Technology-Enabled Disruption Some Perspectives

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Technology-Enabled Disruption

Why has it become so easy for new entrants to overcome historic entry barriers of scale, cumulative skills and capabilities?

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- Know-how embodiment in manufacturing tools
- Know-how embedded in design tools
- **Rising level of abstraction**

Why High-Tech Commoditization Is Accelerating

Knowledge embedded within state-of-the art production and design tools is a powerful force that is leveling the global technology playing field. It democratizes innovation and makes future competition ever more challenging. BY WILLY SHIH

FOR TECH COMPANIES that rely on sophisticated engineering, staying ahead of international competition seems to get harder every day. It used to be an article of faith that technology-intensive product manufacturers, automakers, or white goods makers could capitalize on their longstanding engineering and design leadership to cement their position worldwide. But

that's no longer the case. Today, young upstarts in many product segments, especially from China, can develop world-class design and production capabilities in a short period of time. In some cases, they are closing gaps with long-established incumbents and becoming market leaders within a decade.

The popular narrative is that three main factors are driving this: (1) blatant copying of intellectual property (IP), (2) governments pressuring companies to share technology in exchange for rights to do business, and (3) normal knowledge spillover as workers move from multinationals to local companies.1 But other, less recognized forces are at play, and they are accelerating commoditization and making product differentiation increasingly difficult to sustain.

Knowledge, particularly the tacit knowledge and know-how that takes years to develop, now flows through pathways that we take for granted. It is embedded into the tools used to design and manufacture products, and it is incorporated into the building blocks that are used to build more complex systems. The implications are profound. Perhaps the biggest implication is that, armed with

THE LEADING How can technology companies protect themselves from commoditization?

FINDINGS

Advanced production tools commoditize the manufacture of many hardware products, making differentiation more difficult.

Modern comput ized design and simulation tools reduce the value of experience.

As product designers use increasingly sophisticated building blocks, complementary complementar assets become more critical.



Know-how Embodiment in Tools

Advanced production tools commoditize the manufacture of many hardware products

- Enables new players to capitalize on many years of R&D performed by others
- Levels the global playing field





This has played out in numerous industries

Semiconductors, TFT-LCDs, LEDs, Solar, Advanced Metalworking

Implications



Commoditization pressure on U.S. firms

• Especially when faced with non-market based competition

Waves of cheap building blocks crashing on our shores (see below)

Serious implications for Defense Industrial Base and supply chain resiliency

What's Happening to All That Compute Power?



Computing power "almost free"

Sophisticated design tools



Implications



Much harder for U.S. companies to hold on to technological lead

 Loss of scale and home market size advantages

Waves of cheap building blocks crashing on our shores (see below)

Labor arbitrage coming to engineering jobs

 What we saw in manufacturing direct labor comes to high skill high technology content work

Abstraction

Structuring and packaging complexity in a way that makes it easier to understand

• Only need to understand and master the interface

Abstraction

Encapsulates a model of a system

 Hierarchy of representations

Key benefit

 Enables designers to conceptualize at a higher level



General Purpose Platforms

Raise the level of abstraction Enable new waves of innovation











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Implications

Accelerated innovation through recombination and on top of platforms (key abstractions, cheap building blocks)

- Compute + always on connectivity + touch interface
- Remarkably easy to implement machine learning and artificial intelligence applications



And ...

- Traditional advantages of scale and incumbency upended
- Change coming faster than ever

Schumpeter's "gale of creative destruction"

• Whole industries transformed, or may disappear

