**Project Objective:** Design a sustainable packaging program for EMC, a manufacturer of IT storage hardware

**Sustainable Packaging at EMC**
Understanding progress to date in the broader context of EMC

- Six Sigma Culture
- Corporate Sustainability Goals
- Incremental Packaging Improvements
- Focus on Content, Reusability, and Efficiency

**Industry Best Practices**

- Dell aims to use sustainable content, reduce packaging cube size, and enable curbside recycling
- Wal-Mart has developed a sustainable packaging scorecard to assess packaging of its suppliers
- UPS focuses on material content, product to package ratio, damage prevention, and transportation
- Sustainable Packaging Coalition has developed a comprehensive definition of sustainable packaging
- Global Packaging Project is an effort to standardize indicator and metrics for sustainable packaging

**Packaging Lifecycle**

- Sourcing
- Manufacture
- Distribution
- Use
- End of Life

**Material Content**
- Recycled Content
- Recyclable Content
- Renewable Content

**Design and Performance**
- Weight
- Production Waste
- Reusable
- Cube Efficiency

**Use**
- Reuse Rate
- Total Packaging Used

**Overall**
- Lifecycle Global Warming Potential

**Recommended KPIs**

- **Execution Plan**
  1. Clarify accountability and obtain resources
  2. Enable data collection
  3. Calculate baseline
  4. Set concrete long-term targets for each metric
  5. Establish process to prioritize efforts
  6. Implement!
Pursuing Energy Efficiency in Data Centers

Different Actors in the Green Data Center Market

- **Governments** – Setting regulations
- **Consortiums** – Setting standards
- **Companies** – Leading green technologies

**30,000 Sq.ft Data Centres** that previously (2003) cost $20 million may now cost $200 million.

**Drivers for the Green Data Centre**

- Regulatory, Compliance, Environmental concerns
- Challenging Business Environment, Cost Optimization
- Virtualization, Power Cooling Space

**CO2**

By 2020, CO2 emissions from data centers will exceed those from the Airline industry...

A 15MW Data Center can use up to 360,000 gallons of water a day...

**Metrics of Data Centre Energy Efficiency**

Edan Bin-Nun, MA Shu, Shylesh Muralidharan
<table>
<thead>
<tr>
<th></th>
<th>Culture Fuels</th>
<th>Seambiotic</th>
<th>Solix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capex</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Biomass Density</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Contamination</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

✓ - Competitive advantage
X – Competitive disadvantage

**Problem definition**

1. What are the core elements of Culture Fuels’ value proposition?
2. What portion of the algae industry’s value chain is Culture Fuels best suited to capture?
3. What are the strongest complements within the industry to Culture Fuels’ strengths and goals?
4. Should Culture Fuels pursue a partnership or a transactional business model?
**RILA**

- An US based trade association comprised of large retail companies, including Wal’mart, Target, Best Buy, Home Depot, Lowe’s, CVS, 7-Eleven

**Project Objectives**

- Understand existing sustainable supply chain activities in the retail industry
- Provide recommendations in promoting sustainable engagement with RILA membership

**Approach**

- Conducted secondary research on sustainability initiatives
- Interviewed companies/associations to gain deeper understanding of their motivations, challenges, and future plans

Team: Eugenia Chiang, Tonia de Sousa-Shields, Sam Crawford, Matt Connors, Aurora Tillon

**Industry Progression**

Companies are seeing strategic value of adopting sustainability in their supply chain

**Types of Initiatives**

**Characteristics of Leaders**

- **Cautious Adopters**
  - Risk management
  - Short-term
  - Internal/limited
  - Audits
  - Internal operations
  - Minimal

- **Embracers**
  - Motivation
  - Vision
  - Metrics
  - Implementation
  - Drivers
  - Collaboration

**Future of Supply Chain Engagement**

- Social Compliance
- Environmental Impacts
- Product Safety

- Typical areas of focus
  - Typical areas of focus
  - Typical areas of focus
  - Typical areas of focus

- Comprehensive reporting
- Environmental impacts
- Product safety

- Typical areas of focus
- Typical areas of focus
- Typical areas of focus

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- Typical areas of focus
ShellTek is a new start-up with a portfolio of potentially disruptive innovations. The scope of the project was to identify a market, their competitors, and a logistics strategy for two of their products.

### Ballast Water

**What is Ballast Water?**

- Ballast water maintains the ship’s structural integrity and balance when it is traveling without cargo
- When the transported water is pumped out at the destination port, nonindigenous species can disrupt the native ecology
- The International Maritime Organization (IMO) has passed regulations that require ships to treat the water before discharging

### Organic Fertilizer

**Market Analysis**

- ShellTek wants to focus on mid-size commercial farmers
  - Not large scale (corn, wheat etc)
  - Not households (lawn, veggies)
- Tomatoes, veggies, ornamental plants
  - But, ornamental flower market declining
- Organic vegetable market growing and particularly strong in California & West Coast

### Logistics Analysis

- Competition is widespread and sophisticated
  - Large number of organic fertilizer companies in the US
  - Range from large, diversified producers to specialized entities
  - Some offer custom fertilizers
- Prices vary widely within and across competitors’ product lines

### Recomendations/Next Steps

#### Ballast Water

- Test products in accordance with IMO Ballast Water Convention standards
- Partner with established vessel operators to test products in real life scenarios
- Explore passive delivery mechanism to lower costs (possibly through partnership with established maritime services companies)

#### Organic Fertilizers

- Focus on organic vegetables in California
- Evaluate value proposition and define position within competitive landscape
- Locate production near supplier, and ideally minimize distance between supplier and customer

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15.915 Laboratory for Sustainable Business 2011: Ming Cheng, Wei Ji, Elaine Lim, Christine Schoenzart, Jason Tama
Developing a Decision Support Tool for Sustainable Beef Purchasing

About Sodexo

- One of the world’s largest food service companies
- Operating in 34,000 sites in 80 countries
- “Better Tomorrow Plan” includes 14 commitments to
  - Environment
  - Nutrition, Health and Wellness
  - Local Communities

Beef Industry Overview

- One of the world's largest food service companies
- Operating in 34,000 sites in 80 countries
- "Better Tomorrow Plan" includes 14 commitments to
  - Environment
  - Nutrition, Health and Wellness
  - Local Communities

Questions

- What does “sustainable beef” mean?
- What are examples of good purchasing decision tools in the market?
- What is Sodexo’s existing beef purchasing process?
- How can we design the best tool that:
  - Maximizes beef sustainability
  - Is easy to use within Sodexo’s process

Sustainability Issues in Supply Chain

- Calf/Cow
- Stocker/Background
- Feedlot
- Processor/Packer
- Distributor

Sustainability Scorecard For Suppliers

<table>
<thead>
<tr>
<th>Supplier: Acme Beef Packers</th>
<th>Rating</th>
<th>Legal</th>
<th>GHG</th>
<th>Water</th>
<th>Human Health</th>
<th>Animal Welfare</th>
<th>Waste</th>
<th>Labor</th>
<th>Land Conversion</th>
<th>Biodiversity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Good</td>
<td>Excellent</td>
<td>Good</td>
<td>Needs Improvement</td>
<td>Good</td>
<td>Good</td>
<td>Needs Improvement</td>
<td>Needs Improvement</td>
<td></td>
</tr>
</tbody>
</table>

Biodiversity

- Biodiversity

GHG
- ++

Water
- ++

Human Health
- ++

Animal Welfare
- ++

Waste
- ++

Labor
- ++

Land Conversion
- ++

Recommendations

- Customize this tool as a near-term solution for tracking and comparing supplier sustainability
- Start with impacts that are under Sodexo's direct control: Distributor and Packer/Processor stage
- Devise best strategy for achieving supplier buy-in
- Take active role in industry-wide efforts to create a commonly-accepted standard for the sustainable beef
- Continue to build partnerships with universities and nonprofits such as WWF, Sustainable Food Lab

Chidum Ayeni SF ’11, Erin Connolly SCM ’11, Alice Hartley MBA ’12, Adiya Ode SF ’11
Advisor: Rick Locke
Typha Charcoal in Senegal
Changing a National Threat into Durable Wealth
Rodrigo Caro, Helena de Frutos, Ajamu Kitwana and Angela Shen
15.915 Laboratory for Sustainable Business

The Country: Senegal
- The western most country in West Africa
- Area of almost 76,000 square miles
- Population: about 13M
- Capital city: Dakar (about 2.6M people)
- French, Wolof and other local languages
- Loosing 45,000 hectares of forests each year.
- Facing threat of desertification

The Problem: Typha Plant
- Large parts of the Senegal River are covered by Typha
- A weed rooted in the soil that requires less than 5 feet of water depth
- Problems caused by Typha:
  - Introduces water born disease
  - Disrupts irrigation channels
  - Impedes livestock from drinking water
  - Reduces fishing productivity
  - Shelter for agricultural pests

The Opportunity: Typha Charcoal
- Economic
  - Revenues for SupDeCo
  - More affordable household fuel
- Social
  - Jobs available to rural women
  - Greener jobs
- Environmental
  - Reduce deforestation
  - Combat typha
  - CO2 Emissions reduction

The Challenges: Scaling Up?
- Harvesting over the river
- Eradication versus continuous supply
- Market acceptance
- Diseconomies of scale
- Competition
- Regulation risks

Industrial Charcoal Production: Value Chain Analysis

<table>
<thead>
<tr>
<th>Harvest</th>
<th>Production</th>
<th>Transport</th>
<th>Wholesale Retail</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural entrepreneurs</td>
<td>Rural entrepreneurs/ Factory</td>
<td>Transporter</td>
<td>Dakar Retailers</td>
<td>Dakar households</td>
</tr>
</tbody>
</table>
CO₂ Emissions (Credits): LCA Stage Breakdown

(gCO₂e/MJ)

Complex
• Difficult to interpret results
• Results dependent upon assumptions, weighting, and boundaries
• Expensive

Ecochilectra Business Model:
Promote residential recycling through utility bill reduction incentive while simultaneously driving social impact through improvement of working conditions for Street Pickers.

Project Scope & Deliverables:
- Evaluate and recommend options to scale operations to other municipalities without requiring additional funds from Chilectra
- Develop expansion model including roles & responsibilities, incentive structures, and key performance indicators
- Create financial model to evaluate investment requirements, profitability, and general attractiveness of the opportunity from perspective of Operating Center

Key Findings & Recommendations:
- Recyclables market has potential
  - Supply of recyclables < Demand by Recycling Firms
  - No existing players in household recyclables
- The opportunity requires the right investor
  - High capital expenditure requirements
  - Thin margins

Recollecting Firms may realize additional margins through vertical integration and is the ideal investor.

Key measures:
1. NPV: $45.4 M
2. IRR: 37%
3. Payback time: 5.5 yrs
4. CAPEX: $39.1 M

Assumptions:
1. Max 80% penetration
2. 5% Back Office fees
3. Flat market price for recyclable materials
New Technology to Relieve Water Scarcity Among the World’s Rural Poor

Background

- Oasys (Osmotic Application Systems) is a privately held Boston, MA based company developing a suite of proprietary energy and resource recovery products to address the growing, global water crisis.
- Engineered Osmosis™ (EO™) is a platform for reducing cost in the production of clean water, power and energy through more efficient and sustainable utilization of resources.
- The technology enables purification of brackish groundwater and saltwater using less energy than traditional Reverse Osmosis (RO).
- In the U.S., Oasys technology has been developed for industrial purification; however, it asked the S-lab team to evaluate applications in the developing world.

Project Overview

- Market Analysis (3 weeks)
  - Global survey of water scarce regions
  - Identification of brackish water resources
  - Competitive technology analysis

- Business Case (3 weeks)
  - Identification of target regions
  - Deep dive in selected regions
  - Contact local players
  - Develop business case

Key Actions

- Global survey of water scarce regions
- Identification of brackish water resources
- Competitive technology analysis

Strategy development

- Identification of target regions
- Deep dive in selected regions
- Contact local players
- Develop business case

Findings and Recommendations

- Many states of India have severe water scarcity combined with brackish groundwater
- There is an established market for Reverse Osmosis in South Asia, indicating a potential entrance opportunity
- Develop relationships with local players in the water sector to ensure access to distribution channels, ongoing education initiatives, and cultural relevance
Worked with Asics and S-Lab mentor

Recommend ways to improve communication and stakeholder engagement surrounding Asics’ sustainability initiatives through its CSR report

Presentation covering:
- Essential elements of a successful CSR report
- Overview and analysis of work streams:
  1. Literature and standards analysis
  2. CSR Report benchmarking
  3. Stakeholder Interviews
- Recommended changes to Asics CSR report to align with industry best practices

Objective

Presentation covering:
- Essential elements of a successful CSR report
- Overview and analysis of work streams:
  1. Literature and standards analysis
  2. CSR Report benchmarking
  3. Stakeholder Interviews
- Recommended changes to Asics CSR report to align with industry best practices

Deliverables

GOAL: Gain baseline understanding of relevant research regarding CSR reporting
KEY ACTIVITIES:
- Review ~ 20 recently published theses, academic papers, journal articles and books
- Investigate ~25 different standards, alliances, auditing tools for CSR and CSR reporting; narrow focus on GRI and Ceres

GOAL: Identify CSR reporting best practices; review apparel & sports industry and other-industry reports and interview authors
KEY ACTIVITIES:
- Reviewing reports –
  - Adidas, Nike, Timberland, Puma
  - Toyota, Ford
  - Sony
- Interviews:
  - Adidas
  - Nike

GOAL: Determine drivers of, target audiences for, and desired information to be gained by various stakeholders from CSR reports
KEY ACTIVITIES:
- Asics – Internal CSR
  - Team interviews – North America, Europe & Asia
- Investors: UBS
- NGOs: Ceres, Trucost

Recommendations ranging from

1. Re-evaluate internal processes
   - Consistency and global standards
   - Address current silos (e.g., report is biased toward Japan)
   - Consider target audience

2. Strive for stronger GRI level C reporting and then move to B
   - Prioritize and fill in the existing gaps
   - Enhance the quantitative data
   - Consider interactive on-line report

3. Create vision for transparency
   - Benchmark Ceres–ACCA (North American) awards program
   - Establish ambitious goals
   - Gain credibility through auditing