The Environmental Impact of Ultra-Processed Foods on the Global Food System

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Abstract

Our globe is faced with a formidable challenge: producing enough high-quality, diversified, and nutrient-rich food within the confines of our planet to feed a growing population. This entails considerably decreasing the global food system's environmental impact.

Climate change may seriously affect our ability to produce enough food in a world with a growing human population.

A significant factor in environmental change is agriculture. One-third of all glasshouse gas emissions**[1]** and roughly 70% of freshwater use are caused by it.**[2]** In addition, it consumes 38% of the world's land**[3]** and is the main reason for biodiversity loss.**[4]**

More than 7,000 different plant species can be used to make food.**[5]** But today, just three cereal crops—rice, wheat, and maize—provide 90% of the world's energy, with more than half of the world's population depending on them.**[6]**

This continuous trend is most certainly being greatly influenced by the rise of *ultra-processed foods (UPFs). Therefore, cutting back on the production and consumption of these items presents a special chance* to enhance both our health and the food system's environmental sustainability.

This is of particular importance to management accountants who need to consider environment, society, and governance (ESG) issues in driving 'sustainable' value enhancement of their organisations. Consequently, the manufacturing, marketing and waste-management of UPFs presents a significant challenge to our cost management systems.
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The Global Agricultural System and Food Costs

In more recent times the global agricultural system has remained largely strong despite the impact of climate change, increasing deforestation, and decreasing soil productivity — and, thankfully, there have been only a few severe food shortages. This is because the volume of crops grown per hectare varies from year to year by about 30%, according to research published as far back as 2007 **[7]**

On the other hand, food costs have been fluctuating more and more during the past few decades.**[8]** While there are many factors that can affect food prices, such as crop yield, weather, trade, speculation in the markets for food commodities, and land management techniques — the majority of open trading systems have made it possible for shortages of food in some areas to be offset by surpluses and increased production in other areas.

Unfortunately, the stabilising effects of global trading to counter climate change, deforestation and soil degradation could start to break down with the globe now appearing to move towards higher trade barriers. The twin pressures of climate change and trade barriers alone could result is the

increase of food prices significantly, placing stress on budgets of poor people in rich countries as well as those living in poor countries.

Also, whilst over the past 50 years crop growth per hectare has increased significantly; in more recent times this growth has decreased relative to earlier decades. According to recent studies, bad weather may have prevented up to 30% of the anticipated growth of European crops.**[9]** It is most concerning that the most noticeable shifts have frequently occurred in nations that are at high risk of climatic impacts on food supply and cost, such as those in sub-Saharan Africa, which includes South Africa.**[10]**

This is especially evident in the cases of barley, maize, millet, pulses, rice, and wheat. It appears that the countries most at danger for food shortages are also those hardest impacted by global warming.**[11]**

The Impact of Rising Temperatures

According to the *Intergovernmental Panel on Climate Change (IPCC*) — the world's foremost experts on climate science —the increased frequency of extreme weather events and higher average global temperatures brought on by climate change will decrease the reliability of food production.**[12]**

The IPCC also provided evidence that increased heat and rain brought on by climate change are deteriorating land and decreasing soil productivity. This is due to the loss of organic matter and soil nutrients, which has a negative impact on crop production. Also, when sea levels rise more quickly due to global warming, there will be more saltwater intrusions and agriculture land will be permanently flooded, which will exacerbate these negative effects.**[13]**

With losses ranging from less than 1 tonne per hectare in Central Asia to 100 tonnes per hectare in South-East Asia, recent modelling of soil loss in wheat and maize fields reveals significant differences between tropical climate zones and regions with a substantial amount of flat and dry land. The five largest producers of wheat and maize demonstrate the strong influence of topography and climate on simulated water erosion. Water erosion is relatively high in Brazil, China, and India, where a large portion of cropland is in tropical regions, while annual median values are much lower in Russia and the United States.**[14]**

Fertilizers and Food

The increased use of chemical fertilisers and irrigation has been able to offset a significant amount of soil degradation. This has largely corrected historically bad land management in Europe and the US. For instance, according to one study, the decline in soil quality would have caused American maize yields over the past 100 years to drop from roughly seven to just over one tonne per hectare without fertiliser. Nonetheless, while costing farmers more than $500 million-year, fertiliser has allowed yields to be generally maintained.**[15]**

However, chemical fertiliser overuse can contribute to soil acidification and soil crust, thereby reducing the content of organic matter, humus content, beneficial species, stunting plant growth, altering the pH of the soil, growing pests, and even leading to the release of greenhouse gases.**[16]**

These findings have grave repercussions for less developed regions of the world where the quality of the soil is deteriorating but there are not enough resources to add fertiliser – chemical or organic – to make up for it. Climate change will exacerbate the situation, and its impact will become much more concerning.

Growing new crops, or the same crops in various locations, in response to rising temperatures is just one of the many facets of land management for food production that have evolved in recent decades. In many regions of the world, the overall impact of these changes has considerably enhanced food yields, and land managers may be expected to modify their plans in response to climatic changes.

However, if multiple major breadbasket regions (the parts of the world that produce most of the food) simultaneously experience failure of important crops like *wheat, maize*, and *soybeans* due to climate change, the risks of price increases making food too expensive in less developed regions of the world could increase.**[17]**

The Impact of Ultra-Processed Foods on the Planet

Another significant impact on climate change is the planet's dependence on Ultra-processed foods (UPFs). While studies have shown how western diets strong in caloric**[18]** and animal products**[19]** often have negative effects on the environment, UPFs have also been related to environmental issues.**[20]**

Whilst the effects of UPFs on human health are well-explained, the environmental implications have received less attention. Given that ultra-processed foods make up a large portion of the food supply in high-income countries, this lack of attention to their environmental impact is surprising, and may suggest the possibility of strong lobbying by UPF manufacturers to keep the issue off the table. **[21]** Sales of UPFs are also rapidly rising through low and middle-income countries where there has been no discussion of their impact on the environment.**[22]**

A recent study, also makes the argument that the production, processing, and consumption of "traditional" foods are negatively impacted by increasingly globalised diets heavy in ultra-processed foods.**[23]**

How To Recognise Ultra-Processed Foods

Ultra-processed foods refer to a class of foods described as *"formulations of ingredients, mostly of exclusive industrial use, that arise from a succession of industrial processes."*

They typically contain cosmetic additives and little or no whole foods. You might imagine them as foods that would be difficult for you to prepare at home. Examples include candy, soft drinks, chips, pre-made meals, and quick food items from restaurants.

In contrast, "traditional" foods, which are those that have undergone little processing or are produced using conventional processing techniques, include fruits, vegetables, whole grains, preserved legumes, dairy products, and meat products.

Fermentation, canning, and bottling are examples of traditional processing techniques that are essential to ensuring food safety and global food security. Yet, foods that are ultra-processed go beyond the minimum requirements for food safety.**[24]**

Australians consume a lot of food that has undergone extreme processing — 39% of Australian people' entire daily energy consumption comes from these items.**[25]** This is more than Belgium, Brazil, Columbia, Indonesia, Italy, Malaysia, Mexico and Spain**[26]** – but less than the United States, where they account for 57.9% of adults' dietary energy.**[27]**

The ultra-processed foods that contributed the most dietary energy to Australians aged two and over included ready-made meals, fast food, pastries, buns, and cakes, breakfast cereals, fruit drinks, iced tea, and confectionery, according to an analysis of the 2011–12 *Australian Health Survey* (the most recent national data available on this).[28]

Unfortunately, although not the view held by governments and Big Food, quite a few researchers have shown that we are being poisoned by ultra processed foods because of:

- High concentration of simple carbohydrates – especially worrisome being the high fructose corn syrup used as sugar in most ultra processed foods, especially those prepared in the USA.
- Additives – for example, for taste, colour, food preservation.
- Heat – there is evidence to suggest that the application of very high heat (typical in ultra food processing) causes chemical changes in the 3 main ingredients of the food, i.e. sugar, carbs and proteins.
- Leaching – often the plastic wrapping can leach into the food item.

What are the Effects of Ultra-Processed Foods on the Environment?

Because only a few crop species are used in ultra-processed foods, the habitats where these ingredients are grown are burdened. Good examples include oil seed crops (like palm oil), maize, wheat, soy, and soy. Food producers choose these crops because they are affordable to grow and have high yields, allowing for mass production.

Moreover, nutrients from animals that eat these same crops are used in ultra-processed foods. Fruits, vegetables, grains, legumes, meat, and dairy products are just a few of the minimally processed whole foods that have been supplanted by the rise of easy and affordable ultra-processed foods. This has decreased the diversity of our food supply as well as the quality of our diet.

In 2019, the most common ingredients packaged food and drink supply in Australia were milk (11.0%), wheat flour (15.6%), sugar (40.7%), and vegetable oil (12.8%).**[29]**

Unfortunately, there is a substantial correlation between biodiversity loss and specific substances found in ultra-processed foods, such as chocolate, sugar, and some vegetable oils.**[30]**

The Cost Impact of Ultra-Processed Foods

The production costs of ultra-processed food can vary depending on various factors such as the type of product, ingredients used, manufacturing processes, and scale of production. Ultra-processed foods typically undergo extensive processing and contain additives, preservatives, and other artificial ingredients.

Some of the key cost components involved in the production of ultra-processed foods are:

Ingredients: The cost of ingredients can vary significantly based on their quality, availability, and sourcing. UPFs often rely on inexpensive and bulk ingredients, such as refined grains, cheap oils, sugars, and additives, which can help keep costs relatively low.

Processing: The extensive processing involved in producing ultra-processed foods requires specialised machinery, labour, and energy consumption. The costs associated with processing include equipment maintenance, energy bills, and the wages of skilled operators and technicians.

Packaging: Ultra-processed foods are typically packaged in individual servings or larger containers. The cost of packaging materials, labelling, and design can add up, especially for brands that invest in attractive and informative packaging to appeal to consumers.

Marketing and Advertising: Promoting ultra-processed foods involves significant marketing and advertising expenses far beyond those required for 'traditional' brands. These may include advertising campaigns to spuike the benefit of an additive in their UPF verses that on a competitor, product endorsements by public figures such as sportspersons, product placements, and other promotional activities to create brand awareness and drive consumer demand.

Research and Development: Developing new ultra-processed food products or improving existing ones requires investment in research and development. Companies may spend considerable amounts on market research, product formulation, taste testing, and quality control to meet consumer preferences and maintain a competitive edge.

Regulatory Compliance: Ultra-processed foods are subject to various regulations regarding food safety, labelling, and nutritional content. Complying with these regulations often involves additional costs for testing, certifications, and compliance procedures.

Distribution and Logistics: The costs associated with transporting ultra-processed foods from the manufacturing facilities to retail stores or distribution centres should be considered. This includes transportation fees, warehousing costs, and inventory management expenses.

Waste-Management: An entire article can be written on this. Most UPF manufacturers totally ignore what happens to the packaging after consumption. As most often UPFs come in soft-plastic wrappers, or soft and hard plastic combined containers, these are disposed as waste, and ultimately end up in landfills or in our oceans.

It is important to note that specific production cost figures can vary widely depending on the product and the manufacturer. The food industry is highly competitive, and companies often aim to optimise costs while maximising profits. Nutrient values and the impact on the environment take a distant second.

Summary

It is possible to reduce the environmental impact of highly processed meals. These foods are not only unhealthy, but they are also not necessary for human nourishment. Ultra-processed food consumption is also associated with a number of diseases, including type 2 diabetes, cancer, irritable bowel syndrome, heart disease, and depression.**[31]**

In order to combat this, food production resources might be redistributed globally to produce wholesome, less processed meals. For instance, large amounts of grains like wheat, maize, and rice are ground into refined flours that are then used to make refined breads, cakes, doughnuts, and other bakery goods.

They might be diverted to the production of healthier foods like whole-wheat pasta or bread. This will increase global food security and give major breadbasket nations like Ukraine and Russia better protection from natural disasters (let alone armed warfare).**[32]** Ukraine and bordering parts of Russia are home to the famous mineral-rich 'black soil' that provides the perfect growing conditions for grains, giving the region its fame as the 'world's breadbasket'. The other breadbasket country is Brazil.

By completely avoiding the usage of some substances, additional natural resources could be preserved. For instance, changing consumer tastes for healthier foods could drastically lower demand for palm oil, a prominent ingredient in ultra-processed foods linked to Southeast Asian deforestation.

Obviously, the best way to lessen your impact on the environment and enhance your health is to consume fewer ultra-processed foods.

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