27th FORUM ISLI SUPPLY CHAIN
24 MARCH 2017

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White Paper
Supply Chain Sustainability
ACKNOWLEDGEMENTS

The ISLI Supply Chain Forum Team 2017 would like to thank the following persons involved in the preparation of this white paper:

ARRAILOLOS Adrien, Supply Chain Manager, XyloLink
ATZEL William, Director of Supply Chain's Centre of Excellence, Orange Group
BABAI Zied, Professor KEDGE Business School
BAUBERT Alexandre, VP Global Distribution, Schlumberger
BELLART Patrick, Technological Innovation & Automation Director, FM Logistic Corporate
BENARD-DENDE Anil, COO, Showroomprive
COLOMBET Cyril, Manager, Ferrand SAS
ESTAMPE Dominique, Professor KEDGE Business School
HAAKE Beau, Business Unit Manager, Michelin
JAEGLER Anicia, Professor KEDGE Business School
KLIBI Walid, Professor KEDGE Business School
LIU Hui, Supply Development Coordinator, Decathlon
MAHE Bruno, Global Supply Chain and Near East Operations Director, Danone Nutricia Early Life Nutrition
MANGEARD Philippe, President, TK’BLUE AGENCY
MENEZES Mozart, Professor KEDGE Business School
MEUNIER Franck, SC Director EU, McCain Foods
MILIAN Bernard, Senior Consultant, AGILEA S.A.S.
PEYROL Fabien, Professor KEDGE Business School
RANGNEKAR Amit, Director Operations & Distribution, Centaur Pharmaceuticals Ltd
SEMERTZIDIS Lamprinos, Consultant, Boston Consulting Group
TÊTE Nicolas, Operations Director, IDEA LOGISTIC
VAZIRANI Aditya, VP Corporate Strategy, Robinsons Cargo & Logistics Pvt Ltd
Authors - ISLI Supply Chain Forum Team 2017

AGRAWALA ADARSH
BERTHOUX CHARLOTTE
BOUMAHROU MEHDI
CHIEN SHUO-CHEN
CUESTAS MONDRAGON NATALIA
DENG WEIKANG
DESAN THOMAS
DJUJOKOUA FONING_UY MYLÈNE
EL FADDALI HASNAE
GRS MANEKANDAN
GUPTA SHEENA
KANDE SOUBEL
KOSHAK MOHAMMED
MACKOWICZ MAXIME
MARIE ERWAN
MWAMBA MWENDAKANI RUTH PRISCILLE
NAKAYIZA FATUMAH
SADALLAH MOHAMED EL AMINE
SAID KHAMIS
SANGAM REDDY HARSHA CHAND
SHAH DARSHIL
SHIH TU YU-CHI
TABET WISSAL
TSAI SHANG-WEN
EDITORIAL

For the 27th consecutive year, KEDGE Business School Global Supply Chain Management Programme, ISLI, organizes and hosts the Supply Chain Forum. Unique meeting place and crossroad for ideas and discussions on the evolution of the supply chain, the Forum gathers every year more than 300 international supply chain leaders.

New challenges, technology evolutions, new consumptions models are on the rise. Supply chain leaders have to innovate constantly to face these issues.

This year, the Supply Chain Forum offers to discuss these challenges around 5 round tables animated by high profile supply chain leaders on the following themes:

1. Managing the Supply Chain in a VUCA world
2. Smart & Digitalized Supply Chain
3. End-to-end Supply Chain
4. Omni-Channel Supply Chain
5. Sustainable Supply Chain

The discussion and a summary of the proposed solutions will be grouped together in a White Paper so that each participant can keep some of the elements of the discussion around the main question that we are proposing this year: How to collaborate, perform, evolve, now?

White paper

“Supply Chain Sustainability”
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OVERVIEW

After the postwar boom in the 60’s and 70’s, developed countries experienced a strong economic and demographic growth, which made specialists wonder what the limits of this growth were and the impact that such a development could have on the society and the environment. Few years later, in 1987, the Brundtland report put forward an alarming point of view regarding the planet and its environmental problems which were connected to poverty in the southern countries and to the modes of production and consumption of the northern countries. It is this collective awareness which allowed specialists to define the real stakes of sustainable development.

Sustainability is the ability to continue a defined behavior indefinitely. Firstly, the desirable aspect of behavior must be defined. Examples of these aspects include:

- Environmental sustainability, which is the ability to maintain rates of renewable resource harvest, pollution creation, and non-renewable resource depletion that can be continued indefinitely.
- Economic sustainability, which is the ability to support a defined level of economic production indefinitely.
- Social sustainability, which is the ability of a social system, such as a country, to function at a defined level of social well-being indefinitely.

A more complete definition of sustainability thus includes environmental, economic, and social sustainability. This is the goal behind “The Three Pillars of Sustainability”.

Nowadays, we can notice that more and more companies are committing to introduce sustainability into their operations. Several big groups have promised to put sustainable development at the heart of their strategies. This includes use of new measures of performance which integrate the three dimensions: economic development, environmental protection and social equity. Furthermore, to apply an efficient sustainable strategy, companies must extend their commitment to responsible business practices in their value chain. This way, buyers and suppliers can also collaborate to improve the impact of the business on society and the environment around the world. Thus, supply chain sustainability must be recognized as a key component of sustainable strategy, maintaining the integrity of a brand, ensuring business continuity and managing operational costs.

Sustainability comes first with the perception and ideology we have within the company. This perception can initiate a change of behavior. Corporate social responsibility (CSR) represents the commitment made by companies to a sustainable way of production, internal training of employees and implementing sustainable supply chain. Sustainability is also a question of business, to fulfil customer needs and in the future, contribute to growth of market due to return processes and optimization.

When analyzing the aspect of sustainability of a company, it is essential to start with the most basic instrument that is used to drive the working of the company. In most cases, this
instrument is the product or service that the company provides. Hence, it is important to design products and processes that can survive varying external conditions. Products not only face technical challenges due to ever developing technology, but also environmental and socio-economic pressures associated with production, distribution and development. In addressing the issue of sustainability, it is vital to ensure that various processes that work to bring the product to a customer are sustainable as well.

The implementation of a sustainable supply chain is a continuous process. Once the company decides to have the spirit of sustainability, the success depends on the discipline to do a permanent and constant revision of all the processes involved in the supply chain.
FINDINGS

1. CSR and the Three Pillars of Sustainability

At first when we read the word sustainable, several preconceived notions come to mind like green, environmental issues and pollution. Human activity has impacted Earth negatively, in a manner which is contradictory to our needs. In the last fifty years, awareness regarding these issues has increased and it has become common today to take these effects into account. Now, the question arises on how to combine the most profitable economic activity with the least damaging effect for environment and, by extent, for people.

It seems unusual to combine concepts of sustainability with the concept of economic development, but if we give a weight (economically speaking) to what nature does for us, this can set up a new paradigm in the economic relation between economy and environment. This tradeoff is currently unbalanced, and a solution may lie in the concept of Corporate social responsibility (CSR) which is based on three pillars: Economy, Society and Environment.

CSR presents the idea that companies are responsible for the three pillars within their internal and external activity. This is not an additional process outside of the core activity of the company, but is a new way of thinking, conceptualizing and designing the organization of the company (in extent the choice and the organization of processes of production).

This is where we reach Supply Chain Management (SCM). Because of the end to end concept hidden underneath those words, managing sustainability in a supply chain required effort in not only downstream direction, but in the upstream direction as well. When you deal with supply chain at a strategic level you have the broader point of view of what a company does, a prerequisite for improving operations and results and particularly to deal with sustainability. This makes the link between the decision at a strategic level and the action at the operational level.

Many big groups, like LVMH or Kering, have put sustainable development at the heart of their strategies and implement the concept of CSR strategy (Corporate Social Responsibility). According to the French Minister of Ecology and Sustainable Development, Corporate Social Responsibility is:
“the contribution of business to sustainable challenges. For businesses, the approach consists to take into account social and environmental impacts of their activity in order to adopt the best practices as possible and contribute to the improvement of the society and the protection of the environment. CSR strategy allows to associate economic logic, social responsibility and eco-responsibility.” (Strategic, 2013)

Corporate Social Responsibility of companies implies that CSR have to use new measures of performance, which integrates 3 dimensions.

These 3 perspectives, more well-known under the name of 3 P: “People”, “Planet” and “Profit”, or “Triple Bottom Line” are primordial if the company wants to contribute positively to sustainable development. (Mercator, 2010)

However, traditional measures of computability do not take into account all bad effects the company can have on exterior world like pollution, the use of non-replaceable resources, greenhouse gases emissions and employment destruction in a country (Strategicor, 2013). These “externalities” are considerate as “free” by computability of businesses. But, they represent a quantifiable cost in long term if the company wants to develop a CSR strategy where social and ecological efforts are necessary to be taken into account.

The drying up of the Aral Sea

The Aral Sea was a lake lying between Kazakhstan in the north and Uzbekistan in the south. Once one of the four largest lakes in the world, the Aral sea has dried up and heavily polluted in recent years due to irrigation projects and fertilizer run-offs from nearby areas. The eco-system of the Aral has been nearly destroyed and salinity in the water has increased drastically. Because of this, the native fish species have disappeared from the sea, destroying the once affluent fishing industry in the area. Polluted waters have also caused severe health problems in the neighboring areas, where increased instances of lung cancer, tuberculosis and digestive disorders have been reported.

Taking into account social and environmental externalities in the life cycle of the product and maintaining efficient economy in the strategy can increase demand for the product by consumers. The advantages are:

- **Anticipation constraints and prevention of risk**: Presents a sharp knowledge of company’s social and environmental externalities and the new expectations of its customers.
• **Innovation**: Modifying way of working and evaluation of practices in order to transform constraints and opportunities and continuous innovation to increase the quality of products and services.

• **Differentiating and increasing value of brand**: Differentiating from competitors and increasing the perceived value of the brand.

• **Team motivation**: Allows companies to motivate its teams by making them work on stimulating projects while mobilizing common issues and values.

• **Economical and financial performance**: Reduces costs, especially those related to resources consumption or waste production.

2. **Customer point of view**

In the sustainability issue and from a supply chain management (SCM) point of view, the first indicator is to know what the customers need and what are their concerns, Environmental concerns has been defined as the degree of consumers’ awareness of environmental problems and their willingness to contribute personally to the solution of these problems (Dunlap and Jones 2002). Over the last years, customers have shown increasing willingness to participate, through their way of consumption and recycling. Consequently, companies have adapted their product to the ever changing demand and the relationship between customers and company

The need of green products responds to some general factors:

• Customers are more likely to purchase green products (Vernekar & Wadhwa; 2011).
• Customers are ready to pay premium price for green products (Codington 1990).
• Personal beliefs may influence consumer behavior (Ibrahim & Al 2008)

According to Hofstede (1980): “Collectivism is the conviction that focuses on interdependence, in-group harmony, family security, group-oriented goals, social hierarchies, cooperation, and a low level of competition”. Roughly collectivism focus on the welfare of society and collectivists are committed to their duties and obligations. Collectivism has been considered as an important construct influencing environmental concern of consumers and hence, the influence of collectivism values on green preferences of consumers is important. (Triandis, 1993)
Environmental concern is an important factor which establish a link between Collectivism and green product purchasing (Leonidou & Al, 2010). Confucian (group behavior regulation, conformity) or horizontal (emphasis on personal goal along with group goals) collectivism are positively related to environmental concerns while vertical collectivism is negatively related to environmental attitude.

Laroche et al. (1996) defined Eco-literacy as “the measure of the individual’s ability to identify and understand an ecologically-related symbol, concepts and behaviour”. It has been proven that the understanding and knowledge of environment helps customers to assess offers form companies and hence, influence their decisions in terms of purchasing (Alba & Hutchinson, 1987).

a. Perception of product life cycle by the consumer: Extended Value

Extended value is “the extension of traditional added value which integrate all social and environmental externalities of the company during the complete life cycle of its product.” The traditional added value aims to optimize the exchange and is based only on the satisfaction of consumers. It does not take into account the notion of social and environmental responsibilities which prevents it to answer to the new expectations of the consumers in terms of sustainable issues. However, the modes of consumption of the consumer has changed. They want to know where the product comes, and especially if its manufacturing has impacts on environment. Integrating the notion of extended value in the strategy of a business is a big change, but it’s going to be a “key element in the evaluation of the offer by the consumer” (Bascoul, Moutot, 2009).

The strategy of the extended value is based on a thorough analysis of the point of view of the consumer; what is the perception he has about the company activity and what are his expectations in terms of social and environmental responsibilities.

The strategy of extended value is different than the other strategies of sustainable development, because it is not based on the point of view of the company but on the point of view of the consumer. In order to apply the strategy of extended value efficient, you have
to anticipate and understand the new types of expectations related to the company’s externalities and know how to give value to them (Bascoul, Moutot, 2009).

The Extended Value is based on 6 dimensions: 3 times (Ante, Péri and Post) and 2 contexts (ecological and social). From the customer point of view these temporal dimension can be divided in 3 times:

- **ANTE product life before its consumption**: All events that appear before the act of consumption.

- **PERI product life during its consumption**: The time during which the consumer is using the product.

- **POST product life after its consumption**: All the elements that appear after the consumption.

Les Petites…: Perception of the consumer of the environmental and social impacts the product cycle life of a dress (Berthoux, 2016)

A panel of 25 consumers was interviewed to define what, according to them, was the social and environmental impact regarding a dress in polyester during its life cycle, from the fashion brand Les Petites...

- More than half the interviewees believed that the sourcing and production phase had the most impact on the environment and society.
- Over 60% of the interviewees mentioned discharge of waste into water and air as an important environmental concern.
- Moreover, 50% of the interviewees denounced the use and the release of toxic substances, chemical products, fertilizer, pesticides, and dyes toxic for the environment and humans.
- 45% think that the use of natural resources and non-renewable energies like water or petroleum will have harmful impact on the society.
- Hazardous working conditions of the workers was the primary concern of several interviewees, with 70% voting positively for the issue, especially in underdeveloped countries. Over 60% of the interviewees mentioned use of child labor as a concern.
Each step of the cycle life of the product can have consequences on environment and society. The strategy of the extended value analysis of 2 of the 3 pillars: social and environmental. Indeed, if we want to apply extended value, it is necessary to take into account all social and environmental externalities of the cycle life of the product which includes negative impacts but also positive impacts.

3. Employees point of view

It is essential to specify the impact of the implementation of a CSR strategy on employees. CSR affects society through the action of the company via the change of behaviour of workers and it tends to be an ongoing improvement. Here questions arise regarding the effect of CSR on behaviour of employees, how it can change the organization of work and finally if this changes their behaviour outside the company.

Employees perceive CSR from both ends of the supply chain, as a producer and a consumer. Moreover, employees tend to be more likely to buy green or sustainable product and by extension have a positive or negative perception of their own job and product. This dual point of view can affect the engagement and commitment of the workers within their company and their self-esteem regarding their activity for a living.

![Figure 7. Interconnections between Social aspects of CSR. Inspired by: Rafa Hacker, 2015](image-url)

**Figure 7. Interconnections between Social aspects of CSR. Inspired by: Rafa Hacker, 2015**

a. Employee engagement: A strong outcome of CSR.

Employees can be considered as the most important stakeholders of any organization. This means that they have a major role in the success or failure of their organization and in turn, can be affected by the organization’s activities. This is how employees are likely to be affected by the CSR programs (Koh & Boo, 2001; Peterson, 2004).

For years, the engagement of workers has been a very important subject as it deals directly with the efficiency of processes and the competitiveness of firms. Employee engagement is a strong predictor of employee outcomes, organizational success, and financial performance (e.g. total shareholder return) (Bates, 2004; Richman, 2006).
b. Effect of CSR on employee behaviour

An employee’s perception of CSR activities of their organization is directly related to their organizational commitment. Employees perception of CSR can affect their belief in the goals and values of the organization. This perception directly influences the moral of employees engaged in different projects. If an employee has a positive notion towards the company values, they are more likely to put in considerable effort into their work and hold a strong desire to continue as a member of the organization. When employees find that their organization is working in a socially responsible way, they feel proud of their association with the organization, which, in turn, leads to a higher level of commitment to the organization. A research examining 212 Review of Business Management found a positive relationship between the two; i.e., employee organizational commitment is found to be higher in organizations that are perceived to be socially responsible.

Employee commitment is more likely to affect their behaviour within company. Organizational Citizenship Behaviour (OCB) is defined as an employee’s willingness to go beyond the prescribed roles which he/she has been assigned (Organ, 1990). This is the willingness to give time to help others who have work-related problems, prevent problems with other workers, and obey an organization’s rules, regulations, and procedures, without supervision from hierarchy. These behaviours are perceived to be derived from employees' positive work attitude, such as organizational commitment.

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**CSR and Employee Engagement at Southwest Airlines**

Southwest Airline Co. (SWA) is an American passenger airlines based in Texas, USA. SWA regards itself as a company dedicated to “doing the right thing by taking great strides to ensure customer safety, and fostering trusting relationship between SWA employees, suppliers and planet” (SWA, 2011).

SWA is regarded as a leader in CSR (BCCCC, 2009). The company considers its employees as a target audience of its CSR policy. It offers benefits and training to employees for providing excellent services to its customers as a part of its CSR. One of the CSR programs at SWA involves giving working time off to employees to volunteer at non-profit organizations and charities during the week. This initiative has been highly appreciated by employees, who feel fulfilled by contributing their time to help the needy. At the same time, the initiative has also given employees a chance to interact with their colleagues outside of work and build stronger connections with them (Hongyue Ma, 2011). Another social initiative by SWA makes charitable donations to organizations of the employee’s preference.

Because of the efforts made by SWA, it is recognized as a socially responsible company both by the public and its employees. Various surveys have concluded that SWA’s employees love to work at the company, and the majority of SWA’s employees are highly engaged at work (Casey, 2011).
OCB can be used to maintain the balance in a social exchange between employees and the organization (i.e., a cognition oriented explanation). It can be understood that this behaviour is more directly intended to benefit the organization. This behaviour is a natural expression of the employees’ influence at work (e.g., Isen & Levin, 1972), rather than reflecting employees’ deliberate attempt to restore the balance with the organization.

As mentioned previously, employees’ perception of CSR activities of the company can strengthen their commitment and build a long term relationship with the organisation. An emotionally attached employee can devote their abilities and efforts to perform activities that go beyond their formal job description.

Being responsible for the needs of the society and conducting ethical business practices are now the standard expectation of the employees. Employees are not only concerned about their wage, but they also look for meaning in their daily job. Involvement in CSR activities is a way to have this link for the employees. They like to identify themselves with a socially responsible organization since it heightens their self-image and, in turn, they reciprocate through positive attitudes and behaviours such as greater job satisfaction, a higher sense of organizational commitment, intense engagement within the job and organization and a greater level of organizational citizenship behaviour.

4. Sustainability in product development

The demand for consumer goods has seen an exponential increase in terms of volume with increase in globalization, urbanization and buying power of consumers in almost every area of the world. With the increase in demand, the average life cycle of consumer products has reduced drastically from earlier decades. In case of fast moving consumer goods (FMCG), the average product life cycle can be several years owing to the relative simplicity in design of the products. However, electronic products, like mobile phones, have a much shorter product life cycle in the tune of 5.6 years. Manufacturers and researchers face a continuous challenge of developing advanced products in a limited time frame to meet retail and consumer demands that change continuously (Nicole Van Nes, 2005).

Besides technical advancement, non-technical factors like environmental, social and economic impact also affect the direction in which product lines are designed. These factors have a global impact on consumers and the environment in which they live (Wayne D. Hoyer, 2013). Hence, compliance with these non-technical factors is often observed across all consumer product lines, from soaps to laptops.

Products designs are, thus, expected to meet a host of criteria in order to fulfil customer demands and remain competent in the market. The crucial stage to focus on in order to meet these varying demands in design is the product development phase (Gaurav Akrani, 2012). Not only is product development the ideal time to introduce changes in design and technology, it is also the ideal time to introduce sustainability measures to be built into the design of the product.
a. Influence of technical factors

Product development for technical products can take up to several years in research and manufacturing. However, the rate of innovation has increased exponentially in the twenty-first century. New technology may become available during the design or manufacturing phase of products. This effect of new technology introduction is felt most during the product development phase. To survive in the current market, technical upkeep and pace of development are of high importance (Arthur Petron, 2007).
omnipresent in the market today. From cell phones and TV sets, to microwaves and cars, engineering developments have transformed mere everyday objects into keen receptors and transmitters of information which analyse information to give quicker, more efficient solutions. The novelty of the functions offered has created an appeal for innovative products. Thus, companies offering electronic consumer products need to keep up with the changes they introduce in their products.

b. Influence of non-technical factors

Although the electronic sector has been gaining traction in terms of revenue and volumes in the market, most consumer goods still remain non-technical in nature. These products that could be items of everyday consumption do not require regular development in design or forms. If we consider FMCG like soaps and cereal, little innovation is observed the years and the average product life cycle remains high above the standard for electronic products. These products are thus affected by non-technical factors like social, economic and environmental impact (Crafts and Design Support Material, 1998).

1. Social Impact

Social impact can be better understood as the effect of a product on stakeholders that interact with the product throughout its lifetime. Workers, consumers and local communities can be identified as the major stakeholders. These groups are related with the sourcing, manufacturing, use and the end-of-life stages of life cycle (Wayne D. Hoyer, 2013). The perception of these groups impacts the reception of any new product.

These needs may also vary between stakeholder’s and the stage of life cycle of the product. Workers that contribute in the manufacturing process are most affected by procurement, imports and production activities (Rajesh Chandy, 2013). With the introduction of automation in these processes, the risk of loss of employment rises drastically for these workers.

A similar situation may arise if the manufacturer decides to move production to another country. Thus, in these situations, a nexus needs to be reached between manufacturing policies, desired quality and cost efficiency, all of which can be introduced in the design and development phase.

Figure 11. Stakeholders in Social impact of product development. Inspired by: Wayne D. Hoyer, 2013
2. Economic impact

It is needless to say that the cost of a product directly influences sales and performance in the market. Price, quality and aesthetics mark the primary aspects of a product that attract customers. With technical evolution, however, the product designs have become more sophisticated in terms of technology, appearance and materials used. Due to this, the price of products, from soaps to cars, have been increasing steadily over the years. High prices mean that some of the products will go out of the scope of affordability of some economically challenged customers, who may have preferred lower quality products but at a higher price. Thus, prices need to be tailored to the specific markets they are going to serve (Crafts and Design Support Material, 1998).

Reducing the manufacturing cost, and thus the selling price, may require use of less advanced technology or cheaper material. This trade-off between quality and cost directly affects the structure of a product. A secondary aspect of the price is the cost of continually using the product, called running costs (Crafts and Design Support Material, 1998).

Sales of Shampoo Sachets in Indonesia

In many of the smaller parts of Indonesia, common commodities such as shampoos, soaps and detergents are being sold in the unconventional forms of travel size sachets which contain just enough product for one or two time use. These sachets are available at every convenient store and neighborhood market in towns and villages where people cannot afford to buy full size bottles. The low price and limited use of one sachet allow the user to try several varieties and brands of the same product without affecting their personal budget. The need for sachet commodities rose out of the lack of accessibility and low buying power in developing and under-developed nations. This product is an excellent example of design innovation to suit different markets. (sachetsandmore.com)

The costs of associated with a product depend not only on the manufacturing processes used but also on the pre-sale and after sale value addition. The costs can be broken down as into four major areas: Purchasing, manufacturing, sales and running costs (Ragatz, 1997). The cost to price of product ratio is decided based on the company policy and nature of the
product being produced, which in turn depend on a host of subjective and objective criteria. One of those criteria is the quality policy practiced by the company for its products. This subjective criterion influences the materials, processes and aesthetics of the product. To ensure product sustainability in terms of sales, it is essential to find the optimal point between price and quality.

3. **Environmental Impact**

The materials and processes a company employs have a direct impact on the environment. At every stage in the product life cycle, there rises either a need for natural resources or formation of by-product that need to be disposed. Environmental impact has also become the centre of discussion in recent times due to the evident harm caused by industrial processes to the natural environment of many communities. In most countries, laws have been imposed to limit and guide the effect of industries on the surrounding natural resources, like land, water and air (Crafts and Design Support Material, 1998). Thus, understanding the environmental impact at each stage in product life cycle is imperative for sustainability.

![Diagram of Product Life Cycle]

*Figure 9. Product life cycle. Inspired by: Crafts and Design Support Material, 1998*

The choice of materials made in designing a product must take into consideration the processes of extracting or obtaining the material from natural resources. Use of precious materials, for example, may be beneficial at the beginning but will not support production in the long run since the material will become extinct at a quicker rate and become more expensive eventually (Ragatz, 1997). One way to avoid this is by reducing the amount of components required for manufacturing.

During the processing of the materials, several by-products may be generated that may or may not be toxic in nature. Proper disposal of these materials should be essentially a non-expensive and safe process. An effective alternative is to use renewable resources that will not only replenish the source through by-products but also diminish the waste generated.

The end of life-cycle processes is where the true impact of production is truly felt. Choice of materials and their end-of-life condition determine the kind of facilities required to recycle the product. This stage is also important for ensuring that the raw materials used for initial production are available at a reduced price for the next cycle. The end-of-life processes play a major role in enhancing sustainability of the product over time.
5. Evaluating Supply Chain Performance

a. Green SCOR

Developed by the Supply Chain Council to guide companies applying SCM principles, Green SCOR is the sustainability version of the SCOR reference model with the addition of sustainable metrics. Green SCOR is developed in four basic steps.

![Figure 10. Steps for Green SCOR development. Source: LMI Government Consulting, 2003](image)

Based on the methodology developed by LMI Government Consulting (2003) for the green SCOR model, it is advised to check the processes in the SCOR model and assess the impact each process has on the environment. The best practices must be based upon knowledge of the existing and emerging practices for environmental management within private industry and the public sector. The following table provides an example of the metrics and best practices included in the GreenSCOR.

<table>
<thead>
<tr>
<th>Process element</th>
<th>Release finished product to deliver</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process element definition</strong></td>
<td>Activities associated with post-production documentation, testing or certification required prior to delivery of finished product to customer.</td>
</tr>
<tr>
<td><strong>Performance Attributes</strong></td>
<td><strong>Metric</strong></td>
</tr>
<tr>
<td>Reliability</td>
<td>% Release errors</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>Quarantine or Hold time Release process cycle time</td>
</tr>
<tr>
<td>Cost</td>
<td>Realize cost per unit</td>
</tr>
<tr>
<td><strong>Best Practices</strong></td>
<td><strong>Features</strong></td>
</tr>
<tr>
<td>Accurate and low cost batch records for regulatory compliance</td>
<td>Electronic batch records</td>
</tr>
<tr>
<td>Review batch records by exception</td>
<td>Electronic batch records linked to process plans/recipes and exceptions flagged</td>
</tr>
<tr>
<td>Automated notification of laboratory regarding sample availability</td>
<td>Interface between production system and LIMS</td>
</tr>
<tr>
<td>Implement EMS program</td>
<td></td>
</tr>
<tr>
<td>Implement hazardous materials system</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 11. Matrices and Calculations in Green SCOR Card. Source: LMI Government Consulting, 2003*
b. **Sustainability Life Cycle Assessment**

Life Cycle Assessment - SLCA allows firms to define, assess and communicate product sustainability. It’s an assessment that gives a strategic overview of the full scope of social and ecological sustainability at the product level. It results in an analysis (using colors instead of numbers) that helps company to evaluate the environmental, social and economic impact of a product during its shelf life.

![Diagram of Life Cycle Assessment](image)

*Figure 12. Methodology of Sustainable Life Cycle Assessment (SLCA). Inspired by: Merve Guvendik, 2017*

**Case Study: LCA of FairPhone**

Fairphone is a Dutch company that creates smartphones whose specifications and production have been designed to integrate environmental and fair trade practices. Studies about future sales of the phone were made by the company for research purposes. “Results showed that owners used their previous smartphones for 2 years, feature phones for 3 years and basic phones for 4 years. On average, Fairphone owners got 30 hours of use from a fully charged phone. Also, 56% of the owners still had previously owned phones at home. This highlights the importance of collecting used phones and making sure they complete their lifecycle, either to be reused or recycled”. (fairphone.com)

![Graph of Average Lifetime of Previous Phones](image)

*Figure 13. Average Lifetime of Previous Phones. Source: Next step in Life Cycle Assessment, Fair-Phone, 2014*
Impact assessment

In a study conducted by Fairphone, it was found that the energy consumed during use has the highest impact on global warming, followed by energy consumption at production of the phone. Among the phone’s many components, the production of the LCD screen has the highest environmental impact in terms of resource utilization and waste generation. Replacing these valuable parts adds significantly to the phone’s impact. Fairphone decided not to include a charger and headphones with the units sold. This decision saved 1.6474 kg CO₂-equivalent per charger and 0.725 kg CO₂-equivalent per headphones. In total, 42.6 tons of CO₂-equivalent is saved (Fairphone, 2014). Two assumptions are made in calculation: Fairphone owners use their old headphones; and owners who didn’t buy the charger from Fairphone use their old chargers.

LCA was used in the decision making to review shipping options from an environmental perspective. Shipments sent by train added a total of 3.6 tons of CO₂-equivalent in the form of emissions. However, emissions will be 26 times higher for the air cargo option, leading to a total of 95.4 tons (FairPhone, 2014).

![Figure 14. End-of-Life of Previous Phones. Source: Next step in Life Cycle Assessment, Fair-Phone, 2014](image)

c. Material Flow Analysis

MFA is an analytical method to quantify flows (and stocks) of materials (or substances) in a well-defined system based on the principle of physical balance used to study material flow in circular economy. MFA technique is based on principle of system boundary, physical exchange between system, nature of processes in the system and process balances. The process can be divided into steps.
According to the International Association for Impact Assessment, "Social impact assessment includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment" (IAIA, 2017). In all sectors, there is need for conducting SIA and evaluations at different stages.

**Figure 16. Steps for conducting Social Impact Assessment (SIA). Inspired by: IAIA, 2017**

The Niger Delta Oil Spill

Oil was first found in Nigeria in 1956, and commercial production of crude oil began in 1958 under a host of foreign oil companies. However, the rapidly growing oil industry in the Niger Delta has been riddled with controversy regarding distribution of revenues and environmental damage caused by oil spills.
According to government agencies, there have been over 7,000 oil spills in the Niger Delta between 1970 and 2000 (The Guardian, 2016). Local residents and indigenous tribes residing in the delta region have been impacted the most by these oil spills. The average personal income of the people in these regions are very low. In fact, “among a population of over 6000 people, over 50 per cent earn less than NGN 25,000 (US$300) annually” (IAIA, 2017). The social climate in the region is characterized by serious communal clashes and high level of corruption. Following the civil war, presence of militia has increased throughout Nigeria. Because of social and financial restrictions, data gathering has become difficult because foreign agencies looking for information are perceived as intruders in these areas. The terrain of the region also imposes barrier on movement of people and relief teams to and from the areas. Poor infrastructure and education has restricted growth in most regions (Akpofoure & Ojile, 2011).

**Impact pathway assessment and development**

Social Impact Assessment was carried out in the affected area by Akpofoure & Ojile (2011). The process included the following steps:

- A survey of the area using the project developers’ representative, a community liaison officer in charge of the area (CLO).
- A formal request for a community forum comprising the elders, chiefs, youth and women leaders, as well as other opinion formers was initiated.
- Recognizing the socio-cultural heritage of the people of the Niger Delta where kola nuts and drinks were a traditional part of such occasions, adequate provision for these is made at the community’s scheduled meeting.

At the meeting, community representatives were given details of the proposed project and study, citing the necessary statutory backing. Issues such as number of workers to be employed from the community and the wages to be paid were also reconciled during the gatherings. Well-structured open ended and closed ended questionnaires were administered to households, assisted by well-trained and instructed personnel from outside and within the communities. The major drawbacks of this technique were transport and socio-cultural problems. (IAIA, 2017)

**RESULTS**

It was found that attempts to improve community participation in development activities were hampered by poor information and education. Rising indignation and social unrest/tension along with continuing neglect by the rural people of the Niger Delta, had...
highlighted the necessity for detailed community/socioeconomic understanding within the general framework of environmental assessments. (IAIA, 2017)

“The results obtained were very satisfactory and statistically appropriate for the project’s needs. In the first place, an understanding of the social and natural environment was established. With full interaction and participation of the community’s members, all interests were seen to be respected, and differing shades of opinion were sifted for better data collection, analysis and policy consideration”. (IAIA, 2017)

It was also discovered that when communities are actively involved in the data gathering, interpretation and subsequent usage, an openness is displayed, better quality information is obtained and minimum time is expended in the process. Unlike most assessments based on literature and conjecture, quality data based on facts are easily gathered and informed analyses carried out. The use of local people in questionnaire administration also enhances the data gathering process. The capacity building potential of this methodology is obvious. As Akpofure & Ojile (2011) said: “the cause of social tensions in some of these communities is usually the charge of impropriety against the so-called community leaders by the youth”.

e. Human Right Impact Assessment

The assessment of human rights impacts - HRIA of SC is a key component of corporate responsibility (Götzmann, Bansal, (n.d)). Impact assessment can provide an evidence-based analysis of business interaction with human rights, and as such can provide a platform for developing concrete and context specific actions to avoid, mitigate and remediate any adverse impacts. The adoption of a human rights-based approach is key to any impact assessment that places social well-being at its core.

"Planning and scoping": assessing and deciding who should be on the assessment team, defining parameters for assessment

"Data collection and baseline development": Understand the key human right area and selection of indicators.

"Analysis of impact": Identifying impact of activities on human right

"Impact mitigation and management": Determine actions to be taken to address impacts, apply human rights compatible mitigation hierarchy

"Reporting and evaluation"

Figure 18. Methodology for Human Right Impact Assessment. Inspired by: Götzmann, Bansal, (n.d)
**f. ISO 26000**

Published in 2010, ISO 26000 (International Organization for Standardization, 2010) gives guidelines to companies and organizations to operate in a socially responsible manner. This means acting ethically and transparently to contribute to the good health and well-being of society. When applying ISO 26000: 2010, it is recommended that the organization take societal, environmental, legal, cultural, political and organizational differences as well as differences in economic conditions into account. A pragmatic evaluation, the AFAQ 26000 method offers the possibility to any organization (company, association, administration or union) to measure the maturity of the CSR approach according to the ISO 26000 standard, with varying degree of advancement. Certification is a useful instrument that enhances credibility of a company. In some sectors, it is also a legal or contractual obligation.

**g. Summary of tools available for measuring Supply Chain Performance**

<table>
<thead>
<tr>
<th>Tools</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green SCOR</td>
<td>SCM</td>
</tr>
<tr>
<td>LCA</td>
<td>Environmental impact and waste, cost reduction, focus product development, support marketing claims, improve product image and identify appropriate performance indicators</td>
</tr>
<tr>
<td>SIA</td>
<td>Community and stakeholder engagement, workforce management, housing and accommodation, local business and industry content, health and community wellbeing</td>
</tr>
<tr>
<td>HRIA</td>
<td>Recruitment, HR analyst, learning &amp; development, supply chain, health &amp; safety</td>
</tr>
</tbody>
</table>

*Figure 19. Summary of tools available for evaluating Supply Chain Sustainability*
CONCLUSION

Social and environmental aspects of sustainable development have impacted consumer demand and has made customers more conscious towards consuming responsibly. Customers are now more attentive to a company’s behaviour and the manufacturing activities for its various products. These evolving trends are some of the challenges companies must acknowledge in order to understand sales patterns and demand growths.

Companies are trying to incorporate environmental concerns, economical performance and social equity at the heart of their strategy and policies with the help of Corporate Social Responsibility (CSR). The strategy of extended value allows companies to introduce social and environmental externalities linked to product life cycle into their traditional values, and hence serve the expectations of their customers.

Moreover, when a company employs sustainable practices, it has a positive impact on not only its image and brand value, but also the stakeholders that interact with the company and its products throughout their lifetime. Employees are one of the major stakeholders that are impacted by a company’s CSR policies. It is important that employees share the vision and beliefs of the company, and it is just as important that companies keep their employees’ interest in mind while drafting CSR policies. Doing so can increase morale of employees and give them an incentive to work in a more dedicated manner.

The rate of innovation has been increasing continuously over the years and posed a challenge for companies looking to introduce new products in the market. A need has been created for product design to evolve continuously in order to meet the ever changing market demand. Product designs are expected to meet several challenging criteria in order fulfil customer expectations. Introducing sustainable practices in the development phase of a product is an effective way to ensure that new products meet demand and are socially, environmentally and economically sustainable. This can be challenging since the average life cycle of products may range from a few months to several years.

An effective way to thoroughly understand the impact of a product is by analysing its method of production and the end-of-life processes. There are several different dimensions of a product’s impact, namely: social, environmental, economic and human. Tools such as Material Flow Analysis (MFA), Life Cycle Assessment (LCA) and Green SCOR Card are effective for evaluating the environmental and economic impact of products and their materials throughout their lifetime. On the other hand, tools like Social Impact Assessment, Human Right Impact Assessment and indicator ISO 26000 provide a more in-depth assessment of the social impact of products. These tools, when used in conjunction, can provide a more wholesome picture of a product’s impact, and may be used to dictate product design and company policies.
RATE YOUR SUPPLY CHAIN (Self-Test)

1) What is your CSR policy focused on?
   - Environmental impact
     - We do not have a CSR policy in place yet
     - Welfare of employees and society

2) What is your product design influenced by?
   - Environmental impact of the product
   - Market trends
   - Cost incentives

3) How are supply chain operations viewed at your company?
   - From inbound to outbound logistics only
   - From our suppliers to our customers
   - End to end: from our suppliers’ suppliers to our customers’ customers

4) Among the following, what is the most important criterion you use to choose suppliers?
   - Quality of materials
   - Long term relationships
   - Cost of materials and incoterms

5) How involved are your employees in the making of sustainable policies in the company:
   - All employees are involved
   - Only the management team (CEO and the local managers) are involved
   - Only the sustainability project team is involved

6) Which Sustainability measurement tools are used for projects in your company?
   - Tools to measure environmental impact
   - Tools to measure environmental and social impact
   - No tools are used

7) How publicized are your company’s sustainability policies (through company website or other sources of information)?
   - Extremely publicized
   - Somewhat publicized
   - Not publicized at all

8) How well do you understand the end-of-life processes of your products?
   - After sale processes are somewhat documented
   - No waste generated from product
   - End-of-life processes are documented in detail
Now, count how many of each figure you have:

✓ [ ] [ ] [ ]

Mostly ✓

You have a good understanding of CSR and are well acquainted with its implementation. Your efforts should not be reduced; CSR is a continuous process and can greatly affect the company’s performance and image. It could be beneficial to form strategic alliances with other sustainable partners who share the same views and values regarding sustainability.

Mostly •

You are in the good way to implement a successful CSR program. Your current focus is on just one or two pillars. It may be beneficial to introduce the third pillar of sustainability in your CSR policy. One of the recommended strategies is to form a new team that focuses on implementation of the sustainability policy.

Mostly ➤

You may not have an effective CSR policy in place right now. Acknowledging the need for a CSR policy is a good way to start the implementation process. The outcomes of a well-structured CSR policy can provide rewards to compensate for the effort required at this stage. A good start is to engage the management of your company, from the CEO to managers in various departments, in the policy making process. Their commitment is key for success.
EXECUTIVE INSIGHTS

TK’BLUE AGENCY

TK’BLUE is an extra-financial rating agency organized as a service platform. It measures, rates and promotes the eco-performance of each actor – carriers and contractors – in compliance with legislative and regulatory requirements concerning CO2 emissions and CSR at National and European levels.

Mr. Philippe MANGEARD, President TK’Blue Agency

1. What does TK’Blue aim to achieve through its policies?

TK’Blue est née de trois évolutions récentes dans les besoins fondamentaux des entreprises européennes pour leur chaîne logistique: Evolution sociétale: mesurer, piloter et valoriser les efforts.

Engagement dans le développement durable: Communication responsable avec les parties prenantes (salariés, actionnaires, clients, fournisseurs, collectivités, investisseurs) notamment pour la diminution de leur empreinte environnementale.

Evolution économique et progrès des systèmes d’informations: Nécessité pour les directions logistique, transport, supply-chain, DD, RSE, et générales de disposer de nouveaux outils de pilotage pour garantir l’efficacité du maillon stratégique de la Supply-Chain et d’éléments de mesure efficace pour comparer ses propres performances dans le temps, ainsi que par rapport aux autres acteurs du même secteur.

Evolutions réglementaires:
- Obligation de rédaction d'un rapport RSE
- Obligation de publication d’un bilan annuel d’émissions de GES des opérations de transport.
- Affichage CO2 obligatoire pour toutes les opérations de transport.
- Vérification obligatoire des habilitations sociales et fiscales des prestataires de transport.
- Lutte contre le dumping social et la concurrence déloyale, visant à renforcer la responsabilité des maîtres d’ouvrage et des donneurs d’ordre dans le cadre de la sous-traitance.

2. What is the “TK’T index” and what is it used for?
L’indice TK’T est basé sur la qualité des matériels, équipements, organisation et niveau de formation des personnels, et donc un indicateur fiable des performance économiques et environnementales à attendre du prestataire de transport.

L’indice TK’T permet donc de:

- choisir dès la commande les meilleurs prestataires, sans attendre des évaluations à posteriori (retards, accidents, manques, etc.)
- améliorer sa politique d’achat de transport avec des exigences de performances claires et vérifiables d’émissions de CO2 et RSE.
- collaborer de façon transparente et continue avec ses transporteurs sur un plan d’amélioration des moyens et services mis à disposition.

De plus, nos outils adossés à cet indicateur TK’T et celui des émissions CO2, l’indice TK’CO2, permettent un pilotage et une valorisation très fine, complète et sur mesure de la réduction des impacts environnementaux des flux logistiques, GES et autres nuisances (congestion, particules, accidents, bruit...).

3. Apart from the regulatory context, in your view why should a company implement a sustainable performance?

Les quatre indicateurs fournis par les services de l’Agence : TK’T, TK’CO2, TK’€ et service TK’PL, permettent une lecture globale de l’ensemble de la performance et des plans d’action, et apportent des bénéfices directs, en particulier financiers, et indirects à chaque acteur de la chaîne de transport. Par exemple:

l’indice TK’CO2 apporte:
- homogénéité et solidité des informations reçues par un tiers de confiance, plutôt que par chacun des prestataires
- reporting régulier aisé et analyse facilitée des performances de chacun
- rapport annuel précis et documenté sans besoin d’autres ressources externes

L’indice TK’€ apporte:
- un bilan sociétal précis et opposable au tiers
- une communication environnementale rationnelle

Le service TK’PL qui analyse en temps réel des performances logistiques des transporteurs (indicateurs d’optimisation logistique : poids moyens transportés et distances moyennes de livraison) apporte :
- des économies directes sur les frais de transport par alerte immédiate sur dérive éventuelle des distances ou poids moyens des livrations.
- 0,5 à 4% par an de gains sur les achats transports par la surveillance de ces indicateurs avec chaque transporteur.
Des bénéfices indirects sont aussi attendus :

- S'appuyer sur la crédibilité d'un Tiers de confiance dans ses communications internes et externes (notamment pour les analystes financiers de plus en plus exigeant sur la RSE transport des grands distributeurs)
- Mieux collaborer avec ses transporteurs et organisateurs de transport

**MICHELIN**

**Michelin** is a French tire manufacturer and one of the three largest manufacturers in the world. It also owns other tire manufacturers, like BFGoodrich, Kleber, Tigar, Riken, Kormoran and Uniroyal. Michelin is also notable for its Red and Green travel guides, its roadmaps, the Michelin stars and for its company mascot *Bibendum*, commonly known as the Michelin Man.

**Mr. Beau HAAKE, Business Unit Manager - Michelin**

1. **What is the average environmental impact of your products, and what has been done to reduce it?**

Michelin works actively to reduce its environmental impact. The Michelin Environmental Footprint (MEF) in 2015 was 62.8, and the goal for 2016 was to be at 61. In 2010 the MEF was 70, and the goal that was established was to reduce the MEF by 50%. Currently the MEF has been reduced by 38%. Michelin has improved the MEF by significantly reducing energy consumption at their manufacturing sites, reducing CO2 and VOC emissions and decreasing waste produced and landfilled. Each year every factory is challenged on their footprint. The group also works with their logistics teams to reduce supply chain CO2 emissions by 10%.

2. **How did Michelin become a responsible global employer?**

Michelin believes that diversity is a competitive advantage, and that through diversity it will increase creativity and performance. Michelin is continually striving to become a responsible global employer. It is achieving this goal by increasing diversity among its employees. One example of this is in its goal to increase the percentage of women managers to 30% by 2020. Michelin is on track to meet this goal.

3. **What is MAPP and how does it impact the social pillar of sustainability?**
MAPP stands for Automated Management of Performance and Progress. It is a management method that is being developed by Michelin based on theories by Isaac Getz in his book “Liberté & Cie”. The goal of MAPP is to move the decision-making ability from the hands of the manager to the hands of the team that is closest to the problem. Michelin considers that the true experts in their factories are the workers that are daily operating the machines and working with the materials to create the finished products. By giving them the liberty to make decisions together on how to resolve problems, Michelin has drawn on the collective intelligence of their teams to create more agile factories that are able to respond quickly to customer needs. This liberated style of management has created a work environment that is more engaging on every level of the hierarchy. The factory workers are challenged to expand their knowledge and their networks as they work with different workshops in the factory to solve common problems that affect the production. Decisions are made in a democratic way, since the team decides together how to answer many different questions ranging from promotions, staffing and short to long-term goals. The manager’s role in MAPP is to coach the members of the team in the application of the tools provided. They are also responsible in guaranteeing the equity of all members by being vigilant in allowing all members to express their ideas and participate in the decision-making process. As the team becomes more and more stable in their functions, the manager’s role becomes diminished. However, since the team will continue to renew as employees come and go, the manager continues to guarantee the positive transition of knowledge between the new team members.

MAPP directly improves social sustainability since it promotes equity, diversity, networking and open governance. All of these things lead to a more mature workforce that feels challenged in their work and engaged in their goal to satisfy the customer. These feelings of collectiveness and accomplishment satisfy their superior needs, as defined by Maslow, which lead to an improved quality of life. According to Noble Laureate Amartya Sen, all of these qualities lead to an environment that is socially sustainable.

### IDEA GROUPE

*IDEA Groupe* - logistics provider for specific industrial supply-chains, was founded in 1919 under the name of *MTTM La Fraternelle* – a company that was originally port-based and co-operative. As an industrial logistics provider, *IDEA Groupe* pilots supply-chain design for exceptional, specific and sensitive products. It offers both comprehensive and tailor-made logistics solutions.

The main sectors in which *IDEA Groupe* is active are: aeronautics, energy, shipyard, defence, agro-food and industrial bulk. The company’s expertise is broad-based: industrial and bulk logistics, packing, transport, and shipping.
Mr. Nicolas TÊTE, Operations Director – IDEA Groupe

1. What does sustainability mean from the context of industrial logistics?
To avoid resource consuming! (time, human resources, money, energy ...). Our goal: DIFOTIS! Our motto: Quality first! Our strategy: To avoid resource consuming!

2. How has technical innovation affected the CSR policy of your company?
The 3rd Industrial Revolution will improve our ability to evolve and moreover to transform our employees to the business of the future.

3. Can you comment on the “Ergonomics” behind Idea Group’s CSR policy?
Ergonomics is the best way to preserve our human resources from occupational disease, to make confident our employees, to create a virtuous circle ... and to contains our expenses (salaries represent 80% of running cost).
REFERENCES