Social Life Cycle Inventory and Impact Assessment of Informal recycling of Electronic ICT Waste in Pakistan

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ABSTRACT

In order to meet the growing needs of information and communication technology, companies are producing new and improved products every day. With every new product in the market another product becomes obsolete. These obsolete products are being added to the world's fastest growing waste stream. 20-50 million computers become waste each year. It has been estimated that 20% of electronic waste is formally recycled, while 80% is shipped to developing countries where it is recycled informally through crude process. It's manually dismantled, burned, dumped and dipped in acids to extract precious metals. One such nation which is at the receiving end of this waste stream is Pakistan. This business has become a very profitable business and requires very little expertise to conduct these crude procedures. These activities do not just add toxics to the environment but has great social and health impact on its workers. There lies a great need to study the impacts of these processes on environment, workers, community and the society. In order to study this, a detailed on-site inventory and assessment of informal electronic waste recycling has been conducted using the UNEP guidelines on Social Life Cycle Assessment. This study shows that apart from income generation and recovery of various metals and materials, informal recycling has drastic impacts on its workers and the local community.

Keywords

Electronic waste, Informal recycling, Social Life Cycle Assessment, Pakistan.

1. INTRODUCTION

Information and communication technology (ICT) has helped develop the world into what it can be seen as today. People are connected to one another while they are sitting at two extreme ends of the world. Penetration of ICT has played its role in development of humans socially as well as economically. Mobiles and computers have reached the remotest parts of the world. Around the globe, more and more electronic equipment, such as computers and mobile phones, are being produced and used every year. At the same time, the life time of such devices, before they are replaced by new ones, is decreasing.

Cell phones now have an average life span of less than two years in the industrialized world, and computers two to four years (SEPA, 2011). As a consequence, the amounts of electronic waste are increasing rapidly, and it is now one of the fastest growing waste streams (SEPA, 2011).

Electronic waste, or WEEE (Waste Electrical and Electronic Equipment), is at the same time a valuable and problematic waste stream. For instance, every ton of discarded electronic equipment contains 17 times more gold than gold ore and 40 times more copper than copper ore (CRN, 2007) but it also contains many toxic substances (Sepulveda, et.al. 2010). Therefore, it needs to be collected and recycled properly, both to avoid losing valuable resources, spreading hazardous substances to the environment, and causing serious health problems.

Strong international regulation has been put in place to limit the content of hazardous substances in electronic equipment and to ensure proper handling and recycling. Still, studies show that globally only 20% of the waste is recycled properly (Takeback coalition, 2009). Large amounts are exported illegally to developing countries, where poor people recycle it manually at a much lower cost. This informal recycling process involves manual dismantling of electronic waste, burning of wires, and extraction of precious metals through acid dipping. Most of these processes are carried out in densely populated areas and has its impacts not only on the environment but on people involved in this process and living in the vicinity (Umair and Anderberg, 2011).

Used electronic equipment makes its way into Pakistan by several means. One of them is as second hand material, some sent as donations. However, the second hand market is also used as a loophole in the legislation, illegally disguising electronic waste as functioning second hand products (Umair and Anderberg, 2011). Many who are living below the poverty line in Pakistan have found informal electronic waste recycling as a source of income. Families have created cottage industries in their homes where women and children contribute equally in earning a livelihood (Umair and Anderberg, 2011). Despite the fact that the country has signed international agreements to avoid this, it is happening

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because of lack of national legislation and enforcement and probably much because of lack of awareness among authorities. As this is an illegal sector, there is also lack of good information about the flows and impacts of the waste.

From the perspective of developed countries, from which electronic waste is exported illegally, there also remains much to be done to address this problem. The so-called WEEE Directive (2002/96/EU) sets collection and recycling targets for electronic waste for countries within the EU. This Directive has been assessed as being successfully implemented in Sweden (SEPA, 2009) and in an overall environmental life cycle perspective by e.g. Wäger et al (2011). But since the flows of illegal trade are not known, and Life Cycle Assessment (LCA) emission data for informal recycling processes are not available, illegal trade is mentioned as a known problem, but it is omitted from the analysis due to lack of data.

Lack of good information on the adverse end-of-life impacts of ICT equipment sometimes leads to underestimated life cycle impacts, and to inadequate local legislation and enforcement. One means to alleviate the problems of illegal trade and informal recycling of electronic waste may be to make better data on the extent of this business and its impacts available. If included in environmental assessments of the ICT sector, electronic equipment, and evaluations of the performance of take-back policies and recycling systems, this may put pressure on authorities to develop better policy instruments and monitoring systems, and on companies to develop strategies, business models or products with less impact over the entire life cycle.

2. AIM AND RATIONALE

The overall aim of this study was to contribute to a less skewed picture on the overall life cycle impacts of ICT and electronic equipment. Despite the fact that the truly unsustainable conditions under which informal recycling of electronic waste is taking place in developing countries has been documented and debated for quite some time, there is as yet often a lack of integration of this knowledge when assessing the overall life cycle impacts of ICT, electronics, and even when looking at its end-of-life (WEEE) in particular.

Our specific objective was to collect data on the social impacts of informal electronic waste recycling in Pakistan, using the framework for Social and Socio-Economic Life Cycle Assessment (SLCA) as defined in by UNEP (Benoît and Mazijn, 2009).

By providing a systematic inventory and impact assessment of informal electronic waste recycling, this study will help in creating a more realistic view of the impacts of ICT equipment in a complete life cycle perspective. New regulations, economic incentives, or business models need to be developed to address this problem in a sustainable manner. As more and better data of this kind becomes available, governmental and corporate policies and strategies may be developed on a more well-informed basis.

This study has been conducted in Pakistan but its results can be applicable in many developing countries where the situation is similar. The data that has been collected is based on empirical data collected by interview and close observation of informal electronic waste recycling sites in Pakistan.

3. METHODOLOGY

3.1 Social LCA

This study is based on the UNEP guidelines (Benoît and Mazijn, 2009) for SLCA. These guidelines are developed in accordance with the ISO 14040 and 14044 standards for environmental LCA (ELCA), but for inventory and assessment of social and socio-economic inventory and impact assessment.

SLCA is a social impact (and potential impact) assessment technique that aims to assess the social aspects of product and services and their potential positive and negative impacts along their life cycle, encompassing extraction and processing of raw material, manufacturing, distribution, use, reuse, maintenance, recycling and final disposal (Benoît and Mazijn, 2009). SLCA does not provide the information whether a product should be made or not. It can only provide elements of thought for a decision on production of a product.

Similar to ELCA, a quantified functional unit is defined as the starting point to determine the product system, but impacts may not be expressed per functional unit if semi quantitative or qualitative data is used. The geographical location of unit processes needs to be defined. The inventory data and impact data are specified in relation to different stakeholders. Stakeholders include all key players involved in the life cycle process of the product. Impacts are studied on the basis of social subcategories (issues of concern) which may help in identifying various impacts on the stakeholder. Impact assessment is carried out using various impact categories including health and safety, development of country, human rights etc. (ibid.).

3.2 Field Trip

A field trip was conducted to seven cities and one town of Pakistan where electronic waste recycling is carried out at large. Interviews were conducted with various stakeholders that included officials, import officers, importers, sellers, waste collectors, manual dismantlers (scrappers), refurbisher, gold extractors, etc. The cities visited during this trip were Islamabad, Rawalpindi, Lahore, Faisalabad, Gujranwala, Peshawar, Karachi and Shadahra (town).

The interviews conducted with the officials, importers, and sellers were informal conversational interviews apart from one or two questions that were decided before hand. The interview conducted with the scrappers, gold extractors, and collectors were based on a open ended questionnaire developed according to the sub categories of the Social LCA based on UNEP Guidelines (UNEP, 2009).

4. CASE STUDY

4.1 Goal

The goal of this study was to improve decision making related to ICT, electronic equipment, and electronic waste, by providing better data on the social impacts of informal electronic waste recycling in Pakistan, using the framework of SLCA as described in the UNEP guidelines.

4.2 Functional unit

The functional unit of this study, which measures the product/service utility of the system, is the handling of electronic waste that enters the informal recycling sector in Pakistan in 2012. This study covers only electronic waste coming from the ICT sector (mobile phones, personal stationary computers and laptops, telephone exchanges, and printers).

4.3 Geographical boundaries

This study was conducted in Pakistan. A detailed visit was made to various electronic waste recycling sites in eight different cities which included Islamabad, Rawalpindi, Lahore, Karachi, Peshawar, Gujranwala, Faisalabad and Shadahra (town). These are the major cities where huge amounts of electronic waste are being recycled. Therefore, these cities can be equivalent to representation of all Pakistan. As the process and impacts of informal electronic waste recycling is similar in most of the developing nations involved in this process, this study could be used as a baseline for countries such as Bangladesh, Srilanka etc.

4.4 System boundaries and delimitations

This study covers the informal recycling of electronic waste from the ICT sector (Figure 1). To be more precise, informal recycling actually includes refurbishing, dismantling, and recycling. Hence, it covers the service chain, from the point of arrival at one of the many informal recycling sites in Pakistan, until it is either refurbished and sold as second-hand electronics; dismantled, recycled and sold as raw material; sent to formal recycling; or finally disposed of.

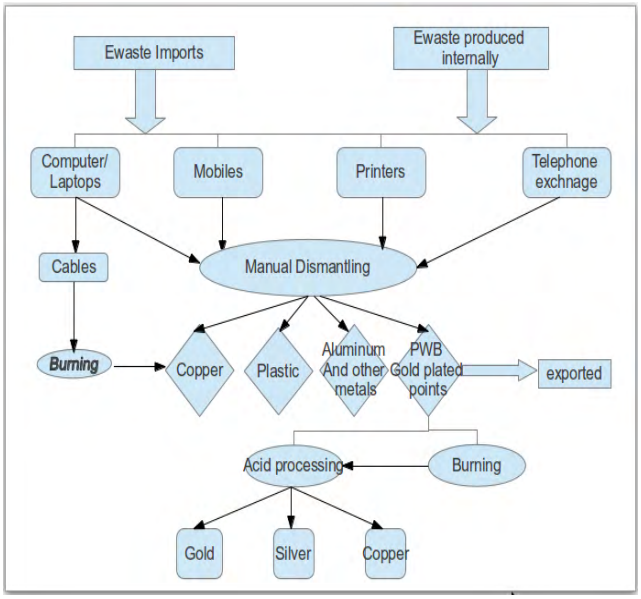

Figure 1. Flow chart illustrating informal recycling of electronic waste from the ICT sector in Pakistan, as included in this study.

The subsequent formal recycling in Pakistan or elsewhere or final disposal of certain material fractions that are removed during dismantling is excluded. This could be covered by more easily available data on formal recycling and disposal, hence it was not the main focus of this study. For the same reason, shipping and transports of electronic waste to and in Pakistan were also excluded. Printed wire boards are sometimes exported for processing and recycling out of Pakistan. This was excluded for more practical reasons, since it was not possible to study during the field trip to Pakistan.

4.5 Data type and assumptions

The data that has been collected is site specific data and has been collected through observations during field visits, informal conversational interviews and with the help of open end questionnaires. No assumptions have been made. The study is completely based on interviews and first-hand experience of the people involved in the process.

4.6 Limitations

As electronic waste recycling is an illegal business from the imports to the process so the people involved felt scared to answer questions. Efforts were made to gain the confidence of the ones involved in the business and get the best picture out of interviews conducted. Yet, there could always be a possibility that some facts were hidden by the stakeholders in order to protect their business secrets and to show a more positive side of the business than the negative.

4.7 Stakeholder categories

A stakeholder category according to UNEP is "…a cluster of stakeholders that are expected to have shared interests due to their similar relationship to the investigated product systems" (Benoît and Mazijn, 2009). The stakeholders that have been included in the SLCA are the workers (collectors, scrappers, gold extractors) local community (people living in the vicinity of these sites), society and value chain actors (importers, business owners). Consumers have not been added in this study as there is no consumer during the process of informal electronic waste recycling. The consumer plays a role once these materials have been recycled to produce new items such as furniture from plastic, jewelry from the gold etc.

Collectors are the one who collect electronic waste several times during the day from various computer shops importers etc. At the end of the day they take whatever they have collected and sell them to various scrappers for dismantling.

Refurbishers are the ones who buy second hand equipment and fix it. They usually buy second hand equipment and polish it, make screens scratch less for them to appear as good as new.

Manual dismantlers/Scrappers are the ones who are involved in the process of dismantling products. They rarely refurbish equipment they are mostly involved in dismantling and selling different material used in the computer such as plastic, aluminum, copper etc.

Precious metal extractors are the ones involved in extraction of precious metal from printed wire board, old processors and gold plated parts of the computer. They usually buy motherboards in bulk they are then crushed and dipped or dipped directly into acids where it is left to corrode the plastic and other material corrodes leaving behind gold silver and copper which is extracted with further processing.

4.8 Subcategories

Subcategories in SLCA are social and socio-economic issues of concerns (UNEP, 2009). UNEP guidelines have the minimum list of subcategories out of which relevant ones were picked for this LCA (Table 1).

Table 1 Subcategories identified in informal recycling

Stakeholder category	Subcategories
Workers	• Forced labour • Child labour • Social security • Wage/benefits • Freedom of association and collective bargaining • Work hours • Equal opportunity/discrimination • Health and safety
Local community	• Health and safety • Community engagement • Local employment
Society	• Contribution to economic development • Public commitments to sustainability issues
Value chain actors	• Promoting social responsibility • Fair competition

5. INVENTORY ANALYSIS

5.1 Workers

5.1.1 Working hours

Pakistan has ratified to International Labour Organization (ILO) conventions:

C001: Hours of Work (Industry) Convention, 1919 (No.1). This convention supports application of the principle of the 8-hours day or of the 48-hours week.

C014: Weekly Rest (Industry) Convention, 1921 (No.14). This convention supports application of weekly rest.

The workers spend more than 12 hours per day at work which is more than the desired working of the ILO conventions. Not everyone have weekly breaks. These working hours are applied on workers of all ages. They take very short lunch breaks and tea is mostly supplied at their work stations during the day.

5.1.2 Child labour

Pakistan has ratified the following conventions:

C138: Minimum Age Convention, 1973 (No.138). This convention concerns the minimum age for admission to employment. The convention advocates that the minimum age of a child for admission to any type of employment or work which by its nature or the circumstances in which it is carried out is likely to jeopardize the health, safety or morals of young persons shall not be less than 18 years.

C182: Worst Forms of Child Labour Convention, 1999 (No.182). This convention concerns the prohibition and immediate action for the elimination of the worst forms of child labour. According to article 3 of this convention work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children is included in worst forms of child labour.

Child labour is common sight in this business. As it is a profitable business and requires less expertise, children coming from poor backgrounds find it an easier way to support their families. Apart from this in many cases where people have set up home businesses, the whole family works in processing this equipment. So the children do not get much choice than to come into the business of electronic waste recycling. They try to help parents with their work just like in any other cottage industry. They look through toxic ash to find what could be of some value and can be sold. Children working in this business are from the age of 6-18. Some attend school, while others have left school to work. They help collecting equipment, dismantling, burning of wires, burning of motherboards, separation of metals, melting of solders and acid processes. Their work is equally laborious as that of an adult. The working hours are also similar. Working under the same conditions for same duration being exposed to same amount of toxic with their higher vulnerability and lower immunity makes it a more dangerous business.

According to the ILO convention each member who ratifies convention C182 shall take immediate and effective measures to secure the prohibition and elimination of the worst forms of child labour as a matter of urgency. Similarly convention 138 states that each member for which this Convention is in force undertakes to pursue a national policy designed to ensure the effective abolition of child labour and to raise progressively the minimum age for admission to employment or work to a level consistent with the fullest physical and mental development of young persons. In this case, despite ratification of these conventions, Pakistan authorities have not taken any action. This could mostly be because of lack of knowledge in this field.

5.1.3 Health and Safety

The workers may be 6-50+ of age. They have no protective gears while working. Many of them knew that gloves and masks are good for protection but some think they could not afford good quality ones. While they handle extremely toxic waste with their bare hands, some say they never need any protection, that it is a clean business.

The process of dismantling, open burning of cables, and extraction of precious metal are extremely toxic. It exposes workers to various toxics such as lead, barium oxide, mercury, brominated flame retardants, dioxins, furans, various POPS , carbon black. These affect various human organs and are known carcinogens. They have no information about the toxicity of this business and very few complain about possibility of ailments related to their exposure to these toxics.

Some complain about having breathing problems due to smoke while burning or because of inhaling acid fumes. They say it is usually a temporary condition which goes away once they eat gur (traditional unrefined sugar cane sugar) that clears their breathing track. This is very hard to believe that these people who are exposed to such toxic material everyday would not have any ailments.

Skin patches (white) are a common site in these workers. Cuts, burns are also very common. In collectors and people who were involved in crushing computer chassis it is very common that they have muscular pains, fever and tiredness.

The shops of these workers are usually located within or close to computer markets. Most are located in basements that are badly lit, and workers have to focus hard while working. Due to being in basements the air circulation is not good as well. Therefore exposure to toxic dust is prolonged. Most of these shops are very

close to or inside residential areas thus introducing a vulnerable group of people to these toxics 24 hours a day.

In some cases workers have setups with in their homes. While they sleep on the roof tops with their families the motherboards processors melt in acid baths. This is where gold extraction takes place. Similarly they and their families are exposed to toxic fumes.

The shops where gold is purified are extremely dark shops with very little air circulation. The shops are very small to accommodate one or two people at a time.

In many cases these activities take place in open spaces away from the cities when the city's development authorities would not allow such activities to take place within the cities. Such activities include burning of plastic, wires etc.

5.1.4 Social Benefits/Social Security

There is no concept of social security. Mostly businesses are run by families so there is no one to ensure social security and in cases where labour is hired to do this work the owner does not ensure any social benefits. There is no concept of pensions or some sort of fund that covers their health or accidents etc. In case of emergency workers and employers will help each other in their limited means.

5.1.5 Forced labour

There were no case indications of forced labour. Everyone states to be working willingly in this business. The profitability of this business attracts many.

5.1.6 Wages/Fair Salary

A collector may earn from 500-1000 PKR (Pakistan rupees) per day, corresponding to US$5.5-11.1 per day. This is in case the collector is self employed and is not working for any one. An average wage of a scrapper or collector working on daily wage is 250 PKR (US$2.7) per day. They hardly manage to cross the extreme poverty line that is defined by the World Bank that states extreme poverty as living on less than US$1.25 a day (World Bank, 2005).

Small-business owners (refurbisher included) may earn from 1000-1500 PKR (US$11- 16) per day, while bigger business owners may earn up to 20-30 kPKR (US$213-320) per day.

The people who work as employed labour on a monthly wage may earn from 7-12 kPKR (US$74-127) per month.

5.1.7 Freedom of Association and Collective Bargaining

There are no labour unions in this business, except for Karachi where there exists one workers union which is not specifically for the scrappers but all the workers in that area.

5.1.8 Equal opportunities /discrimination

Christians are religious minority in Pakistan. Many people working are in informal recycling are Christian but there has been no discrimination against them. They work in a very peaceful manner with the Muslims. Women and children also have equal opportunity to work in this business especially in case of the cottage industry. This is one place where equal opportunity for women and children may introduce a vulnerable group of individual to very toxic working environment.

5.2 Local Community

5.2.1 Safe and Healthy Living Conditions

Informal electronic waste recycling techniques are extremely toxic. These activities add pollutants to the air, soil and waters. Few of the impacts have been mentioned before. They have similar impacts on the local community. They get exposed to similar toxins for longer duration as they reside close to these sites. A study showed that pregnant women who live in areas close to electronic waste dismantling sites have higher exposures to persistent organic pollutants and depressed thyroid hormone levels than those who live farther away from the facilities. This study compared women in two regions of China (Zhao, 2010). In another study in 2007, children from one to six years old in Guiyu were compared to those living in a neighbouring town where no e-waste processing was done. Children in Guiyu were found to have blood lead levels (BLL) that were significantly higher than those in the neighbouring village. The study concluded that elevated BLLs in Guiyu children were common as a result of exposure to lead contamination caused by primitive e-waste recycling activities (Huo, 2007).

5.2.2 Community Engagement

The local community lacks awareness of these processes. They are not aware of the impacts of the processes that go on in their neighbourhood. These places are densely populated, and this population has become very used to the noise pollution, smoke etc. Gold extraction is a secretive business and mostly people living in the vicinity of these gold extractors are not aware of what might be happening in their backyard. There is a great need to raise awareness among these people to promote community engagement.

Apart from the workers and owners there is no community engagement in this business. Community is not aware of the activities and the impacts, therefore they do not indulge to improve or to worsen the situation.

5.2.3 Local Employment

This is a profitable business with less expertise required than other businesses, so many have found their livelihoods in this work. Many jobless youngsters have found it an easy way of earning. Many students work at these workshops after school to support their education and families. Many of the workers are ex-army soldiers who after retirement have found this as well paying occupation.

5.3 Society

5.3.1 Public Commitment to Sustainability Issues

Informal electronic waste recycling has recently come into the limelight, but still very few officials know about it. A very small number is aware of its processes and impacts. This is more of an illegal business. There remains a great need to get the government to look into the issue and suggest cleaner mechanisms to keep the lives of the workers and community safe. There should be government initiated awareness programme to protect the community. Regular monitoring of the local water bodies, soil samples need to be tested. No such activities are taking place, thus government is lacking initiative, maybe due to lack of awareness or maybe due to negligence or no incentives.

5.3.2 Contribution to Economic Development

Electronic waste imports or second hand computer imports play a positive role both socially and economically. In a country where 60% of the population lives below the poverty line second hand

equipment is the only way to enable provision of MDG 8 that states "*In cooperation with the private sector, make available the benefits of new technologies, especially information and communication technologies" (United Nations, 2012)* Second hand equipment is the only way to get computer for the middle and lower class individuals in Pakistan. It is therefore very important for these imports to continue coming into Pakistan.

Apart from this many people have found a profitable business option in this business. Stopping these imports would hamper the livelihood of many living below the poverty line. This scrap is a rich source of material. If these quantities can be recovered it could be an asset for a country like Pakistan.

5.4 Value Chain Actors

5.4.1 Fair Competition

Problems regarding fair competition were seen in Karachi where the mafia plays a great role in controlling the market. They control the prices of electronic waste while the prices of precious metal keep increasing in order to ensure more profit in the business. Thus fair competition is very hard to achieve. This has an impact on prices of electronic waste in the rest of country as Karachi the hub of electronic waste. In this case the value chain actors get good profits but the poor seller and workers are left underpaid.

5.4.2 Promoting Social Responsibility

Some of the value chain actors are aware of the consequences of electronic waste recycling. Therefore they hire other people at low wages to bear the impacts. They have not provided their workers with any protective gears. Several of them are not aware that there are any consequences of this business. They are interested in the profits they get from the business. Lack of awareness and selfishness on behalf of these owners will lead to bad health and slow death of these workers. Transparency is required on the behalf of the owners of this business when they hire workers. They should tell them about the consequences which is not known by the workers at all. There needs to be transparency about these activities when other community members are being affected by it.

Similarly a lot of importers when importing electronic waste know that it is scrap as they mostly buy it off recyclers in developed countries. They are not aware of the quality and how much life of the second hand products is left. Many details about the product is hidden when the product is being sold and shipped to Pakistan and in case it is being sold in Pakistan there is a fee for checking the quality and working condition of this equipment. Many of the dealers know what they are buying is scrap from recyclers.

6. IMPACT ASSESSMENT

The impact assessment was made using UNEP guidelines. After selecting relevant stakeholder and subcategories impact categories were selected (Table 2). There is not one way of impact assessment in SLCA. In this case symbols were used to

Table 2. Social impact assessment of informal recycling in Pakistan

			Impact category				
Stakeholder category	**Subcategory**	**Status in summary**	**Health & safety**	**Socio-ec. repercussion**	**Human rights**	**Dev. of country**	**Total rating**
Worker	Working Hours	74 hrs +	-	-	-	+	Negative
	Child Labour	yes	-	-	-	-	Very neg.
	Health and Safety	Extensive negative impacts	-	-	-	-	Very neg.
	Social Security	No	-	-	-	no imp.	Very neg.
	Forced Labour	Not seen	no imp.	no imp.	+	+	Positive
	Wages	More than 2.7 $/day	no imp.	+	no imp.	+	Positive
	Equal opprtunities/discrimination	Equal opportunities, no discrimination	-	+	+	+	Positive
	Freedom of association	No	-	-	-	-	Very neg.
Local community	Safety and health	Yes	-	-	-	-	Very neg.
	Community engagement	no	-	-	-	-	Very neg.
	Local Employment	yes	-	+	no imp.	+	Indifferent
Society	Public contribution to sustainable issues	no	-	-	-	-	Very neg.
	Contrib. to ec. development	yes	+	+	no imp.	+	Positive
Value chain actors	Promote social responsibility	no	-	-	-	-	Very neg.
	Fair Competition	no	no imp.	-	no imp.	-	Negative

show if subcategories had a relation to the impact category, using "+" to indicate positive impact and "-" negative impact of the subcategory, and "no impact" to indicate when an impact category is not at all affected by a certain subcategory. A simple colour system, inspired by Ciroth and Firanze (2011) was used that evaluates the overall social impacts of each subcategory.

7. CONCLUSIONS

Earlier studies have been performed on the adverse impacts on informal recycling of WEEE, but none in Pakistan. More importantly, only one study was found which tried to incorporate the impacts in an S-LCA framework (Manhart et al, 2011). This paper contributes data on social impacts of informal WEEE recycling, in a format which should be help easily incorporate assessments of ICT systems, equipment, and WEEE recycling, providing a more realistic picture of the life cycle impacts. This paper has sketched a picture of impacts of informal recycling on various stakeholders and it shows that it has mostly negative impacts on its workers and community but at the same time helps in decreasing poverty and is playing a vital role in economic development. The scrapper plays a great role in recycling of WEEE, but his/her health and benefits needs to be covered under the corporate social responsibility schemes of ICT developers and manufacturers. This paper will share the facts, impacts and importance of the unjust trans-boundary movement of WEEE. It also highlights the need of strengthening of Extended Producer Responsibility not only in developed countries, but also in developing countries. It also emphasizes the need for awareness rising among the workers community and the government officials.

The experience from on using the UNEP/SETAC guidelines (Benoît and Mazijn, 2009) in a supply chain of informal activities shows that some of the listed subcategories are hard to apply under these circumstances. Still, some of the negative social impacts in supply chains may very well originate from informal activities in developing countries. This needs to be considered when further developing the UNEP/SETAC guidelines.

8. RECOMMENDATIONS

One of the main reasons why this business causes so many impacts is lack of awareness among the various stakeholders. There lies a great need to share these findings with the Government officials and authorities and help them create awareness among different stakeholder from the value chain actors to the worker. This is the first such study conducted for informal electronic waste in Pakistan. The results of this study should be shared with different producer and manufactures of ICTs. Efforts should be made by them to include these distant workers and their benefit in their policies as a part of their Corporate Social Responsibility. A study needs to be undertaken to improve weaknesses of UNEP guidelines when applied on informal sector such as this one.

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