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Visualizing Social Issues in Supply Chains Using The Social Hotspot Database

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Abstract:

Companies benefit greatly from streamlined models and tools that can be used to mine for data and prioritize issues regarding the potential impacts of their operations and products. Guided by the well-established fields of Environmental Life Cycle Assessment (LCA) and Corporate Social Responsibility, Social LCA is a developing technique that allows for the generation, organization, assessment and communication of product life cycles' social impacts. As a precursor to a full Social LCA study, Social Hotspots can be identified through the use of a generic (i.e., top-down) database of country and sector-level social issues relative to the share of worker hours in the supply chain. Over the last three years, researchers at New Earth constructed such a prioritization tool, called The Social Hotspot Database (SHDB, www.socialhotspot.org).

The SHDB system includes a Global Input-Output (IO) model derived from GTAP that is used to visualize product supply chains by Country-specific Sector (CSS). From the GTAP IO data on payment of wages to workers, a Worker Hours Model was created with wage rate data (obtained primarily from the International Labor Organization and the United Nations Industrial Development Organization. This Worker Hours Model is then used to rank CSS within the supply chain of a product category by labor intensity. Those with the highest share of worker hours are considered first for potential Social Hotspots using the SHDB's Social Theme Tables. These tables are populated with quantitative and qualitative indicators by country, and sector when relevant, that are characterized for their level of risk that the specific social issue is present. By testing the CSS with the greatest share of worker hours and other relevant CSS in the supply chain with the SHDB Social Theme Tables, it is possible to prioritize places in the supply chain that warrant a closer (site-specific) investigation.

The paper will present an overview of the SHDB development methodology, including a detailed description of two of the Social Theme Tables, and highlight future advancements.

1. Introduction

The globalization of supply chains, which includes the expedited exchange of raw materials and consumer goods among countries, has its socioeconomic benefits (e.g. jobs for the poor). The complexity and lack of transparency of modern supply chains, however, often results in conflicting social impacts like income inequality, corruption, human exploitation, and resource degradation (Lee & Vivarelli, 2006). Corporations, who are often unaware of the embedded social impacts, are now under scrutiny and increased pressure to uncover and divulge this information. Passed just last year in California, the Supply Chain Transparency Act requires companies to identify the forced and child labor risks of their supply chains (SB 657, 2010).

Nevertheless, the convolution of supply chains makes this task burdensome. Even though better management is becoming key in this globalized system of outsourced production and trade, for the most part, most companies fail to adequately recognize that the supply chain extends far upstream, to suppliers and their suppliers, and even downstream to their end-users. According to research by Bain & Company in 2003, only 7% of 162 companies effectively tracked the performance of their vendors, logistics providers, distributors, and customers (Cook, 2003).

A true socially sustainable company considers the impacts of its products beyond its own sphere of local operation, and beyond its bottom line. The ideal approach is to take responsibility for the entire life cycle -- the system of organizations, people, technology, activities, information and resources involved in manufacturing, moving, using and disposing of their product or service (Hutchins and Sutherland, 2008).

Looking at social issues in business practices is not new; for example, Corporate Social Responsibility (CSR), which promotes third party auditing and verification of worker rights and working conditions, has grown over the last several decades as a means to help businesses act more in line with society's values (OECD, 2009). The International Standard Organization (ISO 26000, 2010) provides CSR guidance in business efforts to operate in the socially responsible manner that society increasingly demands. While CSR does provide effective methods for the enterprise and facility level, it fails to address the larger picture of the social issues prevalent across complex value chains made up of many businesses (Benoit and Mazijn, 2009).

Considering the full life cycle of a product is a more holistic way to institute improvements in a globalized economy because it accounts for the entire supply chain (and sometimes the use and end-use) of a product in a single assessment. Environmental Life Cycle Assessment (E-LCA) is a tested technique used to quantify environmental impacts of a product or service over its lifetime, including raw material extraction, manufacture, distribution, use, and disposal. The methodology standardized by ISO 14040 (2006) aggregates inputs and outputs of resources and chemicals to air, water, and soil into several environmental impact categories, such as global warming, resource depletion, human health, and others. Until recently, E-LCA was an arduous and expensive technique for companies to apply and many avoided it merely to avoid knowing what the true environmental impact of their product or service was. Now that companies are becoming increasingly interested in promoting themselves as "more" sustainable than a competitor, and with the explosion of streamlined tools, along with data availability and transfer, E-LCA is moving into the mainstream (Goleman, 2009).

A primary goal of LCA has been, from the beginning, to maintain or enhance the health of humans and the environment via its well-established impact categories of human, abiotic and biotic protection (Jolliet et al., 2004). In E-LCA, however, with the exception of the impact category of human health, which considers chemicals released to the environment indirectly affecting people's physical constitution, overall social wellbeing of a product or unit process is not assessed (Norris, 2006). Human or social wellbeing defined includes themes like quality of life, adequate living standards, human welfare, life satisfaction, basic human needs fulfillment, human development, happiness and utility (McGillivray, 2007). The dimensions are diverse and cover aspects ranging from knowledge, friendship, self-expression, affiliation, bodily integrity, health, economic security, freedom, wealth and leisure (Alkire, 2002).

Social Life Cycle Assessment (S-LCA) is a newer method that intends to add in critical indicators of human wellbeing that are influenced by processes or companies in supply chains, such as worker's rights, community development, consumer protections, and societal benefits. The Guidelines for Social Life Cycle Assessment of Products (The Guidelines) offer an effective framework that complements E-LCA and CSR, and represents the consensus of an international group of experts leading research in this field (Benoit and Mazijn, 2009). This research builds off of recommendations offered in The Guidelines for the inventory, or data collection, phase of a S-LCA study.

2. Methods: The Social Hotspot Database Model

Attempting to collect site-specific data throughout a supply chain would be a time and cost-prohibitive endeavor. Furthermore, if only a bottom-up, enterprise-level approach is used, very few companies in a supply chain can be fully assessed, due to the intensity of collecting data on a company-by-company basis. This falls back to a CSR approach rather than S-LCA, and perhaps misses important social impacts somewhere in the supply chain.

Not only The Guidelines, but also other respected authors in the field (e.g., Dreyer et al., 2010; Hutchins and Sutherland, 2008; and Kruse et al., 2009) propose that a limited number of site-specific evaluations should be coupled with a top-down, generic assessment in the inventory phase of S-LCA. A simplified screening tool containing regional and sector-specific indicator data on social issues of concern can be used to guide site-specific data collection efforts by identifying "Social Hotspots" (Benoit and Mazijn, 2009).

Social Hotspots are activities in the product life cycle that provide a higher opportunity to address issues of concern (eg. human and worker rights, community well-being etc.), as well as highlight potential risks of violations, damage to reputation, or issues that need to be considered when doing business in a specific sector and country. Social indicator data for country-specific-sectors (CSS) is extremely valuable, since unit processes are all associated with a particular industry in a country, that which may have specific social impacts to be aware of.

The Social Hotspots Database (SHDB) is a tool for acquiring greater visibility of social impacts in product supply chains. It incorporates two ways of prioritizing CSS as hotspots, through a set of Social Sub-category Tables that characterize risk of specific issues and with a Worker Hours Model developed primarily from the Global Trade Analysis Project's (GTAP) database.

2.1 Social Sub-category Tables

The SHDB currently contains 22 Social Sub-category Tables (containing more than 50 characterized indicators) for issues such as forced labor, freedom of association rights, excessive working time, high conflict zones, and access to adequate sanitation, to name a few (See Table 1 for all Social Themes and Indicators). Algorithms are used to rank quantitative values as low, medium, high, or very high; rubrics are applied to determine risk levels of qualitative data.

Regional specificity is a major consideration when collecting indicator data for the SHDB. The tables include global statistical data for 227 countries and up to 57 sectors. Ekvall (2011) highlighted the relevance of national statistics to assess the potential social impacts of supply chains. The global and sector indicators and qualitative data collected for these tables were extracted from various prominent, international, statistical organizations such as the World Health Organization, the International Labor Organization, the World Bank, and many others. Nearly 200 sources of data have been incorporated into the database.

Table 1: Social Sub-category Tables and their respective indicators and characterized impacts

Category	Sub-category	Data Indicator	Characterized Impact
Labor Rights and Decent Work	**Labor Laws/ Conventions**	Number of Labor Laws	Potential of Country not passing Labor Laws
		Number of labor laws by sector	Potential of Country not passing Labor Laws by Sector
		Number of Labor Conventions ratified (out of 81 possible)	Potential of Country not adopting Labor Conventions
		Number of Labor conventions ratified by sector	Potential of Country not adopting Labor Conventions by Sector
		Year of last Minimum Wage Update	Potential of Minimum Wage not being updated
	Wage Assessment	Minimum Wages (USD)	Potential of Country Average wage being < Minimum Wage
		Average Unskilled Wages (USD) in country	
		Non-poverty Guideline (USD)	Potential of Country Average wage being < Non-poverty Guideline
		Average Unskilled Wages (USD) in country	
		Minimum Wages (USD)	Potential of Sector Average wage being < Minimum Wage
		Average Unskilled Wages (USD) by sector	
		Non-poverty Guideline (USD)	Potential of Sector Average wage being < Non-poverty Guideline
		Average Unskilled Wages (USD) by sector	
	Population living in Poverty	Percent of Population living on <$2/day	Risk of Population living on <$2/day
	Child Labor	Child Labor % in country	Risk of Child Labor in country
		Child Labor % by sector	Risk of Child Labor by Sector
	Forced Labor	Qualitative	Risk of Forced Labor in country
		Qualitative	Risk of Forced Labor by Sector
	Excessive Working Time	Percent working >48 hours/week in country	Risk of Population working >48 hours/week in country
		Qualitative	Risk of Population working >48 hours/week by Sector
	Freedom of Association, Collective Bargaining, Right to Strike	Qualitative	Risk of not having Freedom of Association Rights
		Qualitative	Risk of not having Collective Bargaining Rights
		Qualitative	Risk of not having the Right to Strike
	Unemployment	Unemployment Average % from 2000-2009	Potential of High Unemployment in country
		Unemployment % by sector	Potential for High Unemployment by sector
Health & Safety	**Occupational Injuries and Deaths**		
	Occupational Toxics & Hazards		
Governance	**Corruption**		
	Legal System	World Bank Worldwide Governance Indicator - Rule of Law	Overall weakness of Legal System
		Bertelsmann Transformational Index - Rule of Law, independent judiciary	
		CIRI Human Rights Index - Independent Judiciary	
		Global Integrity Index - Judicial Accountability	
		Global Integrity Index - Rule of Law	
		Global Integrity Index - Law Enforcement	
		World Justice Project Average	
Human Rights	**Indigenous Rights**	Presence of indigenous population, X	Not characterized
		Indigenous Population, %	Amount of indigenous population
		ILO Convention adopted for Indigenous, Y or N	Risk of country not adopting Indigenous ILO convention and UN Declaration
		UN Declaration for Indigenous, endorsed(Y), abstained(A), against(N)	

Category	Sub-category	Data Indicator	Characterized Impact
		Number of Laws enacted to protect indigenous	Risk of country not passing Laws to protect indigenous
		Qualitative	Potential for Indigenous Rights Infringements by Sector
	Gender Equity	Social Institutions and Gender Index	Overall weakness of Gender Equity
		Global Gender Gap	
		World Bank Gender Development Indicator	
		World Bank Gender Empowerment Index	
		CIRI Human Rights Index - Economic	
		CIRI Human Rights Index - Political	
		CIRI Human Rights Index - Social	
		Adolescent fertility rate (births per 1,000 women ages 15-19)	Not characterized
		Fertility rate, total (births per woman)	Not characterized
		Share of women employed in the nonagricultural sector (% of total nonagricultural employment)	Not characterized
		% Unemployment, (% of female labor force unemployed/% of male labor force unemployed)	Not characterized
		% of women workers vs. men by sector	Risk of Gender inequity by sector
	High Conflict Zones	Heidelberg Conflict Barometer - # of conflicts	Potential for High Conflict
		Heidelberg Conflict Barometer - maximum intensity of conflicts (1-5)	
		Heidelberg Conflict Barometer - change in conflicts (positive=worsening)	
		Number of Refugees - UN Refugee Agency (000's)	
		Center for Systemic Peace Indicator	
		Minority Rights Group Indicator	
		Top Risers from last year in Minority Rights Group Indicator, X	
		Qualitative	Potential for High Conflict specific to sectors
	Human Health - Other Health Risks besides Disease	Life expectancy at birth (years) 2008	Risk of low life expectancy
		Mortality rates for injuries (per 100 000 population) 2004	Risk of high mortality rates due to injury
		Proportion of undernourished % of total population, (-) = <5% 2005-2007	Risk of high undernourishment
		Deaths due to indoor and outdoor air and water pollution, per million 2004	Risk of death due to air and water pollution
		Population affected by natural disasters, ave per year per million 2000-2009	Risk of death due to natural disasters
	Human Health - Communicable Diseases	Cases of HIV (per 1000 adults 15-49 years) 2010	Prevalence of HIV 2010
		Cases of Tuberculosis (per 100 000 population) 2008	Prevalence of Tuberculosis 2008
		Cases of Malaria (per 100 000 population) 2008	Prevalence of Malaria 2008
		Cases of Dengue Fever (per 100 000 population) 2005	Prevalence of Dengue Fever, 2005
		Cases of Cholera 2008	Prevalence of Cholera 2008
		Mortality rates from communicable diseases (per 100 000 population) 2004	Risk of mortality from communicable diseases
Community Infrastructure	**Children Out of School**	Children out of School – male	Risk of Children not attending School – male
		Children out of School – female	Risk of Children not attending School – female
		Children out of School – total	Risk of Children not attending School – total
	Access to Improved Drinking Water	Access to Improved Drinking Water, % - rural	Risk of not having access to Improved Drinking Water – rural
		Access to Improved Drinking Water, % -	Risk of not having access to

Category	Sub-category	Data Indicator	Characterized Impact
		urban	Improved Drinking Water –urban
		Access to Improved Drinking Water, % - total	Risk of not having access to Improved Drinking Water – total
	Access to Improved Sanitation	Access to Improved Sanitation, % – rural	Risk of not having access to Improved Sanitation – rural
		Access to Improved Sanitation, % – urban	Risk of not having access to Improved Sanitation – urban
		Access to Improved Sanitation, % – total	Risk of not having access to Improved Sanitation – total
	Access to Hospital Beds	Access to Hospital Beds - # beds/1000 pop	Risk of not having Access to Hospital
	Smallholder vs. Commercial Farms		

2.2 Worker Hours Model

The second major component of the SHDB is a Worker Hours Model that ranks 6,441 country-specific sectors (CSS), equivalent to unit processes, within product supply chains by labor intensity. Worker hours are used as an activity variable because they are a representation of where people are most active in supply chains. This activity variable not only provides a ranking CSS by worker hours, but can also be used effectively for Life Cycle Attribute Assessment (LCAA) (Hauschild, 2008; Norris, 2006). With LCAA, it is possible to calculate the share of a supply chain that may be affected by child labor, or perhaps the percentage of worker hours with site-specific data collected. The unit variable can also be applied to set cut-off boundaries of the product system under assessment.

In order to determine Worker Hours by CSS, two sources of data were required – (1) a global input-output (I/O) model that provides total wages paid out by country and sector per dollar of output and (2) unskilled, skilled and total average wages per hour. By dividing Total Wages Paid Out by the Average Wage Rates per hour in each CSS, it was possible to obtain annual Worker Hours per dollar output by CSS. The Global Trade Analysis Project (GTAP) based at Purdue University offers a general economic equilibrium model that provided the total wage payment data for a matrix of 57 sectors and 113 countries and regions, reporting for a total of 6,441 CSS.

The majority of average wage rates paid to workers, skilled and unskilled, by country and occupation were accessed from the Laborsta Database compiled by the ILO (http://laborsta.ilo.org/). Additional wage rate data for specific manufacturing sectors were obtained from the United Nations Industrial Development Organization (UNIDO, www.unido.org). Some further wage rates were found through the OECD website (http:// stats.oecd.org/) and the Food and Agriculture Organization (FAO) - Rural Income Generating Activities (RIGA) database (http://www.fao.org/).

The Social Theme Tables and the Worker Hours Model are used to help identify Social Hotspots in product supply chains. By knowing what countries and sectors claim the highest amount of worker hours, collectively with what countries and sectors have high or very high risk of social issues according to the Social Theme Tables, it is possible to direct the collection of more site-specific data or make improvements in a product supply chain.

3. Table Development

Within the Social Hotspots Database project, important issues, or issues for which risk and opportunity tables should be built, were identified through literature review and recommendations from the UNEP Guidelines for Social Life Cycle Assessment, the ISO 26000 Guidelines for Social Responsibility, the Global Social Compliance Programme Reference tools, and the GRI G3 Guidelines. In addition, a multi-stakeholder advisory board of 17 representatives from the private sector, NGO's, and academics was formed to advise on research priorities and hot issues. Methodological Sheets developed by the UNEP/SETAC Life Cycle Initiative are available for several subcategory themes and indicators, which have been used to assess impacts within the themes and identify indicators and data resources (Benoit et al., 2010).

One of the most challenging aspects regarding the development of the SHDB is data collection. Generic data is uncertain due to its broad and indiscriminate nature. Data are often sparse, outdated, or difficult to obtain for certain indicators, even at the country level, and often sector level data were simply not available. Although certain sources, like the World Bank's World Development Indicators, the ILO databases, and the U.S. Department of State's Human Rights Reports have data on hundreds of countries, it is rare that data is completely comprehensive. Primary company-level data collected via auditing procedures, such as performed by Dreyer et al. (2010b), may hold less uncertainty, however, are much more expensive and time intensive to gather, and are not currently used in the SHDB.

Not only is the availability of data an obstacle, but data quality is also vitally important. Using generic or secondary data, rather than site-specific, primary data, presents obvious challenges. At times the data might not relate well to the concept being measured, or the collection agency may transform the data in a way that invalidates it, or parts of the necessary data may not be available. In certain countries, errors may be introduced because monetary resources are not available to gather statistical information (Benoit and Mazijn, 2009). A majority of social indicators found in international databases are based on information obtained from national censuses that are conducted irregularly only when resources allow. Data for the intervening years have to be interpolated. These numerous methodological issues make the data difficult to compare both between countries at a given point in time and within given countries over time. These problems do not provide reason against the use of social indicators, but rather grounds for attempting to improve their reliability (McGillivray, 2007).

Construction of each of the Social Sub-category Tables often takes a unique approach depending on what kind of indicators are available, or whether only qualitative information is accessible. Indicators are identified for each chosen social theme, and are selected on the basis of relevance to the impact theme, data availability and coverage (countries and sectors), quality and scientific/public recognition of the data source. Currently, all the data is sourced from publicly available databases (ILO, World Bank, OECD, WHO, etc.). Whenever possible, triangulation is implemented with different sources of information, which are compared across impact sub-categories to identify differences and discrepancies in data and data interpretation.

The data collected are mapped to country/region and sector specification according to the GTAP Model. Each risk and opportunity table identifies the indicator(s) used to measure the impact

sub-category, the indicator results for each GTAP country and sector, the algorithms used to assess risk or opportunity, and the metadata (ie., data sources).

3.1 Child labor

Child labor refers to work for children under the age of 18 that is mentally, physically, socially and/or morally dangerous or harmful and that interferes with their schooling. UNICEF defines child labor as work that exceeds a minimum number of hours, depending on the age of a child and on the type of work. For ages 5-11, it means at least one hour of economic work or 28 hours of domestic work per week. For ages 12-14, it mean at least 14 hours of economic work or 28 hours of domestic work per week. For ages 15-17, it means at least 43 hours of economic or domestic work per week. Such work is considered harmful to the child and should therefore be eliminated.

An estimated 158 million children aged 5-14 are engaged in child labor, one in six children in the world. In Sub-Saharan Africa around one in three children are engaged in child labor, representing 69 million children. In South Asia, another 44 million are engaged in child labor. Millions of children are engaged in hazardous situations or conditions, such as working in mines, working with chemicals and pesticides in agriculture or working with dangerous machinery. Children living in the poorest households and in rural areas are most likely to be engaged in child labor. Most child laborers work in agriculture, approximately 60 percent. Those burdened with household chores working as domestic servants are overwhelmingly girls, who are especially vulnerable to exploitation and abuse.

Data in this table not only represents the Worst Forms of Child Labor specified by the ILO convention 182, but any form of labor, including working for family businesses and farms. Data is reported for different age ranges, which are specified for each country in the metadata, as it comes from various international, secondary sources. Therefore, countries may not be directly comparable to each other. Rather, the characterization levels of risk or opportunity are to be used in the Social Hotspot Database as a means of locating areas of high risk or opportunity within supply chains at the country and sector level.

The child labor table was initially constructed using data from the Understanding Children's Work (UCW) database established by UNICEF, ILO, and the World Bank. The UCW survey assessment reports data from over 50 countries for percentage of total children working by economic sector, whereas most other secondary sources only provide information on total child labor within a country, if that is even available. The U.S. Department of Labor's 2008 Findings on the Worst Forms of Child Labor was also a source with sector data for agriculture, manufacturing, and services.

Other sector level data was determined, not quantitatively by percentage, but by level of risk using the U.S. Department of Labor List of Goods Produced by Child Labor or Forced Labor 2009, a report required by the Trafficking Victims Protection Authorization Acts of 2005 and 2008 produced by the U.S. Department of Labor's Bureau of International Labor Affairs (ILAB), Office of Child Labor, Forced Labor and Human Trafficking (OCFT). Another source of useful information was from the International Confederation of Free Trade Unions (ICFTU). One last important reference used was the U.S. Department of State, Country Reports on Human Rights Practices.

Using the sources of qualitative data, we determined level of risk in a sector based on what types of child labor were occurring in a country, for example, in Argentina, child labor exists in commodity production of blueberries (agriculture) bricks (construction), cotton (agriculture), garlic (agriculture), garments (manufacturing), grapes, and olives, strawberries, tobacco, and tomatoes (agriculture) according to U.S. Department of Labor List of Goods Produced by Child Labor or Forced Labor 2009. The risk characterization criteria are presented in the following section.

Risk of child labor was determined at the country level and at the sector level. A country could be characterized at 5 levels - no evidence, low, medium, high, or very high. No evidence was only used if reports specified that there was no evidence of child labor occurring in the country. Examining the distribution of data over the entire world, it was determined that the following criteria be used to specify risk at the country level: <4% = low, >4-10% = med, >10-20% = high, >20% = very high.

Sector level risk is only given a range of 4 levels - no evidence, low, medium, or high. The criteria for quantifying risk within countries at sector level is described below:

- If sector survey data exists, >0.5% = high, >0.1 and <0.5 = medium, <0.1 = low, based on the overall distribution. If another source called out an instance of child labor in a sector, if the sector was low or no data in the survey, characterization was increased to medium, if the sector was medium or high in the survey, characterization was labelled as high.

  If no sector survey data exists and there was no evidence of child labor according to a source, then all sectors and country level have no evidence of child labor risk.

- If no sector survey data exists but one source called out child labor, and country risk is low, then sector risk is low. The same applies for medium and high country risk. If no survey data exists but one source called out child labor, and country risk is very high, then sector risk is high.

- If no survey data exists but two or more sources call out child labor in a sector, and country risk is low, then sector risk is medium. If no survey data exists but two or more source called out child labor, and country risk is medium, high, or very high, then sector risk is high.

- If a commodity is called out in DOLs List of Goods Produced by Child Labor, and survey data is available, increase a low or no data sector to medium, increase a medium or high sector to high.

- If a commodity is called out in DOLs List of Goods Produced by Child Labor, and survey data is not available, for countries with low overall child labor, mark the sector as medium, for countries with medium, high or very high child labor, mark the sector as high.

Some countries are still missing data for at least the country level percentage in the Child Labor Table. These include: Taiwan, Anguilla, Aruba, Bahamas, Cuba, Iceland, Andorra, Faroe Islands, Gibraltar, San Marino, Monaco, Bermuda, Greenland, Saint Pierre and Miquelon, Falkland Islands, French Guiana, Saint Helena, Israel, 8 from Oceania.

GTAP		Percentage of Child Labor	Level of Risk	Percentage of Child Labor by Economic Sector for Social Aspect Database (GTAP and ISIC codes mapped to sectors in rows below)														<----- GTAP Codes <----- ISIC Codes	
				PDR, WHT, GRO, V_F, A & B		COA, OIL, GAS, OMN, C & E		CMT,OMT,VOL,MIL,P D		CNS F		TRD G & H		OTP,WTP,ATP,CMN I		OFI, ISR, OBS, ROS, OSG J - P			
GTAP	*Country/ Region*	*Total (male and female)*	*no evidence (n.e.), <4 = low, >4-10 = med, >10-20 = high, >20 = very high*	*Agriculture, hunting forestry and fishing*		*Mining, Energy, Utilities*		*Manufacturing*		*Construction*		*Commerce, wholesale, retail, trade, hotels, restaurants*		*Transport, Storage, Communications*		*Banks, insurance, real estate, government, education, health, and social services*		***Meta Data***	
Code	Name	%		Sector %	Relative Risk	Sector %	Relative Risk	Sector %	Relative Risk	Sector %	Relative Risk	Sector %	Relative Risk	Sector %	Relative Risk	Sector %	Relative Risk		
PAK	Pakistan^	16.4	high	12.8084	high	-	high	1.1644	high	-	high	-	-	-	-	2.4272	high	Source: Child Involvement Data - The Depa international core labour conventions regar of hazardous forms of child labour, includir found in agriculture, followed by informal a manufacturing, coal mining, deep sea fishi Pakistan, most commonly in agriculture, th bangles, leather, surgical instruments (mar Acts of 2005 and 2008. U.S. Dept. of Labo	
PAN	Panama^	5.1	medium	3.3706	high	-	-	0.1275	medium	0.0128	low	0.7829	high	0.1178	medium	0.6885	high	Source: Child Involvement Data - The Depa Infantil, 2000. Accessed on www.ucw-pr Panama, Washington, D.C., February 25, 2	
PRY	Paraguay^	6.5	medium	3.4366	high	0.0371	low	0.2620	medium	0.0520	low	1.0920	high	0.0884	low	1.5321	high	Source: Encuesta Permanente de Hogares percent); the services and sales sector (14. Child Labor exists in commodity productio Dept. of Labor Bureau of International Labo	
PER	Peru^	22.2	very high	16.2571	high	0.0133	medium	0.5950	high	0.0222	medium	4.8174	high	0.1088	medium	0.2442	medium	Source: Encuesta Nacional de Hogares Sc [World Bank, World Bank World Developm making sector (increased construction and Practices- 2003: Peru, U.S. Department of gold (mining), coca (agriculture) according Labor Affairs. Office of Child Labor, Force	
PHL	Philippines^	11	high	7.0477	high	0.0616	medium	0.4400	high	0.0528	low	2.6411	high	0.1606	medium	0.2035	medium	Source: SIMPOC Labour Force Survey, 20 production, deep-sea fishing, mining, and Fashion Accessories, Gold, –Hogs, –Porn Authorization Acts of 2005 and 2008. U.S. in mining and manufacturing.	
POL	Poland	-	low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Source: The law protects children from ex employers underpaid them or paid them la	
PRT	Portugal^	3.4	low	1.6531	high	0.0048	low	0.3788	high	0.2363	high	0.9996	high	0.0116	low	0.0785	low	Source: Labour Force Survey 2001. Acces been reported in Braga, Porto, and Faro, a declining significantly in recent years (http:	
ROU	Romania^	1.2	low	1.1648	high	-	-	-	-	0.0076	low	0.0077	low	-	-	0.0054	low	Source: Household Labour Force Survey, 2	
RUS	Russian Federation*	5	medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Source: Child Involvement Data - Average indicate that child labor is a problem in the The breakup of the Soviet Union and the tr /cjp/tda2004/russia.htm#_ftn3336]	
SEN	Senegal^	30	very high	24.1800	high	0.0300	medium	1.4100	high	0.3600	medium	2.4600	high	0.1800	medium	0.1500	medium	Source: Enquete Nationale sur le Travail de include: child begging; forced child labor; work underwater; and "very dangerous wo and small businesses. [http://www.dol.gov 2009. Report Required by the Trafficking V www.dol.gov/ilab/programs/ocft/PDF/2009	
SGP	Singapore*	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	Source: Despite recent efforts in this doma age of 18 years. In practice however there	

Fig. 6 - Selection of Countries in the Child Labor Table - Country and Sector Level Characterization

4. Conclusions

In our globalized economy, important stakeholder groups are starting to hold companies responsible for the social impacts they cause in their product supply chains including child labor, corruption, employee discrimination, and deprivation of rights (e.g., Hauschild, 2008). The movement to create an understanding and clarity around supply chains will facilitate better corporate and consumer decision-making (New Zealand Business Council for Sustainable Development, 2003; O'Rourke, 2005). The goal is to establish transparency in how products are produced, under what conditions, and with what materials. When purchasing information is clear and accessible for making decisions based on ethics, environment, and economics, a global paradigm-shift will change the face of consumerism and improve the standard of living universally (Benoit et al., 2010).

Social Life Cycle Assessment (S-LCA) is a new technique that can be used to evaluate the social and socio-economic impacts of a product. Generic, top-down data like that in the SHDB is necessary because in an extensive supply chain with many tiers and thousands of unit processes, it points to the specific unit processes (ie., hotspots) that should be investigated further. Using both the Worker Hours Model and the SHDB Social Theme Tables, it is possible to guide the decision-making process to help determine if and where to conduct case-specific assessments. This cost and time-efficient system including ranking by importance with an activity variable, hotspot assessment with the SHDB subcategory tables, and a limited number of site-specific visits represents a promising approach to S- LCA suggested by The Guidelines.

The SHDB project aims to foster greater collaboration in improving social conditions in supply chains worldwide. The ultimate goal of the SHDB is to identify the Hotspots in a supply chain that should be investigated further for specific social issues that may negatively affect the reputation or bottom line of a company. It has been applied successfully to several pilot product studies over the last year, as will be revealed in a subsequent paper by lead author, Catherine Benoit-Norris.

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