



Intangible capital of technology and know-how matters more for profit than production

Businesses around the world need to pay closer attention to technology, design, branding, and other forms of intangible assets, if they want an edge over their competitors in keeping customers interested.

About a third of the value of goods manufactured globally comes from intangible capital, highlighting the need for businesses to protect the intellectual property of these types of assets to stay competitive.

This is among the findings of a new study from the World Intellectual Property Organization, titled *2017 World Intellectual Property Report—Intangible Capital in Global Value Chains*.

The report looks at the role of intangible capital in global value chains, the range of activities needed to manufacture a product and deliver it to consumers.

Carsten Fink, chief economist of the World Intellectual Property Organization, says the study shows that the value of intangible capital amounted to \$5.9 trillion in 2014, contributing twice as much as tangible capital.

This is the first time the return to intangible capital in global value chains has been measured.

Let's look at the final assembly of cars. Let's ask: what is happening at that supply chain stage in economic terms. Now, the company performing final assembly relies on a large number of inputs, which are either sourced domestically or imported from abroad. The company then employs labor and so-called tangible capital in its final assembly operations. With tangible capital, we mean machinery, robots, warehouses and essentially equipment that you can touch. But the company also crucially relies on intangible capital,

which we define as technology, know-how, design branding and similar assets, which are crucial for the functionality and general appeal of the product.

Among product groups, food, motor vehicles and textiles account for the largest share of income generated by intangible capital in the manufacturing global value chains.

In the case of smartphones, intangible capital plays a big role in the success of manufacturers.

Smartphone users in general choose phones for their cutting-edge technology, hardware and software design, brand reputation and image, all of which are intangibles.

Fink says that thanks to its intangible capital, Apple captures 42% of the sale price of every iPhone sold.

The same applies for Chinese smartphone maker Huawei, while Samsung captures about 30% of the value of each of its android-based smartphones sold.

It's important to point out, though, that the price of Apple's high-end smartphone is substantially higher than the prices for the high-end smartphones of Samsung and Huawei, and Apple's sales volume substantially exceeds those of its two competitors. That, arguably, is also a result of its valuable intangible assets. So, if one looks at the overall value capture in absolute terms, Apple accounts for most of the intangible income in the market for at least the high-end smartphones. If one looks at the overall smartphone market, the picture would probably look a bit different.

Fink says component makers also benefit from intangible capital.

Corning, the maker of the Gorilla Glass used in iPhones and other mobile devices, sits on very valuable intangible assets, and the same holds for providers of patented technology, such as Nokia and Qualcomm, which essentially derive income from patent licenses.

Intangible capital plays a huge role in the success of players in the coffee industry.

In general, there are two main forms of intangible capital in the global coffee chain—brand reputation and image.

Both are crucial across all coffee-market segments and allow companies to differentiate products from those of competitors.

Turning a country's coffee into a high-quality and appealing consumer product largely depends on technological innovation.

When it comes to this segment, technological innovation occurs in supply-chain activities that are closer to the consumer than at the farming and harvesting levels.

Patent data shows filings covering new innovations like modern espresso machines and coffee capsule systems available in many homes and offices.

With consumers increasingly taking an interest in the origin of coffee, how it was farmed and how best to brew coffee beans, new opportunities are emerging for farmers who may want to invest in their own branding activities.

A number of coffee-exporting countries such as Colombia and Jamaica have relied on origin-branding to differentiate their coffee in the marketplace.

And amid radical changes under way in the solar panel industry in recent years, the importance of intangible capital for businesses is growing in prominence.

Intangible capital of participants in the solar panel value chain consists of advanced technology, which often requires specific know-how especially at the upstream stages of the supply chain, and often companies who hold these technologies keep it secret.

The know-how typically often rests with individuals that have deep insight and knowledge about particular production processes.

Finally, this is an area where technology has progressed rapidly, and continuous innovation has led to a dramatic 80% reduction in the price of solar modules between 2000 and 2015.

The big story about the global photovoltaic supply chain is essentially the takeover of Chinese companies. Chinese companies have come to dominate the photovoltaic global value chain and they, over time, have progressively increased their market share that has resulted in bankruptcies and acquisitions

in the traditional manufacturing locations—United States, Europe, and Japan. Also quite interesting from a trade perspective, this has led to the imposition of protectionist measures both in Europe and the United States and some other countries as well.

Fink looks at how Chinese producers acquired the intangible capital, and the technological know-how to produce solar cells at the technology frontier, and how to continue to lower the costs of these solar cells.

There were essentially two important channels of technology transfer in the case of the People's Republic of China.

First was international trade. China's producers, especially at the initial stages when they started to compete internationally, purchased state-of-the-art production equipment from international suppliers, effectively importing knowledge.

Access to cheap labor then enabled China's solar panel producers to be competitive at the international stage when they started producing.

Secondly, China's companies benefited from an inflow of skilled engineers and executives from abroad, who brought with them technological knowledge, capital and access to professional networks.

Because of the rising prominence of its companies in solar panels, China has emerged as the leading source origin of patent filings from 2010 onward and has seen continued growth, notwithstanding the global decline in patent filings, says Fink.

The short story of the evolution of global value chains for solar panels is that solar panels were largely invented in the developed world, then China learned about this, they took over the manufacturing supply chain, and that itself really had an important effect on the global innovation landscape. China is still innovating more than ever, and the leading suppliers in the developed world are also still innovating heavily. There is a lot going on in terms of possibly new technologies that could be used for solar and cell production, and nobody in

the industry really knows in which direction this is going—it's a really interesting story of how technology shapes the supply chain.

That was Carsten Fink, chief economist of the World Intellectual Property Organization, speaking at the Asia launch of the 2017 World Intellectual Property Report—Intangible Capital in Global Value Chains, held at the Asian Development Bank Institute in Tokyo.

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