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HOUSEHOLDS' WILLINGNESS TO PAY FOR ENVIRONMENTAL
PRACTICES: AN IMPLICATION OF ECO-LABELING FOR LEATHER
PRODUCTS IN ETHIOPIA

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Abstract

Eco-labels are becoming important market based instruments to influence the behavior of consumers and industry in favor of environmentally-friendly products. This study examined households' willingness to pay (WTP) a premium for environmental attributes of leather products in a hypothetical market. An eco-labeling scheme is used to differentiate leather products.

Data was collected using two-stage sampling. First purposive sampling is used to select two kebeles based on their relative distance from the pollution source and polluted river. Next 300 households are selected using systematic random sampling.

Descriptive statistics and an ordered probit model are used to analyse the data set. The result revealed that the majority of the households agreed that environmental pollution caused by conventional leather processing is a problem to the livelihood of the people. Besides, almost all respondents acknowledged the importance of the shift of production techniques from conventional to environmentally friendly production techniques. With regard to eco-labeling scheme, almost all respondents supported the programme.

About 75% of the respondents are willing to pay a premium for environmental practices. The results suggest that monthly income, family size and location significantly affect willingness to pay.

Finally, the findings in this study showed that there is a market for eco-labeled leather products. Therefore eco-labeling could be used as an important market instrument to complement mandatory laws and regulation for environmental protection.

Chapter 1 Introduction

1.1. General Background

Before a few decades the conventional wisdom among development economists and policy makers has been that improved environmental quality is a luxury for the world's poor. There has been a wrong assumption that most people in developing countries do not give much value for improvements in environmental quality because they simply can not afford to pay for it. But recently environmentalists and many members of the development community have argued for just the opposite. That is, investments in environmental quality improvements should not wait until incomes rise. The new conventional wisdom is that economic development and environmental improvements are in fact complementary, not competing, objectives (Choe et al. 1996). In relation to this, Tietenberg (2003) pointed out that the major challenge of the global economic system in the 21st century is finding a way to deal effectively with global poverty without jeopardizing the environment.

Environmental degradation is one of the eminent and immediate challenges that the African continent faces. For many poor people in Africa the quality of their environment is a matter of survival. Even if the continent lags behind in industrial performance, the environmental impact intensity of this sector in relation to the level of industrialization is among the highest in the world (UNEP, 2006).

Therefore, it is inevitable to ensure that environmental best practices are incorporated at these early stages of industrialization whenever investments are being considered. In such a way we can use the potential of industrial growth in Africa to alleviate poverty and hence to bring sustainable development. To facilitate this and to set thematic areas and priority activities, African countries established African Roundtable on Sustainable Consumption and

Production with the financial support of United Nations Environmental Programme and the Government of Norway (UNEP, 2006).

In order to help Africa to achieve sustainable development through sustainable resource use Sustainable Consumption and Production (SCP) could be seen as a base. Sustainable Consumption and Production are essential tools to attain the Millennium Goals, particularly for eradication of poverty and hunger and to ensure environmental sustainability. In this regard the overall priority of a programme of Sustainable Consumption and Production in Africa is to ensure that the basic needs of the poor are being met. The challenge here is to provide more people with a better quality of life without undermining the natural resource base and destroying the ecosystems on which we all depend (UNEP, 2006).

Sustainable Consumption and Production would have a positive impact on the development of different sectors in the economic activity. For example, industrial development could be enhanced through improvement of markets for sustainable goods and services irrespective of destination markets. This requires not only development of environmentally friendly products but also effective marketing tools to provide the necessary attribute of the product to the consumers.

An eco-label can be used as a market tool, through identifying environmentally preferable products based on an environmental impact assessment of a product compared to other products of the same category.

Eco-labeling programme sets up non-binding environmental requirements for these products and awards a special label to producers who meet the standards. Eco-labeling has increasingly been seen as an important market instrument used to complement mandatory laws and regulations for environmental protection (CCICED, 1996).

Eco-labeling is only one form of environmental labeling. There are two other forms of environmental labeling. These are government-mandated label and self-declarations. Unlike government mandated label eco-label is voluntary and unlike self-declaration eco-label involves standard setting and enforcement by a third party.

The core objectives of successful eco-labeling programs are protecting the environment, encouraging environmentally sound innovation and leadership and building consumer awareness on environmental issues. In recent years there has been a proliferation of voluntary eco-labeling programmes for various products and sectors. Many of the programmes were initiated by non-governmental organizations (NGOs), private industries and governments. All eco-labeling programmes share the common assumption that consumer's product choices are not just motivated by price and mandatory product information. There are other product attributes which could motivate consumers, including environmental objectives (GEN, 2004).

Eco-labeling will induce costs to the firm due to the adoption of environmentally friendly production techniques. Hence, the success of an eco-labeling programme largely depends on the awareness of the public on environmental goods and effective demand for those goods. Therefore, a potentially crucial factor determining the adoption of environmentally friendly production technique by firms is whether consumers would be willing to pay a premium for these practices (Moon et al. 2002). This study attempts to investigate household's attitudes towards environmental practices and willingness to pay a premium for those practices in a hypothetical market for eco-labeled leather products.

1.2. Statement of the Problem/ Justification

Ethiopian Environmental Protection Authority in its National Capacity Self-Assessment Action Plan considered promoting eco-investment as one of the underlying principles for the implementation of its action plan (EPA, 2006). In this document eco-labeling scheme development is identified as one of the potential investment areas. Despite this there is no any attempt made by the authority or different stakeholders to promote eco-labeling.

In this study leather and leather products are preferred as industrial goods to be studied due to the following reasons. Firstly, leather tanning is a potentially pollution intensive industry. Environmental concerns in a tannery include wastewater, solid waste, air pollution, soil pollution and health and safety aspects. Waste from tanneries potentially contains toxic,

persistent or otherwise harmful substances (European Commission, 2003). The problem would be devastating if there are people living around the tannery and the river basin polluted by the release.

Secondly, it is possible to decrease substantially the pollution level by shifting the production technique from conventional to advanced low waste environmentally friendly techniques. In a well managed tannery, the total load discharged in effluents can be reduced enormously, namely Suspended Solids by 58%, Chemical Oxygen Demand 38%, Biochemical Oxygen Demand 37%, Sulphides 90%, ammonia 37%, Total Kjeldahl Nitrogen 57% , Chlorides 75%, and Sulphates 67% (UNIDO, 1998).

Thirdly, Ethiopia has a competitive advantage on leather products. This is due to its livestock population and the nature of leather tanning (Loop, 2003). Leather tanning is an input oriented production process, especially raw materials and labor. Raw materials account for 50% to 70% of production costs, and labor accounts for 7% to 15%, chemicals about 10% and energy 3% (European Commission, 2003).

Lastly, even if there is Environmental Pollution Control Proclamation (Proclamation No, 300/2002) there is no enforcement mechanism to control pollution problems. There is only a Provisional Standard for Industrial Pollution which identifies tanning and production of leather goods as one of the eight sectors in industry (EPA, 2003).

1.3. Objectives of the Study

The general objective of the study is to examine households' willingness to pay (WTP) a premium for environmentally-friendly production techniques in leather processing. Specific objectives include:

- identifying household's attitude towards environmentally-friendly production techniques and their support for eco-labeling scheme;
- to investigate the effect of household's expenditure for leather and leather products on willingness to pay a premium for environmental practices;
- determining the socio-economic and demographic characteristics that influence household willingness to pay (WTP) a premium for environmental practices;
- identifying the impact of location on households WTP; and
- To give policy recommendation on the use of eco-labeling as environmental policy instrument.

1.4. Study Site

The study is conducted in Addis Ababa using two different groups of households. The first group is those households living around Dire Tannery and the river polluted by the effluent released from the tannery. Dire Tannery was established in 1972 at a place called General Winget -Kolfe Keranyo sub-city. The tannery is located in an inhabited area with dwellings as close as 50 meters from the factory (UNIDO, 2004a). The second group

would be those who are living relatively far from the pollution source and the polluted river-Bole sub city.

1.5. Significance of the Study

This study will have a significant contribution due to the following reasons. First, eco-labeling is becoming an important market based instrument for pollution control. In order to implement effective eco-labeling programme in any sector it is important to know consumers' attitude towards the programme. In spite of this there are only limited theoretical and empirical studies that address the issue. Besides, the focus of those studies is on agricultural commodities. This study would try to investigate the demand of consumers for eco-labeled leather products. Hence it will have a contribution not only to alleviate the existing environmental problems but also it will add to the limited literature in the specific area.

Second, in order to get maximum benefit from our livestock resources we have to increase not only the size of leather production but also the quality of our leather. Nowadays environmental attribute has become one of the quality parameter. Therefore, by introducing environmentally friendly production techniques in the sector it would be possible to increase our competence in the world market.

1.6. Scope and Limitation of the Study

The scope of this study is limited to the leather sector and has the following limitations:

- It considers only one of the stakeholders, consumers, in alleviating pollution problems.
- It does not incorporate production process of other inputs for leather products; such as sole production in shoe case.
- It does not address the issue of transaction cost due to the shift of production processes and administration costs for certification.

1.7. Organization of the Study

The introduction part of the thesis gives a background to the study. The second part is literature review which discusses leather production processes and eco-labeling. The third part, chapter 3, addresses data, methodology and model specification. Chapter 4 is the analysis and discussion part while conclusion and recommendations are included in chapter 5.

Chapter 2 Literature Review

2.1. Leather Production

2.1.1. Leather Production Process and the Environment

Leather production consists of three main processes. These are beam house process, tanning process and finishing process. In the beam house process, unwanted parts such as hair, skin, and hoof are removed from raw hides. If the skin is preserved by salt, there would be a desalting to remove the salt. In this process the raw hides are prepared for the subsequent tanning process. These are liming, unhairing with sulfide, fleshing, trimming, deliming and bating. The waste water from this process is characterized by high alkalinity and contains high concentration of suspended solids (skin, hair- mud) and oil/ grease. In addition, chemicals used in this production step, such as lime, soap, ammonium salts, alkaline, sulfide and bactericide are discharged with the beam house wastewater (GTZ, 1997).

Then the pre-treated hide is split and the top part of the hide, called upper hide or grain, is used for production of finished leather. The lower part is called lower hide or split. The hides are cleaned and cut in to required sizes and they will be passed to the next process called tanning. Tanning is a process in which decomposable raw hide is changed in to finished hide which is more stable, not decomposed, and resistant to hot water condition and hot water. This is done by chemical reaction between natural tanning, chromium or other chemicals and collagen (protein) in the hides (Ibid).

Two types of tanning processes are mainly used for the production of leather. They are chrome tanning which uses chromium as tanning agent, and vegetable tanning which uses natural tannin or synthetic substances. Chrome tanning is more popular, because it is faster and cheaper. In addition, the chrome tanned leather is more resistant to heat and humidity. Prior to tanning, pickling with salt is a necessary step for both processes. Salt, sulphuric acid and formic acid are used in the pickling process. The purpose of pickling is to adjust the P^H (hydrogen ion concentration) value to a level which is suitable for the tanning reaction. During the tanning processes, specific chemicals (high exhaustion chromium fixing reagents) may be used in order to increase chromium uptake and to reduce the residue chromium concentration of the float- wastewater (GTZ, 1997).

After tanning the leather will be sammied to become dry, trimmed with a trimming machine, and classified according to its quality. Then it is ready for sale as a wet blue (semi-finished) or further processing. The next process in the production of leather is finishing process which constitutes re-tanning for wet blue and dyeing. Re-tanning is usually carried out to improve the quality of the wet-blue. In this step the chemical used may be chromium, tannin or syntan (a synthetic chemical).

Leather dyeing may or may not be carried out depending on market demand. The dyeing process depends on the type of dye used. Normally formic acid is used for P^H adjustment before dyeing. Up-take of dyes on the leather is facilitated at increased temperature. Steam is usually used to heat up the leather and the dyeing liquor. Besides, to ensure that the final leather is soft and stable, fat-liquoring is necessary for the tanned leather. After this, the leather will be taken for spraying, pattern printing, etc, according to the demand of the market (GTZ, 1997).

The total load of pollution discharged in the effluents from individual processing operations of conventional leather technology in the three stages of leather processing is as follows: Suspended Solids 83-149 kg/ ton, Chemical Oxygen Demand 145-231 kg/ton, Biochemical Oxygen Demand 50-86 kg/ton, Chromium 3-7 kg/ton, Sulphides 4-9 kg/ton, Ammonia 4-6

kg/ton, Total Kjeldahl Nitrogen 12-18 kg/ton, Chlorides 137-202 kg/ton and Sulphate 52-110 kg/ ton (UNIDO, 1998).

2.1.2. Technologies and Production Methods that can

Reduce Pollution

Processing hides and skins to convert them into leather has long been an important industrial activity. The potential environmental impact of the processing has been regarded as an inevitable consequence of such activity. The Conventional Leather Processing produces a high level of effluent loading. There are industrially proven technologies available for decreasing the pollution load. The pollution load decrease is made possible by introducing advanced low waste techniques.

Various technical methods for solving problems of negative impact of hide processing on the environment fall into two broad groups. The first group involves the introduction of processing technologies usually termed as Low Waste or Cleaner Technologies that can be regarded as Advanced Technologies in comparison with conventional ones. Their characteristic consists mainly of decreasing the effluent pollution load, not using harmful chemicals and producing solid wastes which are utilizable as by products. The second group is Waste Water Treatment and Environmentally-Friendly Solid Waste Handling and Processing (GTZ, 1997).

By introducing industrially proven low-waste advanced methods, the total load of pollution discharged in effluents can be reduced significantly; namely Suspended Solids by 58%, Chemical Oxygen Demand 38%, Biochemical Oxygen Demand 37%, Sulphides 90%, Ammonia 87%, Total Kjeldahl Nitrogen 75%, Chlorides 75% and Sulphates 67%. Even though the pollution load of chrome can be decreased by 94% by introducing advanced technologies, the minimum residual load 0.15 kg/ton raw hide can still cause difficulties in land filling and composting of sludge from wastewater treatment under legislation in force. The amount of effluent produced in processing of one ton of raw hide can be decreased from 34-56 m³/ton to 12m³/ton (UNIDO 1998)

2.1.3. Leather Production and Leather Products

in Ethiopia

The Ethiopian leather & leather products industry has reached an advanced stage of development when compared with other African countries in the Region. Furthermore it has a reputation of excellence in the international market, especially for sheep skins leather for gloves industry (UNIDO, 2004b).

Ethiopia possesses one of the world's largest livestock populations. In particular, Ethiopia is seventh for cattle, ninth for sheep and lambs and eighth for goats. Within Africa, only Sudan has more bovine cattle and considerably more sheep and lambs, but in goat population Ethiopia occupies the third place after Sudan and Nigeria (Ibid).

The production of hides and skins is found principally in the farms of the mountain and high plain areas; this environment gives hides a considerable thickness (an important characteristic). Ethiopian highland sheep skins, estimated to comprise about 70% of the national sheep skin production, have an international reputation for a unique combination of characteristics of fine quality, thickness, flexibility, strength and compact texture. They are very suitable for the production of high quality leather garments, sports gloves and are in great demand on the world market (UNIDO, 2004b).

The government of Ethiopia has identified the leather sector as one of the growth sectors capable of accelerating economic development by creating more employment, generating income through exports, and offering investment potential. In 1998/99 the share of leather and leather production accounted for 71.95% and 6.1% of the manufacturing export and that of the total export earning respectively (Ibid).

There are 21 tanneries in operation, which have created direct job opportunities for 3975 people. Of the 21 tanneries, 9 are 100% export oriented in semi-processed skins and 14 have facilities for the treatment of effluent. Four tanneries are expected to start operation in the near future and licenses have been issued for the establishment of an additional 18 tanneries. The Ethiopian tanning industry- state owned and private sectors, addresses two market segments: 1. Export of semi- processed and finished leather and, 2. the local market for finished leather (UNIDO, 2004b).

The leather product industry in Ethiopia includes the manufacture of leather shoes, shoe uppers, leather garments, bags, and stitched upholstery. The producers belong to the formal and informal sectors of the economy. The footwear industry is composed of two groups: the larger mechanized footwear industries and the remaining production units that can be considered as medium and small and medium scale companies (MSMs). The classification is based on their capacity, production volume and level of employment. A list of 12 mechanized footwear factories includes the most important medium- large producers in the formal sector. The installed yearly production capacity of the major footwear enterprises is 3,726, 250 pairs while their actual output is 1,787, 500 pairs. For the informal sector the installed capacity is about 3,456, 750 pairs annually (Ibid).

The second important sector in the leather industry is the leather garment sector. There are 14 major producers of leather garments. The output of the

leather garment sector ranges from 10-60 garments per day whilst the installed capacities range from 20-150 pieces per day. This is principally due to (i) the size and static state of the domestic market as well as (ii) a negligible penetration of the export market. At present the domestic market represents the principal outlet for the manufacturing companies. The main outlets are local consumers from medium to high income groups, resident foreigners and informal exports carried out by Ethiopians living abroad who sell the garments over soon (UNIDO, 2004b).

2.2. Eco-labeling

2.2.1. Background

According to Wessells (2001), the underlying economic theory for labeling products can be traced back to Stigler's (1961) work on the economics of information (FAO, 2001a). In Stigler's work, information is portrayed as a valuable resource, in particular, information on prices. Different sellers may ask varying prices for the same product. Determining the pool of sellers, and prices demanded by each seller for a good, is a time-consuming task. Thus there is a "search cost" attributable to time and energy expended by the consumer in finding the seller with the lowest price. Hence, consumer searches for information (lowest price) until the marginal benefit of additional informations equal the marginal cost of obtaining the additional

information. As a result, there is a market for information based on the consumer's willingness to pay for information and producers' marginal cost of providing information (Stigler, 1961).

Stigler however did not discuss search costs in the context of finding the highest quality product. In this regard, Nelson (1970,1975), contends that the problem of determining quality levels in the market is even greater than the problem of determining price level since information about quality is usually more difficult to obtain than information on prices. Nelson distinguished two types of products: search goods and experience goods. In the case of search goods one can determine the quality of the product by searching, where quality might be defined as price, size or package or color. In this context, Nelson's search goods are defined in a similar fashion to Stigler's definition as those goods that consumers can determine quality by examining or researching the product. Consumers' acceptance of producers claims will vary by the nature of the characteristics advertised. Advertising may be used by producer to provide consumers with information on the lowest prices among grocery stores, in their area and other information, this will lower the consumers search costs.

When we come to experience goods quality is expressed by their tastes, durability, or maintenance needs. Hence, consumers cannot determine a products quality until they buy and use it. Consumers will evaluate those goods they repeatedly buy in some what the same manner as search goods.

For instance, bad-tasting good will quickly lose its share of the consumer's budget.

There is a third category of goods, credence goods, which is added to the definition of goods by Caswell and Mojduszka (1996). In the case of credence goods, one cannot determine quality either through search or experience. For example, the nutritional value of a good or a production process of a good cannot be determined by search or experience. Credence goods are more complicated in that consumers cannot determine the products quality even after they buy and consume it. Here we have an imperfect market because firstly, there is asymmetry in possession of knowledge between producer and consumer. And secondly, it is not practical for consumers to assess the quality of the product. In this regard food safety and nutritional information are considered to be attributes of credence goods since an individual consumer will not find it practical to test the protein or food-borne pathogen contamination level of food (Caswell & Mojduszka, 1996). According to Caswell (1998) the environmental friendliness of a good is also an attribute of credence goods. Consequently, labeling can transform credence attributes to search attributes that allow the consumer to judge quality of the good before they purchase.

A crucial factor here is that, there should be an intervention by a third party to ensure that the producer provides the consumer with truthful information. If this condition is met labeling could be used as a means of

providing information to consumers. Labeling would address the difficulties of a market for a good that has credence attributes, so that consumers would make informed decision. While issuing the labels either third party certification is used or there may be government regulation. Third party certification is defined as a certification done by a body that is not in any way involved in the production, marketing, or consumption of the good in question. This may be a private organization or a public organization. Government regulations can mandate labels, formats for labels or controls on voluntary industry claims. Therefore, if a product has an eco-label regarding its production process, an attribute not easily determined by the consumer, the consumer may prefer to purchase the eco-labeled product, given that all other quality attributes are the same for the non- eco-label good(FAO,2001a).

Lancaster (1966) pointed out that attributes of goods have value to consumers. That is, consumer's demand for a product is characterized demand for a product instead of consumer's demand for a bundle of attributes, where each product has one or more attributes. In essence it suggests that consumers derive utility not from the goods themselves but from the attributes the goods are believed to possess. Lancaster's work has been the underlying theory which is used as justification for the economic analysis that has been done for evaluating consumers preferences for seafood eco-labeling (Wessells et al. 1999) and agricultural commodities eco-labeling (Moon et al. 2002) among others by viewing the characteristics of a

product as quality, safety, price, production process, taste, color etc. Caswell and Mojduska (1996) classified major categories of food product quality attributes as food safety (e.g. levels of microbial pathogens, residues), nutritional value (e.g. compositional integrity, taste), package, and process (e.g. animal welfare and environmental impact). Accordingly, one can evaluate the marginal value of each of these attributes to the consumers.

2.2.2. Theoretical Literature Review

There is a very limited theoretical analysis of the economics of eco-labeling. This includes Mattoo and Singh (1994), Nimon and Beghin (1999a), Sedjo and Swallow (2000), and Swallow and Sedjo (2002).

Wessells (2001) cited Mattoo and Singh (1994) for the discussion of eco-labeling in general, that is without attaching it to a particular commodity. They argue that in certain cases, eco-label can lead to adverse effect on the environment. In a partial equilibrium model there is assumed to be a homogenous product, which can be produced by two methods. One is environmentally-friendly and the other environmentally unfriendly. In addition there are two types of consumers, those who are concerned about the environment and those who are not. The major assumption is that concerned consumers are willing to pay more for the product that they are sure has been produced by environmentally friendly methods than for the same product produced in environmentally-unfriendly methods. While the

unconcerned consumers react strictly to price, purchasing whichever product is least costly.

If demand for the environmentally friendly product is greater than its supply, the price of the eco-label product will increase in relation to the price of the environmentally unfriendly product. This will lead to a standard result where there is an economic incentive for producers of environmentally unfriendly products to switch to environmentally friendly production.

However, Mattoo and Singh find that, at a particular equilibrium price, if the consumer demand for the environmentally friendly good is smaller than the proportion of that good, then eco-labeling may lead to increased prices for unlabeled goods, and hence increased output of products produced by methods detrimental to the environment. This means if there is little demand for the environmentally friendly good relative to the unfriendly good, then it is possible that the price of environmentally friendly goods would, in equilibrium, be less than for environmentally unfriendly goods. This would lead the unconcerned consumers to buy the friendly goods, until price arbitrage is created where the prices of friendly and unfriendly goods are equal. This new equilibrium price based on differentiated goods will be higher than the equilibrium price under no differentiation, causing increase in production of both friendly and unfriendly product.

Swallow and Sedjo (2000) use a general equilibrium framework to analyze the effects of mandatory eco-labeling of forest use on the amount of sustainable harvested acreage of forest. The focus of their analysis is whether ecosystem quality on a regional or global scale will necessarily improve after the economy adjusts sources of supply to the demands generated by the implementation of eco-labeling. While the authors admit the results from the general case are ambiguous, the analysis shows that there is a potential for certification to lead to reallocation of land away from forestry towards less ecologically sustainable uses, with the possibility of sufficient impact to diminish global biodiversity. If the forest owner is faced with the mandatory choice of becoming certified or removing his products from the market, the forest owner may well choose to reallocate his land to another productive use. That other use may or may not be beneficial to the forest ecosystem.

Sedjo and Swallow (2002) make a conceptual analysis based on a voluntary scheme. The focus is on whether the market will necessarily generate a price differential for labeled and unlabelled wood products. Sedjo and Swallow show that the average price of wood will increase if certification is costly or if eco-consumers generate a sufficiently large increase in demand. These factors could then result in a price increase in labeled wood, large enough to create an increase in demand for non-labeled wood through a substitution effect, putting pressure on supplies of non-labeled wood with potential negative impact for forest ecosystems. Alternatively, given that certification is

voluntary, the forest owner may choose to supply uncertified wood, and that practice may be less damaging to the ecosystem than the alternative use which would have been employed under mandatory certification. In this respect, voluntary certification may be better than mandatory certification. It prevents the land from being allocated to an even less sustainable ecosystem under something other than timber production.

Nimon and Behgin (1999) provide a formal analysis of the welfare and trade implications of eco-labeling programmes. The analysis is based on a textile market between an industrialized north and a developing south, and the eco-labeling involves production process standards. In their stylized model, the north imports conventional textile goods from the south and produce conventional good as well. It is also assumed that the north has a tariff in place on imports from the south. There are also fixed costs of certification.

The results from their analysis of comparative static is that a labeling programme in the north, without participation from the south, is detrimental to both Northern and Southern producers of conventional textiles. Consumers' benefits from a larger choice set, but demand for conventional textiles, including imports, decrease. The presence of a specific tariff worsens the decline of imports of conventional textiles. Some of the negative impacts on the domestic conventional textile industry can be mitigated by increases in tariff.

If the south also implements eco-label, the south's produces of conventional textile are even worse off than before, but the south regains market share in aggregate. The issue then becomes harmonization of eco-label and production process standards. The analysis assumes that the quality of the eco-label good in the south is lower than the quality of the eco-label good in the north due to a lower marginal damage of pollution in the south's environmental quality. Given that divergence in quality, if both the north and the south have eco-label, suppliers in the south would rather harmonize upward, as long as the increase in demand dominates the loss caused by increasing marginal costs due to higher standards. Harmonizing downward would benefit the south's conventional textile industry. Upward harmonization imposes further competitive discipline on the north's eco-labeling industry, thus benefiting consumers with lowered prices.

2.2.3. Empirical Literature Review

There appear to be few empirical studies on the market for eco-label products in the economic literature. The most recent include, Nimon & Beghin (1999b) who investigate the market for eco-labeled textiles, Wessells et al. (1999) and Johnston et al. (2001) who investigate consumer demand for eco-labeled seafood in the U.S. and Norway and Moon et al. (2002) for eco-labeled agricultural commodities.

Nimon and Beghin (1999b) investigate the price premium for “organic cotton”, “environmentally friendly dyes” and “no-dye” apparel. The data used are price and characteristic data for apparel from U.S. retail mail order catalogs and Internet catalogs collected between May and October 1996. The data set contained 794 observations including 364 observations of conventional apparel and 430 observations of organic apparel. Of those observations, 117 contained both synthetic /cotton fiber blends.

The analysis is based on a hedonic price function in which the price of the product is regressed on explanatory variables that account for the various attributes of the good. In this analysis, the variables used to explain price include type of items (pants, socks, T-shirts, etc.) catalog, gender, age, dye type (low, impact, no dyes), organic cotton categories and shares of organic cotton and synthetic fibers in total fiber content. The results identify a robust premium for organic cotton; with an average premium of 33.8% of total apparel price. The authors could not find any evidence of a premium associated with environmentally friendly dyes; however, there is a discount for the no dye attribute that mostly reflects cost savings from simplified production.

Wessells et al. (1999) investigate the demand for eco-labeled seafood (cod, cocktail shrimp and salmon, specifically) in the U.S. market. The methodology used involved gathering data with a survey administered to a random sample of 1,640 U.S. consumers by telephone. The survey was designed so that respondents compared certified (i.e., with an eco-label) and

uncertified (i.e. without an eco-label) products, whose prices differed according to a premium paid for the certified product. With the exception of difference in certification and price, the two products were identical in all regards, including quality and freshness. Certification was designed as a “program... that would label seafood in order to guarantee that it is caught under strict controls that prevent too much fishing. Certified seafood will have (a) new label that guarantees no over fishing. Uncertified seafood will not have this guarantee.”

Consumers were presented with three paired comparisons, in random order for salmon, cod, and cocktail shrimp. The base price varied for each species, depending on the range of common retail price for each product at the time of the survey. Premium ranged between \$2.00 ad \$5.00 per pound. The certifying agency alternated between the World Wildlife Fund (WWF), the National Marine Fisheries Service (NMFS), and the Marine Stewardship Council (MSC). It is important to note that certified salmon was compared to uncertified salmon, certified cod to uncertified cod, etc. The survey did not ask respondents to choose, for example, certified cod versus uncertified salmon.

Data were collected in the summer of 1998 on the household’s geographic location; trust in specific agencies as providers of certification, seafood consumption habits, household seafood and grocery budgets, memberships in environmental organizations, perceptions of the status of Pacific salmon

and Atlantic cod stocks, and a variety of other factors with potential impact on preferences for labeled seafood products. On average, about 70% of respondents chose eco-labeled shrimp, salmon or cod over non eco-label.

Econometric analysis was performed to determine the factors that influence the choice at eco-label over non eco-label products using a logit analysis; results suggested that respondents' preferences for eco-label fish are most affected by size of the premium. As the premium increases, the likelihood that the respondent would choose the eco-label over the non eco-label produce declines. In addition the likelihood of choosing eco-label fish differed by species, geographic location of the household, consumer group and was slightly affected by certifying agency. For example, the effect of the premium was negative for all species, but smaller in magnitude for salmon and greater for cod. Households on the west coast of the U.S. were more likely to choose certified salmon than those in other parts of the nation. Households that were members of environmental organization were more likely to choose certified fish over uncertified. Other factors found to influence choice of eco-label fish were gender- females were more likely to choose eco-label products than men; and seafood budgets – those households with larger seafood budgets were more likely to choose uncertified products. These results also indicated that significant consumer education must take place; two- thirds of respondents indicated that they were unsure about the status of Pacific salmon and Atlantic cod stocks.

Johnston et al. (2001) extends the paper by Wessells et al. (1999) by examining cross-country differences. In addition to the U.S. data discussed above, the authors collected data from a virtually identical telephone survey administered to 2,039 Norwegian residents during the fall of 1999. The primary differences in information collected between Norway and the U.S. were that a) instead of cocktail shrimp, the Norwegian survey asked about the smaller coldwater shrimp; b) instead of using NMFS as a governmental certifying agency, the Norwegian survey used the Norwegian Fisheries Directorate; and c) the premiums were specified in Norwegian Kroner, not U.S. dollars.

It is found that Norwegian consumers were less likely to choose certified seafood products, averaging closer to a 50% preference for certified. Approximately 34% preferred uncertified, while a fairly large percentage, 15%, gave no answer.

In order to test the hypothesis that consumer preferences for eco-labeled seafood differ across nations, econometric analysis of an equation similar to that discussed above was performed. In this case, the Norwegian and U.S. data were combined with appropriate variables specified to determine if there are differences in the two sets of respondents. In order to do the comparison with premiums that were in both Kroner and Dollars, the premiums were converted in to percentage. Results indicate that there are differences. Again, results indicate that as the premium grows, consumers will be less likely to

choose eco-label seafood. This effect is even stronger in Norway, thus consumers in Norway are more price sensitive. In addition, consumers in Norway are more likely influenced by the certifying agency than the U.S. consumers. Those Norwegians who belong to an environmental organization are less likely to choose certified compared to U.S. respondents who are members of environmental groups.

There are several implications from the results of this study. Most importantly, respondents to these surveys were educated about what the product was being certified for i.e. why it had an eco-label. Once educated, they were then asked to make their choices between certified and non-certified. The results showed that the majority of respondents chose eco-label products, however, that was very dependent on the size of the premium. In addition the sample of consumers who were surveyed in each country could be considered “educated” consumers- i.e. educated about the meaning of the eco-label. In reality, when these choices are no longer hypothetical and consumers may be more or less educated about the eco-label, consumers may be more or less likely to choose products from certified fisheries. That choice will certainly depend on the premium paid for eco-label fish over non eco-label, but will also depend on how aware the consumers are about the issue the eco-label addresses. Furthermore, the consumer must understand the content of the label i.e., the link between their purchasing decision and effective

management of stocks. The analysis of the paper does not provide the authors with the means to compare choices with and without the information on what certification means.

Moon et al. (2002) uses a labeling scheme to differentiate agricultural commodities produced by environmentally sound techniques from those conventionally produced. According to the authors adoption of such practices is determined by whether consumers would be willing to pay a premium for environmentally friendly production techniques. Eco-labeling will facilitate farmers to capture the rewards for environmental superior performance by providing missing market information about the attribute.

In this study, survey questionnaire was not designed to calculate the monetary value of the technology but to identify socioeconomic and demographic characteristics affecting consumer attitudes towards environmentally sound production techniques. The good used in the study is improvement in environmental quality through the purchase of agricultural commodities produced by environmentally sound techniques. The survey was designed by multi-disciplinary team of researchers from environmental and agricultural research institutions in the United States and Germany. Respondents were drawn from residents of six of the total of twenty-three districts in Berlin. The six districts represent former eastern and western part of the city and reflect three levels of incomes. 2773 residents drawn in

proportion to the district share in the total population of the city were included in the sample, and 525 of the mail survey were returned.

A question intended to measure consumer preferences for environmental quality as related to agriculture was asked. Responses define the WTP, in five categories: 0%, 1-10%, 11-20%, 21-30%, and above 30%. About 17% of the respondents were not willing to pay more. A similar percent of respondents are willing to pay over 30% more for environmental attributes in agricultural products. Overall, nearly 83% of the respondents are willing to pay a premium to prevent environmental degradation associated with agricultural production.

An econometric analysis was done and the result indicated that, household's income did not have statistically significant effects on the WTP for environmentally sound agricultural practices. That is, respondents with larger incomes were not willing to pay more than those with less income. Education was found to be insignificant in consumer valuation of agricultural products. Younger respondents were found to be more willing to pay and marital status turned out to be unimportant in explaining WTP for the use of environmentally friendly agricultural practices. There are differences in WTP across the western and eastern administrative districts of Berlin; the western has a stronger willingness to pay.

2.2.4. Eco- labeling in Developing Countries

Eco-labeling has gained increasing popularity in recent years. Germany's "Blue Angel" label, launched in 1978 to denote environmentally friendly products was a pioneering eco-labeling effort. Since then products with labels promoting attributes like "recyclable," "degradable" or "ozone friendly" are common. Consequently, there has been a notable increase in developing country participation in initiating voluntary eco- labeling programs since 1991. Surveys in developing countries like India, South Korea, Chile and Mexico have found that consumers would be willing to accept higher prices for environmentally friendly products (Basu et al. 2003).

Africa

The development of environmentally-friendly products is one of the major elements of achieving a shift in consumption and production patterns. This could be either an opportunity or a threat to developing country's products in general and African products in particular depending on the level of preparedness. Given the predominantly organic and flexible nature of production process in Africa, countries in the region may benefit significantly through the development and implementation of eco-labeling programmes in the region (UNEP, 2006)

In Africa, two example initiatives have been set up to improve the quality of textile products in North and West Africa. The first example is the 'Fibre Citoyenne' which has been designed to provide guidelines and tools to textile enterprises and their customers on quality, environment and social responsibility over the whole textile process. France, Morocco and Tunisia are the countries that support this initiative to integrate sustainable development approach in the business plan of textile Small and Medium Scale Enterprises (SMEs). The second example is the promotion of 'Bio-Cotton' in West Africa sponsored by HELEVETAS and implemented in Burkina Faso, Mali, and Senegal. The initiative aims the promotion of 'Bio-Cotton' and the development of fair trade market of bio-cotton products in Europe. The pilot projects 'Fibre Citoyenne' and 'Bio-Cotton Production' has demonstrated to feasibility of eco-labeling initiatives. The overall objective is to wide spread and disseminate the results of these pilot cases for global textile development in Africa (UNEP, 2006).

India

India has introduced an eco-label scheme called Ecomark in 1991. Like other eco-label schemes, Ecomark is a market based non-regulatory-instrument to reduce pollution. The main objectives of the scheme are to assist consumers to become environmentally responsible in their purchasing

decisions and to provide an incentive to manufacturers to reduce any adverse environmental impact of their products. Ecomark is available only for consumer goods and eligible manufactures must meet both environmental and quality criteria. Leather and leather products are among the goods which are eligible for Ecomark (Alam 2005).

Alam (2005) examines some of the issues that has an impact on the success or failure of eco-labeling scheme in India's Leather Industry. The study is based on information collected from a large variety of source, both primary and secondary. The primary information was collected by a number of detailed interviews with various stakeholders. These include government policy makers, regulatory agencies, research institutes, agencies responsible for the implementation of the eco-labeling schemes; manufactures, exporters, NGO and consumer groups and industry associations.

The study basically addresses three issues about Ecomark. These are the performance of Ecomark in India, the factors which affect the popularity of Ecomark and measures that can increase the popularity and impact of Ecomark. According to the study Ecomark has been a near complete failure. The basic reasons for this are: a lack of demand for environmentally friendly products, industry's lack of interest and lack of promotional efforts. For a very large majority of Indian consumers price is most important and

environmental concerns do not play a role in their choice of products. Further more the agencies responsible for popularizing Ecomark have done a poor job and, as a result neither industry nor consumers are aware of the label. Hence, if Ecomark is to become an important instrument to promote environmentally friendly products, its acceptance both by industry and consumer must have to be increased.

China

The work on the establishment of an eco-labeling programme in China started in 1993, when the National Environmental Protection Agency issued a circular concerning the establishment of the National Environmental Programme. The objectives of China's environmental labeling program are:

- to reduce domestic environmental stress of products by using market forces as a means to supplement mandatory environmental laws;
- increase public awareness on the environmental impact of products;
- and
- To promote the trade of China's environmentally friendly products.

The programme targets products that have significant environmental impact, that are closely related to people daily life and that cause global environmental problems.

Chapter 3 Data, Methodology and Model Selection

3.1. Contingent Valuation Method

In this study one of the most commonly used environmental valuation techniques, that is, Contingent Valuation Method (CVM), is applied. The CVM is a direct method in that it involves asking a sample of the relevant population questions about their willingness to pay (WTP) or willingness to accept (WTA). It is called Contingent Valuation because the valuation is contingent on a hypothetical scenario put to respondents. Its main use is to provide inputs to analyses of changes in the level of provision of public

goods/bads, and especially of environmental 'commodities' which have the characteristics of non-excludability and non-divisibility (Perman et al. 2003).

Currently CVM is used widely as an environmental valuation technique in developing countries. According to Whittington, it is easier to administer high quality contingent valuation surveys in some developing countries than it is in industrial countries. This is due to high response rate and respondents are often quite receptive to listening and considering the question passed to them in developing countries. In addition to this interviewers are inexpensive relative to the industrialized countries. This allows CV researchers to use larger sample size and conduct more elaborate, split – sample experiments (Whittington, 1996).

CV method uses survey questions to elicit people's preferences for public goods by finding out what they would be willing to pay for specified improvement in them. It circumvents the absence of market for public goods by presenting consumers with hypothetical markets in which they have the opportunity to buy the good in question. In the survey respondents are presented with materials which consists of three parts: 1) a detailed description of the good being valued and a hypothetical circumstance under which it is made available to the respondent; 2) questions which elicit the respondent's willingness to pay for the good being valued; and 3) questions about respondent's characteristics (for example, age, income), their preferences relevant to the good being valued, and their use of the good (Mitchell and Carson 1989).

According to Carson (2000), a carefully done CV study can provide much useful information to policy makers. Most good surveys contain the following: a) an introductory section that helps to set the general context for the decision to be made; b) a detailed description of the good to be offered to the respondent; c) the institutional setting in which the good will be provided; d) the manner in which the good will be paid for; e) a method by which the survey elicits the respondent's preferences with respect to the good; f) debriefing questions about why respondents answered certain questions the way they did; and g) a set of questions regarding respondent characteristics including attitudes and demographic information.

In CVM there are two standard measures of economic value. These are willingness to pay (WTP) and willingness to accept (WTA). WTP is the appropriate measure in the situation where an agent wants to acquire a good. Minimum willingness to accept compensation is the appropriate measure in a situation where an agent is asked to voluntarily give up a good. Both of these measures are Hicksian consumer surplus measures and are often defined net of the price actually paid or received. In order to decide whether WTP or WTA is the correct measure one has to know the property right of the good (Carson, 2000).

In this study CVM is used to analyze the willingness to pay of households for environmental quality through adoption of environmental friendly

production techniques by tanneries. As noted earlier in chapter two of this thesis the conventional leather production process is pollution intensive and uses harmful chemicals and hence it is necessary to shift the production technique to environmentally friendly techniques. The question here is how to cover the cost to be incurred by firms due to adoption of environmentally friendly techniques. The public good to be valued is environmental improvement in the process of leather production. Accordingly, the standard measure used in this study is willingness to pay for environmental practice.

Another issue that arises in this study is due to the nature of the public good which is being valued. An environmental practice in the production process of leather products is credence good; therefore, it is important to transform this attribute to search good. The transformation will bridge the gap between producers and buyers that arises from the information asymmetry. This could be done through an eco-labeling programme for leather products. Thus eco-labeling is used as an environmental policy instrument in the valuation of environmental practices.

3.2. Site Selection and Sampling Techniques

The study is conducted in Addis Ababa, and the site selection is as follows. Firstly, a tannery is selected based on its location and the extent of negative impact caused by effluent discharged from tannery due its production process. Secondly, the settlement of people in the area and along down stream of the polluted river basin is considered. Thirdly, the complaint of the

inhabitants in the area is also considered. Dire Tannery is selected among the tanneries in the city. ¹

Secondly, the second site is selected based on its relatively far distance from Dire Tannery. In this regard, kebele 08/09 is selected from Bole sub-city administration.

Dire tannery is one of the 21 tanneries in Ethiopia. It was established in 1972 and it is located 8 kilometers northwest from the centre of Addis Ababa in Kolfe-Keranyo sub-city. The tannery is located in an inhabited area with dwellings as close as 50 meters from the factory (UNIDO, 2004a).

The sample households in this study are drawn using two stage sampling. In the first stage kebele 14 and 08/09 are selected from Kolfe-Keranyo and Bole sub-city administrations respectively. This is based on the research purposes and hence is purposive. Next 300 households are randomly selected based on the proportion of the households residing in the sub-cities.

There are 432961 households in Addis Ababa, among which 52611 and 38209 resides in Kolfe sub-city and Bole sub-city respectively (CSA, 2004). Accordingly, 160 households and 140 households are randomly drawn from kebele 14 of Kolfe and kebele 08/09 of Bole respectively to make a sample of 300 households.

¹ An interview with Ato Debebe Yilma –Deputy General Manager of Cleaner Production of Ethiopia.

In the second stage a systematic random sampling is used to select the sample households. There is no list of household units in kebele 14 of Kolfe sub-city. Hence I used the estimated number of households by the officials in the kebele which is about 2700 household units.²Accordingly one household is selected out of seventeen to make 160 household units. Sampling was started from the nearby household unit to the tannery in the kebele.

The situation was different in kebele 08/09. There are 2208 households in the kebele and there is exhaustive list for those households with a house number. Hence one household is selected from every sixteen households to make 140 household samples using a systematic random sampling from the list.

3.3. Method of Data Collection

In this study a well-designed survey questionnaire is used to elicit the necessary information from the respondents. The questionnaire is designed to have four important sections (Appendix). The first section is the introductory part which states the purpose of the research, confidentiality and the selection procedure of the household by the researcher-this is done to avoid unnecessary suspicions by the respondent.

² An interview with Ato Alemshet-Manager of kebele 14.

The second section is basically designed to elicit the necessary socio-economic and demographic characteristics of the selected household unit and the respondent in the house. It comprises of demographic questions such as sex, age and location; household's income questions and expenditure questions.

The third section is a scenario-it starts by stating the existing status of environmental regulation in the country in brief. This could be seen as a status quo in the valuation process. Then it addresses the health and environmental problems of pollution in general and pollution problems caused by the conventional tanning production process in particular.

This part also tries to create awareness about a need for a shift of production process from conventional to environmentally friendly production process. In this stage the most important thing is to state the environmental quality improvement from the status quo to an achievable amount of pollution reduction. Lastly, the hypothetical market for the environmental good (environmental attribute of leather products) and the voluntary eco-labeling scheme are described.

The fourth section is comprised of a set of questions designed in such a way to elicit the respondent's attitude on environmental good stated, their support for eco-labeling scheme, and their willingness to pay. The questions are in three forms-multiple choice questions for attitudinal questions;

dichotomous questions for the support of eco-labeling programme and willingness to pay questions. Meanwhile, those respondents which support the programme were asked a participatory question for their willingness to pay. Then a dichotomous choice question for willingness to pay is asked followed by one or more dichotomous choice format question(s) for sequential bids (2%, 4%, 6%, 8%, and 10%). Respondents are asked whether or not they accept some specified sum, and then a question is repeated with a higher or a lower amount, depending on the initial response, and so on until the true value is finally bracketed (Cameron and James, 1987).

Finally there are debriefing questions for those who do not support the eco-labeling programme and/or those who are not willing to pay a premium for environmental practices.

The bids in this study are derived from the estimates of an increment in the production costs of tanneries due to adoption of environmentally friendly techniques. The estimation is made by UNIDO and the estimated amount is 5% of the production costs (FAO, 2001b). But according to Alam (2005) the estimate is 10% for Indian tanneries which is two-fold the estimated amount by UNIDO.

A pretest for the specified bids amount and a pilot study was performed by the researcher before using the questionnaire for the survey.

To collect data from the sampled household units a face-to-face interview is conducted by enumerators. The enumerators were selected based on their education level and experiences. Five enumerators were participated for the collection of data, three of them are 12 grade complete and two of them are college students. They were given the necessary training by the researcher for two days. Besides the enumerators had a copy of the researchers identification card and a support letter written by the department of economics that would be shown at the start of an interview. In addition to this a photo which shows the effluent discharged by the tannery was shown to respondents who live far from the river basin (Bole sub-city).

3.4. Data Analysis

First, descriptive statistics is used to analyze the socio-economic and demographic characteristics of the sampled households, their attitudes towards the environmental problem and the environmental good and their support for the eco-labeling scheme. Besides their purchase decision on leather products is estimated.

Secondly, econometric analysis is performed to identify the determinants of household's willingness to pay a premium for environmental practices due to adoption of environmentally friendly production techniques by tanneries. In order to do so SPSS version 13.0 and Stata version 9.0 are used.

3.5. Theoretical Demand for Environmental Quality

Consumers' market demand for quality attributes is expressed by their willingness to pay for higher level of quality attributes, which in turn, reflects their perception of the benefits they received from those attributes (Moon et al. 2002). Environmental impact of a production process is one of the quality attributes of a good (Caswell and Modjuska, 1998).

But environmental impact cannot be identified by consuming a good. If this is an environmentally sensitive good-a good which has a significant impact on the environment during production, packaging, consumption and/or disposal- it is credence good. In order to change this good into a search good we need an eco-labeling programme. Labeling will also avoid the information asymmetry between sellers and buyers about the good's attribute and could lead to a change in purchasing decision by consumer.

According to Lancaster demand theory, unlike the traditional economic theory of consumer demand, utility or satisfaction is derived from the properties or characteristics which goods possess rather than goods themselves. Consumption is an activity in which goods, singly or in combination are inputs and in which the output is a collection of characteristics. Hence utility or preference orderings are assumed to rank goods indirectly through the characteristics that they possess (Lancaster, 1966).

Lancaster model provides not only valuable economic insights but also provides a potentially useful framework for empirical demand analysis from a survey data (Ratchford, 1975; Caswell and Modjuszka 1998 and Moon et al. 2002). Consumers' market demand is expressed by their willingness to pay for higher levels of quality attributes, which in turn, reflects their perception of the benefits they receive from those attributes.

In this study environmental quality is considered as one of the attributes for leather products. Consequently, consumers' purchase decisions will be made based on a price premium associated with environmentally sensitive goods. That is consumers will purchase environmentally sensitive goods until the marginal benefits of environmental attributes equals marginal costs represented by the price premium (Moon et al. 2002).

This study will use the modified characteristic model of Lancaster by Ravenswaay and Hoehn (1991) and adopted by Moon et al. (2002) to explore consumer demand for environmental quality represented by stated WTP for environmentally sound production techniques in agricultural commodity production.

Conventional leather production is not only harmful for the environment but also can cause a health risk on a consumer. The health risk on the consumer could come potentially due to the use of carcinogenic azo-dyes in the finishing process.

Let's consider a leather product E_t offered at price P_t and a vector of \mathbf{I} alternative products, $\mathbf{E} = (E_2, \dots, E_I)$ offered at prices corresponding to vector $\mathbf{P} = (P_2, \dots, P_I)$. The leather product E_1 contains a vector of \mathbf{J} quality attributes, $\mathbf{a}_1 = (a_{11}, \dots, a_{1j})$, products \mathbf{E} contain a matrix of attributes, $\mathbf{a} = \mathbf{a}_{ij}$. A key component of this model is the concept of services that allow us to

incorporate the roles of attributes in to the model. The level of services is determined by both the products and their attributes,

$$S_t = S (\mathbf{E}_t, \mathbf{a}_1, \mathbf{E}, \mathbf{a}), t = 1, \dots, T \quad (3.1)$$

Then, consumer's utility maximization problem is represented by:-

$$U = U (S_1, \dots, S_t) \text{ subject to}$$

$$m = P_t * E_t + \mathbf{P} * \mathbf{E} \quad (3.2)$$

Solving this constrained utility maximization problem, we obtain a demand function of E_t ,

$$E_t = E_1 (P_t, a_t, \mathbf{P}, \mathbf{a}, \mathbf{m}). \quad (3.3)$$

This equation indicates that a consumer's purchase decision for a product is influenced by a set of attributes associated with it, its price, prices of all other products, and the level of income. Hence, if a consumer highly values an environmental attribute, then it will increase the demand for E_1 .

3.6. Model Selection

Multinomial Models

Multinomial models are used when there are several possible outcomes, usually mutually exclusive. Different multinomial models arise owing to functional forms for the probabilities of the multinomial distribution. A distinction is also made between models where regressors vary across

alternatives for a given individual and where regressors are constant across alternatives. Estimation is most often done by maximum likelihood except for some complication where moment based estimation is used (Cameron and Trivedi, 2005).

Multi-response models are developed to describe the probability of each of the possible outcomes as a function of personal or alternative specific characteristics. The goal is to describe these probabilities with limited number of unknown parameters and in a logically consistent way (Verbeek, 2000).

Assuming that there are m alternatives and the dependent variable is defined to take value j if the j^{th} alternative is taken, $j = 1, \dots, m$. The probability that alternative j is chosen can be defined as:

$$p_j = \Pr[y = j], \quad j = 1, \dots, m. \quad (3.4)$$

Introducing m binary variables for each observation y ,

$$y_j = \begin{cases} 1 & \text{if } y = j, \\ 0 & \text{if } y \neq j. \end{cases} \quad (3.5)$$

Thus y_j equals one if alternative j is the observed outcome and the remaining y_k equal zero, so for each observation on y exactly one of y_1, y_2, \dots, y_m will be non zero. The multinomial density for one observation can then be conveniently written as

$$f(y) = p_1^{y_1} \times \dots \times p_m^{y_m} = \prod_{j=1}^m p_j^{y_j} \quad (3.6)$$

For regression models introduce a subscript i for i^{th} individual and regressors x_i . To specify a model for the probability that individual i chooses the j^{th} alternative,

$$p_{ij} = \Pr [y_i = j] = F_j(\mathbf{x}_i, \boldsymbol{\beta}), j = 1, \dots, m, \text{ and } i=1, \dots, N. \quad (3.7)$$

The functional form for F_j should be such that probabilities lie between 0 and 1 and sum over j to one. Different functional specifications for F_j correspond to specific models, notable multinomial logit, multinomial probit, ordered, sequential, and multivariate models (Cameron and Trivedi, 2005).

Maximum Likelihood Estimation

The multinomial density for one observation is given in (3.6). The likelihood function for a sample of N independent observations is then $L_N = \prod_{i=1}^n \prod_{j=1}^m p_{ij}^{y_{ij}}$,

where the subscript i denotes the i^{th} of N individuals and the subscript j denotes the j^{th} of alternatives. The log-likelihood function is

$$l = \ln L_N = \sum_{i=1}^N \sum_{j=1}^m y_{ij} \ln p_{ij}, \quad (3.8)$$

where $P_{ij} = F_j(\mathbf{x}_i, \boldsymbol{\beta})$ is a function of parameters $\boldsymbol{\beta}$ and regressors, defined in (3.7). More generally, the number of alternatives may vary across different individuals, so that m choices become m_i choices.

The first-order conditions for the MLE $\hat{\boldsymbol{\beta}}$ are that it solves

$$\frac{\partial l}{\partial \boldsymbol{\beta}} = \sum_{i=1}^N \sum_{j=1}^m \frac{y_{ij}}{p_{ij}} \frac{\partial p_{ij}}{\partial \boldsymbol{\beta}} = 0. \quad (3.9)$$

which is usually nonlinear in $\boldsymbol{\beta}$. The distribution of y_i is necessarily multinomial, so correct specification of change in group probability means correct specification of the functional forms $F_j(\mathbf{x}_i, \boldsymbol{\beta})$ for the probabilities P_{ij} . This ensures consistency as then $E[y_{ij}] = P_{ij}$, so taking the expectation of (3.9) yields

$$E \left[\frac{\partial l}{\partial \boldsymbol{\beta}} \right] = \sum_{i=1}^N \sum_{j=1}^m \frac{\partial p_{ij}}{\partial \boldsymbol{\beta}}, \text{ which equal zero } \sum_{j=0}^m p_{ij} = 1.$$

The usual asymptotic theory applies and the variance matrix is minus the inverse of the information matrix. Differentiating the double sum in (3.9) with respect to $\boldsymbol{\beta}'$ and using $E[y_{ij}] = P_{ij}$ yield upon simplification

$$\hat{\beta}^a \sim N \left[\beta_0, \left(\sum_{i=1}^N \sum_{j=1}^m \frac{1}{p_{ij}} \frac{\partial p_{ij}}{\partial \beta} \frac{\partial p_{ij}}{\partial \beta'} - \frac{\partial^2 p_{ij}}{\partial \beta \partial \beta'} \Big|_{\beta_0} \right)^{-1} \right] \quad (3.10)$$

Provided observations are independent over i there is no need to use more general sandwich forms of the variance matrix since the data are definitely multinomial distributed and the information matrix equality will hold (Cameron and Trivedi, 2005).

Goodness-of fit

Often goodness-of-fit measures are implicitly or explicitly based on comparison with a model that contains only a constant as explanatory variables.

A useful pseudo- R^2 measure is

$$McFaddenR^2 = 1 - \ln L_{fit} / \ln L_0, \quad (3.11)$$

where $\ln L_{fit}$ denotes the fitted model and $\ln L_0$ denotes an intercept- only model that estimates the probability of each alternative to be the sample average. For any multinomial model the theoretical maximum value of the log- likelihood is zero. This arises if $P_{ij} = 1$ when $y_{ij} = 1$ and $P_{ij} = 0$ otherwise, for i and j . thus the R^2 measure can be rewritten as

$$R^2 = \frac{\ln L_{fit} - \ln L_0}{\ln L_{max} - \ln L_0} \quad (3.12)$$

This can be interpreted as the fraction of the maximum potential gain in log-likelihood that is achieved by the fitted model (Cameron and Trivedi, 2005).

Ordered response Models

The starting point is an index model, with single latent variable

$$y_i^* = x_i' \beta + u_i \quad (3.13)$$

where x here does not include an intercept. As y^* crosses a series of increasing unknown thresholds we move up the ordering of alternatives. For Example, for very low y^* willingness to pay is low, for $y^* > \alpha_1$, it increases for $y^* > \alpha_2$ further increases to a higher level of willingness to pay and so on.

In general for an m -alternative ordered model we define

$$y_i = j \quad \text{if } \alpha_{j-1} < y_i^* \leq \alpha_j, \quad (3.14)$$

where $\alpha_0 = -\infty$ and $\alpha_m = \infty$. Then

$$\begin{aligned} \Pr[y_i = j] &= \Pr[\alpha_{j-1} < y_i^* \leq \alpha_j] \\ &= \Pr[\alpha_{j-1} < x_i' \beta + u_i \leq \alpha_j] \\ &= \Pr[\alpha_{j-1} - x_i' \beta < u_i \leq \alpha_j - x_i' \beta] \\ &= F(\alpha_j - x_i' \beta) - F(\alpha_{j-1} - x_i' \beta), \end{aligned} \quad (3.15)$$

when F is the cdf of u_i . The regression parameters β and the $(m-1)$ threshold parameters $\alpha_1, \dots, \alpha_{m-1}$ are obtained by maximizing the log-likelihood of (3.8) with p_{ij} defined in (3.15). For the ordered logit model u is logistic distributed with $F(z) = e^z / (1 + e^z)$. For the ordered probit model u is standard normal distributed and $F(\cdot)$ is the standard normal cdf.

The sign of the regression parameters β can be immediately interpreted as determining whether or not the latent variable y^* increases with the regressor. For marginal effects in the probabilities

$$\frac{\partial \Pr[y_i = j]}{\partial x_i} = \{F'(\alpha_{j-1} - x_i' \beta) - F(\alpha_j - x_i' \beta)\} \beta, \quad (3.16)$$

where F' denotes the derivative of F . The term in braces can be positive or negative.

3.7. Model Specification

In this study ordered response model is used to evaluate the willingness to pay of households for environmental practices. Verbeek(2000) considers an ordered probit model for evaluating the economic value of a public good using the contingent valuation method. Moon et al. (2002) used ordered probit model to estimate willingness to pay a premium to prevent environmental degradation associated with agricultural production.

Variables used in the Model

Dependent Variable

Household's willingness to pay (HWTP) a premium in their purchasing of leather products for an environmental practice due to adoption of environmentally friendly production techniques is the dependent variable of the model in this study. It is assumed that WTP is dependent on different socioeconomic and demographic variables and the attitude and awareness

level of consumer of leather products. In environmental economics WTP is used to measure economic values of public goods using stated and revealed preference methods. In social studies WTP identifies socially conscious consumers. A socially conscious consumer is a consumer who takes into account the public consequences of his or her private consumption or who attempts to use his or her purchasing to bring about social change (Webster, 1975). Respondents are asked a participatory willingness to pay question before they are asked how much premium they are willing to pay. Since WTP is a latent variable one cannot observe the exact value, respondents are ordered in seven categories based on their response for the sequential bids.

Attitudinal Variables

Three attitudinal variables are defined and used in this study. These are:

- Respondent's perception about industrial pollution as a problem is measured as environmental index (IENV) using scale;
- Importance of a shift of production techniques from conventional to environmentally friendly production techniques (ISPROD); and
- A support for an eco-labeling programme to differentiate leather products based on their environmental attribute (ECOL).

Socioeconomic and Demographic Variables (Independent Variables)

The socioeconomic variables and demographic variables used in this study are described below.

- Age (AGE): represents the age of the respondent in the survey in years.

- Sex (SEX): defines respondent's sex (=1 if male, else 0).

- Years of Schooling (YSCHL): this is the maximum years of schooling attended by the respondent.

- Employment (EMPL): specifies whether the respondent is employed or not. This is important in the case where the respondents are female- there are housewives, which are unemployed but are second decision makers in the household (=1 if employed, else 0).

- Residual Status (RSTAT): indicates ownership of the house by the households. It may affect MWTP in two ways: as an asset or as an incentive for more interest in a cleaner environment compared with those who rent houses in the area (=1 if own house, else 2).

- Household Income (HINC): this is gross monthly income of the households. It constitutes an aggregate level of regular incomes by household members and other incomes of the household.

- Household Expenditure (HEXP): comprises of different household expenditure at different time interval, depending on the characteristics

of the item. For example, household expenditure on food items is on two weeks while expenditure on leather products is on annual basis.

- Location (LOCA): specifies house location based on distance from the pollution source and the polluted river. It identifies the two groups of population by locating their residential places-in other words it identifies the sub-cities (=1 if Kolfe, else 0).
- Distance from the Polluted River (Rdist): distance from the polluted river for those households that are living in kolfe (in meters). This variable is not used in the empirical analysis because it only applies for Kolfe.
- Family Size (FSIZE): states the number of household members in the family.

Model

The model is based on an underlying latent variable but with a different match from the latent variable, WTP_i^* , to the observed one

($WTP_i = j$, where $j = 0, 1, \dots, 6$).

$$WTP_i^* = X_i' \beta + u_i$$

$$WTP_i = j, \text{ if } \alpha_{j-1} < WTP < \alpha_j \quad (3.17)$$

Where \mathbf{X} is the vector of socioeconomic and demographic variables and β is a vector of coefficient estimates for the socioeconomic variables and u_i is unobserved error term, independent of X_i .

$$WTP_i = 0 \quad \text{if } WTP \leq 0 \text{ \%}.$$

$$WTP_i = 1 \quad \text{if } 0 < WTP < 2 \text{ \%}.$$

$$WTP_i = 2 \quad \text{if } 2 \leq WTP < 4 \text{ \%}.$$

$$WTP_i = 3 \quad \text{if } 4 \leq WTP < 6 \text{ \%}.$$

$$WTP_i = 4 \quad \text{if } 6 \leq WTP < 8 \text{ \%}.$$

$$WTP_i = 5 \quad \text{if } 8 \leq WTP < 10 \text{ \%}.$$

$$WTP_i = 6 \quad \text{if } WTP \geq 10 \text{ \%}.$$

Where, WTP_i^* can be interpreted as willingness to pay for an environmental practice. As shown above one of the boundaries is normalized to zero, which fixes the location, but we also need normalization on the scale of WTP_i^* . The most natural one is that u_i has a fixed variance. In the ordered probit model this means that u_i is *NID* (0,1) (Verbeek 2000).

Chapter 4 Analysis and Discussion

4.1 Descriptive Analysis

In this part results derived from the responses given by respondents are analyzed using descriptive statistics. This is done by the help of frequency tables and summary statistics of variables.

A respondent was asked to identify his/her status in the family by specifying his/her relationship to the household head. Accordingly, of 292 respondents, 201(68.8%) were household heads, 40 (13.7%) were spouse, 39 (13.4 %) were son/daughter of the head, and 12 (4.1%) were relatives of either the head or the spouse.

Attitudinal Variables

One of the objectives of this study is identifying household's attitudes towards environmentally friendly products and their support for eco-labeling programme. In order to do so respondents in the household were asked three questions. Firstly, they were asked about their attitude towards the

seriousness of the pollution problem caused by conventional leather production process. Secondly, they were asked the importance of the shift of production process from the conventional to the environmentally friendly techniques. Thirdly, they were asked about their attitude about the eco-labeling programme which could be used as a market based instrument to differentiate leather products based on their environmental attributes.

Four scales were used to identify the index: a serious problem, a problem, a simple problem and not a problem at all. Almost all of the respondents (96.2%) acknowledge the seriousness of the pollution problem while only 3.8% state the pollution as a problem.

The second attitudinal question was importance of the shift of leather production technique from conventional to environmentally friendly methods. Four alternatives were given to the respondent's: very important, important, not-important and do not know.

Among the 292 respondent's 238 (81.5%) and 54 (18.5%) agreed that the shift of the production technique is very important and important respectively.

The last attitudinal question was about the eco-labeling programme that differentiates leather products based on their environmental attribute. The

respondents were asked whether they support the programme or not. The result shows that 289 (99%) out of 292 support the programme.

The questionnaire has incorporated one social activity variable which elicits information about the presence of household member who is involved in community based environmental practices. Unfortunately, there is no any organized environmental activity in the survey area let alone to get a member in the households.

Socioeconomic and Demographic Variables

The explanatory variables in this study include socioeconomic and demographic variables.

In the survey there are several questions about the household; this include household income, household expenditure, family size, employment status, years of schooling, sex and age of the respondent, house location in reference to the pollution source and polluted river, and annual expenditure on leather products among others.

Of 292 respondents 156 (53.4%) are male and 136 (46.6 %) are female. In regards to location 155 (53.1%) and 137(46.9%) are drawn from Kolfe (Kebele 14) and Bole (08/09) sub-cities respectively.

When we consider the employment rate of the respondents, 24.5% are unemployed and 75.5% are employed. Among the employed 52.8% run their own businesses 29.4%, 13.1%, and 4.7% are government, non-governmental organizations and private company employees.

Dependent Variable

The dependent variable in this study is willingness to pay a premium and is defined in seven categories: 0, 1, 2, 3, 4, 5 and 6. Frequency of these categories is shown in Table 1. The result revealed that about 25% of the respondents are not willing to pay a premium for environmental practices through adoption of environmental friendly techniques. The second category which is denoted by 1, defines a willingness to pay a premium greater than zero and less than two, this accounts only for 1.37% of the respondents. The share of the 3rd, 4th, 5th, 6th, categories are 10.62%, 26.37%, 16.44% and 4.45% respectively while the 7th category accounts for 16.10% of the respondents.

From the frequency table we can see that three-fourths (75.34%) of the respondents are willing to pay a premium for environmental practices based on different socioeconomic and demographic variables.

Table 1: Frequency of Categorical Willingness to Pay for Environmental Practices

Willingness to Pay	Frequency	Percent	Cumulative
0 (WTP= 0%)	72	24.66	24.66
1 (0 < WTP < 2%)	4	1.37	26.03
2 (2 <= WTP < 4%)	31	10.62	36.64
3 (4 <= WTP < 6%)	77	26.37	63.01
4 (6 <= WTP < 8%)	48	16.44	79.45
5 (8 <= WTP <10%)	13	4.45	83.90
6 (WTP >= 10%)	47	16.10	100.00
Total	292	100.00	

There was also a question in the survey that addresses respondent's reason for unwillingness to pay. Of the total respondents who are not willing to pay 4 did not state their reason. Out of the remaining 68 respondents 38 (55.9%) said they are not able to pay a premium, 11(16.2%) think that it is the government's responsibility to alleviate the pollution problem and 18 (26.5%) argued that pollution problems created by the production process should be abated by the firm itself. Table 2 presents the reasons why respondents are not willing/unable to pay for environmental practices.

Table 2: Respondent's Reason for Unwillingness to Pay for

Environmental Practices

Reason for Unwillingness to Pay	Frequency	Percent
Not able to pay	38	55.6
Government Responsibility	11	16.2
Firm Responsibility	18	26.5
Others	1	1.5
Total	68	100.0

Finally the description and summary statistics of variables used in empirical analysis is shown in Table 3.

The average household in the survey has 2291.86 birr income and 1509 birr expenditure on monthly basis. The average age of the respondent in the survey is 40 years and an average year of schooling is 11.

One of the objectives of this study was to estimate purchasing decision of leather and leather products. Accordingly, for an average household –that is a household whose average monthly income is 2291.86 birr and has a family size of four-the estimated annual purchase value of leather and leather products is 402.3106 birr with a standard deviation of 221.343.

Table 3: Description and Summary Statistics of Variables

Description of Variables	Mean	Std. Dev.
Household Monthly Income	2291.86	2027.274
Household Monthly Expenditure	1509	1028.9
Age of Respondent in Years	40.59712	11.88405
Sex (1= Male)	0.5344828	-
Years of Schooling of Respondent	11.3855	2.960833
Family Size	4.276978	1.649497
Location1=Kolfe	0.5308219	0.4999058
Annual Expenditure on Leather Products	402.3106	221.343
WTP for Environmental Practices	2.863014	2.041259

4.2. Econometric Analysis

In the econometric analysis different socioeconomic and demographic variables that are expected to explain the dependent variable are included. In order to estimate the coefficients for those variables an ordered probit model with maximum likelihood estimation method is used. This is due to the categorical and ordinal nature of the willingness to pay data (Maddala 1983).

The number of observations, maximum likelihood parameter estimates from ordered probit model, the pseudo R² and the χ^2 statistic is presented in Table 4.

Among the socioeconomic and demographic variables household income, family size and location are found to be statistically significant in influencing willingness to pay for environmental practices.

Years of schooling, sex, age of respondents and annual expenditure on leather products are found to be statistically insignificant in influencing willingness to pay for environmental practices in this study.

The number of observations in this part is much less than the number of observation in the descriptive part because there are missing values for some of the independent variables in the data set. This is due to the fact that some respondents are sensitive to questions such as income, family size, age, education and hence are not responsive, while some of the respondents were not able to remember their annual expenditure on leather products.

The hypothesis that all coefficients are simultaneously zero in the ordered probit model was tested using χ^2 statistics. The calculated χ^2 statistic is 43.09, leading to a rejection of the hypothesis. This indicates the capability of the model to explain the variation in willingness to pay for environmentally practices.

A goodness-of-fit measure is a summary statistic indicating the accuracy with which the model approximates the observed data. It is measured as pseudo R^2 in the model (pseudo $R^2 = 0.0519$), which indicates that the fitted

model has the power to explain the dependent variable. In the model it was possible to increase pseudo R^2 by incorporating more explanatory variables. But as the number of explanatory variables in the model increases the number of observations has dropped substantially.

In the model household valuation of environmental practices was driven by household income, location (residence in relation to pollution source) and family size. Accordingly, household income has positive and significant effect for household valuation of environmental practices (Table 4).

Residing near and around the pollution source and the polluted river has also positive and significant effect on willingness to pay for environmentally-friendly techniques suggesting that these households are willing to pay more than those living further away from the pollution source and the polluted river.

Table 4: Maximum Likelihood Parameter Estimates from Ordered Probit Model

Variable	Estimates	z	P> z/
Household Income	0.0003243(.000556)	5.83	0.000
Years of Schooling	-0.0210835(.025961)	-0.81	0.417
Location	0.3893745(.176834)	2.20	0.028
Family Size	-0.1324603(.048999)	-2.70	0.007

Age	-0.0053004(.006669)	-0.79	0.427
Sex	0.1529642(.152645)	1.00	0.316

Number of Observations = 238

LR χ^2 (6) = 43.09 Prob > χ^2 = 0.0000

Log likelihood = -393.23884 Pseudo R² = 0.0519

Note: Numbers in the parenthesis are standard errors.

Family size has a negative and statistically significant effect suggesting that households with more members are less willing to pay perhaps reflecting the effect of income.

4.3. Discussion

The survey results revealed that the majority of the households agree that environmental pollution caused by conventional leather processing is a problem to the livelihood of the people. Besides, almost all respondents acknowledge the importance of the shift of production techniques from conventional to environmentally friendly production techniques. With regard to eco-labeling schemes also almost all respondents support the programme.

When we come to willingness to pay questions, the results showed that almost 75% of the respondents are willing to pay a premium for leather products due to adoption of environmentally friendly techniques. Of course,

the stated amount of willingness to pay varies across households depending on different socioeconomic and demographic variables.

Household income was found to be one of the determining factors for willingness to pay for environmental practices through adoption of environmentally friendly products in leather processing. As household income increases willingness to pay for environmental practices also increases which is generally to be expected.

House location in relation to the pollution source has a significant impact on willingness to pay for environmental practices. In particular, households living near and around the pollution sources are willing to pay more than households residing far from the pollution source and the polluted river basin. This could explain the negative impact of the conventional production process in the livelihood of the people around the pollution source and polluted river basin.

In the literature younger respondents are found to be more concerned about their environment. For example, Moon et al. (2002) found that age has significant and negative impact on willingness to pay for environmental degradation caused by agricultural production process. But in this study age is found to be insignificant in the willingness to pay decision for environmental practices.

Family size is found to be one of the determinants of willingness to pay for environmental practices. It has a negative impact on household's willingness to pay; that is willingness to pay decreases as household size increase perhaps reflecting the effect of income on per capita basis.

Another variable which was considered as one of the socioeconomic variables is annual expenditure of households on leather products. Surprisingly annual expenditure on leather products has no significant impact on willingness to pay for adoption of environmentally friendly techniques by tanneries.

Years of schooling was found to be insignificant. Environmental concern is expected to be positively related to education because it is assumed that as educational level increases awareness about environmental issues and environmental concern also increases. But the finding in this study does not support this assumption.

Chapter 5 Conclusions and Recommendations

Conclusions

The results from the attitudinal questions showed that majority of the respondents are concerned about the pollution caused by the conventional leather production process and hence supported both the shift of production techniques and the eco-labeling programme.

This revealed that there is a possibility of using voluntarily instruments such as eco-labeling in alleviating environmental pollution. It also indicates that there is a room to use environmental attributes in leather products as a potential source of competition in the domestic market.

Further more, the results revealed that about 75% of the respondents are willing to pay a premium for environmental practices. Such evidence revealed that the cost incurred due to voluntary adoption of

environmentally-friendly production technique could be compensated by households' willingness to pay. Of course this depends on the actual amount of an increment in production cost and actual amount of willingness to pay.

About half of the respondents which are not willing to pay think that pollution problems should be alleviated by either the government or by the firm. This indicates that there has to be educational programme in order to increase awareness and to bring attitudinal changes about sustainable consumption. This in turn could facilitate the use of eco-labels in alleviating environmental problems.

The result suggests that monthly income, family size and location in relative distance to pollution source and polluted river are important determinants of willingness to pay. This has an implication in the marketing strategy of firms since this would enable them to identify environmentally conscious consumers as a unique segment in the market.

A difference in willingness to pay due to location of residents offers a useful insight in understanding the seriousness of the problem caused by the conventional production process. This would mean that much effort has to be made by government, non-government organizations, the community and other stakeholders to alleviate the problem.

Finally, this study showed that there is a market for eco-labeled leather products. Therefore eco-labeling could be used as an important market instrument to complement mandatory laws and regulation for environmental protection.

Recommendation

Eco-labeling has become an important market based instrument in alleviating environmental problems. In order to use eco-labeling programme as an effective market tool the government and stakeholders have to facilitate the following:

- financial support for those who voluntarily adopt environmentally friendly techniques;
- increasing technological capability of firms through agencies such as Cleaner Production of Ethiopia;
- enhancing the capacity of government organizations for third party certification-there is a possibility to delegate this task to Quality and Standards Authority of Ethiopia;
- to increase public awareness about the environmental issues; this could be done through formal education and other informal methods.

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Appendix

SURVEY INSTRUMENT FOR WILLINGNESS TO PAY BY HOUSEHOLDS FOR ADOPTION OF ENVIRONMENTALLY FRIENDLY PRODUCTION TECHNIQUES BY TANNERIES

Introduction:

Hello, first I would like to thank you for taking your time to participate in this interview. I am doing this interview on behalf of Mr. Solomon—who is a student of Addis Abeba University in the graduate programme of economics department. This is purely an academic research and has nothing to do with any governmental or non-governmental organization. You are selected randomly from people living in your kebele. Therefore I kindly request you to give me a genuine answer for the following questions. Your genuine answer would help to alleviate pollution problems through informed decision making.

Confidentiality: Your responses to the questions are confidential. They will be used only by the researcher to analyze the survey result.

Name of Interviewer: _____ Signature: _____

Interview No.: _____ Date of Interview: _____ Time: _____ AM PM

SECTION A:

Socio-Economic Characteristics of the Household

1.1. Respondent's Name: Mr. Mrs. Miss _____

1.2. Address: Sub-city: _____ Kebele _____
House Number: _____

1.3. How long have you been living in this house (area)?

1) _____ Years 2) Do not Know 3) Refused

1.4. Ownership of the house:

1) Private 2) Rent 3) Others (specify): _____

Household Information

Ser. No.	Name of the household member	Age	Sex 1.M 0.F	Years of schooling	Employment 1. Employed 0. Unemployed	Income (in Birr)	
						Monthly Income	Other Incomes for the household 1. Rent 2. Transfer 3. Other (specify)

								Relationship to the Household Head
								1. Spouse
								2. Son
								3. Daughter
								4. Relative to the head
								5. Relative to the
								Spouse
								6. Other
								(Specify)

Expenditure Questions

How much do you spend on the following items in the period specified on the third column?

SECTION B:

Items	Estimates in Birr	Period: 1. weekly 2. 15 days 3. Monthly 4. Annually
Food (includes cereals, oilseeds and pulses, animal products, fruits and vegetables, drinks, babyfoods, prepared and packed foods, etc.)		2
Clothings and Foot wears (this does not include leather products)		4
Leather products (shoes, leather garments, bags, etc . for household members and others)		4
Medical Expenses		3
Education (school fees, stationery, books, etc)		3
Energy (electricity, kerosene, fire wood, butane gas, batteries, candles, etc)		3
Water rates		3
Telephone rates		3
Rent/Property taxes		4
Transportation (School buses, taxi fare, bus fare, etc.)		3
Personal care (soap, detergents, disinfectants, perfume, hair cut, cosmetics, etc.)		3
Payment for security/ House maids		3
Entertainment (cinema, video, TV shows, visit of recreational site, etc)		4
Jeweleries (presents, personal use, etc)		4
Others (Specify)		4

Scenario

Currently, there are no mandatory production technology standards in Ethiopia. Hence, production technologies adopted by firms is based on the interests of the owners of the factories. This, of course, creates a health and environmental hazard to the people who are working in the firm, consuming the products and on those living around the pollution sources. One of the evident examples is the conventional leather production process. In this production technique, the health hazard basically comes from the tanning process and dyes while the environmental hazard could possibly come from different stages of production. The process is pollution intensive which releases a polluted effluent to the environment; this includes air pollution, water pollution, noise pollution, soil pollution. This results in a health risk both for workers, consumers and individuals living around the firms, people living around the river basin and people who are using the river which is polluted by the effluent. Therefore it is important to minimize the pollution so that to reduce health and environmental hazards caused by conventional production techniques. This would be possible through the shift of production techniques from conventional production process to environmentally-friendly production process. The crucial factor here is that the adoption of environmentally-friendly production process would create a rise in the production costs of leather products. This in turn will lead to an increase in the price of leather products and differentiation among leather products based on production attributes. A voluntary eco-labeling programme could be used as an instrument to differentiate products which are produced by environmentally friendly techniques from those which are produced using a conventional production technique. If we assume that there is a market for eco-labeled leather products, it would create an incentive for firms that voluntarily adopt environmentally friendly production techniques. From the consumers side, there is a crucial factor to the implementation of this programme; that is, their demand for the products revealed by their willingness to pay a premium for eco-labeled leather products.

SECTION C:

Attitudinal and Willingness to Pay Questions

3.1. To what extent do you perceive that industrial pollution is a problem in the livelihood of the people living around tannery and living along side of the polluted river basin?

- 1) A serious problem
- 2) A problem
- 3) A simple problem
- 4) Not a problem at all.

3.2. To what extent do you think that a shift of production technique from conventional to an environmentally-friendly production technique in leather production is important?

- 1) Very important
- 2) Important
- 3) Not important
- 4) Do not know

3.3. Do you support an eco-labeling programme of leather products that would differentiate leather products based on environmental attributes (that is based on production techniques adopted by tannery)?

- 1) Yes
- 2) No (skip to question 3.6)

3.4. Are you willing to pay a premium for leather products that are produced using environmentally friendly production techniques, specifically for eco-labeled leather products?

- 1) Yes
- 2) No (skip to question 3.7)

3.5.1. Are you willing to pay 2%?

- 1) Yes
- 2) No (skip to question 3.8)

Interviewer's Evaluation

INTERVIEWER: COMPLETE THIS EVALUATION AS SOON AS POSSIBLE AFTER THE INTERVIEW.

In your judgment, how well did the respondent understand what she or he was asked?

- 1) Understood completely
- 2) Understood a great deal
- 3) Understood somewhat
- 4) Understood a little
- 5) Did not understand very much
- 6) Did not understand at all
- 7) Others (specify) _____

Comments about the respondent: _____
