

Winning in the knowledge economy

Success through nurturing innovation and managing intellectual property

July 2018

What is the so-called “knowledge economy?”

The United States and other “developed” countries have historically relied on an industrial economy, using physical inputs and natural resources for production. Impacted by globalization and advances in information technology - accessibility, connectivity, distribution, etc. - both developed and emerging economies now also output products and services that are based on intellectual expertise and knowledge-intensive activities. According to the US Department of Commerce, which houses the federal agency for granting patents and registering trademarks (U.S. Patent and Trademark Office, or USPTO), IP-intensive industries create goods and services worth nearly \$7T, or almost 40% of the total US Gross Domestic Product (GDP). This includes \$0.9T of export goods representing more than 50% of total US trade exports, notably in chemicals, medical, semiconductors, communication equipment and computer hardware (see Fig. 1 below)ⁱ. In other words, these IP-intensive industries play an outsized role in a country’s global competitiveness and national progress.

Who?

This piece covers individual companies and countries, with implications for individuals and communities

When?

Now, with reflection on the past and a peek into the future

Why?

Companies (and countries) with unique, intangible assets and associated capabilities will capture more of the value that they create from innovation activities (and they will remain competitive)

Fig. 1: U.S. Dept. of Commerce on “IP-intensive industries” (TM+©+patents) from ‘10-14

38%	of U.S. GDP (\$6.6T)
30%	of US employment (45M jobs)
+46%	higher wages
52%	of total merchandise exports from IP-intensive industries (\$842B)

GDP growth has 3 primary factors: people (labor), capital (investment), and productivity of labor or capital (education, trade, infrastructure, innovation).

$$\Delta GDP = f(\text{labor, capital, productivity})$$

In the US, real economic growth per capita has one constant driver: productivity gains via technology progress. American citizens have benefited from recurring rounds of investment, technology progress, economic growth, and reinvestment. That virtuous cycle has a broad impact on improving the standard of living, which is related to GDP growth, growth in wages, employment, and controlled inflation. As proof, the Bureau of Economic Analysis reports that real GDP per capita has grown 4x in the past 70 years. In fact, back in 1776, Adam Smith cited productivity of the workforce as the main determinant of a nation's standard of living in the long runⁱⁱ. More recently, former Fed Chairman Ben Bernanke highlighted “As has always been the case, technological change and innovation are today in large part driving economic growth and the improvement of living standards iii.

Country-level considerations

While the advances in IT and globalization have spurred countries and companies to innovate, the same factors also make it easier to copy and counterfeit IP rights. Thus, a national innovation strategy not only requires investments in education for skilled labor, basic research, information and communication technology (ICT) infrastructure, tax incentives, etc., but also an IP system with associated policies that encourage innovation and risk taking. Indeed, national plans depend in part on strong IP protections, as evidenced by China's recent focus on improved IP jurisprudence in its courts, coupled with its increasing

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R&D intensity that now exceeds the EU average^{iv} spending on R&D as a percentage of GDP. A strong and balanced IP legal system attracts the flow of capital and provides incentive to pursue ideas that face long odds to commercialization. IP systems that are slow, unpredictable, and expensive have a chilling effect on risk takers and will favor large incumbents with deep pockets who may choose to infringe a new entrant's rights with near impunity.

For example, pundits now debate whether the US IP system has weakened with recent legislation and Supreme Court decisions, thereby handicapping US-centric industries driven by innovation.

The World Trade Organization (WTO) estimates \$300B+ in global royalty and license payments in 2016, including trademarks & branding, patents, software & literary works under copyright, etc. American IP holders accounted for over \$120B of IP exports, classified under the “other commercial services” (see Fig. 3). National innovation strategies may include state-backed programs such as sovereign patent funds (SPFs), which may serve a “nurture & protect” function for domestic industry. An SPF's mission (such as in South Korea or Japan) may focus on commercializing domestic IP, e.g. from state affiliated/funded research organizations.

Of course, much broader than the WTO's recorded trade of IP exports and any SPF defensive or offensive mission, is the economic impact of IP misappropriation. The brewing trade war between the US and China has a central issue of IP theft. On the table are tools such as trade sanctions, import quotas/restrictions, tariffs, blocked takeovers, foreign investment limits, and plenty of collateral damage like US agriculture and Chinese toy exporters. A recent White House statement read "To protect our national security, the United States will implement specific investment restrictions and enhanced export controls for Chinese persons and entities related to the acquisition of industrially significant technology."

For countries with less-diversified economies, like Taiwan (or Chinese Taipei), the IP theft issue is even more urgent. The world's top semiconductor producer exported \$78B in "integrated circuits" and another \$8B in "transistor devices" in 2016 according to WTO statistics. This out of a *total* economy (GDP) of only \$528B. Taiwan Semiconductor Manufacturing Co. (TSMC)^{vii}, which is the world's largest contract chip manufacturer, is engaged in a court battle with major South Korean and Chinese competitors over alleged trade secret theft. In other words, plugging IP leaks, including trade secrets and industrial designs, from Taiwan to its trading partners is of paramount importance to the small country's future.

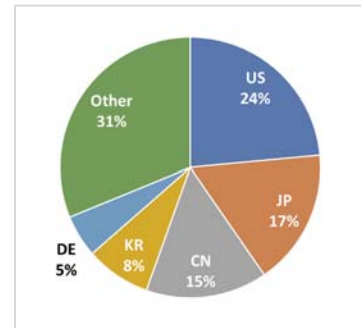


Fig. 2: % Global Share of ~11.7M Active Patents^v

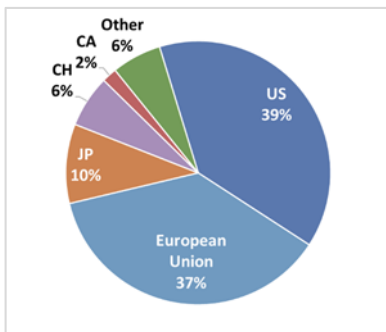


Fig. 3: % Global Market Share of ~\$329B IP* Revenue (*TM+©+patents)^{vi}

Firm-level

Beyond government and national policies that support basic research and promote competition, the private sector impacts the economy by translating technology innovations into successful commercial applications^{viii}. With regards to the profit-seeking activities of individual firms, Chinese company Huawei was the largest patent filer in Europe, according to the European Patent Office (EPO)'s^{ix} 2017 statistics, and the first Chinese company to achieve that #1 spot. Similarly, the World Intellectual Property Organization (WIPO)^x reported that top filers in 2016 were ZTE with over 4,000 applications under the Patent Cooperation Treaty, followed by Huawei with over 3,600, and then Qualcomm with 2,400.

The economic shift to knowledge means a significant % of an operating company's value consist of intangible assets that aren't well measured by industrial economy accounting. Today's businesses operate by leveraging a combination of tangible assets, e.g. working capital and equipment, plus intangible assets, e.g. know-how, relationships, brand, and technology (see Fig. 4 below). Traditional financial statement reporting and analysis focuses on GAAP income statements and tangible assets. Mechanisms to determine the value of long-lived intangible assets are inconsistent and, if provided, are buried in the footnotes of the financial statements. For example, digital investments may be treated as

expenses on the income statement and don't appear on the balance sheet outside of business combinations.

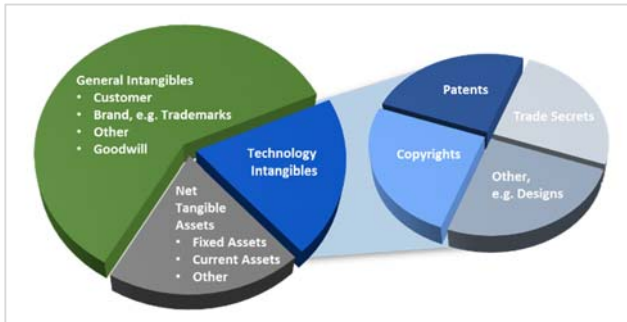


Fig. 4: Technology Intangible Assets as a Portion of Enterprise Value

These “hidden” assets provide the foundation for growth and enable higher margins due to lower cost structure in more scalable businesses. The combination of forecasted growth and return on invested capital promises more free cash flow in the future, yielding higher valuations today. The resulting difference between market price and tangible book value represents investors' expectations for the present value of all intangible assets^{xi}.

Further, these intangible assets, once decoded by investor diligence, create a valuation floor. Ideally, IP protection encompasses the company's early/foundational technology, claims to technical alternatives, and applications in adjacent markets. Such a portfolio provides the company and its investors with optionality; if the original business model misses the market, alternative monetization pathways are possible, e.g. via sale of IP or repositioning the IP and technology for a new commercialization approach.

While consumers and the public benefit from the impact of innovation, i.e. the nature of knowledge as a public good, private sector ownership of IP enables value capture for those IP savvy companies. New entrants can use technology-based intangible assets to level the playing field or disrupt incumbent business models and capture a portion of the large profit pools, whether in ride hailing or in payments and banking. Besides having a strong base of IP rights from which to capture new and adjacent opportunities, sophisticated IP-strengthened companies mitigate and/or diversify their business risk, especially in light of accelerating technology convergence. Incumbents without dynamic innovation and IP strategies will encounter shrinking profits and greater business volatility. At greatest risk will be capital-intensive fleets of 20th century taxis and banks with lagging digital presence^{xii}.

Perhaps the value of IP ownership and management are best illustrated in the quintessential patent-dependent industry of pharmaceuticals. AbbVie expects \$21B in 2020 sales from its biologic medication Humira^{xiii}, despite the fact that the patents protecting the specific molecules expired in 2016. Abbvie's bullish outlook stems from its broader patent strategy that resulted in an AbbVie-owned patent thicket of ~100 patents surrounding the drug. Its active patents cover all of the approved treatment methods (i.e. indications) plus dozens of patents on formulation, manufacturing, and diagnostics.

Fig. 5: Sample of public corporations with patent licensing businesses (excluding value of cross licenses)

Company	2017 Licensing Revenue	Total Active Patents Worldwide	Market Cap
Qualcomm	~\$6.5B	~80k	~\$85.0B
DOLBY	~\$1.0B	~6k	~\$6.5B
TIVO	~\$0.4B	~3k	~\$1.7B

A first step for managing IP assets is to describe the value of IP in terms of a Return-on-Investment (ROI) contribution to the business P&L (profit and loss statement). Admittedly, such an exercise is much simpler with a pure-play outlicensing model (see Fig. 5 above)^{xiv}. But even without direct licensing revenue, a virtual IP P&L or scorecard attempts to quantify the ROI drivers, or tradeoffs between benefits and costs (see Fig. 6 right). The concept extends from biopharma giants to SMEs integrating IP management with the innovation process across its product lines.

Fig. 6: What is the business reason(s) for your IP investments and do those reasons justify the expense?

ROI value drivers (illustrative)	\$M
1. Sustain margin for product X	
2. Expand share in market A	
3. Enforce IP in B	
4. Negotiate discount in supply chain Y	
5. Mitigate IP leakage in C	
6. Create option for alternative commercialization path	
....	
NPV (\$M)	

Takeaways

In summary, the imperatives for companies and countries are two-fold:

1. encourage and nurture innovation; and
2. integrate strategic IP creation & management within these innovation activities.

Successful participants will manage IP as productive business assets (commercially and/or societally aligned) that are incorporated in business planning processes, to name a few:

- linking product development with IP harvesting and creation, whether in the form of patents, trade secrets, or defensive publications;
- mitigating competitive threats with specific IP tactics; and
- ensuring a trade secret program encompasses HR, marketing, and other organizational functions beyond engineering; and
- quantifying the specific value drivers of IP to the business units and/or overall organization.

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About ipCapital Group

ipCapital Group (ipCG) is an innovation and intellectual property (IP) consulting firm serving clients that range from early stage to Fortune 500 in over 800 engagements since 1998.

For more information, visit www.ipcg.com, or contact Adam J Bulakowski at abulakowski@ipcg.com or (802) 859-7800 x261.

Sources

ⁱ <https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf>

ⁱⁱ <https://www.federalreserve.gov>

ⁱⁱⁱ www.mit.edu

^{iv} <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>

^v ipCG Search

^{vi} <http://stat.wto.org/CountryProfile/WSDBCountryPFView.aspx?Language=E&Country=US>

^{vii} <http://www.tsmc.com/english/default.htm>

^{viii} <https://www.federalreserve.gov>

^{ix} <https://www.epo.org/>

^x <http://www.wipo.int/>

^{xi} http://www.ipcg.com/thoughtleadership/Valuation_of_Public_Equities_Including_Alphabet_Amazon_Apple.pdf

^{xii} http://www.ipcg.com/?file=Bulakowski_Banking_Innovation_Whitepaper

^{xiii} <https://www.reuters.com/article/us-abbvie-results/abbvie-says-humira-sales-will-balloon-to-21-billion-in-2020-shares-rise-idUSKBN1CW1JK>

^{xiv} <https://finance.yahoo.com/> as of Jul 9, 2018