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Resource Depletion: Opportunity or Threat for Modern Business!!!

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Abstract: Resource depletion has emerged as one of the most critical challenges confronting modern businesses in the 21st century. The rapid consumption of natural resources such as fossil fuels, water, forests, and minerals due to industrialization, urbanization, and increasing consumer demand has created significant economic, environmental, and social concerns. This paper examines whether resource depletion represents a threat or an opportunity for contemporary businesses. On one hand, diminishing resources lead to rising production costs, supply chain disruptions, environmental degradation, and stricter government regulations, posing serious risks to business sustainability and profitability. On the other hand, resource scarcity encourages innovation, technological advancement, sustainable practices, and the development of green business models. Companies are increasingly investing in renewable energy, recycling, circular economy strategies, and efficient resource management to gain competitive advantages and improve long-term resilience. The study highlights how businesses that adapt to sustainable practices can transform environmental challenges into opportunities for growth, brand value, and market leadership. Ultimately, the paper concludes that resource depletion can be both a threat and an opportunity, depending on how effectively organizations respond to the changing global economic and environmental landscape.

We will need to produce 70% more food by 2050 to meet the demands of the world's massively expanding population, according to the United Nations **Imagine a world of spiraling food prices, water shortages and soaring energy costs.** For many living in the world today, this nightmare scenario is already a reality. Even for the well-off living in developed economies, it's becoming all too familiar and on current projections, it's going to get a whole lot worse. Short-term fluctuations in supply and demand aside, a global population explosion combined with finite resources means the planet cannot sustain ever-increasing levels of consumption using current models of production.

Index Terms - Spiraling food prices, soaring energy, global population explosion.

• INTRODUCTION

The availability of nutritious food, clean air and water are essential components in fostering ecosystems for a healthy life and improved well-being. In the early twentieth century, Mahatma Gandhi (1869–1948) articulated his belief that ‘the earth provides enough to satisfy every man’s need but not every man’s greed’. He also stated that what we are doing to the forests of the world is a reflection of what we are doing to ourselves and to one another. The predictive power of his words has even greater relevance in the twenty-

first century, as awareness has grown that the damage to the environment could be due to human factors, prompting action by researchers and policymakers to halt the degradation of natural resources, as exemplified in reports by the United Nations' Intergovernmental Panel on Climate Change (IPCC, [2014a](#)), and as articulated in the Millennium and Sustainable Development Goals (SDGs).

Exploding population

In the past 10 years, global commodity price increases have wiped out all the declines seen during the past century, during which prices almost halved despite a fourfold increase in the world's population and a massive expansion in the global economy.

The reasons for such price falls were simple - the discovery of new sources of relatively cheap supply allied with new technologies.

Spot the pattern

Real crude oil price*, \$ per barrel



The Economist

But the era of abundant cheap resources is drawing to an end, for reasons equally straightforward. The global population currently stands at seven billion people, and is predicted to rise to more than nine billion by 2050 - that's roughly the population of the UK being added to the planet every year. More importantly, there could be up to three billion new middle-class consumers, mainly in China and India, according to McKinsey. They will drive demand for meat, consumer goods and urban infrastructure, not to mention the energy needed to produce them, to levels unheard of in human history. For example, McKinsey expects the number of cars in the world to double by 2030. And while demand for resources from an exploding and wealthier population soars, finding and extracting new sources of supply is becoming increasingly difficult and expensive. For example, oil companies have to look further and drill deeper to find dwindling reserves of oil, meaning the cost of an average well has doubled in the past ten years, while new mining discoveries have been largely flat despite a fourfold increase in exploration costs. The discovery of shale gas could have a major impact on meeting global energy needs in the decades to come, but as Laszlo Varro, head of gas, coal and power markets at the International Energy Agency, says, just burning current reserves of fossil fuels using existing technologies would create enough carbon dioxide "to boil the planet several times over".

Water shortages

- But it's not just traditional energy sources that are a cause for concern, particularly given that resources are becoming increasingly linked, with shortages and price movements in one having a much greater impact on others.
- Take water, which underpins the production of pretty much every manufactured product on earth - for example, almost 50 gallons are used to extract one gallon of oil, says Dr Richard Mattison, chief executive of corporate environmental research group Trucost.
- Demand for water over the next 30 years is projected to rise by almost a half at a time when the groundwater table in many regions of the world is falling and large areas are suffering from shortages due to drought, large-scale irrigation, pollution, dams and even war. Finite land resources are also coming under enormous pressure.
- Urbanisation displaces millions of hectares of high-quality agricultural land each year - McKinsey estimates that prime land equivalent in size to Italy could be sacrificed to expanding cities in less than 20 years.
- At the same time, tens of thousands of square kilometres of pristine forest are cut down to grow crops needed for food, of which we will need 70% more by 2050 to feed the world's massively expanding population, according to the United Nations.
- In fact, vast swathes of natural land are being converted for all manner of uses across the world, **destroying essential so-called ecosystem services such as flood protection and genetic resources used for live-saving drugs.**

The impact of population growth and Urbanization on natural resources

Underpinning current policy thinking at international level is the acknowledgement of the pressures on natural resources from population growth. The world population is currently around 7.5 billion and is estimated to reach 9.7 billion in 2050 (United Nations, 2017). The population in the least developed regions is predicted to continue growing, with an estimated 1.3 billion inhabitants to be added in Africa (doubling its current population), 0.9 billion in Asia and 0.2 billion in the rest of the world by 2050.

Around 54% of global population is currently urban according to United Nations' (2017) estimates. Evidence from urban geographers, sociologists and engineers shows how growing urbanization is intensifying pressures on natural resources (Rout, 2018), creating extreme levels of air pollution (Srikanth & Nathan, 2018), the lack of clean water (Sansom, Hirst, & Kayaga, 2018), unequal access to energy (Brown et al., 2018), and continued food insecurity (Kenton & Singha, 2018) in both urban and rural communities (Zong & Cai, 2018). Much of the growth in mega cities (with a population of over 10 million) is predicted to be in less developed countries: 21 among 27 mega cities by 2025. The population in some mega cities already exceeds that of the estimates provided by the United Nations (2008) for that year: for example, the population of Tokyo is currently 37.8 million; the population of Delhi is estimated to have reached 25 million; and that of Shanghai, the most populated city in China, exceeds 24 million.

Major shifts in population from rural to urban environments, in conjunction with climate change, are recognized by international organisation to have intensified pressure on ecosystems (including crops, livestock, fisheries and forestry) and food security, resulting in an increase in the number of undernourished people since 2014 (FAO, IFAD, UNICEF, WFP & WHO, 2017). Evidence from a study carried out by environmental and ecophysiology scientists (Medek, Schwartz, & Myers, 2017) suggests that climate-related disruptions to agriculture will become more severe, with ever more serious implications for food supply, plant nutrients and human health. The authors conclude that 148.4 million of the world's population might be at risk of protein deficiency due to elevated atmospheric carbon dioxide concentrations (eCO₂) by 2050. The situation in sub-Saharan Africa, South Asia and especially India presents daunting challenges. They therefore recommend that eCO₂ effects on crop nutrient contents should be incorporated into future

food security policies. An earth science study for the US National Aeronautics and Space Administration (NASA), based on evidence from global crop models collated by climate scientists, suggests, however, that eCO₂ levels could both ‘help and hurt crops’ (Reiny, 2016).

The US Global Change Research Program (USGCRP, 2015) was established by Presidential Initiative in 1989 and mandated by Congress in the Global Change Research Act of 1990 to ‘assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change’. The USGCRP works with academics, the state, industry, and other groups on global change research to study climate change impacts on every type of natural resource from plants to animal species, and the alterations it brings to ecosystems. The Huron River Watershed Council (HRWC, 2016) was founded in 1965 in southeast Michigan and dedicated to river protection. The Council argues that increased risks of flooding, droughts and fires, and the severe degradation of natural resources are the result of reduced water levels, ground water recharge and wetland coverage, due to the warmer water and air temperatures.

The extent to which the American public believes such scientific evidence is revealed in an analysis by Marlon, Howe, Mildenerger, and Leiserowitz (2016) of the Yale Climate Opinion Maps. These authors used statistical modelling of national public opinion data gathered between 2008 and 2016 in the US. They found that: 70% of adults thought global warming was happening; 53% thought that it was due to human activities, while 32% attributed it to natural changes; 49% said that they believed evidence from scientists about global warming, whereas only 28% realized that no consensus existed; 71% said they somewhat/strongly trusted scientists, while 26% said that they did not. When cook et al. (2013) analyzed the evolution of the scientific consensus on anthropogenic global warming in peer-reviewed scientific literature, they found that, over time, the number of published papers rejecting the consensus on global warming had fallen to less than 3%. These findings suggest that, although members of the wider public in the US are rarely exposed to contradictory scientific evidence, they are not necessarily convinced by the views presented by professionals.

The European Commission’s Joint Research Centre, Directorate for Sustainable Resource, analyzed disaster records and high-resolution hazard and demographic projections for the period 1981–2010. Using a prognostic modelling framework through to the end of the twenty-first century, they examined human vulnerability in Europe due to extreme events: heat and cold waves, river and coastal floods, windstorms, droughts and wildfires. The evidence from their evaluation of spatial and temporal variations in intensity and frequency of greenhouse gas emissions demonstrated that, during the reference period, around 3000 Europeans lost their lives each year due to weather disasters (Forzieri, Cescatti, Silva, & Feyen, 2017, p. e202). The authors predicted that, in the absence of appropriate adaptation measures, the figure could reach 152,000 by 2071–2100, with about two-thirds of European population affected annually by weather-related disasters by 2100. They suggested that their results ‘could aid in prioritization of investments to address the unequal burden of effects of weather-related hazards and differences in adaptation capacities across Europe’.

Objectives of the Study:

- To study the impact of depleting natural resources on the modern business
- To find out the other alternative sources for replacing natural resources.
- To understand the importance of natural resources.
- To analyse the impact of urbanization on natural resources.

'Critical list'

But it's not just physical depletion that leads to scarcity. For some resources, political and financial factors can exacerbate the problem, particularly in the short term. A recent survey by consultants PricewaterhouseCoopers (PwC) found a shortage of key minerals and metals could "disrupt entire economies". It compiled a "critical list" including lithium, which is widely used in batteries and wind turbines, cobalt, again a key component in rechargeable batteries, and tantalum, which is used in mobile phones and computers. Geologists prefer not to speculate on the planet's finite reserves of these valuable resources, some of which are already running low, for the simple fact that more could be discovered, but political factors alone make them hard to come by. China, for example, where most so-called rare-earth elements are found, already severely restricts exports to other countries. India and Vietnam have also curbed exports of mineral resources and the pressure for other countries to follow suit is growing.

Equally, increasingly volatile commodity prices, borne in part of increasing uncertainty over supply, mean companies are less willing to invest in discovering new supplies, unsure of the return they will make on their investment. This creates a potential vicious circle, where volatile prices have an impact on supply, making prices yet more volatile, all the while exacerbating the problem of scarcity.

Radical solutions

Clearly, then, something has to give if humans are to live within the Earth's means, as they must.

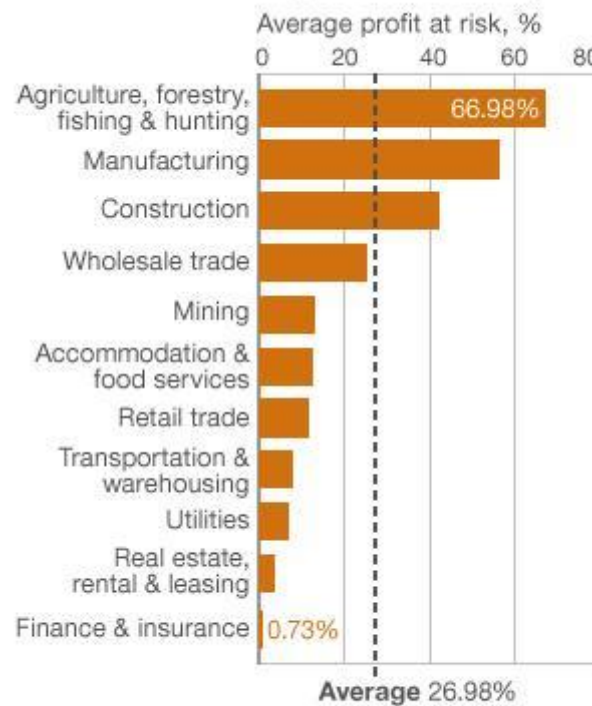


Companies are being forced to spend huge amounts of money to secure their water supplies as Martin Chilcott, founder of the sustainable business community 2degrees, which counts many of the world's largest corporations among its members, says: "The potentially infinite increase in demand for products is clearly unsustainable. "Given finite resources, population growth allied with the growing middle classes means the math's just doesn't add up." Some argue the answers are already out there. Productivity improvements, Mr. Thompson says, would alone help meet almost 30% of demand for resources by 2030 and present trillions of dollars of savings to global companies.

New technologies, substitute materials and greater investment in supply will also be needed, he says. McKinsey estimates that about \$3tn a year would help meet demand for steel, water, agricultural products and energy. This is about 50% more than current investment. Others argue more radical solutions are required.

"Policy intervention is needed to protect resources that are not priced or incorrectly priced," says Malcolm Preston, global sustainability leader at PwC.

Profits lost if water priced correctly



Figures calculated across the world's largest 4,100 companies. Average based on all companies.

Source: Trucost

Water is a case in point. Despite being the world's most precious and increasingly scarce resource, it is incredibly cheap, and in many parts of the world, free correcting this price anomaly would have huge consequences for businesses. Trucost has calculated that more than a quarter of profits of the world's biggest companies would be wiped out if water was priced to reflect its value, as it must be. Land is another example. Huge chunks of the natural world have no monetary value placed upon them, and yet they provide services worth trillions of dollars to the global economy. Only now is this value being recognized and painstakingly calculated.

RESEARCH METHODOLOGY

The present study adopts a descriptive and analytical research design to examine whether resource depletion acts as a threat or an opportunity for modern businesses. The research aims to understand the effects of diminishing natural resources on business sustainability, innovation, competitiveness, and long-term growth. A mixed-method approach has been employed, combining both quantitative and qualitative methods to obtain a comprehensive understanding of the research problem.

The study is based on both primary and secondary data. Primary data are collected through a structured questionnaire administered to managers, business owners, sustainability officers, and executives working in manufacturing, energy, construction, and service industries. The questionnaire uses a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" to measure respondents' perceptions of resource depletion and its impact on business performance.

Secondary data are collected from scholarly journals, books, annual reports of companies, government publications, reports of international organizations such as the United Nations Environment Programme (UNEP), World Bank, International Energy Agency (IEA), and other reliable online databases. These sources provide theoretical and empirical support for the study.

The target population consists of organizations operating in resource-intensive sectors. A stratified random sampling technique is used to ensure adequate representation of different industries.

The study follows all ethical guidelines for academic research. Participation is voluntary, informed consent is obtained from all respondents, confidentiality is maintained, and the collected information is used exclusively for research purposes.

Overall, this methodology enables a systematic investigation of how resource depletion influences modern business organizations and whether it serves primarily as a challenge or as a catalyst for innovation, sustainable practices, and competitive advantage.

Conclusion:

Energy efficiencies, renewable energy and a massive increase in recycling is needed. Some are even calling for what is known as a circular economy, a comprehensive rethink of our current model of production and consumption, where one company's waste is another's raw material, and where obsession with the ownership of material goods is moderated.

Inevitable for some, an unrealistic step too far for others. But one thing is certain, as things stand the numbers don't add up and the odds are stacked against us. Drastic change is needed.

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