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Traces of culture in students' concepts for sustainable product service systems

Experiences from three continents

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The output of industrial design education and practice has always been product-centric. In this study Asian, Australian and Latin American students were challenged with a different approach to design briefs: not to design objects per se as an automatic response to satisfaction of wants, but to consider sustainable product-service systems (PSS). It was intriguing to see how students from different countries responded to the same briefs with proposals which are strongly tied to their cultural traditions.

Context

Throughout the history of industrial design education, students have been trained to satisfy human needs by offering consumers with tangible products, typically positioned as material objects of desire. It was therefore interesting to challenge Australian, Asian and Latin American students with a different approach to design briefs: not to design objects per se as an automatic response to the satisfaction of wants, but to consider product-service systems (PSS) which could potentially consume less material and energy resources throughout their lifecycles.

In 2004 half-day design exercises were simultaneously run at the University of Technology Sydney, the University of Western Sydney, and the University of New South Wales in Australia (Ramirez, Tonkinwise, & Andrews, 2004) to test the ability of design students to notice and elaborate PSS design solutions. There is a conjecture that it would be fundamentally difficult for industrial designers to arrive at dematerialized and less tangible outcomes instead of conventional products. Given the dematerialization ambitions of PSS, tools developed to facilitate PSS design need to explicitly take into account the extent to which they are going completely against the grain of conventional designing (Tonkinwise, 2003). The aim of the exercises then was to identify the best ways to teach designers to include PSS in their solution repertoires when designing. The results indicate that PSS design tasks appeal to students, and highlight the need to support designers' processes with "designerly" tools that orient the mood for novel design processes.

These Australian exercises were later extended into international student workshops on sustainable innovations, conducted by the author in tertiary design institutions in Asia in 2005 and in Latin America in 2008. The participating institutions are the National Institute of Design in Ahmadābād, India; Tsinghua University Academy of Arts and Design in Běijīng, China; Hong Kong Polytechnic University in Hong Kong, China; De La Salle College of Saint Benilde, University of Santo Tomas, and Mapúa Institute of Technology in Manila, Philippines; and Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) in Monterrey, Mexico.

The Australian, Asian, and Latin American exercises were very similar in content but slightly differed in format. In all three, the workshops were preceded by lecture presentations on global examples and case studies of sustainable product development, anchored on the lifecycle design strategies wheel (Brezet & Van Hemel, 1997), as well as on the tools for sustainable PSS solutions from the Sustainable Everyday Project (Manzini & Jégou, 2003). In the Asian workshops, students participated in an intensive brainstorming and sketching session the day after the lecture. In the Latin American case, the workshop was officially integrated as a two-week learning activity into the 7th semester ITESM course, DL00815 Industrial Design Workshop V, and was therefore more comprehensive.

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In all the locations, the task was to generate fresh ideas on how a PSS can be “industrialized” to increase the likelihood of uptake of the PSS amongst the general population, such as by reducing such barriers as high costs of labor in service-intensive solutions. The PSS topic can be chosen from either food, clothing, mobility or lawn care. During the brainstorming sessions students were encouraged to first consider the various PSS cases which existed in their home countries prior to conceptualizing new ones. In the Latin American and Asian schools, the student groups were required to reflect and mind-map the traditional innovations, inventions and PSS solutions in their countries which may be considered as successful local examples of ecological or social sustainability. This was necessary so that the author could have an understanding of PSS examples that were already at work in their national contexts. (In the original Australian workshops the activity of reflecting on local and westernized PSS examples also occurred but wasn’t documented since all students and tutors had a contextualized understanding of Australian PSS cases; at that time we didn’t know that the exercises would be expanded overseas.)

Results

Latin American and Asian students engaged in retrospections of the pleasantries and lack of conveniences of daily living during their childhood, to reminisce what they knew of ways of life during the time of their parents and grandparents, and to compare these reflections with the amenities of the present. All participants were encouraged to present various PSS which are either operating at present or have been practiced in their society in the past. The workshops resulted in the documentation of numerous local PSS innovations, some of which are presented below by country.

When comparing and contrasting the design outcomes of the workshop, the variances in the economic wealth and development of nations (Table 1) should not be ignored, as personal incomes directly affect the capacity of people to acquire products and services. Prosperity can also result in people to behave less conscientiously or become more wasteful (De Mooij, 2004; Hofstede, 1984).

Table 1. Economic status of countries studied

Source: ¹WB (2010); ²IMF (2010); ³UNDP (2009)

	Australia	Hong Kong	Mexico	China	Philippines	India
World Bank Income Groups ¹	High income	High income	Upper-middle income	Lower-middle income	Lower-middle income	Lower-middle income
International Monetary Fund ²	Advanced economy	Advanced economy	Emerging and developing economy	Emerging and developing economy	Emerging and developing economy	Emerging and developing economy
GDP per capita PPP ²	\$38,911	\$42,748	\$13,628	\$6,567	\$3,521	\$2,941
Human Development Index ³	0.970 Very high human development	0.944 Very high human development	0.854 High human development	0.772 Medium human development	0.751 Medium human development	0.612 Medium human development

India

Indian participants working on the garment care topic illustrated many scenarios for extending the life-cycle of the traditional Indian woman’s garment, the sārī. One of them shows how older sārī fabrics are progressively dyed into darker colors when the previous color has faded, when the fabric has become stained or spoiled, or when the owner desires to revitalize the garment (Figure 1). One such business is Sri Ramlok & Co in Chennai (www.ramlok.com). Old sārī fabrics are also recycled into quilts, furniture covers and curtains.

Figure 1. Example of garment-care PSS in India.

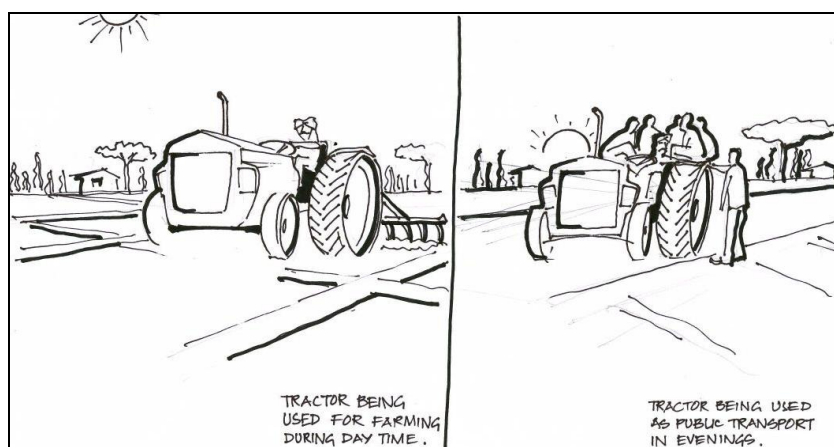
Sketched by students at National Institute of Design, Ahmedabad.



In the transport provision theme, students presented a traditional scheme where a farm tractor is being used to till the farms throughout the daylight hours, and in the evening the vehicle doubles as transport for farm workers back to their homes in the villages (Figure 2).

Figure 2. Example of transport-provision PSS in India.

Sketched by students at National Institute of Design, Ahmedabad.



An interesting PSS example was given by a group of students in the food provision topic. In the city of Pune, there is a common form of livelihood called the “house mess” (Figure 3), where housewives cook for their own families as well as for university students who, for a nominal monthly subscription, come to eat lunches and dinners in their households.

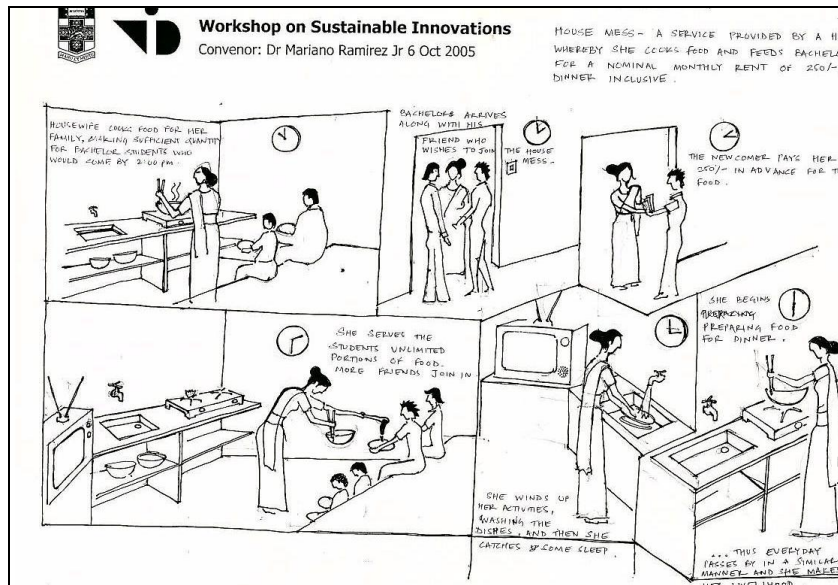
Among the many Indian traditional PSS that surfaced in the discussion was the well-publicized example called the *dabbawallah* (packed lunch delivery) system. In this highly specialized trade that is over a century old, around 5,000 men deliver 200,000 hot home-cooked meals in color-coded lunch boxes from the kitchens of suburban middle-class households to schools, colleges, factories and offices spread across

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Mumbai. The *dabbawallah* system has been recognized as one of the most reliable supply chains in the world – one mistake in every 6 million transactions (www.dabbawallah.com) – in spite of not using any computers or modern technology and most of the delivery staff being illiterate.

Figure 3. Example of food-provision PSS in India.

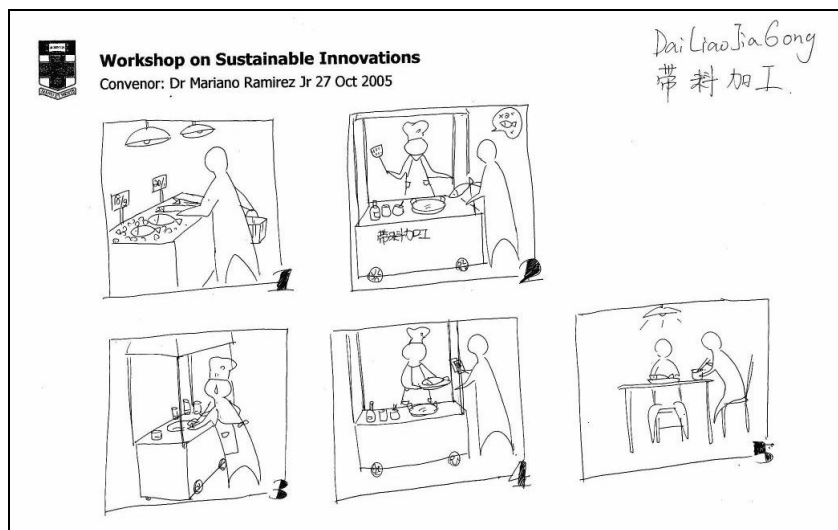
Sketched by students at National Institute of Design, Ahmedabad.



Another Indian PSS discussed was the *kabadiwallah* (junk recycling) system, where waste merchants in bicycles or carts go door-to-door to buy old newspapers, books, bottles, clothes, utensils, and electronic appliances, which they then sell to second hand shops and recyclers. Related to this is the *khattewallah* (waste picking) system, where pickers collect reusable or recyclable waste from roadsides, landfill sites and dumping grounds to sell to recyclers.

Figure 4. Example of food-provision PSS in China.

Sketched by students at Tsinghua University Academy of Arts & Design, Beijing.



China

Chinese participants in the food topic presented a PSS called *dailiao jiagong* 带料加工 (Figure 4), wherein urban residents would purchase fresh fish and ingredients from a stall or food cart, have it cooked to order by a street vendor for a fee, and then enjoy the meal at home or in the roadside tables.

This traditional term, which means “bring material + add work”, has been extended to the concept of OEM (original equipment manufacturer), where an external company pays a Chinese company to manufacture a product for retailing under the external company’s brand name.

Another PSS example given is the traditional *nongjiale* 农家乐 (“farmhouse fun”), wherein rural Chinese peasants provide family travelers a summer countryside experience by offering farm-fresh food and accommodations in their own house.

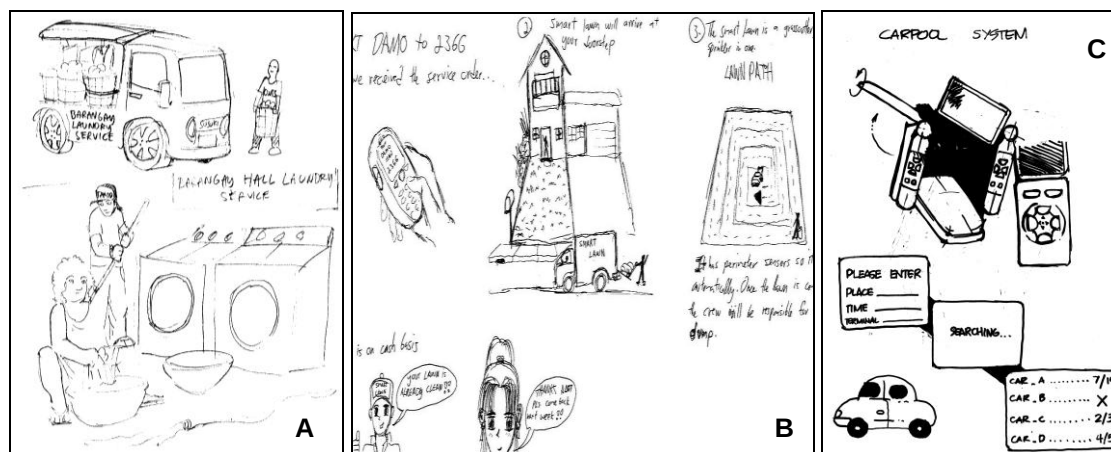
Philippines

A distinctive proposal that students from the Philippines came up with revolves around the *barangay* (village) hall, which is a central hut for community meetings. The hall grounds would be equipped with a laundry facility where the women of the village could converge for laundering sessions and accept other people’s washing as well for fees (Figure 5a); the multipurpose mini-truck of the village could be used to collect laundry from the households and transport them to and from the community hall.

It is remarkable that a number of concepts presented by the Filipino designers employed SMS (short message service) technology, employing digital mobile phones to interact with automated ordering systems using text. Arguably the Philippines is one of the most prolific text messaging centers in the world, with an average of 1 billion text messages sent through the mobile networks every day (Francisco, 2008). Notably such proposals using SMS technology have not been received from students in the other countries. One such concept is a PSS involving a homeowner sending a text message to a lawn maintenance company (Figure 5b), who will set the appointment for periodically mowing and sprinkling the grass and removing the cuttings. Another PSS idea that uses mobile phone technology exploits GPS (global positioning satellite) features on those phones to search for identified car-pool club members who are passing by, headed for the same destination, and willing to take in passengers for their empty seats for a fee (Figure 5c).

Figure 5. Student proposals for PSS in the Philippines.

Sketched by students at College of Saint Benilde, University of Santo Tomas, and Mapúa Institute of Technology.



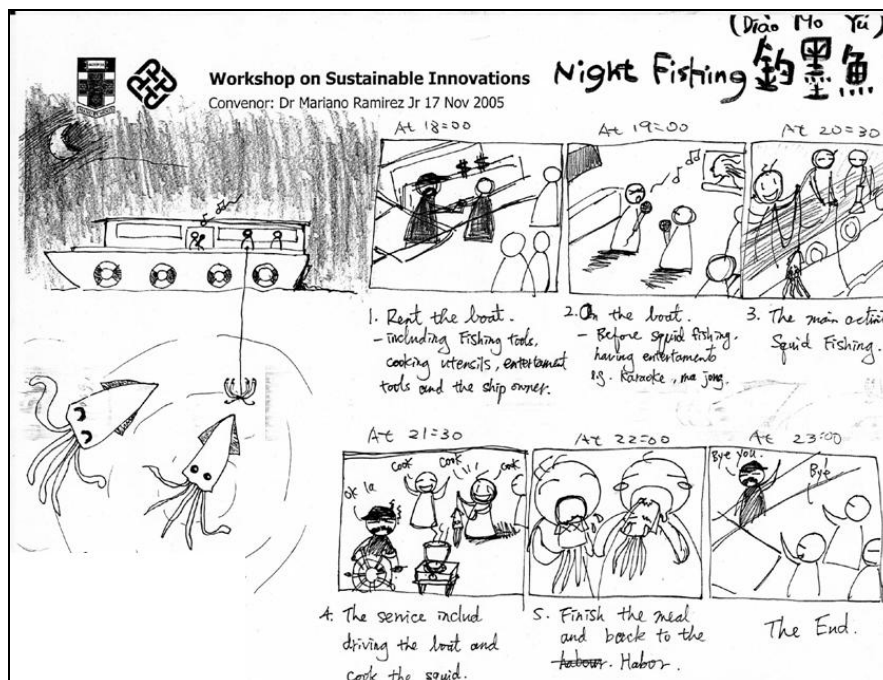
Hong Kong

Students mentioned the unique and successful business scheme in Hong Kong known as the “Milan Station” (www.milanstation.com.hk), which is a retail outlet that buys and sells used high-end designer handbags and luggage. The store cleans and polishes the second-hand articles of fashion, presenting them as if they’re brand new; in fact many tourists are surprised to find out that the luxury items in Milan Station are pre-loved.

A PSS known as *dàomoyü* 釣墨魚 (squid fishing) involves fishing boats that ply the islets in the South China Sea (Figure 6). Families and groups of friends often rent these boats to spend a weekend evening leisurely catching cuttlefish and squid, which are active at night. The boat hire includes all fishing gear, on-board audiovisual entertainment, cooking equipment, buffet meal, and the services of the boat captain, who also cooks or grills the squid that has been caught on the nets and on the fishing lines.

Figure 6. Example of food-provision PSS in Hong Kong.

Sketched by students at Hong Kong Polytechnic University.



Australia

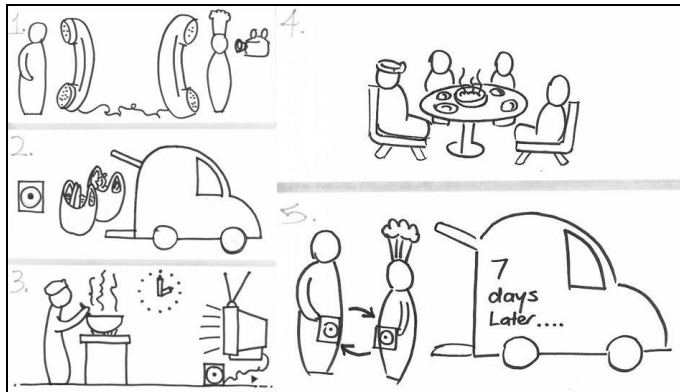
Like Hong Kong, Australia is a developed country whose citizens enjoy one of the highest standards of living and highest per capita incomes in the world. It could thus be expected that the PSS concepts which students propose would be markedly different to those from the developing countries. In response to the challenge of designing PSS for clothes washing, meal provision, and lawn care, students responded with a variety of concepts which ranged from pure product to almost pure service (Figure 8).

Some of the uniquely Australian concepts for meal provision PSS included: a central kitchen or “food hub”, shared by residents in the same street, equipped with community-sized refrigerator that has lockable cold storage compartments for each family, thereby avoiding the need for individual fridges in every household. A similar approach is to have shared hostel-style kitchens in apartment buildings; this idea is not far-fetched as many apartment complexes already have shared laundries. The use of kitchens can be either free-of-charge or pay-per-use, so that residents who use the kitchens less are incentivized by paying less quarterly fees with the apartment management.

During the discussions reference was made to online food ordering and delivery PSS, such as www.MenuLog.com.au and www.MyDelivery.com.au. These portals allow members to search for participating restaurants by postcode and by the types of cuisine available, they show the online menus of the matching restaurants, along with customer reviews and ratings. Most restaurants in the scheme offer free delivery and various promotional deals.

Figure 7. Student proposal for food delivery PSS in Australia.

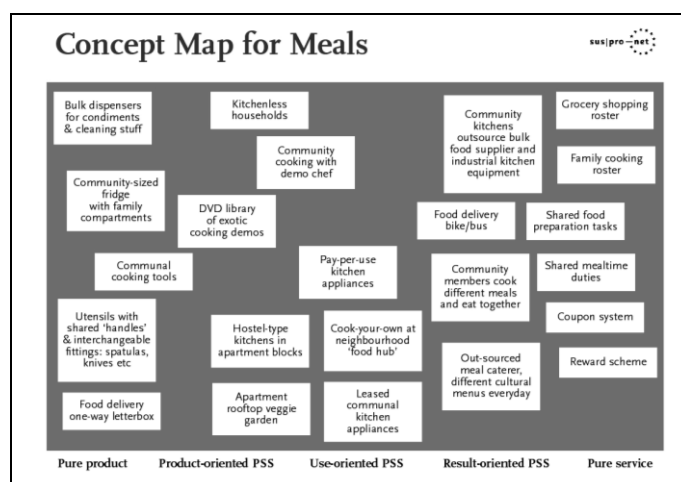
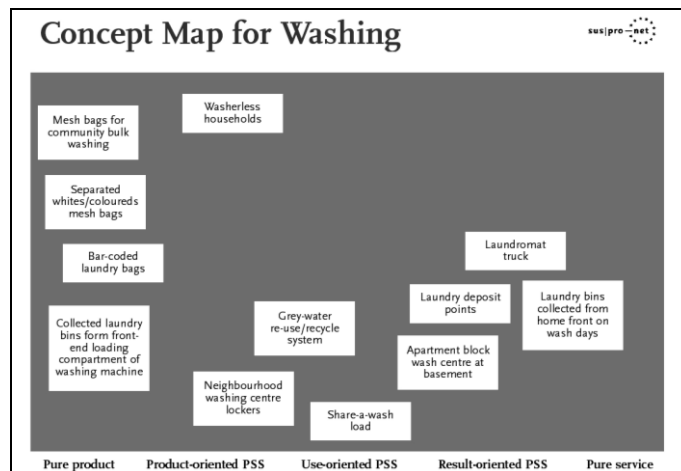
Sketched by students at University of New South Wales, Sydney.



One PSS proposal factored in the multicultural cuisines in Australia (Figure 7). Members would request their meal service provider to deliver a kit of ingredients and special utensils for a particular set of dishes and desserts from one of Australia's many cultures, along with a DVD on how to prepare and cook the dishes in that cuisine. Instead of ordering pre-cooked meals, this service will enable householders to experience the joy of learning to cook a new multicultural menu every week. When the service comes back to deliver a new kit of ingredients, the DVD for the previous menu will be returned.

Figure 8. Range of student proposals for PSS in Australia.

Compiled from concepts received from students at University of New South Wales, University of Western Sydney, and University of Technology Sydney.



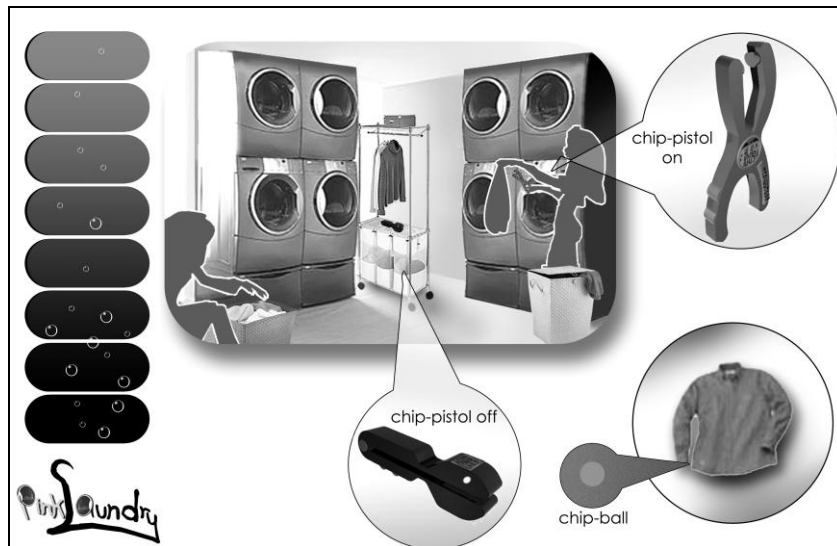
Mexico

An existing PSS mentioned by students in Mexico is a traditional grill service that is part of the *carniceria* (meat market). Weekend social barbecues are customary in Northern Mexico, a practice which has now spread to the rest of Mexico and the American Southwest. In this PSS *carne asada* (charcoal-grilled marinated steaks) are sold in the butchery, with the option of buying the usual accompaniments of *tortillas* (flat bread), *salsa* (spicy tomato sauce) and *guacamole* (avocado dip). In Monterrey, two of the fresh meat sellers which promote this PSS are Carniceria Vigar (www.vigar.com.mx), which offers *asada gratis* (free roasting of purchased meats); and the Texas-based H-E-B meat market, which has a *Martes de asador* (Tuesday grill) special. This PSS is very similar to the British takeaway fish-and-chips which are fried-while-you-wait in fresh fish markets.

A novel PSS concept proposed by one of the Mexican groups involved a communal Lavandería Rosa (“Pink Laundry”), wherein members’ clothes are tagged with microchips to enable sorting by colors or fabric type (Figure 9). The microchips also facilitate sorting by customer at the end of the process. A percentage of the earnings are to be donated to breast cancer research.

Figure 9. Student proposal for garment care PSS in Mexico.

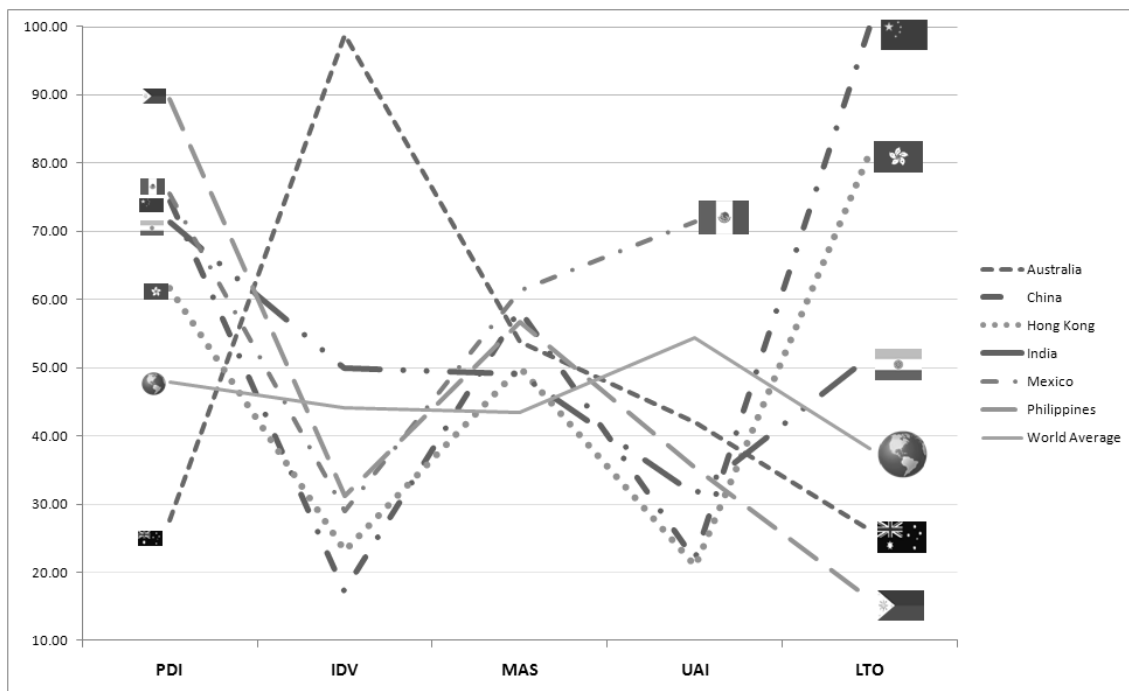
Sketched by students at Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico.



Analysis

The cultural diversity of the design workshop results can be viewed as stemming from the cultural values of their designers. One method to understand and interpret these design differences and similarities is by looking through the lens of cultural dimensions (Razzaghi & Ramirez, 2005), which organize the countless cultural values into a limited number of cultural variables on which societies can be compared. Several paradigms for cultural dimensions exist, of which Hofstede’s model is one of the most popularly referred to.

Hofstede (1984) argues that people carry within themselves patterns of thinking, feeling, and potential actions which are learned throughout their lifetimes. He asserts that culture influences not only individual behaviors and practices but also the shared distinctive beliefs and customs of communities. He was able to empirically identify five dimension scales of national culture. Using Hofstede’s data, the cultural dimension scores for the countries of the student designers were plotted in Figure 10. Based on the connotations of the cultural indexes, the following observations on the student concepts could be associated.

Figure 10. Relative country scores according to Hofstede's cultural dimension scales.

Power Distance Index [PDI]

This cultural dimension measures the extent to which the less powerful members of society within a country expect and accept that authority and wealth are distributed unequally (Hofstede, 1984). In high PDI cultures, hierarchy, status and old age are important to demonstrate position in society and respect; in low PDI cultures, equality of rights and opportunity is stressed and powerful people try to look less powerful and older people try to look younger (De Mooij, 2004). All the countries in this study except Australia scored higher than the world average on power distance.

It was probably not coincidental then that one of the PSS examples given by the Chinese students was the *xingxiangsheji* 形象设计, an “image design” consultancy which offers professional grooming and body fitness advice as well as a selection of clothes or hairstyles to help people upgrade their personal outlook. In high PDI cultures such as China the position of people in the social hierarchy is defined by the stylish clothes they wear, their shoes, posture, makeup and grooming; on the contrary in low PDI cultures such as Australia, people take less care of their outer appearance and wear in public what they wear in private (De Mooij, 2010).

Power distance could also be a motivator which drove the Philippine students to the concept of a laundry facility within the grounds of the community hall. The hall is a domicile of authority and power, and housing the laundry in a place which can be overseen by the local peace-and-order volunteers means that the facility can be kept safe and secure.

The student examples of historical transport in India by *pālākī* (palanquin bearers) and *qulī* (slave-like laborers who carry customers on their backs or heads) are reminders of the social stratification in the Hindu caste system and the acceptance of this discriminatory concept in the subcontinent.

Individualism vs. Collectivism [IDV]

This shows the degree to which individuals in a society are integrated into groups (Hofstede, 1984). People in individualistic cultures are “I” conscious and want to differentiate themselves from others; they express private opinions, prioritize variety and adventure, and value self-actualization and individual decisions more than group decisions. Those in collectivistic cultures are “we” conscious; they secure identity through belongingness to their social network, value harmony with in-group members and avoid loss of face (De Mooij, 2004). Living alone in single households is common in individualistic countries; such would be highly unusual in collectivistic countries.

East Asian and Latin American countries are rated as collectivistic on this scale. It could thus be expected that designers in China, Hong Kong, Mexico and the Philippines are most likely to design with

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their families, community or country in mind. The proposed community laundry and the GPS-enabled car-pooling in the Philippines is a good example of Asian collectivism values at work. Extended families are typical in collectivistic cultures, and the rentable fishing boats PSS in Hong Kong is a good example that focuses on the in-group benefits, harmony, interdependence and togetherness in a very large family.

Australia is the second most individualistic country in the world after the United States; most Western countries are individualistic too. As such personal design preferences could be postulated to be more important than group preferences. Interestingly the Australian students successfully rose to the challenge by coming up with community-type PSS concepts that are radically against their individualistic culture: communal food hubs; hostel-type shared kitchens; and laundry bins and nets for communal washing.

Masculinity vs. Femininity [MAS]

This cultural dimension, aka “gender of nations” or “tough vs. tender”, refers to the value placed on traditionally male or female gender roles (Hofstede, 1984). The dominant values in a masculine or tough society are achievement, performance, competition, status and success: winning, big, strong and fast are desirable. In a feminine or tender society caring for others and quality of life are more important: service-oriented, people-oriented: underdog and small are beautiful. Modesty is valued in feminine cultures: if one excels it need not be shown, so there are no “employee of the month” displays in these countries. Role differentiation is small in feminine societies and large in masculine: in feminine cultures males can take typical female jobs, do household shopping, share in housework, help raise children, etc without being seen as a sissy. In masculine societies people consume “for show”; in feminine societies people consume “for use”.

All six countries are clustered around the same central spot on this scale above the world average. Thus all participant cultures could be said to be moderately “masculine” or “tough”, suggesting a degree of assertiveness and materialism in their peoples.

The Milan Station and fashion accessories businesses in Hong Kong are perhaps testimony to the aspirations of this culture for the accumulation of material possessions and for showing off status symbols, a decidedly masculine value. Moreover, the “image design” service in China are aimed at developing individuals to become more assertive, more self-centered, and geared towards personal achievement, which are all aspirations found important in masculine societies.

Uncertainty Avoidance [UAI]

This indexes the rate by which the members of a culture tolerate unknown, unstructured or ambiguous situations (Hofstede, 1984). Cultures which have a high UAI score need rules and formality to structure life; they have a strong belief in experts; are less open to change and innovation; distrust second hand goods so buy more brand new (De Mooij, 2004). High UAI cultures have a passive attitude to health, focusing on medication and pure drinks and foods; low UAI cultures take an active attitude, and focus on fitness and sports. Most of the countries scored below the world average on this index, except Mexico. Thus Mexico could be said to have a strong uncertainty avoidance culture.

The Pink Laundry concept from ITESM is a demonstration of the desire of Mexicans to be assured of quality in the service provided. Customers would not trust laundry services that couldn’t promise them that they would get their clean clothes back and not those of other people; or that would mix their white garments with colored ones.

Long- vs Short-Term Orientation [LTO]

According to this dimension, aka “Confucian work dynamism”, a society’s “time horizon” is the importance it attaches to the future versus the past and present. In long term orientation, there is acceptance of change, perseverance, thrift and pursuit of peace of mind. In short term orientation, spending is more important than saving for tomorrow.

As expected, the “Confucian” cultures of China and Hong Kong rank highest in long-term orientation, indicative of their respect for tradition, perseverance and parsimony. India is likewise deeply rooted in tradition and ranks above the world LTO average. It is amazing to find the contemporary everyday garments of Indian ladies have changed very little from the early sārī designs that we find carved or painted in ancient temple murals. Thus many students submitted various PSS scenarios for the Indian sārī.

The Philippines and Australia are rather short-term oriented, suggesting that change can occur more rapidly in these countries since long-term commitments do not become impediments to change. The radi-

cal concepts of the Australian students requiring revolutionary changes in everyday living may probably be attributed to short-term orientation. Likewise the prevalence of SMS and GPS mobile business concepts among the Filipino students shows how these relatively new technologies have been easily embedded into everyday living in the Philippines.

Conclusions

It was fascinating to witness the diversity of the PSS solutions from the young Asian, Australian and Latin American designers who participated in these international workshops. The concepts and examples that surfaced through the activities show heavy influences from the students' unique cultures. While these can be partly attributed to the nature of the briefs to which they were responding, the embedding of culture in their responses is likely to have sprung naturally due to the values, norms, institutions and artifacts in the environments where they live and in the society to which they belong.

Students often get pleasantly surprised to find sustainable and less material-intensive product-service systems already existing in their cultures, in one form or another. It was opportune to look back to those days when modern human lives were not yet so intricately intertwined with advanced technologies that require a high intensity of material and energy consumption to deliver. It would be desirable for the relatively simpler but more value-laden product-service systems to be employed as drivers for culturally-appropriate innovation and sustainable solution development. Moreover, the resource-sparing strategies from the developing economies could provide inspiration for reducing the material consumptive practices in the developed world.

The workshops showed that industrial design students can live up to the challenge of designing product-service solutions and consider whole systems when required to, and to digress from the product-centric approach of conventional industrial design processes. It is up to design educators, therefore, to consider sustainable product-service systems and to integrate these constructs in their studio teaching. By doing so we lay the foundation for the next generation of industrial designers to think beyond products and to understand that less resource intensive solutions are indeed possible.

About the author

Dr Mariano Ramirez Jr is a senior lecturer in the Industrial Design program at the University of New South Wales (UNSW) in Sydney, Australia. His current research projects investigate the integration of environmental and social sustainability aspects in design education and practice, the fostering of responsible and positive behaviors through design, and the influences of culture in industrial design processes.

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Notes

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