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The contribution of IoT to economic growth

Modelling the impact on business productivity

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Summary

1. **The world economy benefited by $175 billion in 2018 from the productivity benefits to businesses from the use of IoT.** This is equivalent to 0.2% of GDP.

2. **Over half of these benefits are enjoyed by manufacturing businesses**, making it the sector currently gaining the most from using IoT.

3. **The potential gains for businesses in developing countries are substantive:** enterprises already save 4-5% of costs with relatively low deployment.

4. **Governments can encourage further economic growth:** the right policies can stimulate IoT adoption by businesses – this can sharpen their countries' business sector competitiveness and result in higher tax revenues.

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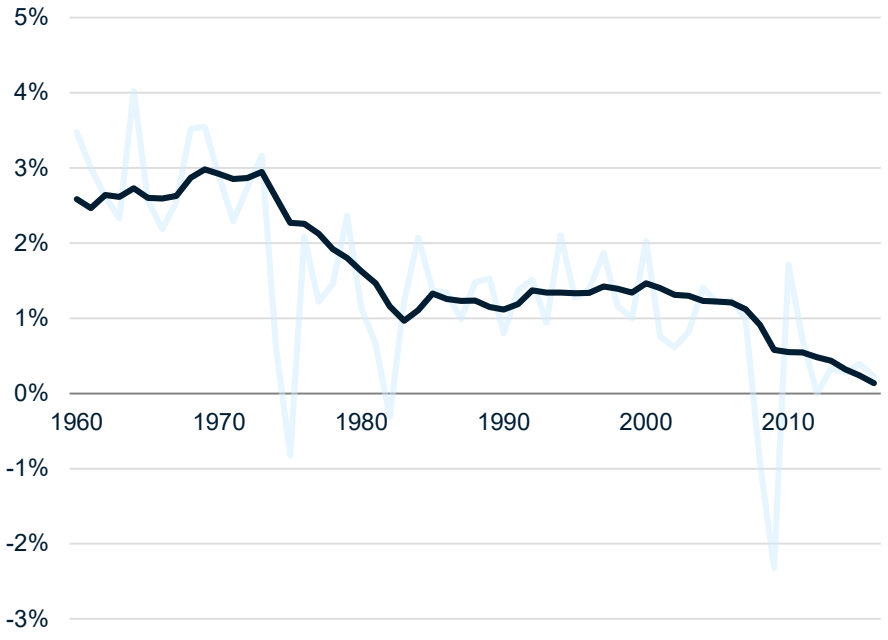
Productivity growth is slowing

- There is a broader slowdown in economic productivity occurring in developed economies, but also in developing economies.
- This presents a major challenge to achieving prosperity and higher living standards.
- IoT can support businesses across the industry to improve their productivity.

Changes in productivity, 10-year moving average of 23 countries



Source Bergeaud, A., Cette, G. and Lecat, R. (2016): "Productivity Trends in Advanced Countries between 1890 and 2012," Review of Income and Wealth, vol. 62(3), pages 420–444

IoT can change the way businesses operate

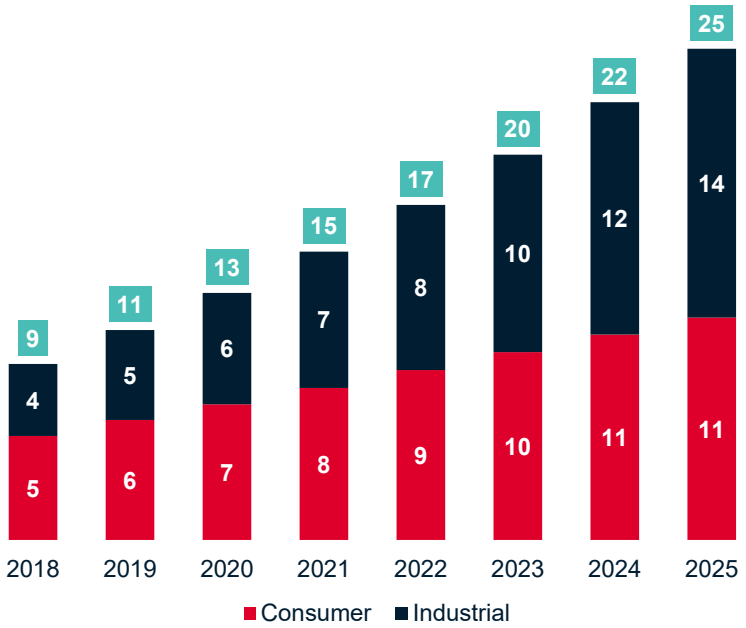
- By deploying connected devices across their operations, businesses are able to make improvements on their current approach.
- The example on the right describes the advantages of manufacturing firms moving from ordinary production processes to smart production processes.
- Replicated across the economy, these changes can lead to improved business productivity and therefore economic growth.

Ordinary factory	Smart factory
• Production line managed manually • Extensive manual monitoring of processes • Manual entry for stock location • Manual documents for inventory • Assessing faults by audit	• **Monitoring** – the performance of equipment and predictive maintenance • **Tracking** – volume, location of stock, equipment. • **Quality assurance** – reducing production waste by assessing and acting on product quality

IoT connections to grow to 25 billion by 2025

- Industrial IoT connections will lead overall growth, on average 21% per year between 2017 and 2025.
- As a result of this significant growth, IoT connections for industry will account for over half of connections by 2025 – 14 billion worldwide.
- This will lead a significant change in the way that industries work.

Global number of IoT connections, billions



Source GSMA Intelligence

We valued productivity based on enterprises' experience

- Our study focusses on the productivity gains for businesses who adopt IoT solutions and deployed IoT devices.
- Therefore our analysis forms one part of a wider view of IoT contribution to the global economy.
- Our results are driven by results from the GSMA Intelligence IoT Enterprise Survey.

In scope

Productivity	Additional output that can be produced by companies as a result of cost savings

Out of scope

Ecosystem direct contribution	The economic value added by companies that produce IoT devices, connections and solutions
Indirect wider economic impact	The knock-on impact of the IoT ecosystem on the rest of the economy
Consumer welfare benefits	Savings enjoyed by consumers: e.g. reduced energy bills as a result of smart metering

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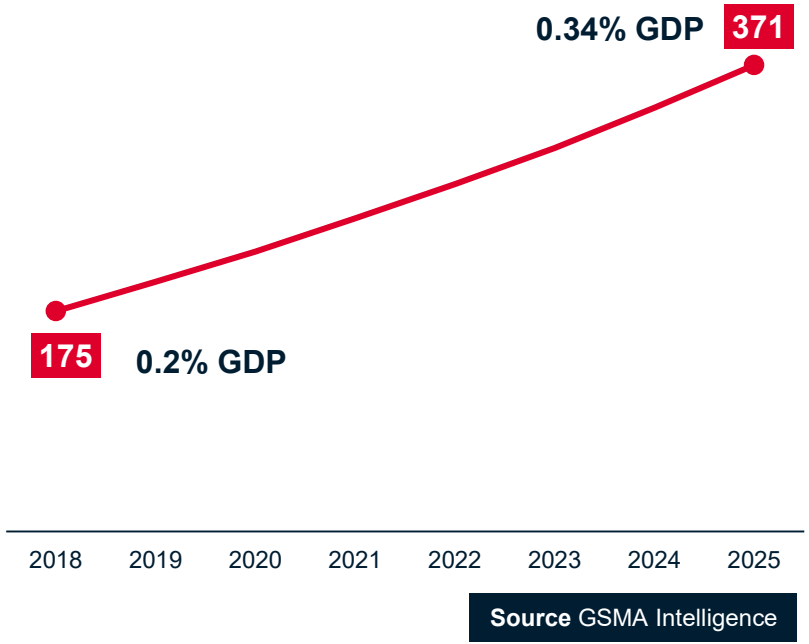
Global productivity impact already $175bn, 0.2% of GDP

- Productivity benefits will be worth over **$370 billion** per annum in 2025 – **0.34% of global GDP.**
- This is just one part of the story of IoT's economic contribution:
  - IoT companies will generate over **$1 trillion** in revenues by 2025
  - Beyond these impacts on businesses, there will be considerable benefits to consumers as connections reach over 10 billion worldwide.

Economic impact of IoT on business productivity

$ billion



Source GSMA Intelligence

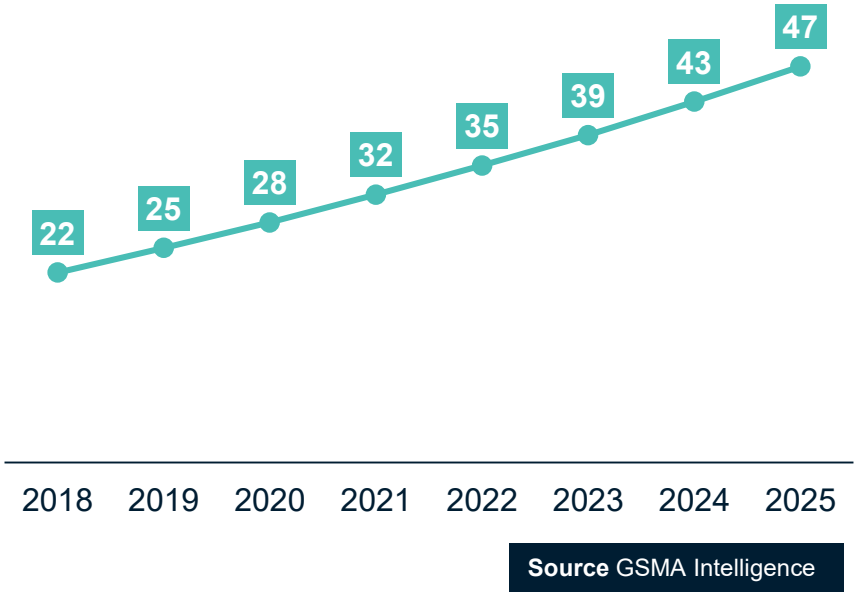
Governments are set to gain fiscally too

- Productivity gains by the wider economy result in more government revenue as taxes are payable on the wider economy's corporate income and sales in particular.

- We estimate that, solely due to productivity gains, $22 billion was contributed to government revenue worldwide, which will rise to $47 billion by 2025. This figure does not include direct and indirect tax contributions from the IoT ecosystem.

Global fiscal impact of IoT-driven productivity growth

$ billion

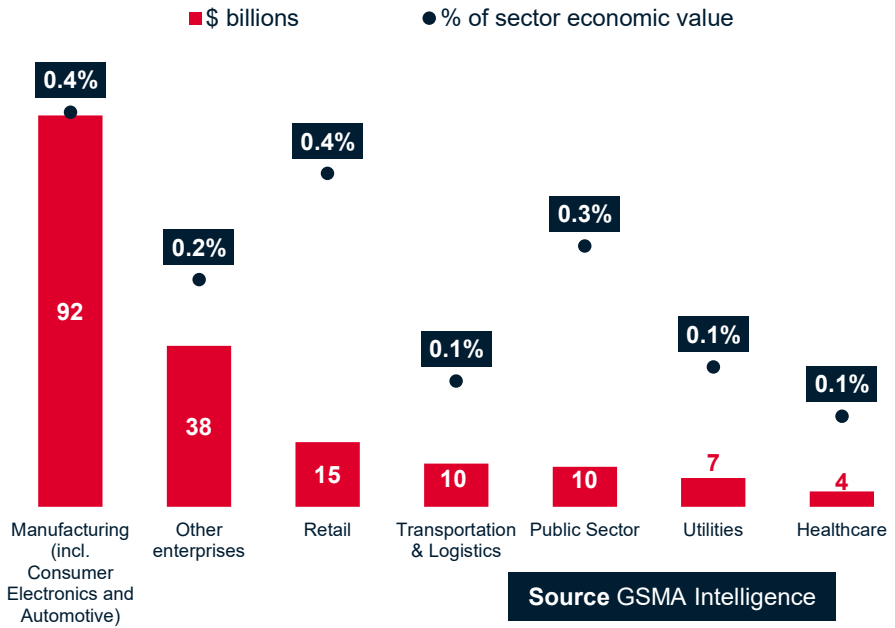


Source GSMA Intelligence

The manufacturing sectors lead the way

- 50% of the total global productivity impact is from the manufacturing sectors, which themselves form a large share of total global economic output.
- Manufacturing (including consumer electronics and automotive) has a higher adoption rate than other sectors.
- Transport, Utilities and Healthcare can make further productivity gains if adoption increases significantly.

Economic impact of IoT on business productivity, global, 2018

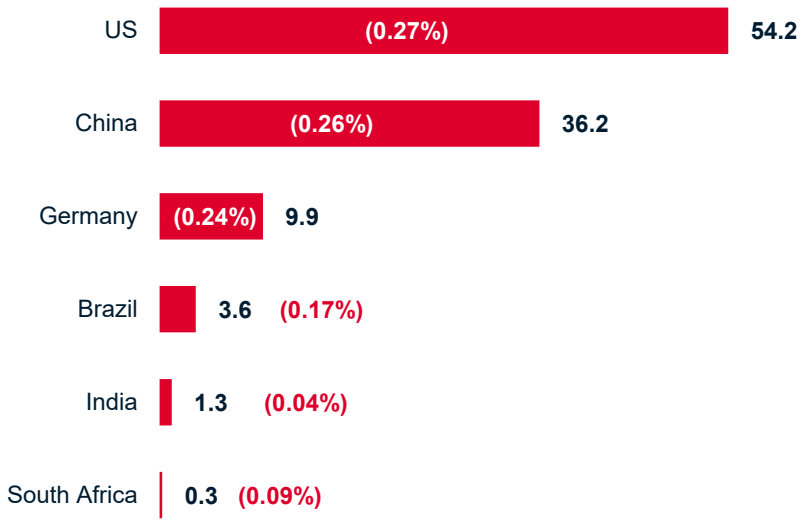


US and China contributing significantly

- In both absolute and relative share of GDP terms, the US and China are leading the world in IoT productivity gains accounting for over 50% of global benefits together.
- This is due to the size of their economies as well as the higher estimated adoption of IoT in those countries.
- Germany and Brazil also benefited from productivity gains worth almost 0.2% in 2018 – both countries have significant manufacturing sectors.

Economic impact of IoT on business productivity, 2018

$ billion (% of national GDP)



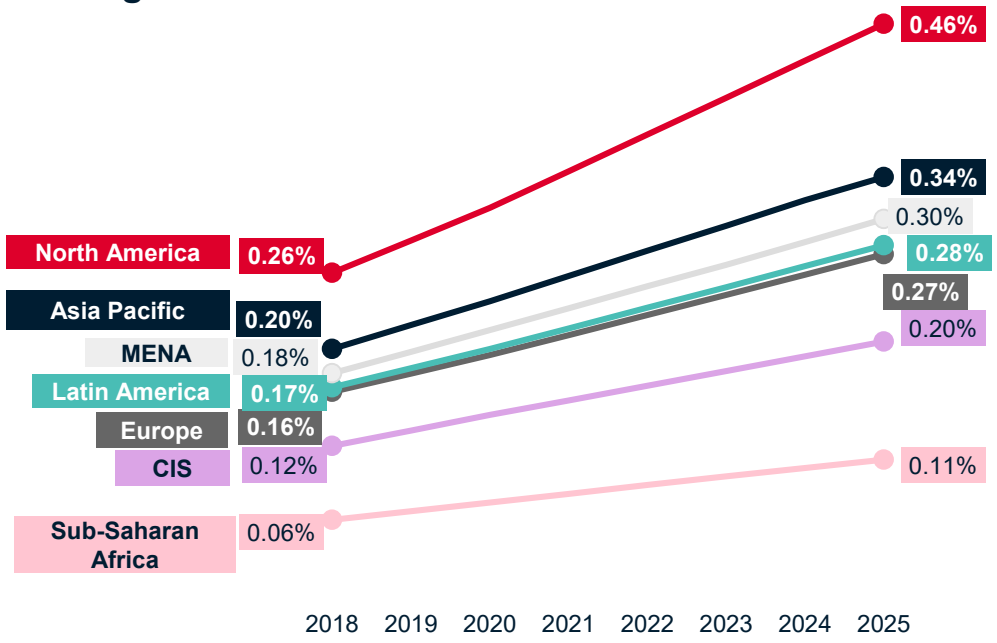
Source GSMA Intelligence

North America to gain most in the future

- North America remains the main beneficiary, with productivity gains worth 0.46% of GDP by 2025.
- While growth will be strong in some developing regions, it is from a low base.
- These regions need more widespread adoption across different industries to benefit.

Economic impact of IoT on business productivity

% of regional GDP



Source GSMA Intelligence

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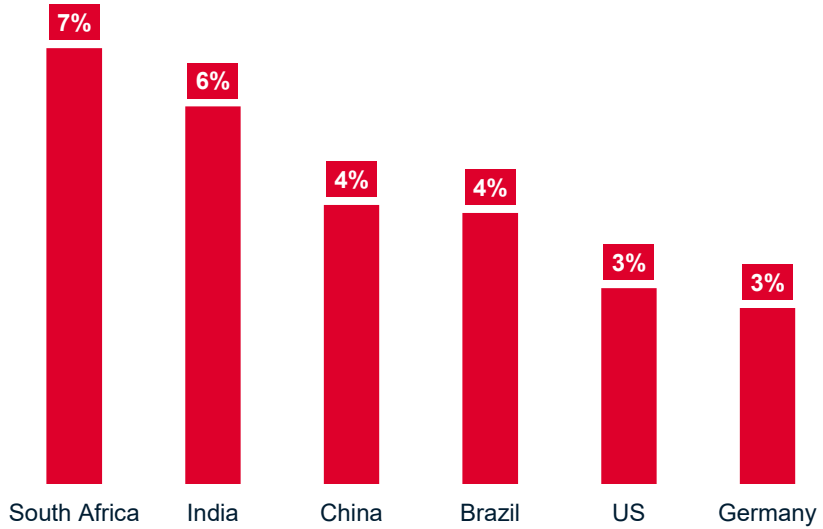
Enterprises in developing countries making significant savings

- Globally, enterprises report savings of between 4% and 6% of operating costs on average.
- But developing countries are reporting higher operating cost savings than enterprises in more developed economies
- On average, businesses are less efficient in developing countries and therefore have the most to gain from deploying IoT technology.

Operating cost savings from using IoT reported by enterprises, simple average across sectors

% of gross operating costs

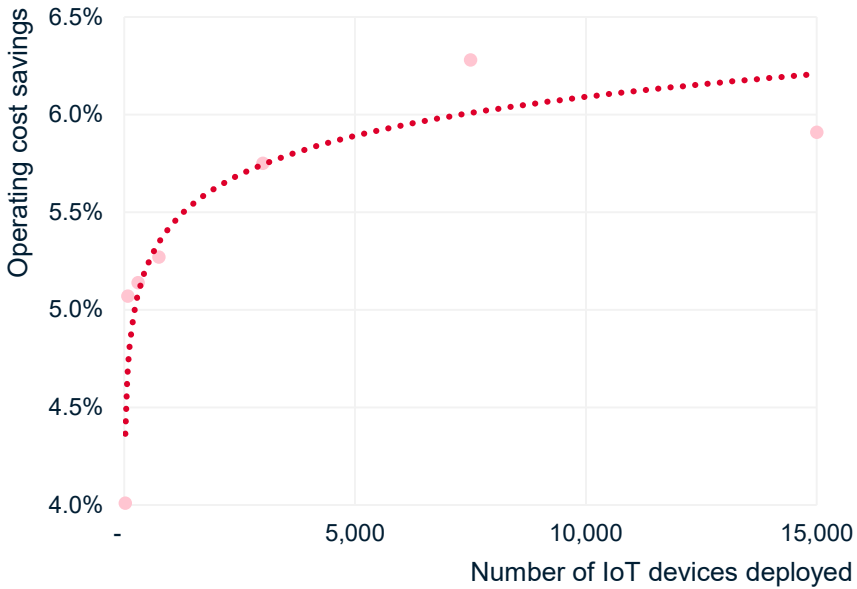


Source GSMA Intelligence IoT Enterprise Survey 2018

Even basic adoption can reap great benefits

- Enterprises with higher levels of deployment make greater savings on average across the 14 surveyed countries, supporting the view that mass-scale deployment has the most significant impact on operations.
- But notably the largest gains in cost savings occur when enterprises shift from deploying a minimal number of devices (less than 50) to deploying over 300 devices.
- This means that focussing on improving adoption will yield significant productivity improvements.

Relationship between mean cost saving and deployment levels

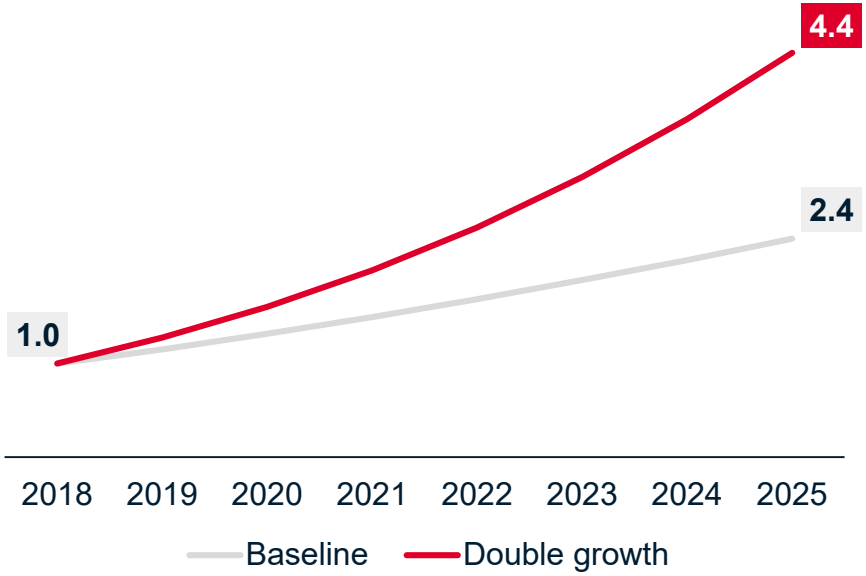


Source Analysis based on GSMA Intelligence IoT Enterprise Survey 2018

Policies designed to boost adoption can have a large effect

- For example, if policies led to a doubling in the growth of IoT adoption in Sub-Saharan Africa
  - The productivity impact would be **+$2 billion higher** in 2025
- Productivity gains will generate extra tax revenue worth $400 million to Sub-Saharan African governments in 2025
  - But this could increase to **$730 million if IoT adoption** was higher

Economic impact of IoT on business productivity, Sub-Saharan Africa



Source GSMA Intelligence

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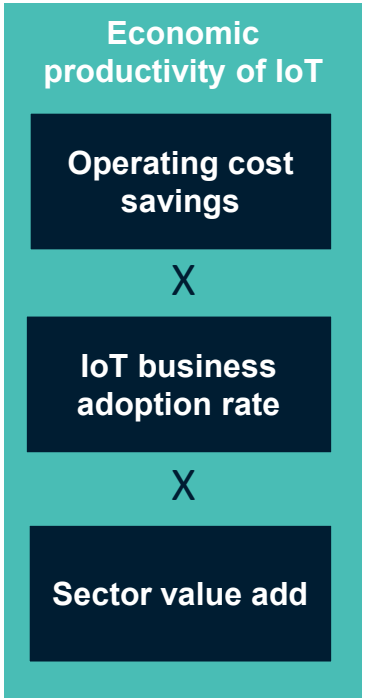
Our modelling approach relies on three key inputs



Businesses cost reductions from using IoT devices using outputs from the GSMA intelligence IoT Enterprise Survey Q4 2018

The share of businesses in the economy that are using IoT: this is based on assumptions from existing research

The size of the sector's contribution to the economy based on calculations from OECD Input-Output table

Modelling principles

The model is based on the following principles:

1. Businesses in many sectors of the economy are able to make savings and run their operations more efficiently as a result of employing IoT technology.
2. The benefit to each of these sectors depends on the number of businesses that adopt IoT.
3. The savings allow each sector to produce more using the same level of inputs.
4. The impact of IoT on business productivity will vary depending on the size of the sector within the economy.

Key sources of inputs

Operating cost savings

The GSMA Intelligence IoT Enterprise survey was carried out in Q4 2018, covering over 2,000 businesses from 14 countries. We asked these enterprises what reductions in operating costs in the previous financial year they associated with the adoption of IoT.

IoT business adoption rate

Most of the research conducted on IoT enterprise adoption is based on actual business adoption, but some is more focussed on population, or urban population. We have assumed in all cases that businesses uniformly cover the population.

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