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The Counter-Industrial Revolution

This is ABSOLUTELY NOT a fourth industrial revolution. If anything, it's counter-industrial

The 'Fourth Industrial Revolution' is a popular label for the wide-sweeping changes that are taking place in our economy. However, this term is misconceived, because this transformation is not a further iteration – another wave – of the Industrial Revolution, like the 'Second Industrial Revolution' which brought assembly lines and the combustion engine. The labels Third and now Fourth Industrial Revolution miss the point that our economy has moved to a qualitatively different basis of generating wealth – a new type of economy. The revolution that is now taking place is as far-reaching as the original Industrial Revolution. It is not the Fourth anything, and it is not industrial. It is a move away from industry. If anything, it is *counter-industrial*.

What has happened is that intangible assets (such as software, data, brands, trust and customer relationships) have replaced physical assets as the principal basis of value creation. This trend has been tracked and measured by economists, but we have yet to realize its profound repercussions for business and society, and to recognize that it can explain so many 'inexplicable' changes that we observe.

It's official – we are now an intangible economy!

Prior to the Industrial Revolution, land was the dominant form of capital. The economy was organic and circular. Then came coal, steam, iron and machinery which were harnessed to convert physical material into physical products. As a result, the principal form of capital shifted from land to machinery, factories and transport systems. Growth rates in Britain that had been stagnant or at best risen imperceptibly for hundreds of years increased to 1.43 percent in 1780 – 1820 and 2.12 percent in 1820 – 1870¹.

Today a new revolution is under way. At the cusp of the 20th and 21st centuries, intangible assets overtook tangible assets in the economy, first in the USA in 1993 and next in the UK in 2001². This was a watershed because it marked the transition from a primarily industrial, physical economy to a primarily intangible economy based on intellectual capital. Intangible assets (e.g. software, patents, artistic designs, training and brands) revolve around intellectual capital; tangible assets (such as machinery and buildings) reflect a physical economy. Intangible assets now outweigh tangible assets, in terms of both accumulated capital and investment. In 2010 a World Bank study found that intellectual capital surpassed tangible capital in the majority of 115 countries³ and in the same year US investment in intangible assets equated to 13.8 percent of output against 7.8 percent for tangibles.⁴

What do we mean by Intangible Assets?

Economists have classified intangible assets, 'non-monetary assets without physical substance', in three groups:

Computerized information

- Software (bespoke, packaged, computer models, algorithms, platforms, digitized operations), databases, data (structured and unstructured), interfaces

Innovative property

- Science and engineering R&D, mineral exploration, copyright and licence costs, other product development design and research

Economic competencies

- Brand equity including trust, firm-specific human capital, organizational structure, customer relationships, partner relationships

Adapted from Carol Corrado, John Haltiwanger and Dan Sichel, *Measuring Capital in the New Economy*, University of Chicago Press, 2005

1. Nicholas Crafts, *Forging Ahead, Falling Behind and Fighting Back: British Economic Growth from the Industrial Revolution to the Financial Crisis*, Cambridge University Press, 2018
 2. Jonathan Haskel and Stian Westlake, *Capitalism without Capital: The Rise of the Intangible Economy*, Princeton University Press, 2017
 3. Susana Ferreira and Kirk Hamilton, *Comprehensive Wealth, Intangible Capital, and Development*, World Bank Policy Research Working Paper 5452, 2010
 4. Charles Hulten, *How Much Does Your Company Really Invest in Innovation?*, The Conference Board, 2013

“Star firms are really about intangible capital” –

Tyler Cowen, Professor of Economics, George Mason University and Centre for the Study of Public Choice⁵

Intangible assets are driving higher returns on capital, productivity, growth and shareholder value. The superior Return On Invested Capital (ROIC) achieved by so-called ‘star firms’ is explained entirely by taking into account intangible assets⁶. According to Corrado and Hulten, “Intangibles [have] overtaken tangibles to be the largest systematic ... source of growth”⁷. Higher productivity is also attributable to intangible assets: the World Bank paper quoted above concluded that differences in physical capital, natural capital, and human capital per worker “explain only between 20 and 43 percent of the variation in output per worker”. The remainder is attributable to intellectual capital. The final evidence comes from the stock-market, where company valuations demonstrate investor perceptions of what counts: “Contrast Walmart’s \$160 billion of hard assets for its \$300 billion valuation against Facebook’s \$9 billion of hard assets for its \$500 billion valuation.”⁸

Intangible assets are different

It is not enough to recognize that intangible assets are important. They are also different in nature and these differences generate distinct and powerful dynamics that managers and policy-makers need to understand if they are to succeed. As Haskel and Westlake explain in *Capitalism without Capital*, whereas physical assets are consumed and wear out, intangibles are *scalable* – think Google, with its data and algorithms, and Starbucks, with its brand and standardized operational procedures that underpin its global expansion. Since intangible assets can be scaled, maximization of returns demands that they are scaled at a global level.

A second aspect of intangibles is that much of the value of intangible assets comes through *synergies with other intangibles*. For instance, with platforms – the archetypal value-creator in the intangible economy – customers draw in other customers and partners, and additional customers bring more data to refine algorithms. These synergies between intangible assets create self-reinforcing loops.

Information technology is at the heart of star firms

There is an intimate relationship between information technology (IT) and other intangible assets. In the analysis of star firms cited earlier, all the very highest performing firms were either IT firms or had a platform business model based on IT. Similarly, in a study of the 50 US firms with the largest surplus wealth, “43 of the 50 firms ... belonged to [industries] whose business model was transformed by the IT revolution. Some, to a limited degree by altering products, materials and management methods ... but 36 are central to the IT revolution; many did not even exist in 1974”⁹.

Information technology creates synergies that amplify the value of other intangible assets

IT also enhances the value of other intangible assets. Though intangible assets are scalable in theory, this potential remains unrealized without a vehicle for scaling. Software and cloud computing enable operations to scale so that intangibles can be leveraged at a global level. In addition, scalable platforms support the concentration effects that lie behind many star firms. Likewise, IT plays a key role by providing connectivity: synergies are easier to create on the digital than the physical plane. For example, Uber’s rapid growth was possible because its operations were essentially a synergistic bundling of digital services – geo-positioning, route calculation, maps, push notifications, payments and receipts – sourced from partners.

But information technology is not everything

Although IT is of critical importance, the rise of intangibles is not simply down to IT, nor is the revolution that is taking place solely about IT and connectivity. The chronology does not fit: as Haskel and Westlake observe, “The rise of intangible investment began before the semiconductor revolution, in the 1940s and 1950s, and perhaps before”¹⁰. The logic does not work either: “While some intangibles like software and data strongly rely on computers, others do not: brands, organizational development, and training, for example”¹¹. Finally, the economic analysis does not support this: “The innovation that has shaped recent economic growth is not ... a result of R&D and ICT investments alone. Instead, a surge of new ideas (technological or otherwise) is linked to output growth through a complex process of investments in technological expertise, product design, market development, and organizational capability”¹².

5. Tyler Cowen, “Star firms are really about intangible capital”, *Marginal Revolution*, 2018

6. Meghana Ayyagari, Asli Demirguc-Kunt and Vojislav Maksimovic, *Who are America’s Star Firms?*, World Bank Policy Research Working Paper 8534, 2018

7. Carol Corrado and Charles Hulten, “How Do You Measure a ‘Technological Revolution?’”, *American Economic Review* Vol. 100, No. 2, 2010

8. Vijay Govindarajan, Shivaram Rajgopal and Anup Srivastava, “Why Financial Statements Don’t Work for Digital Companies”, *Harvard Business Review*, February 2018

9. Mordecai Kurz, *On the Formation of Capital and Wealth*, Stanford University, 2017

10. Haskel and Westlake (footnote 2), p. 30

11. *ibid*

12. Corrado and Hulten (footnote 6)

Let's not forget Beckham, Buffett and Burger King

It is tempting to dub this new economy the 'information economy' or 'digital economy'. However, this is to forget Beckham, Buffett and Burger King.

David Beckham's brand is shaped by our love of football, his right foot, good looks and marriage to Posh Spice – not much digitization here. Next, Warren Buffett has consistently created value by focusing on a range of intangibles that extends to brands, goodwill, a loyal customer base and an entrenched competitive position – today he often uses the term 'moat'.¹³ Third, the value of franchises such as Burger King includes not only knowledge and information, but also artistic elements – trademarks, branding, design – and relationships with supply-chain partners and with fans of the Whopper.

'Information economy' and 'digital economy', therefore, omit crucial elements that the more inclusive 'intangible economy' captures. In its essence, the intangible economy operates on the mental, as opposed to physical, dimension. Our minds are not solely information-processing engines but also encompass culture, emotions and beliefs, plus a range of other 'mental' aspects.

It's not 'either/or'. The intangible economy does not replace the industrial economy; it runs parallel to and is connected to the industrial economy

With the advent of the intangible economy, industry has not gone away; but nor did agriculture in the Industrial Revolution. Innovation in the industrial economy continues, just as it does in agriculture even today. Moreover, countries are at different stages: some are still industrializing, while others are moving more decisively towards an economy based on intangibles. For example in the USA, not only has the value per share of intangible assets risen to three times that of tangible assets, but there has recently occurred an absolute decline in tangible asset value per share.¹⁴

The intangible economy is still connected to the physical industrial economy – after all, we are not disembodied beings. Yet increasingly the space where value is created is in the intangible domain. To take the example of Apple: yes, the iPad and iPhone are manufactured devices, but they are assembled out of commodity components from many of the same manufacturers used by Apple's competitors. The value-add, which enables Apple to charge a premium, comes from Apple's intangible assets: its user experience and design, brand and the eco-system of partners in its platforms – the App Store and iTunes. Plus, of course, the *raison d'être* of the iPad and iPhone is to access the intangible economy.

The implications of the Counter-Industrial Revolution will be just as deep and wide-ranging as the original Industrial Revolution

Just as occurred during the Industrial Revolution, the Counter-Industrial Revolution will have ramifications across our economy and society. For example, prior to the Industrial Revolution, production was organized through the 'putting out system'. Merchants provided raw materials, and often credit, to weavers and their families, who worked from home with their own tools and were paid according to output – say, the number of socks. With the Industrial Revolution and the invention of large machinery, the 'unit of manufacture' moved from the household to the firm; and the location of manufacture moved from the house to the factory, both to control work more effectively and to harness energy to drive machines. Wages and employment contracts supplanted piece-work. Workers organized themselves in trade unions. Capital markets blossomed to fund physical assets such as factories and railways.

Today, with the advent of the intangible economy, we are seeing change on each dimension. The optimal scale for digital assets is global. The home has re-emerged as a workplace for teleworkers. The gig economy has sprung up at the expense of wage-based employment. Unionization has declined (which surely alters the bargain between workers and employers). Finally, many firms delay IPO, preferring to remain private because they regard venture capitalists as better positioned to understand the value of their intangible assets.¹⁵

13. Gary Mishuris, "What You Can Learn From How Warren Buffett's Investment Process Evolved", *Forbes*, December 2018

14. Stephen Gandel, "The S&P 500 has a Tangible Networth Problem", *Bloomberg Opinion*, September 2018

15. Jeff Sommer, "The Stock Market Is Shrinking. That's a Problem for Everyone", *New York Times*, 2018

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Other impacts are less clear, but may be just as significant. For example, the Industrial Revolution brought increasing growth rates: do intangible assets account for ‘secular stagnation’? And if intangible assets lie behind inequality in wealth amongst firms, what might this mean for individual equality?¹⁶

The hardest bit – new mental models

The mis-characterization of the profound change in our economy as yet another phase in the Industrial Revolution illustrates the extent to which our minds are captive to our heritage as an industrial economy. Why, for example, do we even suppose that this change is solely about technology? Maybe culture plays a key role? Indeed, it is hard not to see the hand of culture behind intangible assets such as brands and organizational capital. This mis-characterization stands as a fundamental barrier in responding to the opportunities and threats of the intangible economy. Perhaps a parallel comes from Adam Smith, who had such vision but failed to see the Industrial Revolution that was gaining speed around him – even in the very part of Scotland where he lived.

In our traditional – industrial – paradigm, manufacturing is the archetypal sector (or as we say, ‘industry’) and assets are of course physical. In addition, the mental model for business analysis is ‘process’, with ‘cycle times’, ‘inputs’ and ‘outputs’ that are transported and processed in a linear fashion, often in assembly lines. Assets are built. Physics, the study of matter, has been the guiding science.

The intangible economy differs from the industrial economy on multiple dimensions		
	INDUSTRIAL ECONOMY	INTANGIBLE ECONOMY
Assets	Physical assets	Intangible assets
Archetypal assets	Factories and machines	Platforms, digital operations and algorithms
What is transformed/ created	Physical inputs and outputs	Data, memes, ideas, beliefs, emotions
How assets are developed	Build	Evolve
Motion	Linear	Circular
Time	Batch	Real-time
Mathematics	Arithmetic	Logarithmic
Guiding sciences	Physics	Biology, social sciences and data science

By contrast, in an intangible economy, ideas, memes and other intangibles (such as trust, patents and tokens) are produced and exchanged. Here, the underlying elements are not physical objects – atoms – but ideas, beliefs, pictures, information, words and emotions. Work is characterized by real time, instead of cycle times and batches, which are a result of the constraints imposed by physical assets. Moreover, this is inherently a greener economy because the principal basis of value creation no longer depends on transporting and processing physical goods using energy from carbon-derived fuels. This trend will of course deepen, as electricity generation upon which computers depend moves to renewable sources.

Likewise, the *fly-wheel effects* of the platforms that sit behind the success of Google, Facebook and WeChat are created by self-reinforcing loops that are circular, not linear. Here, systems modelling is the optimal ‘mechanism’ (this manufacturing vocabulary really is deep-rooted!) for much analysis and forecasting. Above all, the underlying dynamic is human behaviour – the behaviour not just of individuals susceptible to ‘nudges’, but of crowds. Artificial intelligence and machine learning systems are not simply built; they learn, adapt and evolve. In this world, the sciences that are needed most are data science, and at a higher level, biology and the social sciences, with statistics the key tool for exploring both.

16. Haskel and Westlake (footnote 2), Part II

In conclusion ...

The first step in responding to the Counter-Industrial Revolution is recognizing both the nature of the transformation that is being wrought and its magnitude. Organizations will develop strategies in a different way once they realize that the most important building blocks are scalable, intangible assets enriched by synergies between them. Our governments and societies will need to devise novel policies – for example, around skills, investment and infrastructure – to ensure success in the new economy, and to mitigate its inevitable side-effects.

In subsequent articles, we will explain how you can develop strategies for the most important types of assets in the intangible economy; how to align your organization behind these strategies (for instance, through adjusting metrics, incentives and management processes); and how to communicate the value of these intangible-based strategies to investors and other stakeholders.

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