ENGG105 Tutorial Week 5 – Design impact assessment *(student notes)*

Learning Outcomes

By the end of this tutorial, students will have had an opportunity to:

- Understand and explain the significance of Impact Assessments
- Develop/apply an environmental impact matrix
- Begin developing evaluation and selection criteria for their design
- Review and consider the depth of their draft design brief.

Resources

- Ted Talk: Catherine Mohr: The trade-offs of building green. https://www.ted.com/talks/catherine_mohr_builds_green
- Marc Gunther (2015). The good, the bad and the ugly: sustainability at Nespresso. The Guardian News.
- Impact assessment score sheet

Tutorial Plan

10 min – intro and team reports
5-10 min – TED talk and discussion
5-10 min – Gunther article and discussion
40-50 min – impact assessment
20 min – report back and discussion
30 min – project work

TED Talk

This talk provides an introduction to the concept of embodied energy and in impact on design for sustainability. Consider – what are the key messages?

Gunther Article (attached). This article considers the issues of supply chain sustainability with a focus on socio-economic AND environmental sustainability.

Environmental impact assessment

This activity requires you to undertake a simplified impact assessments. Consider the scenario for a town water supply (see pg 2). Using the list of factors and the impact score sheet, you must develop an environmental impact assessment by judging each alternative's impact on each of the factors on this scale:

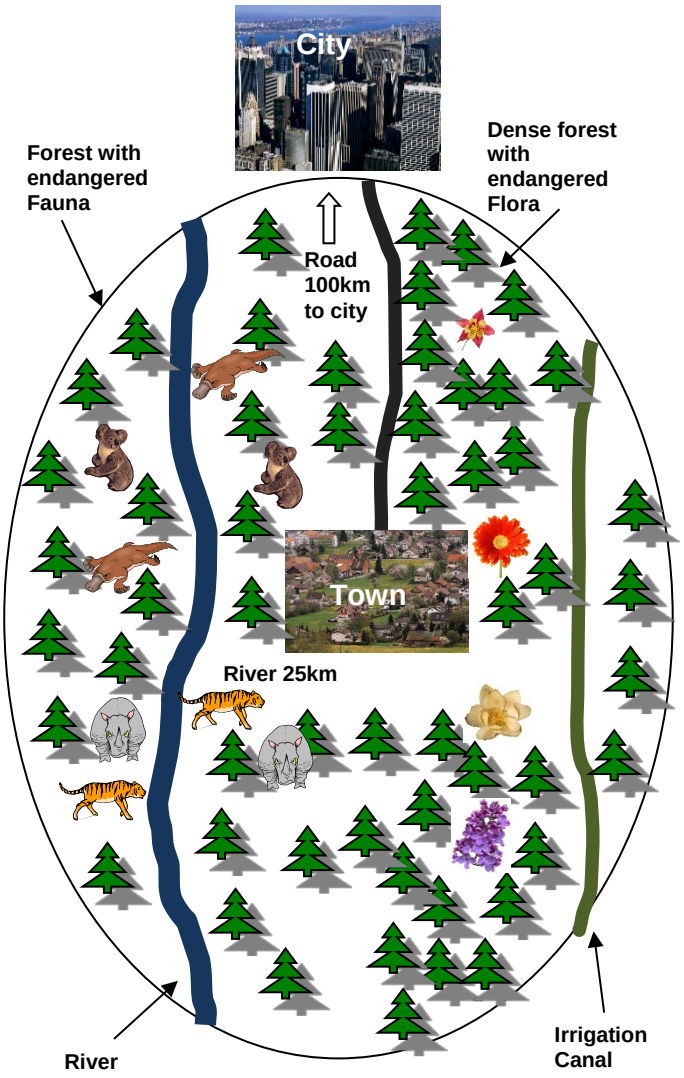
Significant positive impact	+3
Moderate positive impact	+2
Minor positive impact	+1
No impact	0
Minor negative impact	-1
Moderate negative impact	-2
Significant negative impact	-3

Do some quick web research on factors you are unfamiliar with. You must then decide on and justify a weighting system for each of the major categories. For example, you group may decide socio-economic factors are most important, and weigh this category more heavily than others (ie. 0.2, 0.2, 0.4, 0.2). Add up all the impact ratings for each section, apply you weighting criteria, and determine which of the four options has the most positive, or least negative impact.

Available Options

After considering all the options carefully, it was decided that there are four alternatives to solve the town's water supply problem:

1. *Dam: water supply from the river: For this option it is necessary to construct a dam across the river to ensure continuous water supply to the town. The water would be conveyed through a pipeline.*
2. *Canal: Water supply from the irrigation canal. This involves construction of an intake structure to withdraw water from the canal and pump it through a pipeline to the town.*
3. *City: water supply from the city. It is necessary to construct only a pipeline. The pipeline could be constructed along the road.*
4. *Wells: ground water supplied through a number of bore-wells to be drilled in and around the town.*



'cons', is NOT sufficient for the progress report and final design proposal.

An example of analogous design and client briefs for the SMART building at UOW have been posted on Moodle. You may wish to look at these for examples of design considerations and objectives to include in your design brief.

Report back and discussion.

Each group must nominate one member to briefly report back on the results and justify their weighting system. Once you have hear all the results from each team, consider how this may relate to Re-thinking Coomaditchie.

Project work

The remainder of the class is dedicated to refining your design brief. Start developing a set of socio-economic and environmental impact factors that will inform your design decisions, this is a key component of the brief. You may choose to begin with the list provided for the previous task, but you will need to revise it to reflect the local context.

This process is critical to developing a sound engineering solution! A simple list of 'pros' and

Category 1: Physico-chemical environment

a) Earth

Mineral resources
Construction material
Soils
Land form
Force fields and Background radiation
Unique physical features

b) Water

Quantity
Quality
Temperature
Snow, ice and permafrost

c) Atmosphere

Quality (gases, particulates)
Climate (micro and macro)
Temperature

d) Processes

Floods
Erosion
Deposition (sedimentation, precipitation)
Compaction and settling
Stability (slides, slumps)
Stress-strain (earthquake)
Air movements

Category 2: Biological environment

a) Flora

Trees
Shrubs
Grass

b) Fauna

Birds
Land animals including reptiles
Fish and shelfish
Benthic organisms (organisms living and the bottom of the river, lake, etc.)
Insects
Microfauna (micro-plants: algae, fungi)
Endangered species

Category 3: Socio-economic environment

a) Land use

Wilderness and open spaces Wetlands
Forestry
Grazing
Agriculture
Residential
Commercial
Industrial
Mining and quarrying

b) Recreation

Hunting
Fishing
Boating
Swimming
Camping and hiking
Picnicking
Resorts

c) Aesthetics and human interest

Scenic views
Wilderness qualities
Open space qualities
Landscape design
Unique physical features
Parks and reserves
Monuments
Rare and unique species or ecosystems
Historical or archeological sites/objects

d) Cultural status

Cultural patterns
Health and safety
Employment
Population density

e) Constructed facilities and activities

Structures
Transportation network
Utility networks
Waste disposal

Category 4: Ecosystem

a) Salination of water resources
b) Disease-insect vectors
c) Food chains
d) Salination of surficial material
e) Brush encroachment

ENGG105 Tutorial Week 5 – Environmental Impact score sheet

Environmental factors	*Water supply Alternatives*			
	One	***Two***	***Three***	***Four***
1. Physico-chemical environment **Weighting:**				
a) Earth				
b) Water				
c) Atmosphere				
d) Processes				
Weighted total impact scores				
2. Biological environment **Weighting:**				
a) Flora				
b) Fauna				
Weighted total impact scores				
3. Socio-economic environment **Weighting:**				
a) Land use				
b) Recreation				
c) Aesthetics and human interest				
d) Cultural status				
e) Constructed facilities and activities				
Weighted total impact scores				
4. Eco system **Weighting:**				
a) Salination of water resources				
b) Disease-insect vectors				
c) Food chains				
d) Salination of surficial material				
e) Brush encroachment				
Weighted total impact scores				
Total				

theguardian

The good, the bad and the ugly: sustainability at Nespresso

The single-serve coffee maker supports growers, but also creates a lot of waste. Its story illustrates the power and limitations of corporate sustainability programs

Marc Gunther

Thursday 28 May 2015 02.21 AEST

The sustainability story at Nespresso, a company that sells coffee machines and single-serve capsules, is a mix of the good, the bad and the ugly.

On coffee sourcing, the company - part of Swiss multinational Nestle - is an industry leader, training coffee farmers and paying premium prices. In the last few years, it has invested in reviving coffee production in war-weary South Sudan. That's good.

But the company's single-serve aluminum pods create unnecessary waste. A valuable, energy-intensive resource winds up in landfills. That's bad.

Nespresso won't say how many of its pods get recycled. Transparency is an essential ingredient of sustainability. So that's ugly.

The coffee pod company has a hefty corporate sustainability program, including a 38-point list of commitments detailing how it plans to create value for its suppliers, consumers and society, as well as for its shareholders. Nespresso's efforts help illustrate the power of corporate sustainability programs to make meaningful change, but also show where they fall short.

Nespresso introduced the first single-serve coffee machine back in 1986. Growth took off in the 1990s in Europe, and about 15 years ago, Nespresso arrived in the US. It has opened boutiques in tony locales such as Newport Beach, California, and New York's Madison Avenue, and last year the company introduced a coffee machine called the VertuoLine, which makes the 250ml (8oz) cups of regular coffee that Americans favor, along with the petite cups of espresso popular in Europe.

Nespresso doesn't disclose revenues or profits, but it's a big, global operation: 10,500 employees sell coffee in 62 countries. As of

2012, Nespresso sold more than 27bn of its sleek aluminum capsules worldwide.

Nespresso has reinvested its earnings into its supply chain, notably in South Sudan, with the help of the anti-poverty NGO TechnoServe. South Sudan's economy currently depends on oil and foreign aid; coffee has become its first major agricultural export.

Nespresso CEO Jean-Marc Duvoisin spoke with the Guardian about the company's sustainability efforts, branded as The Positive Cup. He also spoke at the Shared Value sustainability conference earlier this month in New York, as part of Nespresso's efforts to gain traction in the US coffee pod market, which is dominated by Keurig Green Mountain.

"It's very interesting for me, because South Sudan is the place where coffee began – it's the cradle of coffee," Duvoisin said. George Clooney, who is the face of Nespresso in Europe, suggested that the company work in South Sudan, he said. "Coffee production helps to pacify regions. That's basically because you have families who can produce on small lands, and they have stable income."

Nespresso invested about 700,000 Swiss francs (about $800,000) and plans to spend another 2.5m CHF ($2.7m) in South Sudan. With TechnoServce, it helped organize three coffee cooperatives, built three wet mills to process coffee and exported 10 tons of coffee last year. It aims to reach 8,000 farmers by 2020.

More broadly, Nespresso has since 2013 rolled out a global program for coffee called AAA Sustainable Quality in collaboration with The Rainforest Alliance. Some 63,000 farmers have been certified under the program, about 80% of those supplying Nespresso, according to its website. They are paid 30%-40% above the standard market price for coffee.

"It's a rigorous and comprehensive program, with real investment in the farmers," Tensie Whelan, the president of the Rainforest Alliance, said. "They are able to pay the producers well and be there for the long term. This is really what we should be doing through all of our value chains."

When Nespresso coffee is packaged into single-serve pods, however, troubles arise. It's hard to compare the environmental footprint of pods with traditionally brewed coffee without making assumptions about unknowns, such as how long a conventional coffeemaker remains plugged in and how much coffee is wasted. Pod defenders say that every bit of wasted grounds has a significant impact, too.

Duvoisin says that traditional brewing methods use much more coffee and energy than pods. "If you look at the environmental impact, the carbon impact, the single portion is the least impactful way of drinking coffee," he said.

Except it's not. The least impactful coffee might actually be instant. A 2009 lifecycle analysis provided to the Guardian by Nespresso found that instant coffee "uses less energy and has a lower environmental footprint than capsule espresso coffee or drip filter coffee, the latter having the highest environmental impacts on a per cup basis". However, this analysis was done by a consulting firm for Nestle, which also makes Nescafe instant coffee.

An independent 2011 study came to a different conclusion: "If one assumes that in the case of filter coffee the whole pot is drunk and in the case of soluble [instant] coffee only as much water is boiled as necessary, then these two methods of making a cup of coffee are by far the most environmentally friendly." Capsules are the losers in that analysis. But it's also unclear how often those assumptions match reality.

Nestle is working to limit the impact of its capsules. According to its website, the company intends to source aluminum responsibly, and promotes recycling in its boutiques and at upscale kitchen retailers. In certain states, consumers can mail back used capsules at no charge via UPS.

How many capsules are recycled? Nestle won't say, instead focusing on its recycling capacity. By email, a spokeswoman explained:

"Given multiple recycling options, any estimate of consumer recycling rates would be inaccurate, so we focus on recycling capacity as a concrete measurement of our progress ... Recycling is a shared responsibility and consumers' participation is essential."

True enough. But if most of the aluminum ends up in landfills, that tell us something important about Nespresso - that its recycling efforts, however well-intentioned, are failing. This is a problem any responsible company needs to admit, and address.

It's particularly important because coffee pods have seen colossal growth and remain the major growth driver in the US coffee market, according to a February report from Euromonitor. The mixed-plastic pods from Nespresso's biggest rival, Keurig, are just about impossible to recycle, though Keurig says it will come up with a recyclable pod of its own by 2020. A small rival called Rogers Family Coffee sells biodegradable pods.

None of challenges, though, should negate Nespresso's good intentions. As Tensie Whelan of Rainforest Alliance told me: "If we only worked with perfect companies, we wouldn't get anything done."

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