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The Digital Shadow: What Does the Sustainability Agenda Hide Behind Convenience?

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A corporation can reduce its paper usage, digitize every process it touches, and call itself sustainable. But that claim needs to be tested against a complete picture of its *relocated* environmental footprint.

A general impression is given to make us believe that the digital transition is insignificant in terms of its carbon footprint, no paper trail, no file warehouses to store mountains of paper, or no visible smoke either. But the environmental cost is not eliminated; it is simply shifted somewhere else away from the direct gaze. This invisibilization is hard to notice because it happens far away from the point of digitalization itself. How power-consuming data centres, cloud servers, gadget manufacturing, and cooling plants fare in terms of carbon footprint has received scant attention. Digitalization is presented as a panacea for enhancing human convenience and combating climate crisis, requiring no scrutiny of its carbon footprint. It is assumed that digitalization carries no implications for carbon emissions significant enough to warrant meaningful discussion or inquiry.

The International Energy Agency (IEA) estimates that data centres consumed around 415 terawatt-hours of electricity in 2024 (about 1.5% of global power use), and that this figure will more than double to roughly 945 terawatt-hours, or nearly 3% of global electricity, by 2030. In carbon terms, that works out to close to 0.5% of global energy-related CO2 emissions today, a share the IEA expects to roughly double by the end of the decade, since much of this new demand is still being met by fossil-heavy grids. Much of the sudden increase in power consumption by data centres can be attributed to the rapid expansion of AI-based tools, which is no longer just a buzzword but a measurable and growing draw on the grid.

Existing widely used frameworks for carbon assessment, chiefly the Greenhouse Gas Protocol, talk about Scope 3 emissions. Scope 3 covers all the indirect emissions that occur outside a company's own operations: everything from the manufacture of purchased goods and services upstream to the distribution, use, and disposal of the products. For large technology companies, Scope 3 emissions are often the biggest number on the page: Microsoft, for instance, has reported that Scope 3 activity accounts for roughly 97% of its total emissions, driven largely by the servers, chips, and data-centre infrastructure built to power its cloud and AI services. There's a reason the Scope 3 standard of the Greenhouse Gas Protocol exists. This framework deals with 15 distinct categories covering the whole business value chain, including purchased goods and services, the use of sold products, and their disposal at the end of their life cycle. No business can afford to ignore its electricity meter when calculating its carbon footprint. Hence, reporting Scope 3 emissions is critical to understanding the true size of a company's carbon footprint. Yet while technology companies state net-zero goals and associated strategies, many continue to under-report or exclude Scope 3 emissions from the picture: a 2023 CDP–Capgemini analysis of European businesses found that just 8% of companies had a net-zero target approved by the Science Based Targets initiative that covered their entire value chain, and only 37% of disclosed Scope 3 emissions were actually addressed by decarbonization measures. Without first acknowledging the trail of carbon footprints, net-zero goals remain ambiguous.

Beyond emissions accounting, this same logic extends to how impact is framed in the first place. A meaningful strategy for product or service sustainability does not focus on asking, "What happens within our organization?" but rather: "What happened before, during, and after our organization intervened in this product or service?"

This question is becoming increasingly urgent in South Asia, which is now rapidly adopting the digitization pathway amid a devastating crisis like the recent flood situation in Nepal. We need to avoid South Asian sites emerging as data centres that support the digital world of Western countries. Digital India ambitiously frames its objective as turning the country into a digitally empowered society and a knowledge economy, where services, infrastructure, and government systems become progressively more digital. Digitalization is not simply replacing paper with machines, but creating a power sink that needs to be fed with electricity continuously. We have to ask how India can meet its objective of replacing paper and other replaceable items without creating power-hungry data centres and associated carbon footprints. We also need to revisit the assumption that this transition is automatically more efficient or emission-friendly. This assumption is further problematic given India's high electricity transmission losses and its continued dependence on thermal power. Thermal generation, dominated by coal, still accounted for over three-quarters of India's utility electricity in 2023-24, and the Institute for Energy Economics and Financial Analysis projects that the country's data centre capacity will grow from around 1.4 gigawatts to roughly 9 gigawatts by 2030, taking data centres' share of national electricity demand from under 1% today to nearly 3%. Unless that growth is matched with clean power, India's digital ambitions risk adding a new, largely invisible layer to its carbon burden in the already stressed atmosphere.

Consider the modern systems businesses rely on every day: cloud storage, AI-powered chatbots, e-commerce recommendation engines, internet banking, remote collaboration tools, mobile payment systems, and logistics apps. They all appear cleaner than what came before. However, each of these systems requires electricity, computing power, hardware, minerals (a different type of resource, and often a non-renewable one), cooling, and an entire, complex global supply chain to operate. A swift click of a mouse on a computer might create a trail of electronic activities and associated emissions to fuel those activities. Thus, emitting carbon footprints has become convenient and invisibilized. When crafting a sustainability strategy, governments and companies need to account for this entire electronic system, not just its shiny, paperless argument.

Further, there is the issue of hardware, which is easy to overlook simply because it is so ubiquitous. We upgrade phones; we buy new laptops and new servers. Hardware breaks, and some of it is recycled, but most of its non-biodegradable waste is not recycled. According to the Global E-waste Monitor 2024, the world generated 62 million tonnes of electronic waste in 2022, a figure projected to reach 82 million tonnes by 2030, even as recycling rates continue to lag far behind production. It points to the same underlying pattern: value creation and resource depletion are leaking out of the resources we use faster than they can be recovered.

The lesson for business leaders is straightforward: efficiency and sustainability are not the same thing. While the older rhetoric of the Milton Friedman doctrine ridiculed managerial concern for environmental issues and held efficiency enhancement as its cardinal, normative goal, sustainability is about taking responsibility for things beyond organizational boundaries. A faster app does not necessarily make for a greener company. A paperless office does not automatically translate into a carbon-neutral one. AI technologies that improve customer experience, if inefficiently designed or poorly used, may end up consuming far more energy than assumed. Today's sustainable business plans need to sit with harder questions: How much computing power does this product really need? How does every additional click, search, or AI-generated response add to the emissions behind it? How long will the hardware last compared with the paper systems it replaces? Can it be repaired? What happens to it at the end of its life? How much of our carbon footprint sits with our partners, cloud suppliers, or customers rather than with us? These are the questions worth sitting with before accepting the assumption that digital transition is inherently pro-environment and necessarily leads to a reduction in carbon emissions.

Future sustainability reporting needs to go deeper, assessed not only by how smoothly paper is replaced, but by what replaces it, and how well that replacement actually serves its intended purpose.

India's own regulatory response illustrates the gap. SEBI's Business Responsibility and Sustainability Report (BRSR) Core, which applies to the top 250 listed companies, requires Scope 3 disclosure for only 75% of a company's supply chain, and even that requirement was pushed back by a year, to FY26, after industry pushback. A framework built to capture exactly the indirect, offsite emissions this piece has traced – the electricity behind the data centre, the minerals inside the server, the e-waste at the end of the device's life – is itself still being diluted and delayed. Materiality

assessments, whether under BRSR, GRI, or ISSB-aligned frameworks, need to treat digital infrastructure as a material topic in its own right, not a footnote to a "paperless" narrative.

This is not a case against adopting digital technology. It is a case for transparency and comprehensive analysis before we accept that digital technology is, in fact, carbon-friendly.

There has always been a flip side to progress. Soot was part and parcel of coal-powered steam engines. Wires and electricity came with the electric power system. Digital infrastructure, too, is built on hardware and software that generate invisible waste, tucked away from direct view and mostly in under-developed areas. While AI may offer intelligence that reduces human burden, it also adds strain to the digital systems that power it. Modern businesses and their millions of consumers should know the true price of digital transition before paying the bill.

Sustainable businesses that come through the sustainability challenges ahead will not be the most modern-looking organizations. They will be the ones that can estimate and transparently report the true cost of their digital footprint before adopting a transition, and reduce that cost carefully, setting a leadership example for other companies to follow. Ultimately, what may matter more than how much we print could well be how much invisible infrastructure and emissions we generate to run the business each time we click "go."

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Bio: What if the way we do business could also shape the kind of world we live in? I'm Soumili Halder, a BMS student at IIM Sirmaur, interested in marketing, product thinking, sustainability, and the human side of business. I enjoy looking at familiar ideas from a slightly different angle, asking not only whether something works, but also what it means for people and the world around us. My interest in sustainability comes from this curiosity. I believe business growth and responsibility do not have to be opposing ideas, and that some of the most meaningful changes begin with the questions we choose to ask. Alongside academics, I spend my time singing, painting, sketching, and exploring ideas across different fields. I write to learn, to question, and hopefully to leave the reader with something worth thinking about after the last line.

Photograph: