Hardware verses Software & Services

As hardware became more of a commodity, Sony, maybe the premier designer of electronic gadgetry didn't foresee the coming dominance of software. Similarly, Sun Microsystems had computer products that had the horsepower to power the early web servers as the internet was taking off. These engineering workstations were eventually surpassed by off-the-shelf microprocessors. Here is another case where a company didn't adjust their business model to exist in the new landscape.

IBM is a case where an enormous and monumental company adapted to change. For most of our lives, at least those of us well into middle age, IBM was a company that made computers, and the various hardware systems that surrounded them. While they produced software, it was originally intended to support the sale and use of their hardware systems. But the company started its transformation to a services-oriented company in the 1990s. It sold off its printer and PC and server businesses in 1991, 2005, and 2014 respectively. While they will still design and sell microprocessors and other supports chips, they are in the process of outsourcing the fab of those ICs.

Since 2000 they have acquired large consulting, software, and information service firms. This has allowed them to become a major player of on demand computing processing, and storage services, known as cloud computing, along with database analytical solutions. They also manage the IT infrastructures for others. IBM provides middleware, that is software that provides services and connectivity to other software applications. Services and software now account for 80% of their revenue. They continue to produce hardware that mainly supports their service offerings, from neural network systems to support artificial intelligence, to zero downtime servers.

This shift to services from hardware centric production has been followed also by Xerox, Dell, and HP. Services are software, which means intellectual property centric. Successful startups today are mainly software companies with a hardware facade. Software engineers at those companies outnumber hardware engineers. Most companies can't compete with other hardware centric companies as the winners in that category are large, highly financed and will quickly commoditize any hardware you can develop. On the software side, while no longer the threat it was, there was a saying "today's successful app will soon be a new Microsoft DLL.

That said, there are nimble companies that provide hardware modules that build in web servers, or allow Wi-Fi, or 5G connectivity. Others provide hardware the is just a portal for the ongoing services they provide. The hardware is not their real profit center, it is the service. Where this has taken off is home security, with startups disrupting business for such long established companies as Honeywell and ADT. Another is Amazon, and their Kindle reader. They lose money on the sale of the reader but gain it quickly back in the sale of electronic books.

But some take this a bit farther and not only provide a service, but also sell and distribute a product at the same time. This model was pioneered by Keurig, where they sell the dispenser of

the product, but rely heavily on selling the consumable product. Just like the old adage of manufacturers almost giving away the razor and making their money on the blades or selling printers at low margin and making it back on the ink.

Commoditization

Most hardware-only products face the risk of commoditization. A prime reason for this is the development of cheap shipping. This changed how the development of products are done, and how companies are organized. In the early 80s China took prime advantage of that. China opened four areas for foreign investment with less than normal government oversight.

The one that exploded to the top is the city of Shenzhen. In 1980 it was a town of 30,000. Today it has 18,000,000 inhabitants. It might be the fastest growing city in human history. Lies just north of Hong Kong. Now Shenzhen is the electronics manufacturing capital of the world. It is known as the "Silicon Valley for Hardware." It's also called the "hardware capital of the world." Sony, Samsung, Apple, Microsoft, Canon all manufacture products in the city. It is claimed that 90% of the world's electronics are made, in part, in this city.

Shenzhen is now part of the world's largest megalopolis, which covers a significant part of China's manufacturing heartland and includes the cities of Shenzhen, Guangzhou, Foshan and Dongguan. This area has a greater population than Argentina, Australia, or Canada.

What made this city ground zero? In the beginning it was simple economics that drove this. Where a U.S. plant would pay $15/hr in labor, Chinese plants would pay $3/hr. But everything was cheaper. In Shenzhen full a meal is still $3. China holds down the exchange rate. This means western companies can buy more. China doesn't tax exports and the US doesn't tax on imports. The US doesn't charge custom fees on some imports, although now they are taxing some ICs & semiconductors.

China made it easy to invest here. Many venture-capital firms targeted the area. At least one that has targeted hardware startups and has set up a hardware accelerator and incubator facility. Shenzhen got here from its manufacturing roots, which created a technologically adept labor pool, and because of this critical mass a very close supply network. Since Shenzhen is in the center of suppliers the supply chain is shorter. Also, all the intelligence that leaks out of all the companies here allows companies to respond quickly to new trends. The city leads China in patent applications. Of all the world this is where the hardware ecosystem has jelled the most. Designers, manufacturers, wholesalers, and shippers have formed a complete ecosystem.

Whereas prototyping elsewhere often takes 4-5 weeks, in Shenzhen it takes only a few days and often at a quarter of the cost as elsewhere. Years ago, National Semiconductor spent two years to develop a new chip, a company overseas took only six months to reverse engineer it.

Many foreigners come from around the world to spend time here to develop their products, helped by the support structure that has been assembled here.

Shenzhen now has one of the largest container ports in the world, and UPS has their Asian shipping hub at the Shenzhen airport. In addition, two cargo airlines, along with two Chinese passenger airlines are based at the airport.

A sample of companies based in Shenzhen:
Anker Electronics – Computer and mobile peripherals
BYD (Build your dreams) – Manufactures handset components and assemble mobile phones
Cogobuy - Computer and telecommunications equipment
DJI – Unmanned aerial vehicles Their drones comprise the majority of the market
Hacha – Portable media players
HISilicon – Fabless semiconductor provider
Huawei – Large telecommunications manufacturer
Linzhi – Semiconductor manufacturer
Makeblock – Arduino controllers and robotic hardware
Mindray – Medical equipment development and manufacturing
Nexgo – Manufacturer of payment terminals and pin pads
Nubia Technology – Smartphone manufacturer
Promate – Manufactures computer, telecommunications, and personal electronics
SenseTime – AI and facial recognition
Technology Happy Life – Sells phones directly to consumers
Tencent – Very large technology conglomerate
Tinno Mobile – OEM Smartphone manufacturer
Topray Solar – Solar panel manufacturer
Umidigi – Smartphone manufacturer
Vsum - Smartphone manufacturer
ZTE – Manufactures telecommunications equipment

But it's not only electronics, but companies like Alibaba also have large sheet metal fabrication operations here. Makerfabs has printed circuit board (PCB) operations there also. The area can build complete products in a very short time.

But prosperity in Shenzhen is pushing prices up there and as manufacturing is becoming more automated, some of that automated manufacturing will move back home. But that doesn't spell doom for the area as the electronics industry there is moving up the food chain and are increasing innovation and branding of their own. We've seen these centers move before. So, no matter where you are, you better figure out what your value added is.

Until recently much of what came out of China was called Shanzhai products. There are two explanations of the term. One came from Cantonese slang, Shanzhai factory, that meant products from an ill-equipped, low-end, and family based outfit. The second might be based on Shenzhen. Shenzhen started its electronics legacy by building imitation or knock-off products designed by others. Again, it is suggested that people who speak mandarin Chinese with a Cantonese accent sounded like they were saying Shanzhai product instead of Shenzhen product.

So, as we have mentioned already, places like Shenzhen rode the first wave of electronic innovation, the commoditization of parts. The second wave is the creation of whole platforms, that is complete development boards, what the Chinese call gong ban, or public board. These can be incorporated into another's products directly or the user can build atop it via modifications. Many boards are developed that cater to smartphones, tablets, smart watches, smart homes, or industrial controls, to name a few.

Today these boards are often referred to as Shanzhai also. These boards are often created by parts manufacturers to ease the introduction of their products into the marketplace, or even by parts distributors to increase their sale of the parts they handle. This new use of Shanzhai allows features that mainstream civilization might dismiss. Such as multiple SIM cards in phones for frequent travelers, or phones with multiple speakers and mics so more than one can talk over a single connection or slimmed down features for those who can't literally afford all the bells and whistles. These platforms or public boards allow for products that have limited distribution as you don't have the cost of designing from scratch and can more readily be customized.

So, what does Shenzhen have to do with your project, besides the fact that there's a good chance parts of your project came through there? You must keep in mind that your value-added proposition is the intellectual property that you can integrate into the project. Unless you're working for a very large organization, that can do its own fabrication, it most likely isn't going to be the hardware that makes your widget compelling, it's how it does what it does that counts.

If you offer another me too product, and you don't have a way to make it cheaper in six months, the commodity providers will swamp your efforts in research, and manufacturing prowess in short order. Large companies like Xiaomi, and Huawei have most everything inhouse and can quickly integrate many features that were in separate products and suddenly your neat stand-alone box is part of someone's smart phone or other platform.