CRIB

Version JHG/3

EGT2
ENGINEERING TRIPOS PART IIA

Friday 3 May 2019 2:00pm - 3:40pm

Module 3E11

ENVIRONMENTAL SUSTAINABILITY AND BUSINESS

*Answer not more than **two** questions.*

All questions carry the same number of marks.

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

*Write your candidate number **not** your name on the cover sheet.*

STATIONERY REQUIREMENTS
Single-sided script paper

10 minutes reading time is allowed for this paper at the start of the exam.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed to do so.

1 Tetra Pak is a leading food processing and packaging company with headquarters in Switzerland. It is best known for its plastic-coated paper carton packages (originally tetrahedron-shaped) for drinks, but it also processes and packages a wide variety of other food products including dairy, ice cream, fruits and vegetables, and pet food.

Tetra Pak is one of a number of companies from diverse sectors who have committed to setting "science-based targets" for their greenhouse gas emissions. Science-based targets are defined in the following way:

"Targets adopted by companies to reduce greenhouse gas (GHG) emissions are considered "science-based" if they are in line with the level of decarbonization required to keep global temperature increase below 2 degrees Celsius compared to pre-industrial temperatures."(https://sciencebasedtargets.org/wp-content/uploads/2017/04/Case-study_TetraPak.pdf)

Prior to setting science-based targets for greenhouse gas emissions, companies like Tetra Pak would typically set targets for these emissions based on extrapolation from current levels of performance (e.g., a goal for a 10% reduction in emissions compared to the previous year).

(a) What generic type of environmental problem does the movement toward science-based targets attempt to address? Explain two typical approaches to such problems. [30%]

Problem – tragedy of the commons (evidence they can define or describe this)

Factors – anything related to how tragedy of the commons problems can be effectively handled through economic, regulatory and/or social factors, including:

- *good scientific understanding of underlying problem and limits set by a credible overseeing entity*

- *effective monitoring and/or enforcement (companies actually have some sanction for not meeting their targets)*

- *mechanisms for social enforcement and/or shaming for those who don't comply*

- *adjustments made in the targets as science is revised*

(b) From the perspective of a company such as Tetra Pak, what are the benefits and risks of setting science-based targets for greenhouse gas emissions, compared to targets based on extrapolation? [40%]

Benefits could include:

- credible basis for setting targets – as opposed to simply 'less unsustainable'/arbitrary targets

- greater trust from regulators/supply chain partners etc through above

- taking responsibility for one's own contribution to a commons problem/the right thing/ethical thing to do

- accounts for ecosystem limits

- taking long term view, readies company for being more competitive; first mover advantage

- leadership in the market/among consumers/loyalty

Risks could include:

- targets more aggressive than can realistically be attained (extrapolation generally based on pretty decent historical data)

- costs of meeting targets will be high (e.g. pricing of and access to renewables now vs future)

- in consumers eye's promising too much and not delivering can be more damaging than not promising so much

-diversion from more important environmental goals for that sector (e.g. water, plastics)

- greenhouse gas reductions may not actually be material to the company, meaning there is more style than substance in setting such a goal

[40%]

(c) With the increasing attention to plastic pollution and packaging, Tetra Pak's management is considering if it should set a goal for plastics that is also science-based. Based on the nature of this issue compared to that of greenhouse gas emissions, would you recommend this as a wise move for the company. Why or why not? [30%]

Reasonable arguments could be made for/against and in either case should be supported by concepts from class topics.

Key distinction to make is that greenhouse gas emissions a clear global commons problem and is less clear the extent to which plastics are. Do we have the level of 'science' to set science-based targets for the multitude of types, uses, and environmental fates of plastics.

For all three parts (a, b, c) of this question:

Better papers will effectively apply and leverage several core ideas – tragedy of the commons, distinction between reducing unsustainability vs. achieving sustainability, and prioritization of environmental actions in relation to stakeholder concerns vs. core business concerns (i.e., materiality matrix).

2 Recent articles in respected science and medical journals (e.g., *Nature*, *The Lancet*) have reported the need for dramatic changes in food consumption – reductions of meat consumption on the order of 80-90% and significant increases in the consumption of beans, lentils and seeds – in order to avoid catastrophic environmental impacts. These impacts include climate change, deforestation, and water shortages.

Two of the types of businesses that will need to respond are major grocery retailers (e.g., Sainsbury's, Tesco) and prepared food restaurants (e.g., Pret a Manger, McDonalds).

(a) Explain how this proposed shift in food consumption represents business opportunities *and* threats for i) a major grocery retailer *and* ii) a prepared food restaurant.

[40%]

Pros for major grocery retailer could include:

- *scale and reach to capitalize on trends and reach a large number of consumers*

- *potential to differentiate if early mover from others in this very competitive sector*

- ability to leverage power within broad supply chains to deliver on new product mix

- consumer loyalty and capacity to help educate consumers and shape trends rather than simply respond

Cons for major grocery retailer could include:

- since have to continue to offer large range of items, can alienate consumers and or suppliers of more traditional foods

- have large presence within supply chain so any moves they make will disrupt sectors (e.g. meat sector) and make their continued provision of these foods more costly or difficult

Pros for prepared food retailer:

- likely relatively nimble and can refocus menu and offerings to capture a trend; don't have to worry as much about broad supply chains and consumer base

- high growth potential if capture the trend and capitalize on it

-focused strategy can enable development of a more holistic business model that addresses the issue and develops the necessary capabilities to deliver on it

Cons for food retailer:

- given relatively lower costs of entry, will be hard to differentiate as others catch the trend and enter the space – refreshing an existing brand might be harder than starting a new concept (e.g. making Pret vegan vs a new solely vegan chain)

- less resilient to trends than a grocery who offers a much wider variety of product and can buffer against future shifts in consumption patterns; consumers may be fickle/prone to trends

Better papers will effectively apply and leverage several core ideas – distinction between reducing unsustainability vs. achieving sustainability, and prioritization of environmental actions in relation to stakeholder concerns vs. core business concerns (i.e., materiality matrix) as well as perhaps ideas about circular economy and LCA (differentiating which types of businesses would be best able to use these to their benefit in addressing this issue).

(b) Your friend proposes to start a prepared food vegan restaurant to capitalize on this new opportunity. Your friend plans to include a life cycle assessment (LCA) for each product, to appear on the menu alongside the nutrition facts. In particular, your friend wants to highlight the greenhouse gas emissions associated with each food item. What advice do you give your friend about how to implement this idea? What should your friend consider in order to give the consumer good information? [40%]

Responses must recognize that a greenhouse gas emission focused LCA captures only part of the picture. Impact areas in relation to deforestation and water shortages would be missed, which might give misleading information to the consumer.

LCAs are complex (to perform and to understand). Responses should show that the student grasps the main steps and their sequence in performing an LCA, the importance of sound data and assumptions, and the importance of conveying results in a way that is useful to the consumer (without being overwhelming) and does not 'greenwash.' Might refer to examples and cases from class to illustrate sound/unsound use of LCA (e.g., Fiji water).

Could either encourage or discourage friend but needs to demonstrate a sophisticated understanding of how the LCA should be performed and that is should be broader than greenhouse gas emissions.

(c) Any change that either a major grocery retailer or a prepared food restaurant can make in its own business is only part of a broader system that needs to shift to achieve lower meat consumption and/or higher bean/lentil/seed consumption. Suggest one way in which *either* a major grocery retailer *or* a prepared food restaurant could attempt to influence any other aspect of this broader system. Explain how this suggestion could be implemented effectively. [20%]

Can focus either upstream or downstream in supply chain (i.e., could focus on how to shift consumer actions through education and other initiatives to alter behaviour). Focusing upstream could present a variety of arguments about how the company could engage suppliers through partnerships, criteria for accountability, or how the company could partner with others in its sector (e.g. other grocery retailers) to exert collective pressure in the supply chain. The use of economic, social and or regulatory incentives could be suggested, and various case studies from class mentioned (e.g. Axel Springer and conflict minerals).

Stronger responses will effectively leverage constructs from class to underpin explanations.

3 The concept of the Circular Economy has recently proven very popular with many companies as it appears to offer a way to improve resource efficiency and unlock potential new business opportunities. However, some consider it to be an overly optimistic solution to the various environmental problems the planet faces.

(a) Evaluate the Circular Economy concept in relation to business sustainability. [50%]

Responses should outline some of the many potential forms of circular economy – e.g. reuse, remanufacture, extending product life, industrial symbiosis, product to service offerings – and the various benefits associated including reduced material costs, increased revenues, lower carbon footprints, retention of embedded energy, innovation in business models, consumer loyalty, responsiveness to regulation.

Critiques can point out the fact that not all material reuse is necessarily warranted – on either economic or environmental grounds – there is complexity involved in how materials are recovered (some can not be) and the rates at which they need. Relies on significant shifts in behaviour that might be outside company control. There can also be rebound effects where greater resource efficiency leads to overall higher consumption. Consumers/companies 'feel' they are doing good but actually they are not. Circular economy also necessarily directs a lot of attention at material use and strongly associated factors like embedded energy and greenhouse gas reduction, but may obscure attention to less 'technical' aspects of environmental impact like biodiversity and fragile ecosystems.

Better responses will go beyond circular economy to consider whether this framework addresses the reducing unsustainability/enabling sustainability tradeoff, to what extent it takes on board planetary limits, and how it plays into core company strategies (as, for example, it shows up in a materiality matrix)

(b) The Cook Composites and Polymers (CCP) case illustrates a number of factors that influence the feasibility and success of a material reuse (industrial symbiosis) opportunity. Describe three of these factors and explain to what extent they can be more broadly applicable to other Circular Economy opportunities in various sectors. [50%]

Factors that contribute to feasibility and success of material reuse include:

- *Non-hazardous material (hence not governed by restrictive laws re its handling)*
- *Many 'generic' potential reuses*
- *Low variation in material (by-product) content and quality*

- *Predictable and reliable material quantity*
- *Trust between potential partners*
- *High margin for by-product/material in the market*
- *Producer of the by-product/material can readily access the market for it*
- *Could also focus on social factors like having an internal champion within the organization*

Arguments for how broadly applicable these factors are will depend slightly on those selected. Trust would be very broadly applicable, given what the research shows about how these material exchanges come about. Other factors like hazardous material, variability in quality and predictability will depend quite highly on the sector.

Responses should recognize that the feasibility/success of a given exchange will always depend on a combination of technical and social factors.

END OF PAPER