

Business-Model Innovation: General Purpose Technologies and their Implications for Industry Structure

Alfonso Gambardella and Anita M. McGahan

This article describes a business model that is growing in prevalence and that carries novel implications: the development of general-purpose technologies for licensing to downstream specialists. In their archetypical format, these general-purpose technologies are constructed in ways that can be employed by different potential downstream licensees, and can accommodate their different strategies. This strengthens the hand of innovative firms in the rising markets for knowledge-based assets, and can be expected to improve their ability to capture a greater share of the value their technology creates. The innovation of business model designed for licensing such technologies will have unpredictable, but inevitable, consequences for industry structure and organizational capabilities, as well as for the content and context for the upstream science.

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Introduction

All firms have business models, but legendary firms that shape their industry structures — those such as Google and Apple Computer — are business-model innovators that organize themselves and their interactions with customers and suppliers in unprecedented ways. These

firms have inspired others both to direct imitation and to further innovation efforts on their own account.

A business model is an organization's approach to generating revenue at a reasonable cost, and incorporates assumptions about how it will both create and capture value.¹ Teece identifies a business model as reflecting 'management's hypothesis about what customers want, how they want it, and how an enterprise can best meet those needs, and get paid for doing so'.² Whenever a business model generates profit, it is because the firm has developed activities and accumulated resources that drive a wedge between operating costs and revenues by making the firm more efficient than rivals (thus lowering total costs) and/or more effective than rivals at raising revenues either through higher prices or greater volumes. The asset or resource base and activity profile of the firm is integrally tied to its business model, and the success of a business model in generating profit — at driving the wedge between costs and revenues — depends on the accumulation within the organization of strategically important resources. In today's economy these are increasingly grounded in intangibles such as scientific knowledge and intellectual property. The essence of a firm's strategy is its business system (or activity set) for controlling these resources and adapting them over time to ensure their continuing relevance to the firm's customers (i.e., the constituents that generate revenues) and suppliers (i.e., those that generate costs).³

In this conceptualization, business-model innovation occurs when a firm adopts a novel approach to commercializing its underlying assets. One arena in which many firms with important knowledge assets are currently innovating is in the rising 'markets for technology',⁴ where firms sell rights to their intellectual property rather than themselves directly commercializing products and services based on their knowledge capital. While markets for technology have grown in recent years,⁵ companies electing to license their technologies confront a number of thorny issues — e.g., how to convince potential licensees to buy a technology that the supplier is not themselves using; and how to enforce their patents or otherwise gain sufficient compensation from the licensee. Markets for technology are evolving quickly, through a phase of intensive experimentation, to address these questions:⁶ their resolution — and the potential for their further growth into adjacent markets and industries — is at the centre of a major set of entrepreneurial and industrial opportunities.

general-purpose technologies [are] a novel alternative to applied, specialized, commercially mature technologies, [featuring] business-model innovation and the evolution of technology markets

This article focuses on one issue arising among this broad set of opportunities: the development of general-purpose technologies as a novel alternative to applied, specialized, commercially mature technologies.⁷ This approach has all the features of business-model innovation, but it also suggests an important trajectory in the evolution of technology markets that may ultimately facilitate further entrepreneurship involving general-purpose approaches in a wider range of application industries.

Business-model innovation and technology licensing

Historically, licensing technology has tended to occur across national boundaries and reflected the geographic limits of the licensing firm's market reach.⁸ Companies issued licenses in foreign countries because they had no concrete *a priori* intention of entering them directly, finding it more profitable to extract rents from licensees with local downstream advantages than to enter such (often geographically remote) markets directly.

But the technology licensing wave of the 1980s and 1990s took on a different character than this 'norm', with firms selling property rights over their ideas to other companies operating in the same

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