

# Incorporating Case Studies into the University Courses to Heighten Awareness about Greenhouse Gas Emissions for a Product from Seed to Supermarket

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## Abstract

This paper presents a practical way of incorporating awareness about the greenhouse gas emissions into tertiary courses. A tertiary course on Supply Chain Management was selected for this purpose. A specially designed case study was provided to the students. The main aim of this case study was to encourage students to trace back the main processes involved in making a product with the purpose of identifying and reducing the energy consumptions in different stages. The case study was undertaken with guidance and feedback. Students were asked to engage in a threaded online discussion on the course discussion group. The suggested solutions were complemented with the necessary feedback and comments and then they were made available to all students to view.

The outcome, based on the students' solution demonstrated their understanding of the systematical ways of identification and reduction of the processes which contribute to generation of greenhouse gas emissions.

Keywords: Greenhouse, Emissions, Sustainable, Supply Chain, Education

## 1. Introduction

As the sources of energy are being used at an exponentially increasing rate, our planet is being threatened and affected with pollution. This undesirable situation is, to a large extent, a result of a lack of full understanding of the seriousness about being green and sustainable amongst some people. There may even be a belief amongst some that the consequences of not attempting a reduction in emissions will never affect them.

So, why and how should the inhabitant of our planet be concerned about these issues? Addressing this question can contribute to reinforcing the importance of having an awareness about ways of helping the situation.

To commence the education in a systematic manner, relevant topics should be introduced into various educational curricula at different levels. As an example, the author has started to incorporate specially developed case studies into the Bachelor's and Master's courses.

To approach the stated problem and answering the research question, a specially developed case study was presented and explained to the students undertaking Supply Chain Management and related courses within a Bachelor degree at an Australian university. The students were then encouraged to access the instructions on the course website and have an active participation in undertaking it. They were instructed to post their attempts and contributions to a to a designated Moodle's Discussions section in the form of threaded discussions. Hence, they were able to receive feedback and comments from both the fellow students and the author (the course examiner).

During and after the completion of the task, the interactive nature of the posted discussions were a demonstration of their attempts into looking into the problem in a more systematic manner. The case study also allowed the students to consider the relevant aspects of the complex network of the connection between seed and supermarket for a given product.

## 2. Our Planet and Greenhouse Gas Emissions

Although we are well aware of the general shape of our planet, we can easily get the feeling that we live on an infinitely large and flat piece of land which we refer to as the “world”. Some basic knowledge of astronomy and its related fields can help us gain a completely different overview of this world. When we discover that our planet (Earth) has a diameter of about 12,750 km, we realise that there are definitely limits on everything.

This kind of knowledge should help us in taking the environmental issues, such as the effects of pollution, overpopulation and greenhouse gas emissions more seriously. When we study other planets, we learn a great deal about looking after our own world. We do not have to go very far. We can simply study our celestial “next door neighbours”, the planets Venus and Mars. We have two extreme situations on hand. Mars with its thin atmosphere and an appearance that suggests the water on its surface has disappeared or frozen, and Venus with its very thick atmosphere and conditions that indicates the existence of an extreme greenhouse situation.

It would be appropriate to refer to an article titled “Leaving a Good Legacy” by Antholis and Talbot in Time [June 14 2010] who quoted two prominent statesmen and political theorists of the 18<sup>th</sup> Century:

“The conservative man of letters Edmund Burke saw society and civilization as a “partnership” of generations “between those who are living, those who are dead and those who are to be born”. It is evident that Burke feared that the citizen might run the risk of leaving ruins instead of an habitation for the future generations.

Antholis and Talbot continue by quoting Thomas Jefferson as follows:

“Thomas Jefferson, Burke’s contemporary, made much the same point when he argued that because “the earth belongs in usufruct [trust] to the living ... no generation can contract debts greater than may be paid during the course of its own existence.”

As suggested by Sundarakani (2008), the carbon emission is present in a supply chain from processing raw materials to dispatching finished goods. Hence, firstly the manufacturer should be aware of what these emissions are and secondly attempt to reduce it in all sections of the chain they have control over. In achieving this goal, education, in particular, tertiary courses can play a major role. The case study presented in the next section has been successful in conveying the main message to Business students. It should be noted that these students would constitute the makers of important decisions and policies related to many aspects of supply chain management in the future.

## 3. Supply Chain and Sustainability Case Study

The following case study is presented and explained to the students:

The regional Supply Chain Manager of a chain of fast food restaurants specialising in burgers has identified one of their popular items for a sustainability investigation encouraged by the Company.

The purpose of this exercise is to:

- Determine the main activities involved in procurement of the ingredients and other necessary resources in making, selling and serving this popular beefburger.
- Identify the major energy dependent activities and processes.
- Consider feasible ways of eliminating some or part of the energy intensive processes without affecting the nature and quality of the product (the popular beefburger).
- Consider ways of reducing the consumption of energy in each main activity and in total within reason.

In analysing the main activities and processes along the supply chain, one may find the following helpful:

Our popular burger is made up of a bun, meat (beef), salad (mainly lettuce and tomatoes) and sauce. Hence, the company has a number of suppliers for these ingredients. The suppliers would obviously have their suppliers. All these organisations have premises, production/preparation facilities, employees with needs for amenities and services. They utilise machinery and equipment in production/preparation and transportation of goods. They need to heat and cool their premises and facilities for pleasant working conditions and desirable storage purposes. They may depend on the usage of water which has to be pumped for storage and appropriate usage such as irrigation. All these activities use energy and energy consumption, ultimately, leads to CO<sub>2</sub> emissions.

Students are encouraged to utilise the multimedia educational resources which are available on the Internet. For instance, YouTube contains numerous educational clips. Many of them are relevant, educationally sound and professionally presented. They are also easily accessible and free of charge to watch. Hence, undertaking a search on relevant keywords can identify suitable learning materials for personal use. For example, a YouTube clip such as 'What is Supply Chain Management' (2013), provides a reasonable insight into the main concepts of managing the supply chain. It also demonstrates, with supported graphics, how different activities play their roles in delivering the final product. In this particular example, the main activities and their resource requirements in producing a bottle of water are explained well.

A publication by Maraseni et al (2009) would be a relevant background reading on how to consider various stages of a product in terms of greenhouse gas emissions (GHG). Rice, being the second most consumed cereal grain in many parts of the world, is the chosen product in this article. It is suggested that all stages in supply chain of an agricultural product such as rice require energy. These stages include land preparation, planting, watering, fertilising, harvesting, processing, storage and transportation. The main findings of the article indicate that developing countries generate more GHG for rice production compared with developed countries. Type of irrigation used has also an effect on the final outcome.

For the purposes of undertaking this case study, your task is to assist the Regional Supply Chain Manager in preparing a short report to be presented to the Management at the headquarters. It must be remembered that the company employs several hundred staff and contracts several hundred people domestically and overseas. Obviously, like many other businesses the company regards profitability an important goal too. Therefore, there may be a need to adopt a pre-emptive approach by prioritising various goals. It is not necessary to adopt a mathematical approach. You easily could notice that some goals would be in conflict with the notion of profitability.

To help the analysis, you may draw mind maps of the activities and their branches and consider their requirements. A mind mapping approach similar to Tony Buzan's method may be adopted. For the purposes of having a practical and manageable approach, you may, initially, consider the three main activities in production of a product or a service. They include, process, transportation and storage. Whether it is a product or a service, let us refer to its production or provision as process. A process needs energy. Any product or service and their preceding links in the chain involve movement. Movement uses energy. At various stages of the chain, parts and materials related to the product or service have to be stored. Storage consumes energy for lighting, heating, cooling and maintenance. The following is a simplified and generic example:

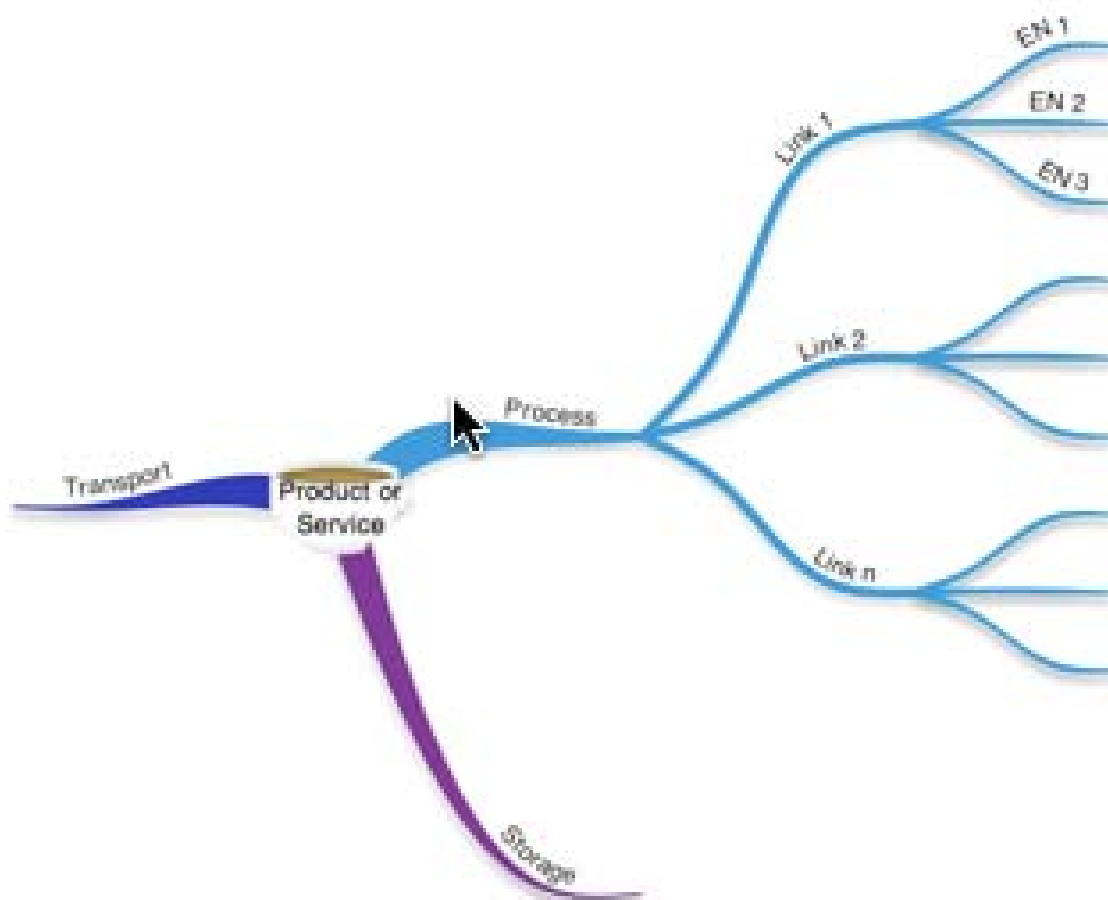


Fig1: A Mind Map Example of Representing Various Activities in a Supply Chain

#### 4. Outcome

In testing the effectiveness of this case study, in an attempt by the students (around 40), the results were posted on the designated Discussion area on Moodle. The students then had the opportunity of seeing different points of view towards the same goal. Having a threaded participation and constructive feedback led to reinforcement of the key learning elements as presented in the case study above. For instance, the students identified various activities upstream the chain which could either be eliminated, combined with others or improved. The students' active participation in this specially developed case study, encouraged them to gain the necessary knowledge and understanding of feasible ways of eliminating or, at least, reducing the unnecessary energy wasting activities.

Therefore, this case study could be a basis for understanding and addressing larger and more serious situations related to energy wastage. For instance, It is noteworthy to mention that motor cars are possibly one of the major causes of GHG emissions which contribute significantly to climate change and global warming.

According to the online article, 'Trends in transport greenhouse gas emissions' (2015), the greenhouse gas emissions generated by transport are on the rise in Australia. This article reports that "Road transport contributed 84% of transport emissions in 2013 (down slightly from a peak of 89% in 2004). Cars accounted for 48% of Australia's transport emissions in 2013, down from 57% in 1990." A percentage of around 50% is certainly a significant amount. It is estimated that a medium car generates over 3.5 tonnes of CO<sub>2</sub> per annum! It should be noted that transportation of resources (materials and personnel) constitutes one of the main activities of supply chain management. As a result of feedback, students were made aware of these facts.

In conclusion, it would be appropriate to mention that over 200 years ago thinkers like Burke and Jefferson were thinking about looking after the planet when pollution sources of today such as transport were non-existent. Hence, any attempt in helping the reduction of the pollution and its sources will be a right step towards cleaner environment.

#### 5. Conclusions

The outcome of successfully completing the specially developed case study demonstrated that the participating students had gained an understanding of how to recognise the main energy consuming processes in production of a product. The provided guidance and constructive feedback helped to reinforce the learning process. Hence, this exercise has paved the way for students to consider more serious scenarios in their future professions as Business graduates. For example, in the future, one may undertake research into finding out the following:

1. Is the average person aware of the consequences of GHG emissions?
2. Does the average person attach any importance to responsibly minimise GHG emissions in their everyday activities?
3. Does the average person try to minimise car trips?

4. How are businesses balancing the conflicting objectives of staying productive, profitable, expanding, creating more jobs and opportunities and at the same time reducing GHG emissions?

#### 6. References

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