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Culturally-Referenced Product Service Systems: Design Ideas from Asian Students

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ABSTRACT

Throughout the history of industrial design education, students have been trained to satisfy user needs by offering consumers with products, typically positioned as material objects of desire. It was therefore interesting to challenge Asian students with a different approach in design briefs: not to design objects per se as an automatic response to satisfaction of wants, but to consider product-service systems which could possibly consume less lifecycle material and energy resources. It became even more intriguing to see how students from different countries responded to the same briefs with proposals which are strongly tied to their cultural traditions.

This paper presents the results of student workshops on “Designing Sustainable Futures” conducted in tertiary design institutions in Ahmadābād, Běijīng, Hong Kong and Manila. The diversity of the culturally-referenced solutions – which can be categorized as being either “product oriented”, “use-oriented” or “result-oriented” – is interesting. Students often get pleasantly surprised that sustainable and less material-intensive product service systems exist in their cultures, and which could be used as drivers and inspiration for culturally-appropriate innovation and sustainable solution development.

INTRODUCTION

Noticeable changes in the environment for product development have been observed in recent years. Previously intangible services are beginning to include physical products for consumers, and conversely, traditionally tangible product-only solutions now incorporate services. Many solutions now comprise varying proportions of tangible products and intangible services, designed and combined to jointly fulfill specific customer needs: this is a contemporary business phenomenon which has been labeled as “product-service systems” or PSS (SusProNet, 2002). Because of their potential in offering dematerialized solutions and in enhancing resource productivity, there has been considerable discussion that PSS could lead to ecological or social sustainability benefits, although not necessarily automatically.

There is a conjecture that it would be fundamentally difficult for industrial designers to design PSS-type solutions instead of conventional products. This is because industrial

design processes for the last century have centered on the materialization of tangible outcomes (Findeli, 2001). 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).

Unless industrial designers are active participants in the design of PSS, the ability of PSS to dematerialize contemporary societies will be undermined by the continued product-centric output of designers. How then should we educate designers to see PSS as creative design responses that they can and should generate?

In 2004 design exercises were simultaneously run at the University of Technology Sydney, University of Western Sydney, and University of New South Wales in Australia (Ramirez, Tonkinwise & Andrews, 2004) to test the ability of design students to notice and elaborate product service system design solutions. The aim was to identify the best ways to teach designers to include PSS in their solution repertoires when designing. Various tools, strategies and case studies for PSS design and ecodesign developed and reported by European design researchers were offered to assist the students. The findings of the experiments 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.

WORKSHOPS

This paper describes the results of student workshops on “Designing Sustainable Futures” conducted by the author in tertiary design institutions in Asia, as an extension of the 2004 Australian exercises. The participating institutions are the National Institute of Design in Ahmadābād, India; Tsinghua University in Běijīng, China; Hong Kong Polytechnic University in Hong Kong, China; and De La Salle College of St Benilde, University of Santo Tomas, and Mapúa Institute of Technology in Manila, Philippines. A total of 181 students took part.

The workshops were preceded by a one-hour presentation by the author on global examples of sustainable product development, anchored on the lifecycle design strategies wheel (Brezet & Van Hemel, 1997).

Students then participated in an intensive 3-hour brainstorming session. In all the schools, small working groups of students responded to two successive briefs:

- **LOCAL SUSTAINABLE INNOVATIONS.** The task was to reflect and brainstorm on traditional inventions, innovations, and community service systems in their countries which might be considered as local examples of ecological or social sustainability. The groups worked on one of these topics: food/water, clothing, or mobility. Mind maps were used to organize member inputs.
- **INDUSTRIALIZING SUSTAINABLE INNOVATIONS.** Students were asked to generate fresh ideas on how the product service systems that they have reflected on and analyzed can be applicable in a highly developed country such as the USA, Australia or western European nations, considering the higher labor costs and the consumer's relative ease of access to mass-manufactured conveniences. While it is understandable that participants may not have had experiences with living or traveling overseas, it is hoped that a general understanding of "western" ways would have permeated through movies, news clips, magazines or documentaries in their countries. Students had to illustrate scenarios showing how the local sustainable solutions could be injected into a global context. By doing so it is hoped that the technologically advanced countries can learn from the seemingly more resource-frugal and therefore potentially more sustainable ways of living in Asian countries.

Each working group was tasked to come up with topical ideas under three PSS categories:

- **CATEGORY A: PRODUCT-ORIENTED SERVICES.** The product is owned by the user or consumer. Approaches include service integration, where a new service or functionality is added to the existing product; and product extension, where the value of the product is increased through upgrading, guarantees, repair, maintenance, etc.
- **CATEGORY B: USE-ORIENTED SERVICES.** The product is owned by the service provider who sells functions instead of products by means of modified distribution and payment systems. Strategies include rental, sharing, pooling, and leasing.
- **CATEGORY C: RESULT-ORIENTED SERVICES.** These include product-substituting services, where products are replaced by new technological services. Another strategy is vertical integration, where customer and retailers get directly involved in the production process, such as production-on-demand. Another is facility management, where the supplier offers incentives for the customer to consume more efficiently thus optimizing the system.

These three categories are positioned in a continuum in which Category A is closer to a "pure product", where the value mainly resides in the content of a tangible product; Category C is closer to a "pure service" or "intangible product"; and Category B lies between A and C (SusProNet, 2002).

RESULTS

Participants engaged in retrospections of the pleasantries and lack of conveniences of daily living during their childhood, to reminisce what they know of ways of life during the time of their ancestors, and to compare these reflections with the conveniences of the present. These exercises resulted in the documentation of numerous local product-service innovations, some of which are presented below by country.

A. INDIA

Indian participants working on the garment care topic illustrated many scenarios for extending the lifecycle of the traditional Indian women's garment, the sārī. One of them shows how an originally light colored sārī is progressively dyed into darker colors when the previous color has faded, when the fabric has become stained, or when the owner desires to revitalize the garment (Fig. 1). This product maintenance strategy is a Category A PSS.



Fig. 1. Example of product-oriented garment-care PSS in India.

In the transport-provision topic, students presented a traditional scheme where a farm tractor is being used to till the farms throughout the day, and in the evening the vehicle doubles as transport for farm workers back to their homes in the villages (Fig. 2). This is a Category B PSS.

An interesting example of a Category C PSS 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" (Fig. 3), where housewives cook for their own families and for university students who, for a nominal monthly subscription, come to eat lunches and dinners in their households.

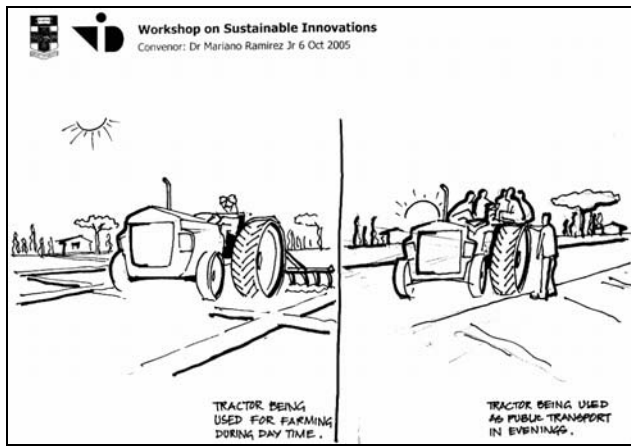


Fig. 2. Example of use-oriented transport-provision PSS in India.

There is also the well-publicized example of a PSS in Mumbai called the “dabbawallah” (tiffinbox carriers), who take meal orders from subscribed office workers in the morning, and then deliver hot home-cooked meals in time for lunch. This highly specialized trade, involving 5,000 men transporting 175,000 lunchboxes with utmost punctuality, is over a century old and has become an integral part of Mumbai’s culture.

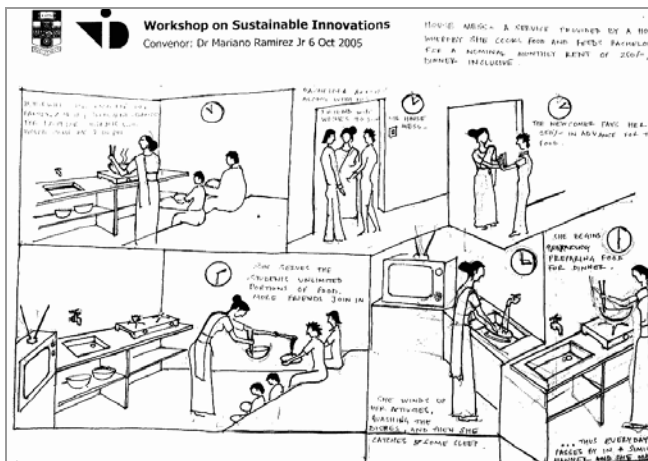


Fig. 3. Example of result-oriented food-provision PSS in India.

B. CHINA

Chinese participants in the food topic presented a Category B PSS called “dailiaojiaogong” (Fig. 4), wherein urban consumers from lone-person households would purchase fresh fish from a shop, have it cooked by a street vendor for a fee, and then enjoy the meal at home.

Other examples given:

- peasants providing summer travelers a countryside experience by offering farm-fresh food and accommodations in their own house (Category C)
- Xingxiangsheji, an “image design” company which offers professional grooming advice and a selection of clothes or hairstyles that matches one’s personality (Category A)

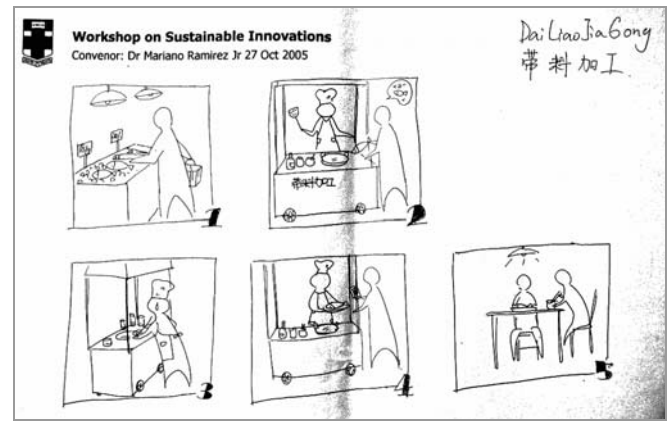


Fig. 4. Example of result-oriented food-provision PSS in China.

C. HONG KONG

Hong Kong students presented various product-service systems which are either operating at present or have been practiced in their society in the past.

A unique and successful business scheme in Hong Kong is the “Milan Station”, 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.

Those working in the food topic presented a Category B PSS. Fishing boats plying the islets in the South China Sea can be rented by families and groups for a day; the service includes providing the guests with some of the fish freshly caught on the nets and grilled by the boat’s on-board cook.

D. PHILIPPINES

A distinctive concept from the Philippines revolves around the “barangay” hall, which is a central hut for community meetings. The hall grounds would be equipped with a laundry facility where the women of the community could converge for laundering sessions and accept other people’s washing as well for fees (Fig. 5); the multipurpose mini-truck of the village could be used to collect laundry from the households and transport them to and from the barangay 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. Arguably the Philippines is the “text messaging capital of the world”, with an average of 400 million text messages sent through the mobile networks every day. Notably such proposals using SMS technology have not been received from students in the other countries.



Fig. 5. Concept for use-oriented PSS laundry in the Philippines.

One such SMS proposal is a Category C PSS involving a homeowner sending a text message to a lawn maintenance company (Fig. 6), who will set the appointment for periodically mowing and sprinkling the grass and removing the cuttings. Another SMS concept concerns a suburban transport hub which fields out pickup vans around the neighborhood to gather passengers into the community terminal, and then transfer them to a mass-transport vehicle which would convey them to the city; the passengers send text messages to the hub to inform them of their pickup locations.

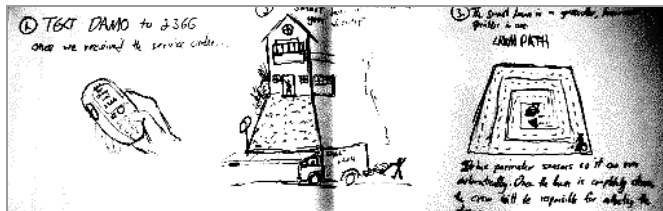


Fig. 6. Concept for result-oriented PSS in the Philippines, using SMS technology for accessing the service.

E. AUSTRALIA

The briefs given to the Australian students were slightly different from the Asian students, although they also worked on the topic of food supply and clothes washing. The variety of concepts resulting from the Australian exercises are presented here (Fig. 7 & 8) to compare and contrast with the results of the Asian workshops.

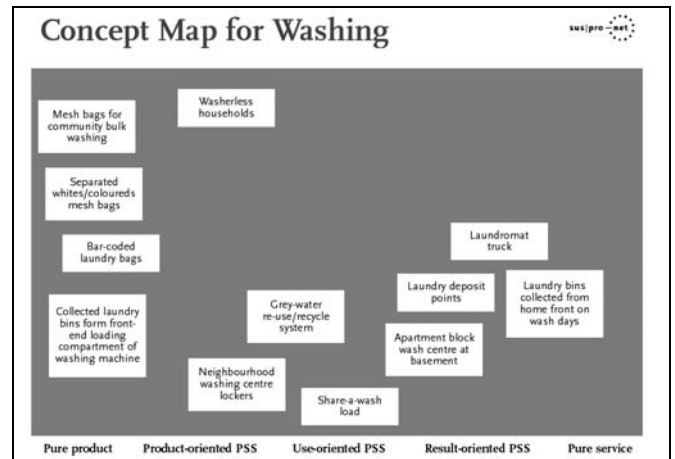


Fig. 7. Australian PSS concepts for clothes washing.

Some of the uniquely Australian ones are

- laundry bins collected from home fronts on wash days form the front-end loading compartment of high-capacity washing machines in a laundry facility (Category A)
- communal food hub in a street shed where families could cook their own meals while sharing the cooking facilities (Category B)
- outsourced dinner kits on specific nights, offering families to regularly experience preparing different multicultural menus (Category C).

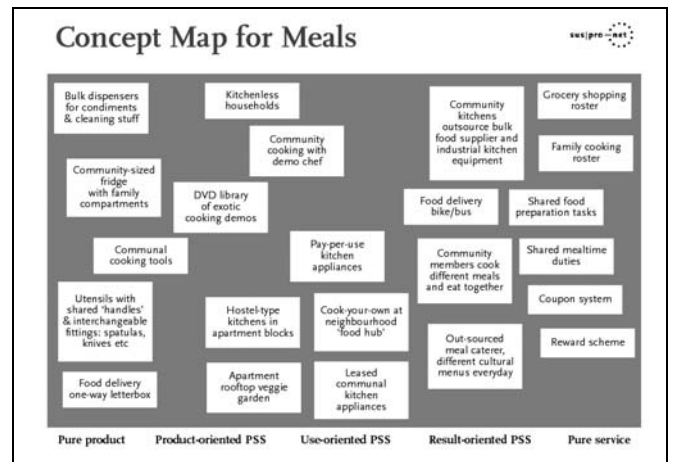


Fig. 8. Australian PSS concepts for meal supply.

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 models exist, of which Hofstede's is perhaps the most popularly referred to.

Hofstede (2001) 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. Further, culture is mainly manifested through the persistent national and regional values, rituals, heroes and symbols of the people.

By analyzing a comprehensive survey of IBM employees worldwide, Hofstede empirically identified five dimension scales of national culture. Using Hofstede's data, the cultural dimension scores for the countries of the participant designers were plotted in Fig. 9. Based on the connotations of the cultural indexes, the following observations on the student concepts could be associated.

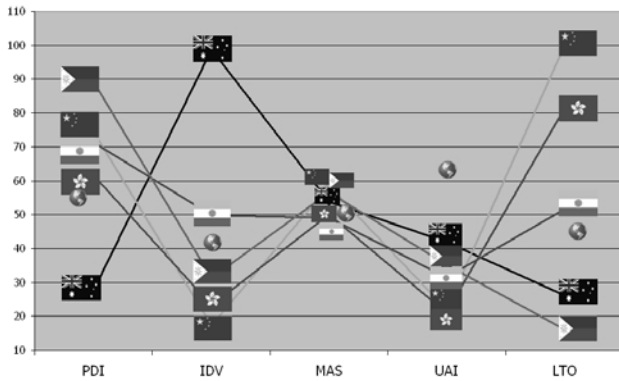


Fig. 9. Relative country scores according to Hofstede's cultural dimension scales.

A. 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 power and wealth are distributed unequally.

All four Asian countries scored higher than the world average on power distance; Australia scored lower. Power distance could be one motivator which drove the Philippine students to the concept of a laundry facility within the grounds of the barangay hall. The hall is a domicile of authority and housing the facility in a place which is overseable by the local peace-and-order volunteers means that the facility can be kept safe and secure.

Historical transport in India by *palkī* (palanquin bearers) and *qulī* (those who carry customers on their backs or heads) also testify to the acceptance in Hindi culture that some people occupy a higher hierarchy in society than others.

B. INDIVIDUALISM VS. COLLECTIVISM [IDV]

This shows the degree to which individuals in a society are integrated into groups. The East Asian countries scored below the world average on this scale, suggesting that their cultures are collectivist. It could thus be expected that designers in China, Hong Kong and the Philippines would underplay personal achievement in favor of group achievement; they are most likely to design with their families, community or country in mind. The proposed barangay laundry in the Philippines is a good example of Asian collectivism values at work.

Australia is the No. 2 most individualist country in the world, and as such personal design preferences could be postulated to be more important than group preferences. Interestingly the Australian students came up with many concepts that are radically against their individualistic cultures: communal food hubs; hostel-type shared kitchens; and laundry bins for communal washing. Coming up with such revolutionary ideas is probably attributable to the Short-Term Orientation dimension, discussed below.

C. MASCULINITY VS FEMININITY [MAS]

This refers to the value placed on traditionally male or female gender roles. All five countries are clustered around the same central spot on the masculinity-femininity scale and all score above the world average. Thus all participant cultures could be said to be moderately "masculine", 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, 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.

D. UNCERTAINTY AVOIDANCE [UAI]

This indexes the degree to which the members of a culture tolerate unknown, unstructured or ambiguous situations. All five countries are on the uncertainty-avoiding side of the chart.

The dabbawallah system in India could be considered as a strategy for avoiding uncertainty and ensuring structured situations. By subscribing to a dabbawallah (whose punctuality is remarkable), an office worker is assured of consistently getting home-cooked lunches everyday, prepared in the style that he or she likes. Studies show that this system has a six-sigma level of quality and there is only one mistake in every 6 million deliveries.

E. LONG VS SHORT-TERM ORIENTATION [LTO]

A society's "time horizon" is the importance it attaches to the future versus the past and present.

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 average for the LTO dimension. It is amazing to find contemporary Indian ladies' garments to have changed very little from what we see drawn 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. As discussed previously, the radical concepts of the Australian students requiring revolutionary changes in everyday living may probably be attributed to Short-Term Orientation. Likewise the prevalence of SMS concepts among the Filipino students shows how this relatively new technology has been easily embedded into the Philippine culture.

CONCLUSIONS

It was fascinating to witness the diversity of the PSS solutions from the young Asian and Australian designers who participated in this study. The concepts and examples show heavy influences from their unique cultures. While these can be attributed to the nature of the briefs to which they were responding, the embedding of culture in their responses could also have sprung naturally due to the values, norms, institutions and artifacts in the environment 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 would be desirable for these 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 the more material consumptive practices in the developed world.

While the workshop outcomes are novel and amusing to western eyes, they can also be viewed as being modest rather than utmost challenging, as can be expected from 3-hour design exercises. However the diversity and interest generated by these sorts of multicultural workshops motivates us to hold more inter-university collaborative studios in the future, perhaps online and with full academic credit. It would be an empowering educational experience for a student designer to be able to think out sustainability solutions with counterparts from around the world.

The workshops also showed that industrial design students can live up to the challenge of designing product-service solutions when required to, and to consider whole-systems approaches rather than focus primarily on tangible product outcomes, or so-called "objects of desire". It is up to design educators, therefore, to consider product-service systems and 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.

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