Economic growth is the monetization of human effort. Originally this effort was physical and primarily the conversion of raw materials into goods, which added value as the result of human physical effort.

The core purpose of capitalism is to add value to human effort. The Gross Added Value of a country is usually called nominal GDP, and consists of net profits plus wages and salaries.

Anyone from outer space landing in Europe in 1200 AD and then returning 400 years later would notice no improvement in the material wellbeing of the population. However visiting in 1850 and then returning in 1960, the difference in material wellbeing would have been massive. And then returning in 2015, yet another leap in material well being.

These leaps in added value per person per hour of work are the result of innovation.

Innovation is a change in the way humans add value which increases the functionality of goods and services.

The graph shows that there is a 56 year cycle (approximately two generations long). Innovation clusters near the bottom of the downswing which then drives a strong upswing lasting around 28 years. On the upswing businesses which fail to innovate lose market share, are taken over, or driven out of business.

The rewards of growth go to those who embrace the new technology which enables them to provide their customers with products and services which are distinctive and compelling. We see Apple making $12bn a quarter in profits precisely because they are distinctive and compelling.

The Kondratieff wave: most researches agree peak to peak at circa 50 years and that innovation increases near the bottom of the downswing. They disagree on the timing.

**The Internet of Things (IoT)**

This is one of the step changes in the application of technology which will grow added value per person per hour. It will be instrumental in increasing living standards for those businesses and countries which fully embrace it. It is a significant opportunity for the wealthy West to keep ahead of the rising East.
The Three Waves

1960’s 1970’s

The first wave of IT enabled automated activities such as order processing, payroll, bill paying and resource planning. Data was captured and organised more quickly and accurately than by a human.

1990’s 2005

The second wave is the growth of the internet which allowed co-ordination and integration heedless of geography and further increased productivity throughout the value chain. However both waves left products themselves largely unaffected.

2012 onwards

The third wave. This is the most significant advance. It is changing the functionality of products. We are at the early stages of what will prove to be a major shake-up in the way value is added. There will be implications for job type, skill level and the distribution of incomes. The big pay-off will be a step change in the functionality and performance of machines as they perform more effectively with less human intervention.

How the Internet of Things will change the rules and forces of competition

All customers wish to obtain Value for Money (VFM). The definition of VFM is unique to each customer. It can be captured in this simple equation:

\[
\text{Value for Money} = \text{Satisfaction} - \text{Price} = \text{Value for Money} = \text{Performance} - \text{Lifetime Cost}
\]

For B2C the drivers of satisfaction are many and varied. For B2B the equation is more straightforward.

The Internet of Things will transform lifetime costs. It will in the majority of cases move maintenance from a time based activity to a need based activity. It will allow user to track the performance of a machine in real time, and show immediately when running costs are moving out of normal or desired range. It is estimated that by 2020 there will be 30 billion examples of IoT in use. Currently the early adopters are pushing the technology forwards. Over the next three years there will be significant applications across all sectors.

Those companies which ignore the trend will be left behind and quickly experience a steady loss in net margin, market share and free cash generation, eventually becoming extinct.

An example of how IoT can effect individual businesses: La Minerva. La Minerva is a typical European family business in the food processing machinery market (meat slicers, hamburger machines etc.) that is facing stiff competition from Asia. Compared to its Asian competitors it had become increasingly difficult to demonstrate
ing difficult to demonstrate that the Lifetime Cost of Ownership (LCO) of their higher quality products was lower over the product lifecycle. The LCO for these machines is often 5x the purchase price, however today purchasing decisions, through lack of data, are based on just 20% (the purchase price) of that cost.

As a result La Minerva decided to introduce a remote monitoring service based on the Solair IoT technology. The service measures the electricity consumption of the machinery. This data is then extrapolated and used for predictive maintenance programs to reduce costly machinery downtime, ensure energy costs are controlled, optimise maintenance service provider costs and apply economies of scale to spare parts and suppliers. Given that the service can also be retrofitted to competitors’ machines and older models, La Minerva is now able to provide clear data to its customers to allow them to make purchasing decisions on a complete Lifetime Cost of Ownership comparison. This means that they win new business and on top of this, thanks to the many additional benefits for their customers, they can sell the new service thus generating new recurring revenue streams.

The overall impact is simple: those who adopt the new technology will increase their competitive advantage and enjoy bigger margins and or greater market share. Many economists argue that this technology will exert continuous downwards pressure on the price of manufactured goods. For commodity products this is true. However buyers will pay a premium for products which can demonstrably produce a step change in life time cost of ownership. This represents a significant opportunity for companies in the mature, Western economies to leap ahead of the low cost Asian suppliers.

IoT will be an important component of the ability to reindustrialise Western economies through the creation of higher added value activities, thereby increasing real GDP per person.