

A business perspective:

WHY AI WILL CREATE NEW BUSINESS LEADERS

Artificial intelligence is set to improve economic productivity and endow some companies with powerful competitive advantages. Interview with Anand Rao, PwC's Global AI Lead.

QUICK READ

- ▶ AI is set to boost economic productivity within three to five years from now.
- ▶ Businesses are deploying AI to cut costs, grow revenues and enable disruption.
- ▶ While businesses are already using AI, it remains in its early stages of development, reminiscent of personal computers in the mid-1980s.
- ▶ Those businesses that harness AI successfully will achieve powerful competitive advantages.





Anand Rao
PwC's Global AI Lead

Whether by powering digital virtual assistants, enhancing medical image screening or allowing chatbots to simulate human conversation, artificial intelligence (AI) is entering the business world. These are just the early days of a technological revolution that is accelerating and will reach across all industrial sectors in many different forms. AI is what's called a "general purpose technology" – like electricity, the personal computer or the internet – meaning that it has the potential to affect the entire economy.

In contrast to the natural intelligence of humans and animals, AI describes machines that mimic human intelligence. From the university lab to the business R&D department, machines are rapidly learning human-like cognitive skills. Technology, financial and medical

businesses have quickly started to deploy them, while other sectors are beginning to implement them to cut costs, boost top-line growth and disrupt established business models.

In time, businesses that pioneer AI are likely to gain such great competitive advantages that it will prove hard for others to catch up. Anand Rao, a Boston-based PwC partner who is the firm's Global AI Lead, predicts that a wave of AI adoption will shortly have significant economic effects. Noting that it is too early to see AI boosting broad economic productivity, he thinks its effect will be apparent in macroeconomic data within three to five years. He also predicts that some companies will build "economic moats" that are hard to breach, disrupting entire sectors as they do so.

"Economic studies show that there is a virtuous circle at play with AI technology, where some companies earn an advantage through their data or people expertise," Rao explains. "Let's say you have lots of data and you are building an AI or machine learning (ML) algorithm that's somewhat better than others. As a result of better personalisation, more customers come to you, your data gets still better and your profits increase. With more profit you hire better people. Your AI gets better still, you get more data, more customers and so you have this virtuous circle."

Seeking competitive advantage

So far, the race to harness AI is at an early stage, comparable to the personal computer in the early 1980s or the internet later that decade. Yet already

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the tech and social media giants have huge amounts of data gained from their day-to-day businesses that they can use to develop AI through ML. This means creating algorithms that can learn from data, or to put it another way, computer programmes that can programme themselves by looking at information. “Deep learning” is the type of machine learning that is enabling today’s progress. It uses many layered artificial neural networks – software that roughly copies the way that neurons work in the brain.

Today’s powerful “massively parallel” computer processors help AI neural networks to learn faster than ever. Having huge amounts of data helps to train neural networks because they continually recalibrate their settings, gradually becoming more accurate. For example, through a technique called “supervised learning” a machine can

be taught to recognise a dog by being fed thousands, or even millions, of images labelled “dog”. Other ways to train machines are “reinforcement learning”, which means learning through trial and error, and “unsupervised learning”, which means teaching machines to learn from data coming from their environment. The former can be used to train self-driving cars in simulators, but the latter is still at an early stage.

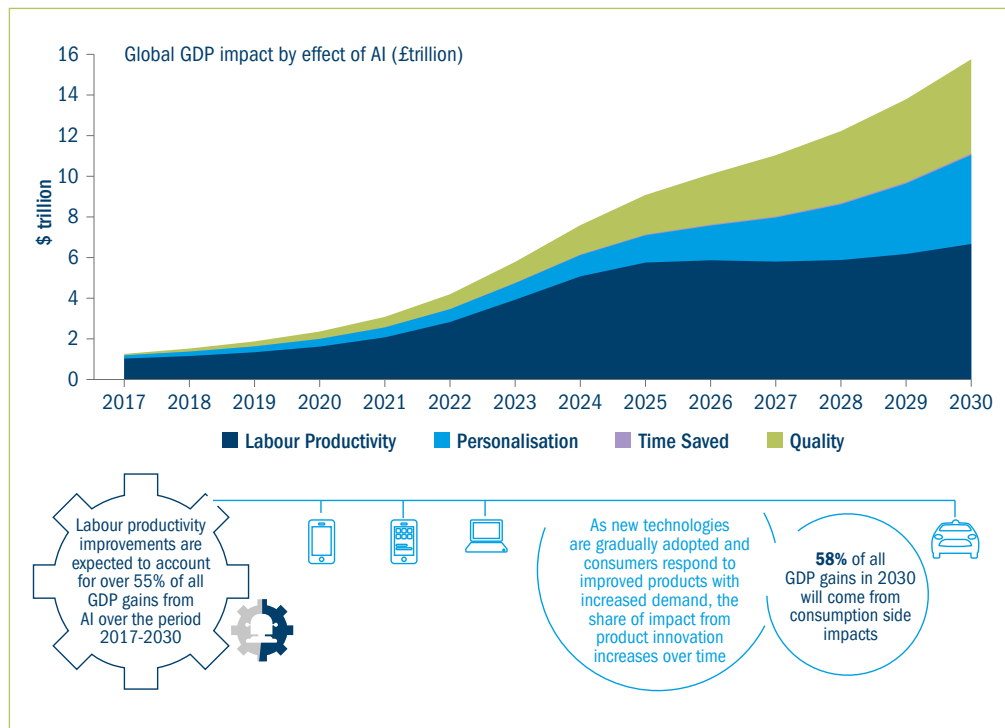
So, where does the competitive advantage for companies lie? According to Rao, the answer is twofold. For the consumer tech companies and social media companies like Amazon, Google and Facebook, it lies in the data. Those that have more data have better machine learning algorithms. But in other sectors there is less data for training algorithms. In these cases, human expertise or “cognitive capital” becomes equally

important, as the expertise of people can be combined with data to create AI algorithms.

“Take medical diagnostics,” explains Rao. “Various clinical experts have done the diagnostics, there’s a huge volume of image data. Now take the image data and combine it with the expertise of the people. That is critical, because otherwise you don’t know what is cancerous or what is not cancerous, so human expertise is involved in labelling the data or saying what the things are that you really want a system to learn. So, human expertise, combined with the specific data in that particular domain, can build something that’s tangible. Therefore, that cognitive capital is where competitive advantage will lie over the next decade, if not more.”



Where will the value gains come from with AI?



Source: PwC analysis 2019.

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How industries are adopting AI

Tech companies are at the forefront of developing AI, followed by media companies. The former are also using it to collect data about consumer behaviour – what people are buying – whether it is goods, services or entertainment.

The second wave is broader, including financial services, healthcare and retail. Financial services companies, from hedge funds and capital markets banks, to retail banks and insurers, are harnessing AI for a broad range of purposes from investment analysis through to customer care. Healthcare companies are developing a variety of ways that AI can help them provide better care at lower cost and retailers are using AI to gain a better understanding of their customers.

The third wave is heavy industry, where the industrial internet of things (IoT) is the catalyst. Aerospace manufacturing, oil, gas and utilities are all sectors deploying sensors and IoT to connect various types of equipment. These sensors are collecting huge amounts of data. AI can make sense of this data, thereby predicting where maintenance will be required and preventing expensive breakdowns.

From a functional perspective, AI is being used in three areas. The first of these is the front end of a business, including strategy development, customer analysis, customer experience and distribution. The second is product development, operations, pricing and customer service. The third spans the back office, including finance, HR and, in the case of financial services, the risk function.



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From automation to disruption

As businesses are digitised, this inevitably generates lots of data, which leads to standardisation and then automation. As back office paperwork is digitised, so processes are automated and, at some point, AI is used to optimise processes. Similarly, operations and customer service are being automated, smoothing the flow of goods and services. Everything becomes more efficient and more effective.

At the front end of a business, AI is improving the customer experience. For example, chatbots are making it simpler for people to interact with businesses, and AI techniques are being used to turn audio and video into text.

But organisations can overestimate the benefits of AI, according to Rao. There is a tendency to think that cutting the amount of time taken to perform an administrative task should lead to an equivalent reduction in headcount. Often employees use some of the time saved to benefit the customer in other ways.

While it's still early to see the benefits of efficiency gains feeding through to productivity numbers, Rao predicts this is not far off. "In specific sectors, people are looking at how to use some of these technologies. For example, how do we use them to reduce the load on call centres? I think you'll see very specific back office functions – customer service and support functions – where there is a huge volume of this happening. There you will see the productivity gains.

"In fact, if you don't automate your business processes you are going to be irrelevant because your costs will be out of whack with the competition."

When it comes to boosting sales, AI is being used to give customers a better experience. The way Amazon and Netflix use AI to personalise customer experiences by making recommendations is a good example of this. Helping customers to reach decisions in this way should make them more loyal.

But the third way that the technology can boost sales, "disruptive AI", is more fundamental. It seeks to answer the question: how can I disrupt my industry or a neighbouring sector? For example, PwC has used AI to help a major car manufacturer develop a strategy for car-sharing. This led to the establishment of a multi-billion-dollar business unit devoted



to car-sharing, electric vehicles and autonomous vehicles.

Another example is oil and gas exploration, where some exploration companies are using AI to interpret the data in seismic surveys. The exploration companies with the most seismic survey data are in the best position to exploit the technology. This allows them to judge precisely where to drill.

Taking AI out of the lab

Looking forward, AI is still a relatively new concept in the business world. Excepting the tech companies' uses of AI in social media and consumer electronics devices such as mobile phones and virtual assistants, there is a yawning gap between what the science of AI has made possible and the uses that businesses are putting it to.

It's not just that businesses may not follow AI's progress in the university labs closely enough. Even more importantly, AI must be adapted for business. Companies need to have executives who understand AI, who can cleanse the data and label it, as well as understanding the risks. Academics, for their part, are not interested in writing papers about methodologies for adapting different strands of AI to the business world.

"So, AI has to move from being an academic discipline of better algorithms to essentially software engineering, with appropriate methodologies, processes, controls and governance," notes Rao. "I think businesses will catch up with what the academics are providing but they'll also be charting a new course forward." He predicts that start-ups will spring up to build the tools needed to commercialise AI.

Additionally, AI is just one part of the broader business technology ecosystem. While AI will make decisions, there will need to be processes and protocols concerning collecting data, organising data, presenting it to people and integrating the decisions made by the AI machine with those still made by humans. There is also computer hardware and software to be developed.

That said, AI is rapidly making a difference in some sectors, especially considering it was hardly used in businesses outside the consumer tech and social media industries 18 months ago. So, how can one judge whether AI is about to turn the competitive dynamics of an industry upside down, with a start-up usurping the leadership of a long-dominant giant?



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The interesting question is how does regulation, and some of the things that are happening economically and politically, play into that? Many politicians and nations are thinking about this ”

“I think you should look at how AI is being used, both from a top-line and a bottom-line perspective and how it’s affecting performance,” Rao says. “Then there is the notion of whether AI is going to disrupt an industry, with an organisation coming in from outside the sector and creating new competitive advantages, new cognitive capital.”

As companies start to build competitive advantages, many of them could become unassailable, having accumulated the best data, algorithms and people.

“Left purely to the market, I think that’s what’s likely to happen,” observes Rao. “The interesting question is how does regulation, and some of the things that are happening economically and politically, play into that? Many politicians and nations are thinking about this. How do I protect my citizens? About 30 countries are developing national AI strategies

and we have been talking to quite a few of them. This is at the top of their mind: if foreign companies dominate our industries through the use of AI, what will it mean for the economy of our country, for our security? The biggest question is whether there will be laws to prevent this from happening. My guess is there will.”

To what extent AI disrupts sectors remains to be seen, but it is likely to transform the global economy and the fortunes of businesses. Like the general-purpose technologies that preceded it – from electricity to the personal computer and the internet – AI will prove a powerful tool for creating leading businesses.



Dr. Anand S. Rao biography

Dr. Anand S. Rao is a Partner in PwC's Advisory practice. He is the global artificial intelligence lead, cross-vertical analytics champion, and the co-sponsor for the AI Centre of Enablement within PwC. With more than 33 years of industry and consulting experience, Rao leads a team of practitioners who work with C-level executives at some of the world's largest organisations, advising them on a range of topics including global growth strategies, marketing, sales, distribution and digital strategies, behavioural economics and customer experience, and statistical and computational analytics. As the global lead for AI, Rao is responsible for research and commercial relationships with academic institutions and start-ups, as well as research, development and commercialisation of innovative AI, big data and analytic techniques. With his PhD and research career in AI, and his subsequent experience in management consulting, he brings business domain knowledge and statistical and computational analytics to generate unique insights into the practice of "data science".

Prior to joining management consulting, Rao was the chief research scientist at the Australian Artificial Intelligence Institute. He has held board positions

at start-ups and not-for-profit companies. He has received widespread recognition for his extraordinary contributions in the field of consulting and artificial intelligence research. He received the Most Influential Paper Award for the Decade in 2007 from the Autonomous Agents & Multi-Agent Systems organisation for his contribution on the Belief-Desire-Intention Architecture; MBA Award of Distinction from Melbourne Business School, 1997 and University Postgraduate Research Award from University of Sydney, 1985; and the Distinguished Alumnus Award from Birla Institute of Technology and Science, Pilani, India. He was recognised as one of the top 50 data and analytics professionals in the United States and Canada by Corinium; one of the top 50 professionals in InsureTech; and his recent paper on "A Strategist's Guide to Artificial Intelligence" has won the National Gold Award by ASBPE for the best technical article in 2017 and the FOLIO editorial award.

He has co-edited four books and published more than 50 papers in refereed journals and conferences. He is a frequent speaker on AI, behavioural economics, autonomous cars and their impact, analytics, and technology topics in academic and trade forums.



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