BCG

Weekly Brief

February 14, 2022

Synthetic Biology: Coming to Disrupt an Industry Near You

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Rich

Our Weekly Briefs go to nearly 200,000 people around the world now, but one of our aspirations for 2022 is to establish a more direct dialogue with the most senior leaders receiving them. Starting today, you will notice this Weekly Brief is addressed directly to you, and if you click on the email in our signatures you'll be responding directly to one of us. We look forward to engaging with you in the year ahead.

Rich and Christoph

To BCG's network around the world

For most of us, the field of synthetic biology has existed as something on the edge of

science fiction, taking place in the far reaches of university labs.

Until COVID-19. Then billions of us injected it into our arms in the form of mRNA vaccines. Now synthetic biology has spawned a range of science-based startups trying to alter conventional products and processes, with the potential to transform much of what human beings consume, from flavors and fabrics to foods and fuels.

A new study by the BCG Henderson Institute (BHI) reveals that by the end of this decade synthetic biology could be used extensively in manufacturing industries that collectively account for more than one-third of global output—a shade under $30 trillion in terms of value.

The basic idea of synthetic biology involves programming cells to generate something new or improved, and its promise is thrilling. Let's look at it from a sustainability angle:

- **Synthetic biology can protect natural resources.** In the textile industry, for example, the production of one ton of dyestuffs requires the use of 1,000 m^3 of water, 100 tons of heavy petroleum compounds, 10 tons of toxic and corrosive chemicals, and at least 200 MJ/ton of energy. By creating DNA-encoded enzymes and incorporating them into microorganisms, synthetic biology companies can convert carbon into a dye or a pigment, greatly reducing dependence on water, energy, and chemicals.
- **Synthetic biology can replicate raw materials.** Making leather is a costly and labor-intensive process, with a harmful environmental and animal-welfare impact. New Jersey-based Modern Meadow has started growing a strain of yeast that it engineers to produce collagen, the protein that gives leather its strength and stretch. Once it's purified, pressed into sheets, and tanned, the vat-grown collagen becomes almost like leather.
- **Synthetic biology can strengthen supply chains.** With manufacturing facilities usually co-located with feedstock sources, such as agricultural and city waste, supply chains are more resilient, the carbon footprint is smaller—and companies are better insulated from fluctuations in commodity prices, foreign exchange rates, and geopolitical tensions. Plus, these raw material sources are abundant and perennial, so supplies for synthetic biology processes are likely to be immune to the shocks that plague today's global supply chains.

Synthetic biology will shake things up across industries. According to BHI's projections, incumbents in sectors such as health and beauty, medical devices, and electronics will be challenged by synthetic biology rivals—as the pharmaceutical and

food industries already have been—in the next five years.

Other industries, such as chemicals, textiles, fashion, and water, which many upstarts are already targeting, will face cost-based competition from synthetic biology alternatives in the medium run, followed in the long term by sectors such as mining, electricity, and even construction.

What should business leaders do? Start preparing now. To begin driving synthetic biology products within their portfolio, they need to:

1. Get familiar with the science and technology, and test promising opportunities.
2. Scout for successful pioneers and partner selectively.
3. Identify the manufacturing and supply challenges and opportunities upfront.

CEOs the world over must come to grips with this fascinating technology as soon as they can. Learning to use synthetic biology will be a matter of survival for some companies and for many others a new source of competitive advantage that will be, in every sense of the word, sustainable.

Until next time,

Rich Lesser
Global Chair

Further Reading

Synthetic Biology Is About to Disrupt Your Industry

Business must learn to use synthetic biology to develop new products and processes, improve existing ones, and reduce costs to remain competitive in the future.

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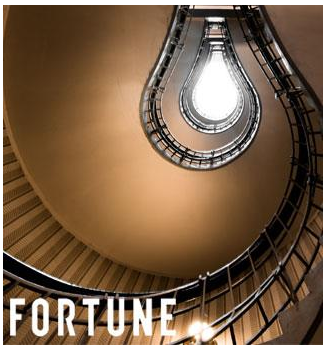

Synthetic Biology Could Help Business Save the Planet

Synthetic biology offers ways to reengineer almost everything humans consume—which in turn could radically reduce our environmental impact.

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Governments and companies must find new ways to collaborate if they are to solve the big multigenerational challenges, such as poverty, inequality, and climate change.

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