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ECONOMICS OF ENERGY EFFICIENCY IN DEVELOPING COUNTRIES

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Abstract

Developing countries' energy has had an exceedingly high demand for growth. Improving energy efficiency will be a great antidote to inflation in the economy, especially in low to medium-income countries, the energy efficiency can cause strain between the objectives of a country in terms of increasing its gross domestic product and the sustainable development agendas of different nations. The research will review shreds of evidence through tables and charts of both the private and the social advantages of improving the energy efficiency of low to medium-income countries. Furthermore, there will be a highlight on the work done by energy subsidies, maintaining unreliable power supply and the capital limits may play in the low investment in energy efficiency.

Introduction

In recent times, technological advancement has reduced the required energy, especially in providing services concerned with power. In developing countries, progress made on energy efficiency causes the need to achieve their economic objectives, yet the sustainable economic development commitments may cause some tension in achieving their goals. Emerging questions that arise from the increasing demand for energy efficiency include; which investment in energy efficiency will produce the highest private and social returns and aid in achieving the economic objectives of that nation? Are there policies that developing countries need to embrace to increase and improve those particular investments? Finally, who will benefit when these policies are made and the assets are easy and quick to access?

Energy Saving policies

Policies to reduce energy expenditure help developing countries improve their energy efficiency investments, increasing their ability to reach their economic objectives. Customers prefer more efficient appliances in low to medium-income countries. In a case study of Mexico, there has been a rapid

increase in energy-efficient technology, showing a total increase in sales from 2.8 in 2017 to 3.2 in 2018.

According to ESI Africa (2016), African countries have embraced mainly more efficient appliances due to the increased efficiency of professionals. According to Amol Phadke et al. (2015), the analysis presented just twenty-five watts of solar power. This research showed that highly efficient technological devices reduce the cost of providing off-grid electricity services by fifty per cent. Senegal has adopted solar irrigation among farmers of rice. Bensch et al. (2015) found that reduced firewood consumption in Senegal by thirty per cent. A traditional stove replaced a conventional one with a better and more efficient version.

Energy Demand Rebound Effects

The rebound effect is that improvements in energy efficiency provide small decreases in energy consumption due to the social impacts. The rebound effect occurs in social systems of technological advancements, such as demand and supply and the transport industry. According to Riahi et al. (2015), a widespread resource constraint is expected in future decades, has been caused by the reduction in stocks of non-renewable natural resources such as fuels from fossils, oil, minerals mined and natural gas,

Natural and Capital Resources

Capital is a liquid asset that generates a steady flow in income, according to Mancini et al. (2017). Natural capital refers to natural resources that create flow and can be used in the social systems of technology.

Benefits of Energy Efficiency

For energy efficiency to increase, it is essential to emphasize reducing energy consumption. Allcott et al. (2017) researched that there are basic sources of benefit from investment in energy efficiency among high-income countries. However, in low and medium-income countries, other significant benefits are essential, and failure to recognize them will highly underestimate the social significance of energy efficiency in the economy. There are three potential sources of advantage: better energy services accessibility, effects on the health of the local citizens, and enhancement in the industrial productivity of the developing country.

Improved Access to Energy Services

Government policies should prioritize improved access to affordable energy services and reliable energy sources. Electricity supply from off-grid sources is low on capacity. Whenever there is a constraint on supply, returns from consumption of an energy-efficient investment can show through reduced cost of services or increased consumption of the service.

Health impacts on local citizens

In low and medium-income countries, energy improvements may include fuels such as firewood and charcoal to a cooking stove that conserves energy. It reduces indoor air pollution generated by natural energies such as firewood and charcoal, leading to deaths in developing countries. Evidence from Hanna et al. (2016) on the benefits of improved cooking stoves found that they had no long-lasting health improvements in India. Therefore, the consumers opted not to maintain the stoves thus did not continue using them.

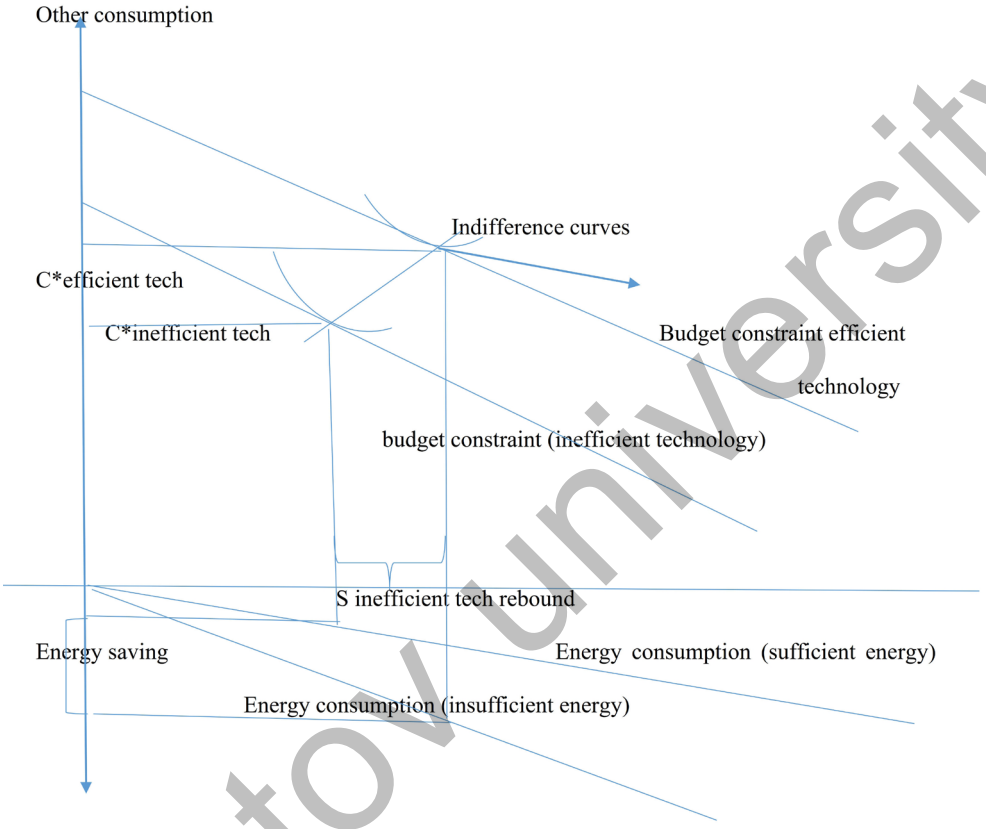
Enhancement in Industrial Productivity

Industrial productivity is a very vital factor in the economy of any nation. One important source has been traced to the effects of better lighting on working conditions. In high-income countries, there is the ready availability of air conditioning .to ensure comfort for the employees. In developing countries, it is common for factories to operate without cooling (Somanathan et al., 2021). Implications on industrial productivity can be seen because high temperatures due to the lack of proper cooling systems reduce productivity. Adhvaryu et al. (2020) found improved worker productivity due to an increase in lighting in India. They concluded that the increase in productivity resulted from improved working conditions.

Conceptual framework

This model shows the relationship between four critical concepts that have been evaluated in the literature: saving of energy, rebound effects on demand of power, the realization gap on energy-saving, and consumers' willingness to buy, for an improvement in efficiency in the remainder of the section, we summarize the empirical evidence on these concepts.

Considering an example of a household choosing between a low energy-efficient appliance and a high-efficiency lighting appliance. The more efficient device requires less electricity each hour of lighting



The household utility depends on its consumption of lighting services and all other consumptions (denoted by C) at the top of the panel of figure 1. The unit price of "other consumptions" Assumes that the household allocates a certain daily income toward lighting expenses and other consumption. The indifference curves found in the top panel show the connection in different combinations of S and C that result in the household's same level of usefulness. The household's budget constraint depicts which choices in consumption are affordable given the energy price, the price of the costs in which goods are measured, daily income, and the level of efficiency of the lighting appliance purchased by the household. Figure 1 shows that the budget limit associated with the more efficient device is less steep because more energy services can be purchased with a fixed income.

The household chooses the consumption bundle that maximizes utility given the budget constraint. These choices are denoted as S* and C*. The figure shows two types of advantages generated by efficiency advancements. The first is a reduction in energy used .shown as energy savings and therefore energy expenses. A reduction in energy expenditures due to decreased power usage shows that the household has more to spend on other expenses. A second advantage is increased consumption of energy.

An Estimate of consumer's willingness to buy using experimental data

Table 1 figures represent the estimated gross present value of the advantages of compact fluorescent lamps adoption. The y-axis depicts the estimated direct energy savings and the associated reduction in expenditure on household electricity. The average net present value over two years is two hundred and sixty-eight kilograms per household, which is more than double the market price of the Compact fluorescent lamp.

	6 years	4years	2years
Lower bond	606	462	268
Higher bond	916	692	396

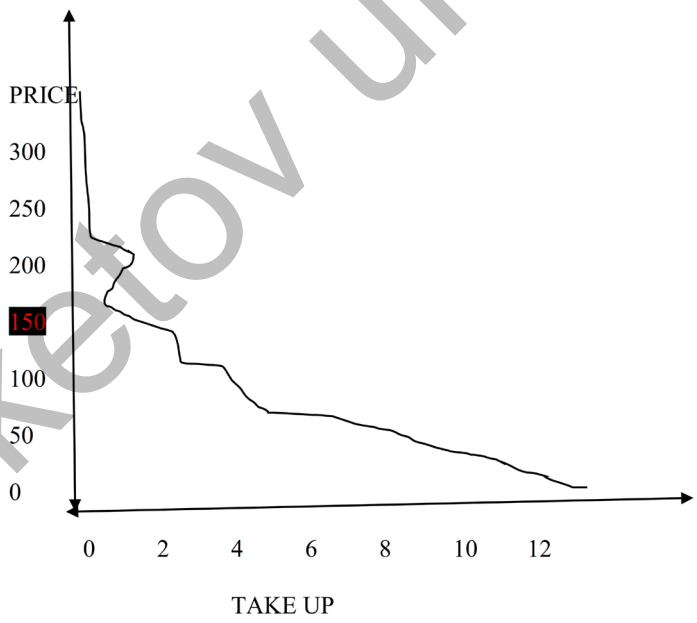
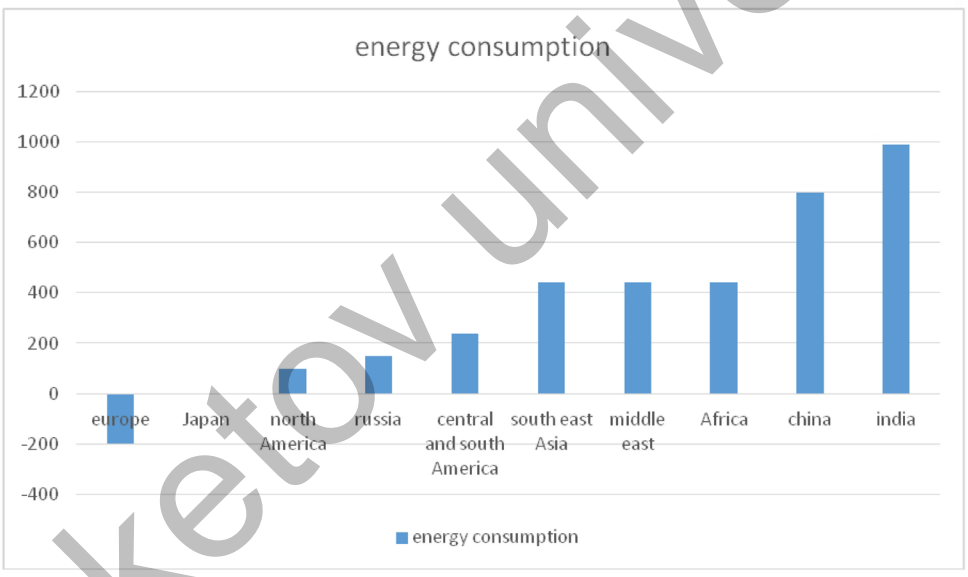


Figure 2. Demand for Compact fluorescent lamps. Graph created using data collected by (Carranza et al., 2021). The figure shows consumers' willingness to buy one Compact fluorescent lamp, as measured through bids made in an experiment using the (Becker et al., 1964) method.

Conclusion

In conclusion, as becomes develops and incomes increase, the demand for energy services in low and medium-income countries will improve. This study has reviewed the social and individual advantages of energy efficiency in developing countries and government policies and their importance in improving energy efficiency in low and medium-income countries. The use of advanced and energy-efficient fuel is also an important aspect that will help improve the level of efficiency in the economy of developing countries since a comfortable workforce can work better, compared to employees who live in areas that are hot with no cooling systems.

Appendix



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