SOCIAL DESIGN: CHALLENGES, PROMISES, MODELS, AND ALTERNATIVES

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by

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_____________________________________________________________________

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Abstract

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This thesis provides an account of how conducting research on location can enable the designer engaged in social design to create a product that truly addresses the needs of end users in cultures that have radically different traditions, resources and infrastructures. I begin by situating my approach to design theoretically, as an amalgamation and synthesis of insights from social and design philosophers like E. F. Schumacher, Nicolas Jéquier, Victor Papanek, William McDonough & Michael Braungart, and the group Superflex. Then, drawing on my field work in Nepal as a case study, I describe the valuable insights into the necessary functions, features, materials, and method of manufacture of products that I gained by living and working directly with the people who will eventually make and use the products I am designing. I describe the information that I gathered through close observation and interview, and explain how what I learned was not only helpful in designing the specific products I set out to develop, but can also be more generally helpful, in terms of process, in making more realistic (informed) design choices. The argument that underpins this thesis work is that a more ethnographic approach to design for the developing world is crucial to both
effective product development and—what’s most important—to the successful adoption of a given design by the intended recipients.
Dedication:

For Wendy, Avalon and Leda
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CHAPTER 1:
INTRODUCTION

Towards a Definition of Social Design

Social design is inflected and informed by an array of sources, ideologies, and professions. This multiplicity of influences is intrinsic to design as an enterprise; as Victor Papanek observes, “All men are designers. All we do, almost all the time, is design, for design is basic to all human activity” (3). Moreover, all design is "social" insofar as it impacts how people live and relate to their material environment and to each other. But while all design seeks to solve human problems and enhance the quality of life through the creation of products and systems, social design works toward those goals with a different approach and different values and priorities. There is no one singular definition for social design: contributors to the discourse surrounding social design include architects, engineers, economists, anthropologists, product designers, chemists, environmentalists, philosophers, artists, politicians, aid and development workers—in other words, anyone who is concerned with using design to address and solve entrenched social and material inequities. This variety of voices has provided me with inspiration and guided my work in the direction it has taken. Consequently, rather than attempting here to provide a definition of social design, I will instead use this section to briefly describe the work of several people who have most directly influenced my own work.
In what follows, I have selected what I feel are representative works from past and recent contributors and perspectives from a variety of disciplines to illustrate both the scope of what constitutes social design, and the ideas and themes that have markedly influenced my own conception of social design.

**E. F. Schumacher**

The person who has most clearly defined the issues associated with development, technology, and the environment is the late economist E. F. Schumacher, author of *Small Is Beautiful: Economics As If People Mattered*. In this and other books and essays Schumacher assembles a series of potent arguments for seeking alternatives to, and the redesign of, current production/consumption systems. One of Schumacher's primary concerns has to do with the inherent injustice and inefficiency of existing systems: as he sarcastically puts it,

> An industrial system which uses forty percent of the world’s primary resources to supply less than six percent of the world’s population could be called efficient only if it obtained strikingly successful results in terms of human happiness, well being, culture, peace, and harmony. (32)

In both his life and writing Schumacher embodied the “Humanistic/Conservator ethic” which underpins and provides the rationale for movements, like "appropriate technology" and its many variants, which advocate developing technologies and economic systems that privilege human and environmental values over profit. In many ways much of my work is informed by ideas articulated in Schumacher’s work as adopted by the appropriate technology movement, from choosing to address my work to the concerns of
the poor to, for example, looking for small scale, low tech, and local solutions to problems.

Nicolas Jéquier

Nicolas Jéquier’s *Appropriate Technology: Problems and Promises* clearly and thoroughly frames the issues and complexities necessary for understanding technology and development. Both the book’s opening essay and its subsequent case studies discuss the many aspects of the relationships between technology and culture, including such issues as scale, the role of institutions, ideology, and social attitudes. This multifaceted approach helped me to develop a more nuanced and informed approach to the limits and possibilities of applying design to solve social problems. In particular, Jéquiere’s framing of technological development in terms of available “hardware” and “software” provided me with a useful framework with which to understand the observations I made in Nepal. Jéquier explains that

[...]he term ‘technology’ invariably suggests the idea of hardware be it in the form of factories, machines, products or infrastructures (roads, water distribution systems, storage facilities, etc.). Technology however goes much beyond the hardware, and also comprises the software. This includes such immaterial things as knowledge, know-how, experience, education and organizational forms. This distinction between hardware and software is just as important in the case of appropriate technology as in that of modern large scale technology. (21)

Jequire's reconceptualization of technology in such terms was crucial for me, in that it enabled me to see the possibilities and opportunities inherent in the “software” of the decentralized and diverse craft-based production system in Nepal. It helped me to recognize that such a system contains within it a nascent potential for sustainable development: that it can, with minor changes and improvements, attain both the
“hardware and software” requirements necessary for development in that particular cultural/social environment.

**Superflex**

Several years ago, while in Europe, I encountered the work of Superflex, a Scandinavian art group. At the time I was searching for a way to move my art practice from the traditional gallery-based system to a more socially engaged approach. I felt the need to expand the audience that my work addressed beyond gallery owners and patrons, in order to engage more fully issues that are critical and relevant to society at large, such as social equity, the environment, and consumerism. In the work of Superflex I not only recognized a kindred spirit but also ideas for ways to address social issues through art and design. The work of Superflex is not as much about the individual works, although most of their projects are very real and practical, but about engaging in a conversation and presenting alternatives to important social issues. Superflex describes its mission as follows:

[W]e… refer to our artistic activity as socio-economic integration. The reason we work within art is because of the possibilities it offers - a space in which to experiment, free from the bonds of convention. (Nacking)

Their work encompasses a range of interventions, performances, and practices, from founding radio and television stations for marginalized groups to starting businesses that present alternatives to profit driven and often “exploitative” models. I take from Superflex an attitude towards the work that understands the conversation, the process, and the approach to be as important as the end product; and, like Superflex, I see my
design activity as a form of socio-economic integration and an experiment in breaking the bonds of convention.

**Victor Papanek**

Victor Papanek was the first designer to forcefully advocate for designers to take their social responsibility seriously. He argued,

> [m]uch recent design has satisfied only evanescent wants and desires, while the genuine needs of man have often been neglected by the designer. The economic, psychological, spiritual, and intellectual needs of a human being are usually more difficult to satisfy than the carefully engineered 'wants' inculcated by fad or fashion." (Papanek 15)

In many respects Papanek's career provides both a model and a rich resource of ideas for pursuing an approach to design that grapples with how to create products that not only fulfill their primary function but do so in a way not harmful to the “human and natural ecology” into which these products will be produced and consumed. He demanded that designers begin to think of the full range of functions that products must satisfy, including the way the product is used, manufactured, and ultimately discarded. In a subsequent book, “The Green Imperative” he introduced into the design discourse a host of ideas on topics ranging from designing for re-use and recycling, to the advantages of small scale production, to including ethics in design. In many ways Papanek laid the groundwork for much of the current discussion on “sustainability” and ecologically sound design practices. All of these concerns about the product’s life and functions, the afterlife of a product's use, the scale of production processes, and the material and social ethics in design have become integral to my design process. I see no purpose, for example, in creating products that are socially beneficial using materials and processes
that are toxic, or in designing a product that cannot be repaired, maintained, or repurposed by its intended user and thus have its useful life extended.

**William McDonough & Michael Braungart**

In their book *Cradle to Cradle*, McDonough and Braungart move the discussion on sustainability forward by arguing that the conflicts between nature and commerce can be bridged by employing specific design strategies. They argue, for example, that by mimicking natural systems such as nutrient cycles, industry can create products that are both profitable and regenerative (and therefore sustainable). What is important about their work is that they introduce ideas and concepts that promise to bring beneficial changes that can be tolerated by a profit-driven model to existing systems for manufacturing goods. They present many examples of their own and others' work that clearly demonstrates that products and systems can create economic, social, and environmental value, what they call the "triple top line":

This new design perspective creates triple top line growth: products that enhance the well being of nature and culture while generating economic value. Design for the triple top line follows the laws of nature to give industry the tools to develop systems that safely generate prosperity. In these new human systems, materials become food for the soil or flow back to industry forever. Value and quality are embodied in products, processes and facilities so intelligently designed, they leave footprints to delight in rather than lament. When the principles of ecologically intelligent design are widely applied, both nature and commerce can thrive and grow. (McDonough and Braungart)

While the work I present in this thesis is not aimed for manufacture in a profit-driven model, I take from McDonough and Braungart's work an understanding of the necessity to look at the entire process of production and find ways of producing objects that allows for both organic and economic sustainability; that is, I am not so naïve as to believe that
design occurs in an economic vacuum, and I aim to create objects that can create economic, social, and environmental value in both their use and manufacture.

The previous four examples are but a small sample of the many voices engaged in trying to come to terms with the effects that our technology has both on the environment we depend on for our survival and the social world we live in. The broader conversation in which they are engaged focuses on shifting emphasis to the impact design has on people and the ultimate sustainability of their material and social culture rather than on design's impact on the corporate bottom line. The work I describe in what follows should be understood and interpreted in relation to, and in the context of, this broader discussion of ways to address some of the pressing problems of our times. And because both the products I designed and the way I carried out the research are the applications of the values and ideas that I have embraced, my work should also be read as contributing to the dialogue on sustainability, design for development, and social design.
CHAPTER 2:
DESIGN OFF THE GRID

Nepal

In late May 2007 I went to Nepal to field test and develop a manual clothes washing machine. The washer needed to be useful to some one who doesn’t have easy access to cash, electricity, or running water. While I was carrying out the washer project I had opportunities to explore several other aspects of my research. Because wood is widely used as a cooking fuel in Nepal, I also wanted to gather information for a wood burning cook stove project. The wood burning stove was at an early stage of development, and I felt the design would benefit if I saw how burning wood impacts domestic life. Additionally, this was an ideal opportunity to ground my work in a specific place and culture and see first hand how a developing economy works, that is, to investigate what products are used, how they are made, and how they are sold. Thus, in more general terms, this trip served as a way to test ideas and evaluate assumptions from the past two years of work. For example, I was interested in assessing what products would be useful, how to implement their production, and the means through which design or design thinking could be applied to addressing some of the needs of the poor. I set about gathering data and experiences by doing a series of walking tours, conducting interviews through an interpreter, and asking a lot of questions as we walked or travelled
by bus. Finally, by looking and taking photographs I attempted to get a sense of the aesthetics and visual culture of Nepal. In this section I will describe the information that I gathered and explain how what I learned was not only helpful in designing the specific products I set out to develop, but can also be more generally helpful, in terms of process, in making more realistic (informed) design choices. In sum, my argument here is that a more ethnographic approach to design for the developing world is crucial to both effective product development and—what’s most important—to the successful adoption of a given design by the intended recipients.

Like most visitors to Nepal, I arrived in Kathmandu, the largest city and the capital. Kathmandu is large, congested, and polluted, so after a few days, my hosts arranged for me to go to Pokhara a smaller city some ninety miles to the west. The trip can take anywhere from five to eight hours or more depending on a variety of factors. The road is narrow, steep, and winding, during the rainy season there are mud and rock slides, mechanical breakdowns and frequent accidents; on top of this, the drivers make constant stops to try to pack more passengers on the bus. The trip is difficult, but the scenery is magnificent and this was a great way to see the countryside, the small towns, and villages of rural Nepal.

In large part due to the difficulty of transport, Nepal has small scale production and local distribution of goods and services scattered throughout the country. Even small villages have a carpenter, blacksmith, tailor shop, basket weavers and rope makers. There are also people with specialized skills who lease themselves for hire, such as plowmen, masons, and home builders. Pokhara is a much smaller city than Kathmandu
but has most of the same urban activities. In Pokhara, as in Kathmandu, there are many small shops engaged in selling and in many cases producing locally made products; in addition, there are numerous shops that supply the raw materials for these activities (Figure 1). These varied, localized production and distribution networks, coupled with other assets, present opportunities for development that because of reasons cited in the previous section have not been fully explored. As I will describe next, these assets include both the “software” and “hardware” (Jéquier 21) necessary for development, although not necessarily what is considered important for industrial development by those following standard models.

![Figure 1: Typical shop in Pokhara.](image)

**Skills**

What surprised me as I travelled in Nepal wasn’t the poverty—although there was that—but rather the potential inherent in the skills and ingenuity of the people. One
cannot help but be amazed by the variety and level of skill practiced by so many craftsmen. Crafts range from ancient traditional techniques to auto repair, welding, appliance and computer repair. Wood, metal, ceramics, basket weaving, textiles, and paper making are some of the trades that are practiced at a high level of skill. Almost every market or commercial district has at least some of these crafts represented. To adopt Jequire’s terminology, Nepalese crafts workers collectively possess the nascent “software” capabilities necessary for innovating new technologies and processes.

The two areas I observed most closely were woodworking and metalworking. These are both trades that I am personally familiar with, and also are important to everyday life and to my project. Because I work in both wood and metal as a furniture designer and builder, and also use a variety of materials and techniques in my sculptures, I felt I had the necessary expertise to understand what I was observing and look at it from the vantage point of a fellow practitioner. In addition this familiarity allowed me to ask appropriate questions and assess the answers. I saw many instances of tools or materials being used in unusual ways. For example, a large gear became a stamping dye for producing stove parts; transformers from discarded microwave ovens were repurposed as welders; discarded metal parts from old machines were used as anvils to hammer out forms in metal. My observations of crafts people at work became an important aspect of my design process, as their creative use of materials and their flexible approach to working those materials inspired me to think more creatively and innovatively about how to solve design problems in situ. In consequence, the interactions I had with craftspeople were crucial to my understanding of the material culture of the region, which is, I would argue, a key step in developing a product that not only could be eventually adopted into
everyday use by Nepalese villagers, but also could be produced, maintained, and repaired locally (which is an equally important consideration).

Examples from the woodworking and metalworking trades will serve to illustrate the level of skill, flexibility, creativity, and adaptability I observed among Nepalese craft workers and to make the point that the region has ample “software” capabilities. The carpentry shops tend to be generalists, for the most part making whatever can be made out of wood and will sell. Every neighborhood has these (often tiny) workshops that supply the local community. Most of the shops range from two to five person operations. Many occupy just one room, usually the front room of the house or an attached covered shed. Working in such cramped quarters, with the most basic tools, these workers achieve a high degree of quality and craftsmanship (Figure 2).
In small villages carpenters tend to make products related to rural life, such as farm implements, but they also supply basic furniture and architectural fixtures, such as doors and windows. In the town and city they undertake more elaborate projects, such as dining sets, bedroom furniture, and cabinetry. Many workshops I observed also produced small-scale “reproducible” items (like stools and boxes) to be sold at market. These shops produce this wide range of items with a surprisingly limited set of tools at their disposal. Carpenters use traditional hand tools such as adzes, axes, hand planes and chisels, interchangeably with power tools such as hand drills, power planers, and saws. Most carpenters, who can’t afford a large and expensive item like a table saw, devise a fairly sophisticated multi-tasking table saw out of a combination of machine parts assembled with a self-made wood support structure. These saws are often combination affairs that cleverly and efficiently put a saw, planer/jointer, and drill on one arbor and run on one motor. Such do-it-yourself solutions to the problem of the lack of specialized tools is fairly typical among Nepalese crafts workers in all fields, and stands as evidence of the kind of creative and adaptive problem solving skills such workers can bring to a collaborative design process like the one I in which was engaged (Figure 3).

Carpenters in Nepal also demonstrated a very high level of technical ability. Woodworkers who practice traditional Nepali wood carving tend to specialize. The religious buildings and the older traditional secular buildings are a combination of brick with intricately carved wood architectural details. Windows are covered with screens of an amazing variety of designs, from organic forms to geometric patterns. Roof supports, door frames, and columns are often carved in high relief figures (Figure 4). Shops that do
this kind of work maintain close fidelity to traditional forms but augment their income by creating smaller scale versions of window screens and carving to sell to tourists.

Figure 3: Combination table saw in use in Nepal shop.

Figure 4: Example of architectural detail demonstrating carving & construction skills.
Artisans who specialize in carving masks for religious performances and festivals also sell to tourists. Through this adaptation of their products for sale to tourists, Nepali craftsmen have maintained their skills in traditional techniques and so are also able to maintain and restore ancient work. At the same time, however, as in many areas of craft, these more traditional techniques serve as a repository for skills and knowledge that are then transferred to newer processes and techniques. That is, the carpenter who can carve an intricate mask easily transfers and adapts that skill to a variety of other, more utilitarian items. The Nepalese carpenter’s flexibility and adaptability in terms of the use of his tools is matched, if not surpassed, by his flexibility and range with regard to his skill sets.

Similarly, in metal working the range of skills is impressive. The traditional metal working techniques provide a foundation of skills and knowledge that are then applied to supplying products for the contemporary market. For example, Nepal has an extensive and highly developed tradition of metal forming by beating a soft ductile metal such as copper on an anvil and/or a wood form (Figure 5). Traditionally this technique was applied to making jewelry, sculptures, and a variety of vessels for cooking, devotional ritual, transport, and storage. The range of applications of these methods has been expanded by contemporary Nepali craftsmen in two particularly interesting ways. First, this forming technique, with the addition of heat, is used on steel to allow blacksmiths to produce products not usually associated with that trade. Most blacksmiths restrict themselves to shaping such things as tools, bladed implements, and mechanical parts, but in Nepal I saw many blacksmiths making frying pans, woks, and a variety of vessels used in the home, farm, and construction site (Figure 6). Second, copper workers
purchased heavy aluminum cookware imported from India, and, using them as blanks, reshaped them into vessels that conformed to Nepali designs. The same vessels were offered in both copper and aluminum, the aluminum at a cheaper price (Figure 7). Both of these serve as an example of the innovative ways Nepalese craftsmen adapt traditional skills and techniques to fashion new and useful products for their local market. Such innovation, inspired as it is by the constraints of local conditions, is invaluable to the kind of collaborative social design I describe in this thesis.

Figure 5: Example of intricately worked metal mask.
Figure 6: Blacksmithing products in Pokhara.

Figure 7: Standard cookware converted to Nepali designs.
Case Study: Metal workshops in Nepal

A shop where I spent a considerable time observing and where I interviewed the owner, Baeadri Narayan, illustrates how tools and techniques are adapted to allow for the making of a variety of products out of a small space and using a minimum of tools and equipment. This shop consisted of two small rooms approximately four hundred square feet in total with a small yard in the back for material and product storage. The equipment was limited to a small hand shear, a metal break, a homemade welder, and a hand-cranked metal rolling machine. In addition they had hand tools such as hammers, chisels, wrenches and the like. The workers in Narayan’s shop had been working for him for quite a while, one almost ten years (since he began running the shop) and two others for five years. This long familiarity showed in the efficiency with which they worked together. For example, workers moved from an individual task to help another work a machine without needing to be asked, there was an atmosphere of friendly cooperation and every one knew what to do. Narayan directed the flow of work and acted as a “catch all” helper as the workers needed assistance. I witnessed this “style” of working in many of the shops I visited.

The main product line in Narayan’s shop was a type of stove that uses rice hulls or saw dust for fuel. These stoves burn for a long time and use a cheap and available fuel. Because of their long burn times, these stoves are quite popular in the distilling of millet wine, the “liquor franca” of Nepal. These small burners are made from the metal from oil drums that have been cut open, flattened into sheets, and then reshaped into several different sized stoves. The body of the stove looks much like a paint can, with an approximately three to five inch diameter hole in the lid, depending on the size of stove
being made, and also a small hole near the bottom on the side to light and allow
combustion air in. The stoves are quite simple in design and construction but require
considerable skill to execute in an efficient and consistent manner. The different parts
are shaped and fitted by hammering on an assortment of “dyes” made from large machine
parts and metal shapes from salvage. The parts are then assembled by overlapping and
hand riveting them together. In this fashion this small shop can produce approximately
twenty-five stoves per day (Figure 8).

![Figure 8: Rice hull/ sawdust stove.](image)

Narayan told me he is able to sell all the stoves he with his four workers can
make. Introduced to the design of the stove by a couple of NGO workers from India, he
began to produce and sell the stoves locally. In a short time, the design caught on, and
soon other metal fabricators were making duplicates. It is surprising how closely the
design is followed by the different shops; even though there are opportunities for
variations, all the stoves of this type I saw in the markets were almost identical. As a matter of fact, all the products made in Baeadri’s shop, which include such items as galvanized buckets and tubs, shallow steel pans used in construction to carry mortar, and an assortment of grills and pot stands for wood fires, could be found in almost identical forms produced by other shops.

Such a lack of innovation and variety in design stands in striking contradiction to the innovative application of skills demonstrated by craftsmen like Narayan; but as the example of another metal workshop I visited demonstrates, the monotony of design has less to do with a lack of interest in or desire for change than with market conditions that make innovation too economically risky for most small-scale producers to undertake. The second shop I visited was owned by Prim, a skilled craftsman who had learned the trade from his father (Figure 9). Prim’s shop made beaten copper and aluminum vessels, and his family members were his assistants. His father, now too old to perform the physically demanding work, was now Prim’s assistant, handing and holding items as needed while helping to watch the children. His wife broke from her tasks in the house to start the forge fire to heat the metal. As children get older they too begin to assist in the work. The overall efficiency of this cooperative way of working allowed this family to earn enough for basic needs, and earned them well above the national average of $250.00 per year. Prim mentioned that they were able to make an average of 15,000 Nepali Rupees per month, about $214.00. When I asked him if he would like to work in a factory if he were able to make much more money, he told me that he preferred to earn less but be with his family and also be in control of his time and work.
In Nepal wages for labor are low, and people have to work long and hard to survive, yet many of the craftsmen I talked to did not view their work as drudgery but took a genuine pride and interest in it. For example, Prim showed me how he had designed and built an efficient rice cooker. His design cooked rice by placing a small amount of charcoal in a chamber at the center of the rice thereby exposing much more surface to the heat. Too expensive to be marketable locally, the rice cooker was nevertheless efficient and practical and won a prize in a design competition sponsored by the local university. Prim’s attempt to introduce an innovative product shows not only how difficult it can be to bring a product to market, but also that there is desire and potential for innovation in spite of the many obstacles. It would be a mistake to conclude that because the products that are made and sold in Nepal tend to repeat in type and form, that this is the outcome of stifling tradition or a lack of desire to innovate. In fact obstacles to innovation in Nepal have more to do with lack of opportunities such as access to credit and markets than with cultural factors. In order for a shop to introduce a new product they have to risk a considerable amount of time and material, a difficult proposition when people are barely surviving.
Challenges to the Implementation of Design Innovation

Beyond the purely economic challenges, the success of products or design ideas is largely determined by three factors: political climate, social and cultural norms and structures, and the technology infrastructure. Using Nepal as an example, I will try to understand how politics, culture, and technology interact to create conditions that either impede or nurture innovation. In developing this project I found it was useful to have a general understanding of how the different forces within Nepali society operate and influence each other. My point here is that what is required from a design point of view is not a detailed understanding of the politics, cultural history or technical/economic conditions, but an awareness and sensitivity to realities on the ground or street, realities that arise out of an often complex and bewildering interplay of social forces.
For example, it was very useful to know that although Nepal has an extensive hydroelectric potential and has a power grid, electrical service is sporadic and limited. One of the consequences of the lack of regular electricity was that shops and restaurants were forced to augment their electrical service with gas and diesel generators, which created choking pollution in the business districts during the regular power outages, among other effects. This is but one example among many that show how one factor can create, on the one hand, a demand for generators and, on the other, pollution, lower incomes for shopkeepers, and a disincentive to produce products that depend on a steady and plentiful supply of electricity.

Looking at some of the influencing factors in an economy like Nepal’s is important to the designer for three reasons. One, it provides information on how a product might be designed to account for the existing conditions; two, looking at such things as availability of electricity, also provides clues and ideas as to what products are needed and are likely to be adopted; and three, although this information may be specific to a particular location, this approach and the information derived can provide valuable insights to address problems in other locations. For the above reasons, I will look briefly at the forces or conditions that in general tend to impede social change and innovation.

**Politics**

Like most governments in the developing world, Nepal's political system is unable to provide basic services to its population or the support necessary for development to its business community. The situation on the ground feels chaotic and, at times, almost anarchic. For example, in Nepal there are strikes on a regular basis. These
actions or strikes are called for a variety of reasons, most usually because some one in one of the factions vying for power has either been assassinated or, more commonly, beaten up by the opposing group. There are other reasons also, such as parliamentary disputes and labor issues, but in general these disruptive one to two day work stoppages are the result of a political system in crisis. It is not within the scope or intent of this thesis to give an account of the political history of Nepal, or explore the connection between unstable governments and poverty, and poverty and political unrest, but only to observe the effects that these strikes have on Nepal's economic and social life.

During a strike, all but the smallest shops tucked away in back streets must close for fear of attack or vandalism by those who called the strike. Taxis and buses cease operation, and transport in general becomes difficult if not impossible. Schools close and commercial life grinds to a standstill. It is easy to see what a stifling and negative effect this has on the economy and, as always, it affects the poorest the most. The impoverished shopkeeper or taxi driver who lives day to day goes without income for the duration of the strike. The ability of people to generate surplus income is hampered at every turn by forces outside their control. Those in power seem oblivious to the effects of their decisions. What one can conclude from this one example is that, at least in the case of Nepal, the political system, not only cannot provide a basic standard of living for its people, but is also a major impediment to development.

Added to the problem of constant strikes is the fact that the fractious, corrupt, and incompetent governmental institutions are unable to undertake initiatives to develop. Most of the services normally provided by government are haphazardly provided by aid from other governments and NGOs. Grants or technical assistance normally provided by
governmental agencies are largely unavailable to small businesses in Nepal. In addition, the assistance that is available often is not intended only or purely for the benefit of the Nepali people. When the Chinese government, for example, builds a road in Nepal, they do it as much to delink Nepal’s interdependence with India as to “help” Nepal. Intergovernmental aid is never given without strings attached. As a result the projects undertaken don’t necessarily benefit those in need or address the actual needs of Nepal. Similarly, NGOs, especially larger ones, tackle problems that fit their mission and agendas, leaving a large sector of the population (mainly the poor) with no services. The fact remains that of all the money spent on aid only a small portion is spent on basic needs for the poor. Water treatment, garbage removal, education, clean drinking water, gas for cooking, and electricity are all unavailable in some measure or extent to the poor. I am not arguing here for a particular policy to spend money in one way or another, but I think that acknowledging existing conditions provides a reliable guide in understanding where the needs are the greatest and where interventions may do the most good.

Moreover, from a design point of view, I think it is helpful to see the political situation as condition rather than a problem. Solving problems within a set of conditions is more useful than trying to change or waiting for the situation to change. The situation in Nepal provides a rich ground for the social designer wishing to contribute to development in a way that improves the lives of those in need. And because of the political conditions, the approaches that seem to have the best effect are direct, small scale, and specific projects. For example, while I was in Nepal I heard of a small group of self-funded individuals that went to remote villages and helped people covert their water powered grain mills to produce electricity when not grinding grain. This type of
small scale project is the type that with a minimum of funding can produce a marked improvement in the lives of a population that under normal circumstances would probably not receive aid of any type.

Social and Cultural

Nepali culture is still to a large extent influenced by its traditions. As I described previously, these traditions present more opportunities than impediments, especially to sustainable development. Like all traditions they provide community, social cohesion, and deeply interconnected ways of living. But traditions also set limits on what is possible within the culture. In Nepal, for example, the caste system still exerts a certain influence, although among the younger generation less and less. Today, the major influence of the caste system can be seen in the professions that people adopt. People from certain castes tend to be involved in certain trades and occupations traditional to their caste. Since most small businesses I observed were multi-generational, this could have a restraining effect on innovation since the older generation, which tend to be more conservative, still control or at least guide the decision making within the enterprise.

Cultural traditions do not in any direct way stifle or impede development, but as I observed in Nepal, and others have elsewhere, cultural norms have a determining effect on what technology is implemented, what product succeeds and which technology or product fails to be accepted. I observed, for instance, that in farm houses that had bio-gas for cooking, there was also an open fire pit on which a portion of the food was cooked. When I asked why this was needed, the answer was that food tasted better when cooked with wood, and that the smoke was needed to keep the attic where food was stored insect-
free. Though there are serious health consequences, discomfort, and inconvenience to cooking on an open fire, the negative effects of open fires are all trumped by the need to follow tradition. In other words, my point is not that the reasons given are not rational responses to given circumstances, but that, like any problem, there are many possible solutions: a cooking hood could be provided to direct the smoke away from the cook, or the attic space could be fumigated by smoking with burning grass or leaves in the attic space on a regular basis, etc. The lesson to be taken from this example is that design that does not take into account the traditional, cultural purposes of the "problem" it sets out to solve is likely to meet resistance in its implementation.

The experience of introducing solar cooking ovens in rural India and Africa is a further illustration of the importance of tradition and social realities in determining whether an idea or product is implemented. When introduced to villagers in rural India, solar cookers were a complete failure. In many ways these cookers represent an inspired solution to the lack of energy and resources in India: the ovens make use of a technology that requires minimal expense to build and require no fuel other than sunshine, of which there is plenty in India. What the designers failed to take into account is that rural women cannot cook during the day. Their day begins at five in the morning, at which time they prepare a breakfast for the family that usually consists of cold left overs from the previous night’s meal. The rest of the day until ten or eleven in the evening is spent working in the fields. The only meal that is cooked is late in the evening, making sunshine useless as a fuel. In other places, such as Africa, unfamiliarity with the technology and adherence to traditional cooking methods also played a part in preventing the acceptance of solar cookers. These experiences provide ample evidence for the
necessity of accounting for and understanding social and cultural realities when designing products, especially for unfamiliar cultures, but also more generally when attempting to create truly functional products that fully integrate into the human ecology in which they are meant to function. Social design must not look at the social, cultural, and human factors as restrictions or limitations, but as the defining values to guide the design of technologies, systems, and products. When human factors are ignored the result is often failure and a missed opportunity to improve the human condition.

**Technology and Infrastructure**

For all but a narrow strip on the border with India, Nepal is hilly or mountainous. Road construction is difficult and expensive both to build and maintain. During the rainy season landslides are common, exacerbated by deforestation and extremely steep terrain. The only railway is in the south and is only sixty kilometers long. The prospect of building railways in the hills or mountains is remote. Many regions, towns and villages quite close to population centers are only accessible on foot or by plane or helicopter. Remote areas are supplied by pack mule trains, and people who live in villages without road access carry their supplies on their backs using a head strap to support the weight. Due to the tourist/trekking industry air travel is well developed, but it is, of course, an expensive form of transport. Although electricity extends to many villages that have no road access, it, too, is at best limited. The challenges of transportation and a limited supply of electricity alone make industrial development in Nepal on a large scale difficult if not impossible. As long as the only measure of “development” is monetary statistics such as GDP, then Nepal is probably a long way from becoming a developed country.
But if we were to measure development in terms of a standard of living in direct relation to the culture of Nepal, then achieving objectives such as access to education, food, clean water, sanitation, and medical care is at least potentially much closer.

Not only is the physical infrastructure challenging, educational and support networks such as universities and technical schools are also few and underfunded. In other words, the institutions that are necessary for modernization and technical development are largely absent. But is industrialization the only road from poverty?

After seeing the many craftsmen I observed in Nepal, I was surprised to read in several articles on Nepal that there was a “severe shortage” of skilled labor. I don’t doubt that this is probably true when it comes to finding workers to fill service, clerical and technical jobs specific to the modern global economy. What this misses, though, is the potential in the craft workers to replace many products that are now produced cheaply, disposably, and unsustainably with high quality, durable, products made using renewable, nontoxic materials. The potential of creating an alternative production and consumption system lies dormant in many places, not just Nepal. Admittedly, what is required is a shift in values in global consumption patterns, but the imperative to move away from the present system grows ever more urgent: James Gustav Speth, Dean of the School of Forestry and Environmental studies at Yale University, frames the problem this way:

…the much larger and more threatening impacts stem from the economic activity of those of us participating in the modern, increasingly prosperous world economy. This activity is consuming vast quantities of resources from the environment and returning to the environment vast quantities of waste products. The damages are already huge and are on the path to be ruinous in the future. So, a fundamental question facing societies today,–perhaps the fundamental question–is: how can the operating instructions for the modern world economy be changed so that the economic activity both protects and restores the natural world? (28)
Exploring Alternatives

A village that I visited, located approximately four to five hours walk from the nearest road, brought into focus, for me, a whole cluster of ideas that have become central to how I view social design and development. Situated in the lower hills of the Himalayas, this village is inhabited by the Gurung, an ethnic minority. Like other ethnic groups living in surrounding villages, the Gurung farm a variety of grains, such as rice, corn, and millet. They also, like their neighbors, keep goats, water buffalo, and chickens. Additionally, they are able to supplement their diet and that of their animals by gathering wild herbs, fruit, and nuts from the surrounding forest. Unlike many places in Nepal this region is still well forested. The Gurung are well known and respected by other Nepalese for the beauty and cleanliness of their villages and for the quality of their craftsmanship in such things as woodworking, masonry, and basket weaving. (It should be noted, as an aside, that all the homes and villages we visited in the area were also for the most part beautiful, well kept, and clean.) I was also told by one of the guides, whose ancestral village was adjacent, that the Gurung are very independent; they have a village council to make decisions for the village, and negotiate with the Nepali government. Their villages are almost autonomous except for being linked to the electricity grid (Figure 10).
Beyond the sheer beauty of the location and the architecture of the homes, what struck me most here was that the children in this and nearby villages were not employed. Soon after our arrival in the area we were escorted for several hours by a happy, curious cluster of children from the village. In contrast, in and around Kathmandu and Pokhara I often saw children as young as five or six working a variety of jobs, from metalsmithing to breaking rocks in the hot sun. For me, this fact alone made me question the validity of measuring standard of living by the usual monetary statistics. These may be relevant in developed economies such as the United States or Europe, but they distort the realities in traditional cultures such as the Gurung village, where the standard of living may be best measured by the fact that the people feel themselves "rich" enough not to feel the need to exploit child labor to survive and thrive.
In these villages people build their own homes, grow their own food, make their own furniture, baskets, containers, and trade for the rest of what they need. One statistic that is often used to measure prosperity is employment. By the usual statistical standards almost everyone in this village was unemployed, yet everyone I met except the children was busy at some task, producing value and livelihood for themselves and others. By monetary standards, these villages are probably among the poorest, yet in terms of standard of living they are by most accounts very well off. I saw no one homeless, hungry, or idle. There was no garbage or sewage to be seen, which is the case in the larger population centers.

Until my arrival at this village, I had puzzled about why the urban Nepali seemed so nostalgic about their ancestral homes. The popular culture is full of images celebrating the rural life and traditions of village life through dances and songs. Yet at the same time the lure of modernity seems irresistible. They want the cell phone, computer, and car: all the conveniences that, if achieved, separate people, and often destroy the fabric of traditional rural life. This seems to me the great conundrum of development: how does one achieve an adequate standard of living and yet maintain cultural diversity, traditions, and a healthy environment?

As I reflect on that day spent in that village in Nepal, what I cannot help but think is that the answer to sustainability may be closer than we think; the question is, are we willing to accept it? It may not be the latest energy source or nanotechnology that provides a future, but the mode of living found in this small village in Nepal or the small towns and villages all over the world, where people have been living sustainably for generations. It may be that such places, which, for one reason or other, have maintained
traditional ways of life, contain the operating system for sustainability. Essentially, places like this village must live within their means, with what is locally available—if they destroy their environment they starve. My point here is not to provide a definitive response for applying these small scale solutions to the global economy, but to suggest that protecting and valuing instances of the remaining traditional cultures, wherever they occur, should be a priority in the same way that maintaining bio-diversity is important.

**Designing and Building Products at the Margins of the Grid**

I began the project to design and build a manual clothes washing machine about three months before travelling to Nepal. Previously, I had worked on an improved wood burning stove. At the onset of these two projects I had decided to concentrate my efforts on looking at and designing products that addressed the challenges of performing basic domestic tasks, such as cooking and cleaning, without access to what we consider basic services, like electricity, tap water, and cooking gas. Although those of us who live in affluent countries consider such services so common and indispensable that we can't imagine living without them, as I learnt in my preliminary research, well over half of the world does not have access to at least one if not all of these basic services. For example, seventy-five to ninety percent of the population in Africa uses wood or charcoal as the primary fuel. In Nepal, even though alternatives such as propane, bio-gas, and kerosene are available, because of either cost or cultural reasons wood continues to dominate as a fuel in both urban and rural locations. Water supplies are also absent in large parts of the world. Many urban areas in developing countries may have a water supply, but, as was the case in Kathmandu, it is unreliable, not potable, and not available to the poorest. In
many rural areas water can be a long walk away. Designing products that did not require access to electricity or running water provided opportunities to improve the quality of life for the poor; at the same time it also presented many interesting and rewarding technical challenges.

**A Manual Clothes Washing Machine**

By the time I arrived in Nepal, I had already built and tested a couple of prototypes for a manual washing machine. Through some trial and error, but also by setting clear parameters, I was able to develop a basic workable system that was an improvement over washing clothes one at a time by hand. The parameters I used to guide the work was that the product should:

- Be inexpensive
- Be easy to build, uncomplicated
- Be robust, simple to repair
- Use readily available materials in its construction
- Be portable
- Clean clothes at least as well as an electric washer
- Reduce the labor involved in hand washing
- Allow for local production or self build

Early on in its development, I realized that merely mimicking an electric washer would not work for two reasons: one, an electric washer gets clothes clean by agitating the clothes over a relatively long period (twenty to forty minutes); and two, the mechanics are complicated and expensive. The average washer costs two to three times the average
yearly salary of people in Nepal. A helpful insight that came both from researching hand washing and doing it myself is that hand washing is actually a very good way of getting clothes clean. The problem is the amount of labor and time required. Each piece has to be scrubbed all over, and the stains, if visible, need to be scrubbed further. My thinking then began to move in the direction of recreating hand washing through some mechanical means and adding mechanical advantage to the process. As is often the case in searching for solutions, the answer came from an unrelated source. A few months previously I had read about how manioc, a staple root starch in many tropical countries, is processed to remove the bitter and toxic juice by pressing or squeezing. One photograph showed one such press used in the Amazon, which consisted of a long basket much like a large Chinese finger cuff in its construction. Although the system I finally devised did not use this exact configuration, this insight led me to develop a net bag, with some embellishments to improve efficiency, as a workable component in my prototype. A further and optional improvement was adding a spiraling rotation to the shaft of the washer. This motion adds more agitation; at the same time, it also increases the complexity of construction; as a result, due to time constraints I left this feature out of the prototype I built in Nepal. At the same time, the prototype I built in Nepal had one significant improvement over my original model: the first machine I built had a simple shaft with a T handle that was pulled and pushed up and down and that proved to be very tiring to operate; in Nepal I added a lever to make the cranking motion easier and more efficient.

In the end I developed a washing system that uses a net bag to hold the clothes as a primary component. The bag has, on the top and bottom, a set of rigid pieces arranged
in a conical configuration that insert into each other as the bag with the clothes is squeezed and then released through repeating cycles. The action of squeezing and releasing mimics that of hand washing, but the machine works more efficiently than hand washing both because it can do several pieces at one time and because the lever allows the machine to squeeze and release the clothes more forcefully. The system is flexible: the lever and bag mechanism can be inserted in many different containers, or, for that matter, directly into a pool or water source. Although this is not ideal because it leads to water contamination, the fact is that most people wash their clothes directly in rivers and other water sources, and, as such, the system could be adopted in areas where tradition or culture might make the use of a machine that could not be used at the water source culturally inappropriate. My hope, however, is that because this system makes washing in a container easier that it will eventually lead to a reduction in water contamination.

The system can also be built in several sizes and more resolved versions with, for example, a wheeled cart that would allow for easy transport of the clothes and machine to and from the water source.

The washer was built in and around a small village near Pokhara where Professor Ann-Marie Conrado of the University of Notre Dame has an educational center that she started and operates in Nepal in conjunction with the HOPE foundation. This center primarily provides computer education for local villagers, but it is also a nexus for a variety of community outreach activities. As such it provided me an ideal place from which to interact with the local community, both to locate people to help in building the washer, and also to demonstrate it and see people's reactions and responses. After we had finally completed the washer, we announced a day on which we invited people to come
and see the washer in action. A small group of men, women and of course children showed up and watched as first the teacher at the school and then several others tried the washer. What was encouraging to me was that observers immediately recognized that the washer could provide a source of income: one man spoke of starting a clothes washing business, and another building and selling the machines. Whether any concrete results will ensue from this one attempt at introduction is still unknown, but the experience did confirm for me that people are receptive to products that try to solve problems specific to their lives, and they can immediately see opportunities for generating income from such products. I had hoped at the onset that beyond solving a specific material problem these products would also introduce a potential for generating income in some way. Moreover, my experience in Nepal confirms that design thinking can be used to solve problems and improve conditions (Figure 11).

Figure 11: Washer in use in Nepal.
An Improved Wood Burning Stove

On my return from Nepal I set aside my work on the washer and continued to work on a wood burning cook stove. This project presents many difficult challenges for technical, cultural, and aesthetic reasons. Stoves, especially wood burning stoves, are inherently difficult to build: the materials are stressed by constant cycles of high heat and cooling, different materials have to be combined to provide a variety of functions, from firebox to doors to cooking surfaces, and in addition air flow and combustion gases have to be balanced and controlled. When one moves beyond an open fire, all sorts of complications ensue--even building a good fireplace requires much skill and careful design. Because of the difficulty of the project I spent a considerable amount of time researching other stoves, and in particular while I was in Nepal I spent a lot of time observing not only how people there cooked on open fires but also the variety of stoves that are in use there, such as the rice hull/sawdust burning stove mentioned above. The information I gathered allowed me to assemble the functions and features that I felt I needed to incorporate into my design. In the end, I determined the following parameters and features for the design of this stove. The improved stove would

- Have a culturally appropriate appearance
- Cook using a minimum of fuel
- Burn cleanly, producing little smoke
- Burn small pieces of wood
- Be capable of burning charcoal
- Make charcoal from bio-waste using surplus heat
- Convert easily from stove to oven
- Be capable of being used to preserve food by smoking or dehydrating
- Have outside surfaces that remain cool
- Provide work surfaces
- Be made from inexpensive and readily available materials
- Be made from mostly low-impact, non-toxic materials (i.e., clay)
- Use a minimum of steel (could be from recycle) for its construction
- Be able to be built in most places

What I want from this design is more than a technically efficient firebox--after all there are several other projects both already being manufactured and in development that achieve good burning efficiency, some of which are also easy and cheap to build. What defines and differentiates my approach is that I seek to innovate in the use of technology and also create an aesthetically desirable and ergonomic product (Figure 12). What I find lacking in much of what is designed for use in the developing world is a concern for such things as the aesthetics and comfort and convenience of use. While many of the designs available are a great improvement over using an open fire, in terms of fuel consumption and air quality, most are still tippy (and therefore unsafe), low to the ground, and purely utilitarian in appearance. It is true that in many places, including Nepal, many of the hearths are placed close to the ground, partly because ceilings tend to be low and people are used to squatting, but I also noticed that many stoves, especially those of professional cooks such as road side restaurants, were built waist high, indicating that there is some precedent in this culture for cooking in a more comfortable posture. Additionally, another concern I wish to address is that young children are often with their mothers
while they cook; this not only presents serious risk for burns (burns among children are common) but also exposes children to direct fumes and smoke.

A stove is more than a hot place to cook. Of all the objects we use every day it, along with a kitchen, carries many often pleasurable associations and memories. The stove should not only provide efficient cooking but be a pleasure to use and look at. For example, in many of the homes I visited in Nepal, the kitchen and stoves and fire pits were kept clean and neat and the pots were cleaned to a shine, even though the wood fires
turns them black. The point here is that appearances matter to most people, especially to those like the Gurung and other Nepali who are still close to their traditional culture with its wealth of arts and crafts.

Another feature of the stove that bears discussion is the incorporation of charcoal making into the design of the stove. This feature increases the stove's efficiency and value in two ways: first, it uses surplus heat that would normally be wasted up the flue to make fuel, and second, it reduces the need for burning wood by providing a way of making a good hot burning fuel from such things as twigs and stems from agricultural waste. The process works by cooking this green or dry vegetation in an enclosed (therefore oxygen starved) chamber. All the moisture, volatile compounds and cellulose are converted to a gas or smoke and this smoke is released into the fire chamber and burnt (similar to what happens in an extremely hot fire where no smoke is released because it is being burnt as it leaves the wood). What remains in the chamber is carbon or charcoal dust. This dust can then be removed from the chamber once cooled and compressed with a binder such as a small amount of clay to form briquettes that can then be used as high grade fuel for future cooking.

Finally, I continue to work on devising a system of production that would easily translate to a developing country such as Nepal and be built locally. Although this goal of providing a fully resolved system to manufacture the stoves is overall workable, it has several problems that remain unresolved. The challenges of working with clay are numerous and require a lot of experimentation. The system I devised and used to build my prototype consists of a series of wood molds that constitute a quarter of the final stove. Four “identical” sections are cast and then assembled with metal banding or
straps. The problems that arise are due to the tendency of clay to warp and shrink unevenly, especially in large sections (20”x30”), making the final assembly difficult. I am confident that with further work with additives (and perhaps by developing an inexpensive refractory cement) this problem will be solved. Additionally, many possible design improvements and ideas have developed as I have worked and struggled with the construction of this prototype. For example, some changes in shape and the assembly system promise to produce improvement in ease of manufacture for the stove.
CHAPTER 3:
CONCLUSION

In conclusion, and as a way of evaluating my work of the past three years (of which this thesis is a documentation), I find it helpful to return to and apply the distinctions of hardware and software. From the onset, my intention has been both to design products that solved specific problems and to learn how to determine which products will not only be an asset to their intended users, but will also be adopted and used. This second aspect is, it turns out, the more difficult to achieve. This is not to say that creating and developing the “hardware” is not without its challenges, but the process of developing hardware is generally predictable: with each successive prototype, the technical problems from earlier iterations can be worked on and resolved. More challenging by far is designing products that can and will be adopted by end users in radically different cultural, social, and economic environments than our own.

The trip to Nepal was a key factor in helping me to understand these challenges and to develop solutions and features in my design that would mesh with existing needs and traditions. Seeing the sawdust burning stove that is used to make millet wine, for example, opened my eyes to the fact that what allows new technology to be quickly integrated into a culture is, in the first place, its suitability to local conditions (i.e., in this case, the fact that the stove burned fuel that was readily available), and, in the second, that there was an immediately recognizable economic incentive for its adoption (i.e., that
the stove could be used to make a profitable and popular consumer item, millet wine). Thus, while my original intention was to develop a machine to be used by women for washing clothes in the domestic environment, what I now realize is that its adoption may, in fact, depend upon its use as part of a profitable business, both as an item to be manufactured and sold, and as a piece of equipment in a small scale commercial laundry facility. As such, as I continue to develop this product, I will need to keep in mind this modified use and perhaps design for greater robustness, capacity, etc. This is not to say that I am abandoning the original intention of making this machine to help alleviate the work load of women in such cultures; rather, that I now recognize that to get it “on the ground” its economic advantages need to be immediately apparent. It may be, for example, that in some cultures the fact that women spend a lot of time washing clothes is culturally or socially desirable, and that there would be resistance to investing time and money into technology that would merely alleviate their work load; but a technology that offered a profit-making opportunity to men of the community would find acceptance, and perhaps have the beneficial side effect of also relieving women of some of the burdens of domestic work.

My point here is that by doing ethnographic research, I aim to avoid both the idealism and the paternalism of most design for the developing world. A realistic understanding of why and how people embrace or, alternatively, resist new technology is key to making that technology acceptable. At the same time, the ethnographic approach has also strengthened my commitment to developing design in such a way that it can serve as a kind of “open source” technology; that is, I do not see these products as the ultimate solutions for end users, but rather as models that can both be appropriated and
further developed by the local culture, and as examples of innovative thinking that might spur innovation and problem-solving among local skilled craftsmen in addressing other technical and social needs.

Clearly, this is an ongoing project, and there are a number of challenges I still need to meet. For example, the washing machine needs further testing before it can go into production, and I need to find funding and a site to work on getting it integrated into a community’s life and economy. The stove continues to present problems in terms of ease of manufacture and, like the washing machine, I will still need to find a place to test its adoption. But working on this project has helped me to develop not just two products, but a method of approaching work that takes into consideration values that go beyond large-scale profitability--values like sustainability, attention to local skills and resources, and sensitivity to cultural needs and traditions.
WORKS CITED


