

LEARNING VALUES IN SUSTAINABLE DESIGN PRACTICES

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ABSTRACT

The paper examines the activities undertaken at the central kitchen of The AkshayaPatra Foundation, Guwahati branch, on aspects of sustainability. This NGO makes significant contributions to the mid-day meal school program in Assam by preparing and serving food daily to about 53,000 children attending government schools in the rural areas in the vicinity of Guwahati city. Section one examines participatory involvement among the different stakeholders including the state, civil society and corporate sector to achieve its goal of a sustainable system that ensures that the dropout rate due to hunger of under privileged children from schools is reduced. Section two, raises considerations of learning values in the process of learning sustainable design practices -the outcome of a design workshop undertaken by students of Design - that focused on seeking design interventions to help improve the deliverables undertaken by AkshayaPatra Foundation, Guwahati.

KEYWORDS

Sustainability, Mid-day meal program, school education, participatory approach

1. INTRODUCTION

India has witnessed rapid economic growth in the past decade, and has now become one of the emerging economies in Asia. The challenge to governance is to make this growth inclusive and to ensure that the benefits of development reach a large section of the country's poor. With more than a billion people and one third of the world's poor, India needs rapid growth with strong employment creation and extended social protection, to reduce poverty and to sustain income increase for its huge population. Structural reforms and social cohesion are needed to accelerate growth and substantially reduce poverty. Bridging this gap is a herculean

task faced by the government. Health and Education sectors are the two important domains for government to intervene through various social schemes.

Studies show that primary school enrolment rate in India has increased over the years. However, school dropout rates continue to be high and even though there has been a slight decrease in school dropout rates in India, it is one of the most important factors for poor literacy. The Indian social mind-set is such that children are treated as bread winners in most low income homes. In India poverty is the main reason why students drop-out of government schools. Inability to pay school fees, the costs of uniform, shoes, transport, stationary, added to that, many of them who go to schools, go with an empty stomach. These impoverished children perform poorly in school due to short attention spans associated with hunger. The Supreme Court of India passed an order on November 28, 2001 which stated that, "Cooked Mid-Day meal is to be provided in all the government-aided primary schools in all the states." The main purposes behind implementing the programme (National Program of Nutritional Support to Primary Education) were to provide protection to the children from classroom hunger, decrease the dropout rate, increase admission and attendance in the school, and improve socialization among the children who belong to different castes. Studies have shown that school meal programmes exert a positive influence on enrolment and attendance in schools. A hungry child is less likely to attend school regularly. Hunger drains them of their will and ability to learn. Chronic hunger can lead to malnutrition. It also delays or stops the physical and mental growth of children. There is also evidence to suggest that apart from enhancing school attendance and child nutrition, mid-day meals have an important social role to foster equality. As children learn to sit together and share a common meal, one can expect some erosion of caste prejudices and class inequality (Khera, 2006). Many students, who enroll, discontinue schooling at a very early age and seek work to earn money to feed themselves and their families. The biggest problem facing the schooling system is that over 50% of children who join up in Class I drop out by Class VIII. A large percentage of children are unable to benefit from the free educational facilities provided by government because they are needed at home to participate in the basic tasks of the household economy. The Government Mid-day meal program in India is the world's largest school feeding program reaching out to about 12 crore children in over 12.65 lakh schools across the country. It has a long history. The scheme promises lunch, free of cost to the children on all the working days.

1.1 About AkshayaPatra Foundation

Along with the government sponsored Mid-day meal program, many NGOs support this cause by their contribution too. **AkshayaPatra Foundation (APF)** is one such NGO providing free food to government school children. The AkshayaPatra Foundation is a fluent demonstration of public-private partnership as it is run with part subsidies from the Government, besides financial support from corporates, individuals and philanthropists. AC Nielsen, an independent research firm, performed an impact assessment in 2010, measuring key indicators such as enrolment, attendance and health of school children (David et al, 2007, Sunita et al, 2010). The study demonstrated an increase in enrolment, especially among the female students, and better health and improved performance among all students who received school lunches. It was in the year 2009, that the state government of Assam invited the AkshayaPatra Foundation to start functioning in the state.

The foundation set up their unit in the Amingaon area of North Guwahati and began to cater to 385 schools with 5000 students. Now it is currently serving to about 53,000 children in 593 schools in the rural areas of Guwahati, Assam. With more than one hundred and fifty employees running the show, the aim of the organization is to extend their facilities to 2 lakh students in the coming years in Assam alone.

2. THE SYSTEM STUDY

A study of the central kitchen at Amingaon, run by AkshayaPatra Foundation was undertaken by the Department of Design, IIT Guwahati to examine its operations on aspects of sustainability and to identify design interventions that may help further optimise operations of its Mid-day meal program. The preliminary study led to conducting a four day design workshop involving 40 students and three faculties of two partnering institutions – Department of Design, IIT Guwahati and the NTNU, Norway.

The following themes formed the focus of enquiry:

1. Study of operations of the central kitchen from a sustainable perspective – economic, socio-ethical and environmental.
2. Sustainability and scalability
3. Design and Social responsibility

Present operations at the central kitchen can be summarized through the systems model shown in figure 3 and figure 4. It identifies the different stake-holders and the operational cycle involved.



Figure 1. Vegetable cutting and rice preparation at AkshayaPatra Kitchen Guwahati

2.1 Field Study of PSS at the Central Kitchen of APF

All the students were given a tour of the central kitchen and were explained its various operations including technical aspects at each stage in detail. A video presentation of the step by step process was shown along with a power point presentation, followed by a question answer session and brainstorming session. The detailed study included aspects of the following stages of running the kitchen:

Planning of the schedule, Procurement of food grains from FCI, Procurement of vegetables from the local farmers, Cleaning of food grains, Cooking of rice, lentil (*dal*) and vegetables(*sabji*), Packaging of prepared food in stainless steel vessels, transportation of food in insulated vehicles to the schools, other related issues like material handling, housekeeping, administrative jobs and maintaining accounts, returning of vessels from schools to the central kitchen, washing of vessels and preparation of schedule for the next day's requirement.



Figure 2. Daily operations of AkshayaPatra Kitchen Guwahati

The students studied the complete system by visiting the kitchen and accompanying vehicles to the schools in order to understand the operations of the whole system. They were able to identify scope for design intervention with the aims of optimising the functioning of the present system. The design intervention areas chosen included stacking space for the vessels, problems encountered while packaging, loading and unloading of the food, transportation, adopting energy efficient practices, cleaning and handling of vessels and innovative communication approaches to enhance sustainable practices for the school children.

Few statistics of the itemised daily consumption and usage at the Guwahati base kitchen is given below in the Table 1.

Table 1. Daily consumption of raw materials in the base kitchen

Item	Consumption
Quantity of Rice (daily)	4 tonnes
Quantity of sambar/dal (daily)	800 litres
Quantity of vegetables (daily)	1000 kgs
Quantity of masala powder/spices (daily)	140 kgs
Quantity of Diesel/LPG used (monthly)	700 litres/50 LPG cylinders

A system study was also conducted on the aspect of the three dimensions of sustainability viz. the environmental, socio-ethical and economic. Various stake-holders were identified in this system and their roles were also studied. (Vezzoli & Manzini, 2008; Vezzoli, 2010) Also collaboration with new stakeholders and other mode of interaction were also thought upon. Aspects of conservation and bio-compatibility were given more priority in this study as analysis found that the system lacks pioneering steps in this direction. Recently, a *masala* powder grinding unit was installed in the kitchen, keeping in mind the possibility of providing adulteration-free ingredients to the children to keep them healthy. They layout of the kitchen is designed complementing the process flow of loading and unloading of the vessels. Among the suggestions given to the base kitchen design, minimising the dependency on non-renewable energy sources was one of the main criterions discussed. Setting up a cattle farm near the kitchen is also on the pipeline as it will form a loop closed in waste management and also provide a facility to decompose the degradable waste generated, which could be used in the farm as manure. A bio-gas plant would provide an additional back up supply of fuel to the kitchen. Utilization of natural light inside the kitchen during day time would result in the reduction in the consumption of electricity.

As shown in Table 1, the base kitchen consumes about 700 litres of diesel and 50 LPG cylinders every month which escalates the total fuel cost per child to 60 paisa. A similar experiment done at a base kitchen in Bangalore has shown that use of biomass briquettes will cut down the cost to about one sixth (Keya, *The Hindu*, 2013). When catering to 53000 students daily, every single paisa saved will bring in considerable savings throughout the year. This shows the degree of scalability of these systems.

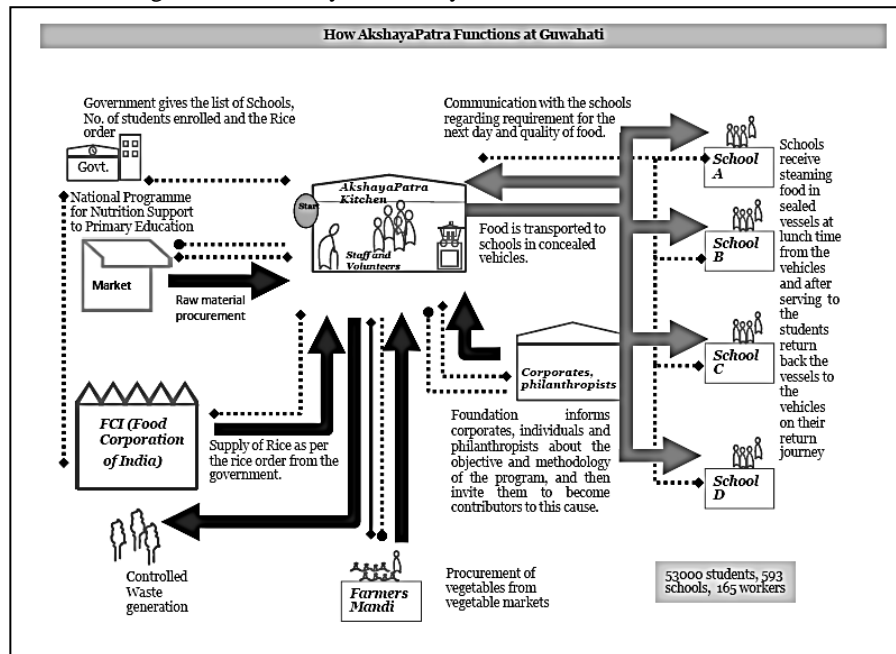


Figure 3. System Map for operations of AkshayaPatra Base Kitchen Guwahati

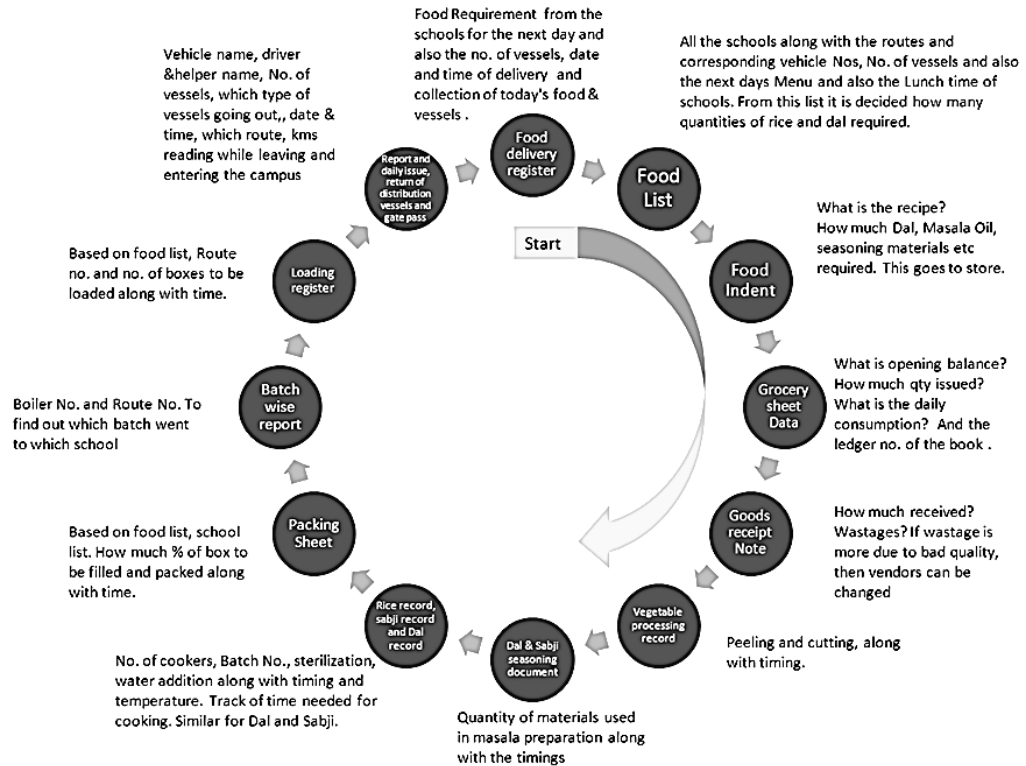


Figure 4. Quality checks at each stage of its daily operation at AkshayaPatra Base kitchen Guwahati

2.2 Observations

Beyond the main consideration of rendering social service, AkshayaPatra has been successful in creating a culture of sustainability throughout the organisation. The use of thick gauged (1.6mm) stainless steel material for the vessels give it a long life and reuse of the same vessels many times eliminates the wasteful use of any plastic containers and packaging that result in generating waste (www.triplepundit.com). The washing of these utensils are also done in a very systematic and efficient manner. This can be a useful method of adoption for organisations where a good dish washing system if developed can help reduce the use of plastic packaging thus, eliminating generation of large volumes of waste and its subsequent management. The quality checks at each step and the surveillance for the wastes at all stages not only makes the process more effective but also gives leverage to the environmental factor. The centralised kitchen uses automation and mechanization wherever possible in a balanced manner. The cutting of the vegetables after it is cleaned, for *sambhar* and *sabji*, are carried out in an automatic cutting machine that could vary both the shape and the size depending on requirement. The right level of automation has the advantage of both improving efficiency through mechanisation as well as utilizing the local manual labour thereby fulfilling the social

responsibility of supporting the local population through employment. AkshayaPatra Foundation is a good example of a product service system where sustaining efficiency and quality are met on the one hand and also ensuring that employment generation levels are maintained. In the preparing of food, the whole process is defined from raw material procurement, cooking, packaging, transportation, return of vessels and waste disposal making it a closed loop. This close loop makes waste minimisation possible and waste disposal minimal. It's a good example of a product service system where a service of providing meals to the school children are rendered thereby making the future generation healthy and more productive. Beyond the social service AkshayaPatra had been successful in creating a culture of sustainability throughout the organisation. From their centralised kitchen model it is very clearly evident that the management is aware of the environmental and social issues and also their effect to the organisation's financial performance. However as per the inputs given by the AkshayaPatra representatives, there exists scope for design intervention considering that the present system has to be scaled up further to meet the target of reaching and serving the needs of nearly 2.0 Lac students in the near future. The intervention domains include the areas of stacking of vessels; truck loading, transportation, packaging and kitchen space re-design which can enhance optimisation of the existing PSS model through efficient transportation and distribution and customisation of the menu preferences and the use of local labour.

2.3 Ideation

Student groups started the brainstorming and ideation process in a collaborative manner taking inputs from AkshayaPatra representatives, school students, school teachers, professors and other design students meeting them in tandem. Number of concepts were generated and presented to all participants and staff, receiving feedback. After the ideation and discussion, the groups selected a single concept and started to work in more detail. They were encouraged to select their concept ideas and present them in the form of product illustrations and renderings supported with product detailing.



Figure 5. Idea generation by students (left) & Discussions and further detailing (right)



Figure 6. Students at work (left) & Final presentation at IIT Guwahati Galleria (right)

2.4 Design Proposal by Groups

The presentation of various design solutions by the groups and the subsequent extensive discussions were held in the presence of representatives from the AkshayaPatra foundation Guwahati. The seven groups presented their design brief supported by mock-up models and computer generated models to substantiate their ideas. Proposals for some of the possible design interventions in the operations of AkshayaPatra included the use of natural lighting and ventilation wherever possible, use of bright colours. Redesign of the vessels that can result in saving space in the kitchen, packaging of food, easy loading and unloading of these vessels in the vehicle etc. The small design interventions identified were very vital in further reducing the system flaws; enhancing easy operation and timely completion of the tasks. These solutions although developed in a very small span of time, showed promise to be developed to the next stage.

Some of the solutions from the seven presentations are given below:

2.4.1 Problem Area- Packaging

Design proposal: The issues identified were reducing the vessels stacking area, Lid deformation, Stability of the vessel, Security & Easy maintenance. This group came up with a security locking system to the vessels to make it pilfer proof during transportation.



Figure 7. Solution for reducing vessel stacking area and new locking mechanism

2.4.2 Problem Area- Health and Hygiene

Design proposal: A cross-cultural approach for suggestion to improvements for AkshayaPatra. Short and entertaining theatre plays in the local language which contains information commonly used to spread information meeting the objective of improving the sensitivity towards social aspects of health and hygiene.

2.4.3 Problem Area- Loading food in the Vehicle

Design proposal: Solution for easy loading and unloading of vessels to the vehicle for transportation keeping in mind the aspects of ergonomics and easy work flow.

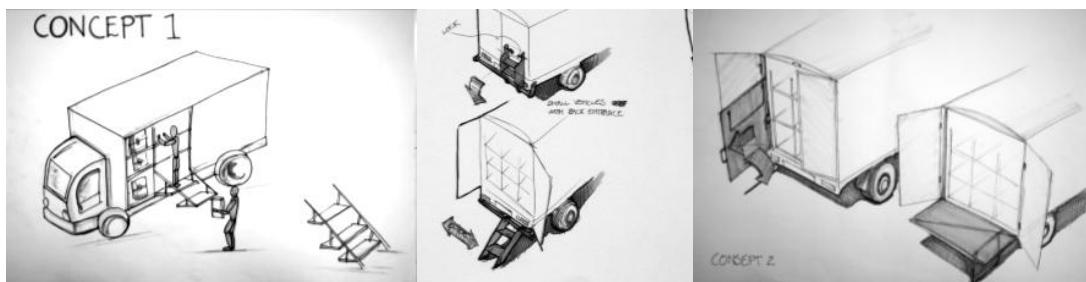


Figure 8. Solution for easy loading and unloading vessels from the trucks

2.4.4 Problem Area: Stacking of vessels

Design proposal: Increasing the Kitchen space by reducing vessel stacking spaces.

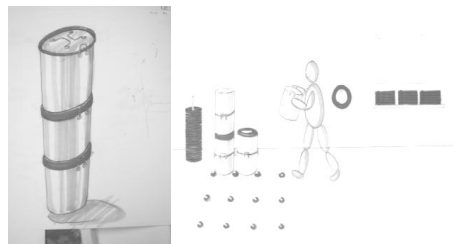


Figure 9. Solution for reducing vessel stacking area

2.4.5 Problem Area- Stacking of Vessels

Design proposal: To Improve Cleaning, handling, locking and stacking of Vessels

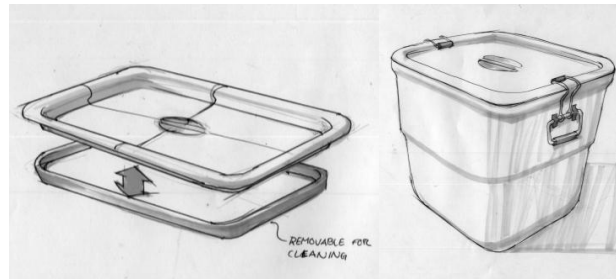


Figure 10. Solution for avoiding spillage of contents during transportation

2.4.6 Problem Area: Vessel & Kitchen Space Re-design

Design proposal: To improve lighting, lack of information transfer, safety issues and bad ergonomic applications.

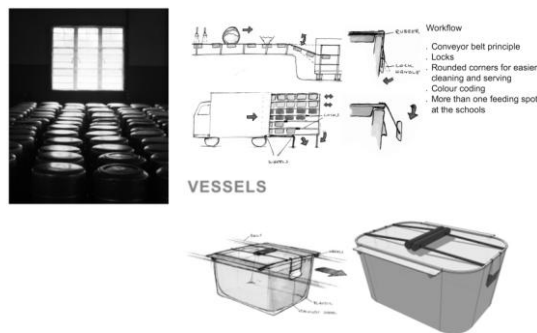


Figure 11. Solution for easy transfer of vessels from kitchen to the trucks by conveyer system

3. CONCLUSIONS

This design initiative was a collaborative learning experience about the different aspects of sustainability. In all the aspects of the three P's of sustainability namely People, Planet & Profit, this organisation gave enough guidance to the students to learn and understand. The whole process is efficiently designed at par with any 'for profit' organisation. This reveals that profit in the domain of sustainability is more aimed at making the organisation more efficient, optimised, and competent. The transparency of the process at each stage gives it reinforcement in terms of socio-ethical sustainability against any form of corruption which will render the system ineffective. In terms of sustainability, AkshayaPatra Foundation is a good example of a product service system (PSS) where the larger goal of providing mid-day meals to the school children in an optimal, non-wasteful, but hygienic and healthy manner is met throughout the whole process - raw material procurement, pre-preparation, cooking, packaging,

transportation, return of vessels and waste disposal in a closed loop system. This close loop operation makes the organisation more responsible in terms of waste minimisation and waste disposal. It's a good example of a product service system where the focus of the result is on a service and not on preparation of a product, in this case food. The services of providing meals to the schoolchildren are rendered with the aim of making the future generation healthy and more productive. This is a good responsible systemic-model (Margolin 2002), which can be effectively implemented in many other organisations in India.

The incremental design solutions developed by the students during system study, in such a short span of time were very much promising and feasible and were much appreciated by the AkshayaPatra representatives. They wish to develop these ideas with their in-house team and take to the next stage of development.

The workshop, though academic in nature, has helped the students to be involved in a real life situation and gain exposure to the problems faced in the field. This also became an opportunity for the students to contemplate about social values and responsibility as a designer and their participation in such design initiatives, which contribute to the larger long-term goals of a community. The values of being responsible and considerate to the environment, providing a fair work place with equality of rights, contributing to the society, using the systemic thinking which scores high in the socio-ethical dimensions were all discussed and contemplated during this study. The participating students appreciated the understanding of such an important inclusive factor in the design process, and its relevance to design in the context of a developing country. Also, such design initiatives became a platform for the academic body to contribute to the society in bringing design for a social cause. The visit to the AkshayaPatra Kitchen gave the Indian students an exposure to the way in which a large scale organisation can effectively exist, operate and contribute invaluable to the society by remaining sustainable, less waste-generating and maintaining high quality and hygienic standards in operations in the context of a developing country like India. Meanwhile for the Norwegian students it was a unique learning experience in a culturally contrasting scenario adding new dimensions to their design learning experience. It brought about an enriching understanding of the socio-ethical dimension of design intervention that focuses on social responsibility and ethical values that go beyond considerations of profit making and situations that the designer will be confronted in professional practice in the near future. The study also brought to the fore aspects of sustainability and scalability. How can one achieve sustainability for larger number of schools where food is to be served? Logistics of operations will have to be reassessed and simple up-scaling of the central kitchen may not be the sustainable solution. For optimization after a certain threshold, the centralised operation model should be converted into a de-centralised model which is a challenge for such big organisations. The base kitchen is now operating in a leased building which restricts any expansion. The kitchen is soon set to be shifted to its own campus where the design solutions suggested by the students could be implemented.

REFERENCES

1. Vezzoli C, Manzini. E 2008, Design for Environmental Sustainability, Springer-Verlag London Ltd.
2. Vezzoli C, 2010, System Design for Sustainability: Theory, methods and tools for a sustainable “satisfaction-system” design, Maggioli Editore.
3. David Upton, Christine Ellis, Sarah Lucas, Amy Yamne, Akshaya Patra: Feeding India's School children, Harvard Business Review 9-608-038, December 17, 2007)
4. Khera R., “Mid-day meals in Primary Schools: Achievements and Challenges”. Economic and Political Weekly 2006; 41: 4742-4750
5. Ministry of Human Resource Development. “National Program of Nutritional Support to Primary Education” Guidelines New Delhi: GOI; 2006. p. 37-39
6. Stuart Walker, “A Journey in Design: An exploration of perspectives for Sustainability” journal of sustainable Product Design (2002); 3-10
7. Margolin V, Margolin S. A ‘Social Model’ of Design: Issues of Practice and Research. Design Issues 18(4) (autumn) 24-30 (2002).
8. Sunita Nambiyar, Greema Pande, Jagdish Solanki, Innovation in Delivery of Mid-Day Meal Scheme through Private Public Partnership, NAPSIPAG 7th International Conference, 11 to 13 December, 2010
9. Keya Acharya, Fuel for food, The Hindu, June 9, 2013
10. www.Indiareports.in
11. <http://www.akshayapatra.org/>
12. <http://mdm.nic.in/aboutus.html>
13. <http://www.akshayapatra.org/ac-nielson-case-study>
14. <http://www.triplepundit.com/2007/12/askpablo-disposable-cups-vs-reusable-mugs>