



ASSET SPECIFICITY

An iPhone connector plug is different from plugs used for Android phones. These plugs are, therefore, *specific assets*. The *degree* of asset specificity is measured by how much value is lost when the asset is shifted to its next best use.

While the example of smartphone plugs is trivial, the influence of asset-specific investments on industries and high-tech industries is profound. Massive and often customized investments are made in the face of uncertainty and without the protection of well-defined property rights. Oliver Williamson in his 2009 Nobel Prize Lecture said that asset-specificity is the main influence on how real-world transactions are configured, including contract design and pricing.¹

In 1978 Intel began development of general-purpose microprocessors for personal and business computers, including IBM's famous IBM PC XT. Intel won the microprocessor competition and retained its leadership position for 3 decades with its x86 products. Along the way, it invested in platforms that integrate chipsets, motherboards, and other semiconductor products into a functioning architecture.

Intel's offerings (a) changed dramatically over time with the development of features such as "hyperthreading" to improve processor speed and "sleep states" to reduce energy use, and (b) were differentiated for its OEM customers based on size and configurations, resulting in hundreds of different products being offered in a given year. Intel invested in so-called fabs around the world for internal supply of chips. The required investments led Intel to enter into contracts with OEMs with various features that concerned competition authorities.

Most of Intel's investments reflected sound foresight, but the icon also made mistakes. Consistent with concerns that specific-investments might not pay-off, in 2005 Intel chose not to invest in chips for the future iPhone.² Yet Intel did invest heavily in Intel Advanced Performance Architecture (iAPX),³ a technological achievement that achieved no commercial success.

High-tech customers also make specific investments. OEMs who buy a given high-tech component, e.g., antennae for mobile devices, do so based on how they work in their specific configurations. End-consumers who buy mobile devices may invest in knowledge about how to use them – knowledge that is to some extent specific to a brand or model. Various intermediaries have to decide whether to invest in specific payment systems, e.g., Visa and MasterCard,

¹ In contexts other than high-tech, asset-specificity is everywhere one looks. A reservation for travel on a cruise ship or airplane is specific to time and location. Investments in brands that provide assurance to customers are, by necessity, specific to the seller.

² "Intel made a huge mistake 10 years ago. Now 12,000 workers are paying the price." Timothy B. Leet tim@vox.com, Apr 20, 2016. Then Intel CEO Paul Otellini did not expect smartphones to become so successful. Also see <https://www.fool.com/investing/general/2013/05/17/was-this-intels-biggest-mistake.aspx>

³ "An introduction to the architecture of the Intel iAPX 432," IEEE Xplore, Software & Microsystems (Vol. 2, Issue 2, April 1983, pp. 29-34.



WeChat Pay.

Asset-specific investments are both necessary for innovation and a source of great friction. On the demand side, they can increase *switching costs*. Asset-specific investments make suppliers and buyers vulnerable to *opportunistic behavior*. As a result, innovative industries often feature (i) substantial vertical integration by industry participants seeking to be on the leading edge, (ii) partnerships and alliances, and (iii) long-term contracts with exclusionary terms.

Economists Bengt Holmstrom and Jean Tirole identified the fundamental imperative behind these various forms of integration:

[T]he organization must succeed in capturing the returns from informational expertise.⁴

In sum, when analyzing high-tech industries, it is imperative to consider:

- Consider the totality of investments made by buyers, intermediaries, and sellers,
- Assess whether the large investments made by industry participants are specific, and
- Evaluate how participants can protect themselves from opportunistic behavior.

Regarding the last step, the degree of difficulty depends on complexity and uncertainty. If an OEM has set up a contest between two input suppliers who must make specific investments, it might be it is possible to design contracts that reward the winner and compensate the loser for its lost investment. As the uncertainties and complexities grow, contract design becomes much more difficult, in which cases vertical integration may emerge as the best (or less bad) approach to dealing the problem of asset-specificity.

Readings:

1. Dennis W. Carlton and Jeffrey M. Perloff, “Vertical Integration and Vertical Restrictions”, *Modern Industrial Organization*.
2. Oliver Williamson, "[The Economics of Organization: The Transaction Cost Approach](#)", *American Journal of Sociology* (87:3), November 1981, pp. 548–575
3. Bengt R. Holmstrom and Jean Tirole, “Theory of Firm”, *Handbook of Industrial Organization*, ed. Richard Schmalensee and Robert Willig, North Holland (1989).

⁴ Holmstrom and Tirole, “Theory of Firm”.



Intel was inside this 1983 IBM PC XT.



“Intel Inside” was everywhere starting in 1996.

