, the right balance between the form and the new things that change (he calls it *evanescence*) is essential for any development: "Creativity affirms change. It tests and challenges form... [searching] for the balance... Without embracing a vision of change, formality can be antithetical to life. On the other hand, without form, change is impossible and even meaningless. If form without change imprisons us, then change without form leads to chaos and despair" (Inoue, 2008, p.4).

Implications to the understanding of technology in Canada and Japan

When the nature becomes the "other" (as emphasized in the Canadian attitudes), the human world and everything related to it (including technologies) is similarly distinct. By contrast, if the nature and the human world are not clearly separated but rather continually changing, the human aims for the most "ideal" combination between the two. This combination then is context- and time-dependent and therefore process-oriented. Technology thus, Ashkenazi (2004) argues, is understood as "...in effect, a part of the 'natural' landscape for most Japanese who, being an urban rather than a rural population, exist 'naturally' in an urban environment." (p.209) Therefore, he continues, "...machines, in their nature, are neither artificial nor natural. It is in what they do that they are defined, if necessary, as either." (Ibid p.217) In other words, since there is nothing exclusively natural or artificial, only the relationship between the humans and the technology in a particular context can define what it is.

Building environmental assessment methods are deeply interwoven into the organizational practices that operate within the specific Canadian and Japanese cultural contexts. As a result, differences in the predominant societal attitudes governing their formulation, structure and decisions to support one or the other technical approach defining the interaction between inhabitants and the building expose the cultural embeddedness of the assessment methods. Acknowledging that the understanding of technology expands to include not only its functional aspects but also its role and the expectations towards it, the following analysis of the LEED-Canada and CASBEE highlights some that reveal cultural differences of the assessment methods. Further, LEED-Canada and CASBEE are addressed on two levels:

1. The assessment methods themselves are understood as "techniques" used to correspond to the expectations prevalent in the society. As such, the technology is analysed indirectly, and the focus here is on the formulation and structure of the assessment methods.
2. Technical approaches in LEED-Canada and CASBEE that support the interaction between inhabitants and the building are examined. Here, the concrete requirements towards technology in the assessment methods are discussed, and therefore the analysis is

thought to be direct. In other words, the focus is on the expectations that are communicated through the assessment methods.

Indirect aspects of technology in LEED-Canada & CASBEE

The formulation and structures of LEED-Canada and CASBEE are qualitatively different and correspond to the previously explored cultural emphases. While in the former a more definitive, simplified and straightforward evaluation method is used, a relatively complex and contextual approach can be observed in the latter. Further, vertical positioning of human and natural worlds in LEED-Canada contrasts with the horizontal conception in CASBEE.

Formulation of the LEED-Canada & CASBEE: definite vs. a range of possibilities

Although in both LEED-Canada and CASBEE, the number of points attained reflects the success of the environmental performance of buildings, their evaluation descriptions reveal divergent attitudes. Credits in LEED-Canada are composed of "intents" expressing the overall goals of the credits; "requirements" with the descriptions of the specific actions/performance to be achieved and "potential technologies and strategies" that could be deployed. Individual credits carry an implied weighting through the number of points allocated to them in the overall total available points.

In CASBEE, the specific performance requirements are not pronounced as clearly as in LEED-Canada. Rather, it communicates the importance to evaluate the range of efforts invested in achieving these goals differently. The credits are assessed on a five scale, where "1 is earned for satisfying the minimum conditions required by laws, regulations and other standards of Japan... and a building at what is judged to be general, ordinary level earns 3" (JSBC, 2010). Levels 4 and 5 then, obviously, are assigned to cases that exceed the ordinary. Table 2 summarizes the requirements of some of these credits.

LEED-Canada assigns points for achieving specific performance requirements whereas CASBEE distributes points in a way that corresponds to the level achieved. Further, LEED-Canada does not aim to evaluate "the level of consideration given to", "efforts to conserve", "how far [it] enhances", "[the] appropriate[ness in] maintenance management", "how well [it is] considered" or "the level of efficiency" (JSBC, 2010). These tendencies in LEED-Canada to evaluate the specific requirements and the range of those results in CASBEE can be explained as culturally embedded. LEED-Canada echoes the dichotomous, fixed and result-oriented Western worldview, and CASBEE acknowledges the contextual possibility of change therefore positioning the evaluations along the continuum with the range of permutations.

Table 2. Summary of the requirements in LEED-Canada (CaGBC, 2009) and CASBEE (JSBC, 2010).

LEED-Canada requirements	CASBEE requirements
The minimum percentage debris to be recycled or salvaged for each point threshold is as follows: 1pt.=50%, 2pts.=75%. (MR, 2 (NC)).	Evaluate the level of consideration given to selection of materials (Q1, 4).
Do not develop buildings, hardscape, roads or parking areas on portions of sites that meet any of the following criteria: [i.e.] land within 30.5 metres of any wetlands..., previously undeveloped or graded land that is within 15.2 metres of a water body..., etc. (SS, 1 (NC)).	Evaluate efforts to conserve and create habitat for wild organisms... how far plans are supposed to enhance the quality of the environment... and whether appropriate maintenance management guidelines have been set (Q3, 1).
Demonstrate a percentage cost improvement (1pt.=25%, 19pts.=56%) in the proposed building performance rating compared with the reference building performance rating (EA, 1 (NC)).	Evaluate the level of efficiency improvement of various equipment types (i.e. A/C, ventilation, lighting, hot water supply and elevators) (LR1, 3).
*Similar credit does not exist in LEED-Canada.	Evaluate how well urban context and scenery have been considered... examine the level of consideration to [guidelines] (Q3, 2).

Structure of the LEED-Canada & CASBEE: inherent simplicity vs. complexity

The cultural tendencies distinctively separating either/or in order to reduce the complexity and allow deductive analysis manifest in Canada versus recognizing the contextual abundance of interactions in Japan are also evident in the difference of inherent simplicity of LEED-Canada and relative complexity of CASBEE. This is particularly evident in the process of scoring, weighting and presenting the evaluation results.

LEED-Canada allocates the number of points for each credit by weighting their importance based on the US Environmental Protection Agency's TRACI environmental impact categories and weightings developed by the National Institute of Standards and Technology (NIST), with "all LEED credits receiv[ing] a single, static weight" (CaGBC, 2009 xiv). Certification is awarded according to the overall number of points attained (80 points and above for Platinum, 60-79 points for Gold, 50-59 points for Silver, 40-49 points for Certified) out of 100. This final designation is the most significant measure used in communicating success.

In CASBEE, the process of allocating points, weighting and presenting the results is more complex. Firstly, the points obtained from each credit on the five level-scale (1-5) are summated. Secondly, the scores are weighted using coefficients that "...should not just be determined from scientific knowledge... [but] take into account the value and perceptions of various interested parties..." (JSBC, 2010 p.25). Thirdly, the overall scores for Building Environmental Quality (Q) and Building Environmental Loads (L) categories are derived (6 scores corresponding to Q1~3 and LR1~3). The 6 obtained scores are presented numerically and graphically to show the distribution in each of the Q and LR categories, and the overall scores for Q and LR are calculated. Then, the Building Environmental Efficiency (BEE) score is derived as the ratio of Q and LR and plotted on the coordinate plane with Q as Y and LR as X. The position of BEE falls in one of the five levels from S down to C. Moreover, stars are assigned according to the obtained S~C level. Finally, a separate evaluation process is used for Lifecycle CO₂ (LCCO₂) in order to assess the "LCCO₂ performance... more precisely... based on the nature of CO₂ reduction initiatives" (JSBC, 2010 p.8).

CASBEE is therefore based on a more diverse approach in both assigning points and presenting the results. This complex way of analyzing performance information is expressed as an aspiration of "giving a multi-faceted and comprehensive grasp of the environmental characteristics of the evaluated building" (JSBC, 2010 p.16). Further, using several types of graphical representations is also a particular aspect of CASBEE, in comparison to LEED's singular representation.

Structure of the LEED-Canada & CASBEE: vertical-horizontal

When LEED-Canada and CASBEE are examined from the vertical-horizontal perspective described above, one obvious difference becomes evident: CASBEE uniquely uses the hypothetical boundary as "...the basis of [its] framework" (JSBC, 2010) to explicitly divide the human space on site (Q=Building Environmental Quality), which evaluates "...improvement in living amenity for the building users within the hypothetical enclosed space" (JSBC, 2010 p.277), and the "other" (L=Building Environmental Load), which evaluates "...negative aspects of environmental impact which go beyond the hypothetical enclosed space to outside" (JSBC, 2010 p.278).

Further, a closer analysis reveals that point allocations and the descriptions of the credits are also different in the two systems. In LEED-Canada, there is no specific order how the requirements are fulfilled, and the importance of the credit entirely relies on the weightings. Cole (2012) observes that in "...LEED... particularly for the Certified, Silver and Gold levels, it is possible to select (or 'cherry pick') from a basket of potential credits in order to attain the necessary overall performance level." (p.42) In CASBEE, however, the distribution of the credits is not fortuitous but growing from the smaller to the bigger therefore implying a somehow hierarchical relationship between them (i.e., Q1 evaluates separate categories of the indoor environment, Q2 – how well the separate categories are integrated and Q3 aims to relate the building with its surroundings).

While the LEED-Canada credits tend to be more or less horizontally distributed (no specific order of what comes first), the relationships between the credits in CASBEE are more vertical. Simultaneously, CASBEE uses the hypothetical boundary to explicitly mark the border between the "inside" (Q) and the "outside" (L). Figure 5 illustrates the difference in approach.

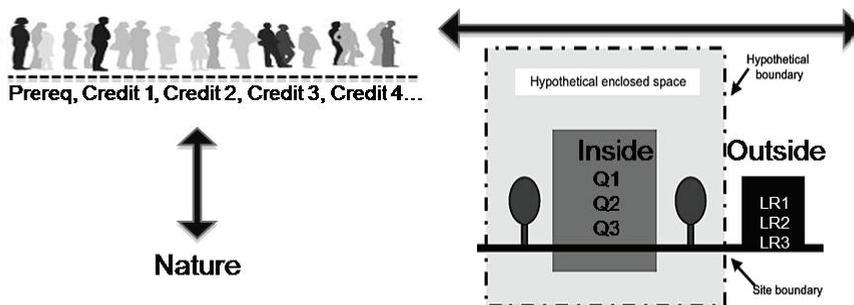


Figure 4. LEED-Canada and CASBEE structures as derived from cultural attitudes

It should be noted, however, that this division does not deny the existence of the continuum. Rather, it shows that the combined effort between Q & L is necessary to harmonize the interaction between the opposite poles.

Direct aspects of technology in LEED-Canada & CASBEE

There is a common belief that the main distinctions between Japanese and Canadian building practices are evidence of the former's emphasis on automation and technological prowess and the latter's emphasis on user control in the environmental building design. Indeed, this is manifest in CASBEE's and LEED-Canada's qualitatively different approaches of providing comfort while minimizing negative environmental effects.

Technical approaches that support the interaction between inhabitants and the building: personal controls vs. service

Similar goals to simultaneously provide comfort and minimize negative environmental effects are evidenced in both LEED-Canada and CASBEE. However, LEED-Canada distinguishes "Controllability of Systems" for the Lighting and Thermal Comfort, which requires "...system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms or conference areas) to promote their productivity, comfort and well-being" (CaGBC, 2009 pp.88-90). Even though Individual Controls are mentioned in CASBEE, this applies only to Hospitals, Hotels and Apartments (in the case of temperature and humidity) or can be substituted with automatic controls (in the case of lighting) (JSBC, 2010 p.99). Further, sophisticated monitoring systems are required for temperature controls in Retail and Restaurants and, humidification/ dehumidification equipment as well as automatic air conditioning controls are required for all buildings, including offices (JSBC, 2010 pp.84-9). Thus it is evident that CASBEE's focus is rather on the Quality of Service (Q2) – the indispensable collective effort in order to enhance "...the indoor environment, which has a major impact on the health, comfort and intellectual productivity of occupants...[and is regarded as] basic performance of the building" (JSBC, 2010, p.19).

It was shown earlier that in Canada, the human world (with technology being part of it) is distinct from the nature. It is therefore desirable to either "isolate" nature or, in the case when this is not possible (i.e., building design) to provide the highest comfort levels by creating a possibility for every building inhabitant to personally control his/ her environment. Since in Japan there is no clear definition of the "natural", and the understanding of nature is continually changing, the focus is to come as close as possible to the harmonious balance by harvesting the collective human effort. In other words, instead of defining the relationship between the inhabitant and the building, the highest level of maintenance management corresponding to the contextual changes in the long term is expected to assure the ease of occupants. These attitudes are clearly expressed in CASBEE through the emphasis on "Service" and the evaluation of its quality as a separate category. Differently than LEED-Canada, productivity of the building inhabitants is not promoted by providing means to personally control their environment. Rather, due to "...the relatedness of environmental performance assessment items (Q1 Indoor Environment and Q2 Quality of Service) and intellectual productivity" (JSBC, 2008 p.8), continual improvement is achieved by integrating a number of different strategies through the Service.

Conclusions

The work presented in this paper is directed at cultural attitudes towards technology in two countries – Canada and Japan – and shows that these attitudes are derived from the collective attitudes towards nature. Cultural differences are revealed by comparing indirect and direct aspects of technology in the corresponding assessment methods of the two countries. These are examined by distinguishing between: (1) the indirect differences in the formulation of the credits (definite, fixed requirements vs. the evaluation of efforts in the range of possibilities) and the structure of the assessment methods (inherent simplicity in LEED-Canada vs. the greater complexity in CASBEE), and (2) the direct aspects such as Canada's emphasis on individual controls and Japan's emphasis on technical prowess and, especially, service. These explanations are based on the culturally rooted understanding towards nature and, since this understanding inevitably shapes the understanding of technology – a wide range of subtle distinctions within the formulation, structure and technological approaches in LEED-Canada and CASBEE are presented.

The consequence of the results of the study is two-fold. Firstly, it provides a critically important lens through which to view side-by-side comparisons of building environmental assessment systems. Secondly, by using this lens to contrast the differences and identify similarities in the two countries, the work exposes the culturally rooted elements that otherwise might not be evident. As such, it supports the argument that the assessment methods are culturally bound and their importation and exportation should be carefully considered from this standpoint.

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