ISL WORKSHOP July, 2022

ISL Cork Workshop July 10th, 2022, 3.30pm to 5.30pm

Venue: The UCC Centre For Executive Education, 1 Lapp's Quay, Cork, T12 VF82

Coordinators: Dr Seamus O'Reilly, Cork University Business School, UCC, Ireland

Prof. Helen Rogers, Technische Hochschule Nürnberg/University of Applied Sciences, Nürnberg, Germany

Towards Circular Supply Chain Systems: Food and Automobiles

As firms seek to respond to the growing demand to reduce emissions, they endeavour to move beyond Scope 1 (internal emissions) and 2 (emissions from energy purchased) and address Scope 3 challenges. As outlined under GHG Protocol Corporate Standard, Scope 3 includes both upstream and downstream emissions and thus requires a supply chain approach. Studies have indicated that in many cases up to 70% of emissions associated with a firm's product are Scope 3 emissions and thus can offer considerable potential in the 'sustainable futures' journey. Attention to the wider supply chain has highlighted the value of a systems thinking to emissions reduction and the benefits of a Circular Economy approach.

Circular Economy approaches seek to design out waste and pollution, keep products and materials in use, and regenerate natural systems. An increased rate of remanufacturing, reuse and recycling processes in the economy has heightened interest in these approaches within the supply chain community (Batista, et al. 2018). Thus, these approaches consider different types of loops within closed loop systems, such as reuse of goods and recycling of materials, and distinguish between "cradle-to-grave" flows of materials and cyclical "cradle-to-cradle" flows (Bocken, et al. 2016; Braungart, 2008; Stahel et al. 1994). Current interest in the Circular economy not only addresses side-streams but can also help us address the complexity of existing supply chains and importantly the design of new more sustainable supply chains, so-called *sustainable futures.*

This workshop focuses on two core production systems that that have a key role to play in our sustainable future; food and automobiles. These systems provide a context to consider the fundamental changes that are required (and in some cases already underway), the supply chain implications arising and how we can best manage this transition (considering opportunity, risk and performance measures).

FOCUS ON: FOOD SYSTEMS

Meat and dairy have been important sources of protein through the ages and in recent years so-called developed economies have enjoyed more than an ample supply. As spending power increases in 'emerging economies', consumers here also seek to increase their consumption of animal-based proteins. The rapid economic and population growth in recent decades has placed increasing pressure on food systems to deliver and this has raised significant concerns about future food security and

sustainability. The negative impact of animal-based food production on the environment has compounded this challenge, in particular bovine animals (cattle and sheep) are a major source of harmful Greenhouse Gases (GHGs), i.e. methane (FAO, 2021). To highlight this a recent white paper by McKinsey & Co (Aminetzah, et al, 2020) suggests that if we consider 'cows as a country' it would have higher GHG emissions than any country, with the exception of China! This has led to increasing calls for more land devoted to plant-based food for human consumption rather than the production of plants for animal consumption.

So, what are the alternatives? A number of alternative sources of protein have attracted considerable attention over recent years. These include plant-based proteins (soy, pea), new animal sources (insects), biotechnological innovations (lab-cultured meat), and mycoproteins (derived from fungi). In addition, abatement measures seek to reduce the harmful impact of bovine production systems with proponents arguing that they are moving towards more sustainable food systems.

However, one could question if there are any truly sustainable food systems, particularly given the level of food waste. It is estimated that food waste generates about 8% to 10% of global greenhouse gas emissions. Given the current wastage levels, especially in plant-based production systems, it is argued that a more fundamental change to our food supply chain systems is required, prompting an increasing interest in adopting a circular economy approach.

FOCUS ON: AUTOMOTIVE SYSTEMS

Analysis of the negative impact of industry on sustainability highlights three categories, energy intensive industries (such as steel or cement), supply chains (e.g. construction) and products such as automobiles. Given the recent attention on e-mobility within the wider transport sector and the development of electric vehicles (EVs), automobiles provide an interesting example to explore in this workshop. Investment in EV from 2010 to 2020 amounts to €35bn. This level of investment positions us at a tipping point between Internal Combustion Engines (ICE) and EVs, however the transition to EV is not without its challenges as evident from the current semi-conductor chip shortage (despite an investment of about €51.5bn over the past decade in semi-conductors) (Holland-Letz, et al. 2021).

While from a Scope 3 perspective (see note on p.3 for definition) this transition greatly reduces emissions from automobile use, numerous issues arise, including user infrastructure issues (in particular charging points), redundancy of much of the existing servicing skillset and the need for new skillsets, and product pricing and availability. The latter highlight the upstream issues in terms of availability of components.

Thus, there remains considerable work in the development of this new automotive ecosystem, including sources of key metals (e.g. lithium, nickel, and cobalt) and components, scale-up of battery and semi-conductor production and development of the charging infrastructure. Furthermore, reaching net zero also means decarbonizing EV manufacture.

WORKSHOP PLAN

This workshop provides an opportunity for participants to reflect on the current state of:

1. Food production and consumption (something that affects all of us), identify the characteristics of more sustainable food systems and consider the supply chain implications of various 'sustainable food production systems'.

2. The current transition to electric powered automobiles (a topical issue) including upstream sourcing issues and downstream infrastructure (including charging and service), and decarbonizing EV manufacture.

The workshop design will promote sharing knowledge and identifying implications arising, intended and unintended, from transition to more sustainable supply chain systems.

Key questions that could guide discussion include:

- Where are the supply chain and infrastructure bottlenecks that will most likely occur?
- Where might physical constraints, whether related to the availability of natural resources or the scale-up of production capacity, limit the pace of the transition?
- How would the transition affect firms' operations and supply chain?
- What opportunities and risks would it create for companies and countries?

Note:

The GHG Protocol Corporate Standard classifies a company's GHG emissions into three 'scopes'. Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.

References

Aminetzah, D., Denis, N., Henderson, K., Katz, J. and Mannion, P. (2020), *Reducing agriculture emissions through improved farming practices*, McKinsey & Company, May.

Bocken, N. M. P., de Pauw, I., Bakker, C. and van der Grinten, B. (2016) Product design and business model strategies for a circular economy, *Journal of Industrial and Production Engineering*, 33:5, 308-320.

Braungart, M., P. Bondesen, A. Kälin and B. Gabler, (2008) "Specific Public Goods for Economic Development: With a Focus on Environment." in British Standards Institution (eds), *Public Goods for Economic Development*. Compendium of Background papers, United Nations Industrial Development Organisation, Vienna.

FAO, Sustainability Pathways Report, Sustainability and Livestock, https://www.fao.org/nr/sustainability/sustainability-and-livestock (2021).

Holland-Letz, D., Kässer, M., Kloss, B. and Müller T. (2021) *Mobility's future: An investment reality check*, McKinsey & Company, April.

Batista, L., Bourlakis, M., Liu, Y., Smart P. and Sohal, A. (2018) Supply chain operations for a circular economy, *Production Planning & Control*, 29:6, 419-424,

Stahel, W. R. (1994) "The utilization focused service economy: Resource efficiency," in B. R. Allenby and D. J. Richards (eds), *The Greening of Industrial Ecosystems*, National Academy Press, Washington, DC, 178–190.