



Capitalizing On Innovation: The Case of Japan

Robert Dujarric
Andrei Hagiu

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Capitalizing On Innovation: The Case of Japan¹

By Robert Dujarric² and Andrei Hagiu³

PRELIMINARY DRAFT

Abstract

Japan's industrial landscape is characterized by hierarchical forms of industry organization, which are increasingly inadequate in modern sectors, where innovation relies on platforms and horizontal ecosystems of firms producing complementary products. Using three case studies - software, animation and mobile telephony -, we illustrate two key sources of inefficiencies that this mismatch can create. First, hierarchical industry organizations can "lock out" certain types of innovation indefinitely by perpetuating established business practices. Second, even when the vertical hierarchies produce highly innovative sectors in the domestic market, the exclusively domestic orientation of the "hierarchical industry leaders" can entail large missed opportunities for other members of the ecosystem, who are unable to fully exploit their potential in global markets.

We argue that Japan has to adopt several key legislative measures in order to address these inefficiencies and capitalize on its innovation: strengthening antitrust and intellectual property rights enforcement; improving the legal infrastructure (e.g. producing more business law attorneys); lowering barriers to entry for foreign investment and facilitating the development of the venture capital sector.

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² Temple University Japan. robertdujarric@gmail.com

³ Harvard Business School. ahagiu@hbs.edu

1. Introduction

Like all advanced economies, Japan faces two interconnected challenges. The first one is rising competition from lower-cost countries with the capacity to manufacture mid-range and in some cases advanced industrial products. For Japan this includes not only China but also South Korea. Though South Korea is by no means a low-wage nation, the combination of lower labor costs than Japan with a very advanced industrial base makes it a formidable competitor in some sectors.

Simultaneously, Japan confronts changes in the relative weights of manufacturing and services, including soft goods, which go against the country's longstanding competitive advantage and emphasis on manufacturing. A growing share of the value chain is now captured by services and soft goods, such as software, while the percentage which accrues to manufacturing is declining. Many of the new industries that have been created or grown rapidly in the past twenty years are either "pure services," such as web-based applications, information services (which are not new but have expanded enormously as exemplified by the success of Bloomberg), or are mixture of services and manufacturing (telecommunications, software).

When it entered the western world's trading system in the 1850s and 1860s, Japanese industry exported silk products to finance the nation's purchases of raw materials, machinery, and technology. Japan then developed into a major textile exporter, taking advantage of its low labor costs rather than of any major innovative capacity. As the country grew richer, and wages rose, it lost its comparative advantage in textiles, which were by then manufactured in poorer nations. Japan's competitive edge switched to more technologically advanced and capital-intensive goods, such as steel, ships, cars, and electronics. Over the past decades, Japanese industry has focused on the more sophisticated segments within these categories where Japan's technological strengths and manufacturing techniques more than compensate for its high labor costs. In these areas, technological innovation and new product innovation have been essential for Japanese companies to remain competitive.

But what is striking is that as Japan has become more economically advanced, its strengths have continued to be in manufacturing, with very few of its star exporters coming from the service or soft goods sectors. Japan, like all other advanced economies, has a very large service sector (about 68% of GDP). But its service and soft good players have generally failed to establish themselves in foreign markets. With very few exceptions, Japan's exporters are manufacturers. In sectors as diverse as software, the hospitality industry, logistics, information services, and others Japanese companies are conspicuous by their minimal presence overseas.⁴

Therefore, Japan is facing the challenge of creating a post-industrial exporting base. This in turn requires an environment conducive to innovation. Japanese policy-makers are aware of the issue. Many have called for efforts to replicate Silicon Valley, while others hope that the next Microsoft will be Japanese. These ideas, as interesting as they are, can only come to fruition decades from now. Silicon Valley is the product of over half a century of development. Its foundations include massive levels of high-skilled immigration, dynamic and competitive private and public universities, a very liquid labor market, a vibrant venture capital industry, an enormous Pentagon R&D budget, and the common law. Japan's chances of creating another Silicon Valley are therefore rather low.

However, there are soft good and service industries in which Japan is already very strong, such as mobile telephony and anime. For a variety of structural reasons which we explain in the following sections of this paper, the country has not capitalized on its innovative power in these industries. As a result, Japanese companies in these sectors failed to establish themselves as leaders in world markets. This is not for a want of technology but results from a failure to transform traditional, hierarchical industry structures best suited to manufacturing, into horizontal, ecosystem-based structures, which have emerged as most efficient for producing and delivering soft goods and services.

⁴ STATISTICS TO BE ADDED.

If Japan is to continue to prosper in a world where its ability to rely principally on manufacturing will diminish, its policy-makers will need to capitalize on its untapped innovative power. In the next section we provide some background on the fundamental shift spearheaded by computer-based industries from vertically integrated to horizontal, platform-driven industrial structures. Section 3 describes the historical characteristics of Japanese innovative capabilities. In section 4 we use three industry case studies to illustrate how Japan's manufacturing-inspired mode of industrial organization is preventing the country from taking advantage of its innovative power. Finally, in section 5 we lay out some possible solutions and we conclude in section 6.

2. The new order of industrial innovation: ecosystems and platforms

The rapid development of computer-based industries since the second half of the twentieth century has spearheaded and accelerated the shift from vertically integrated, hierarchical industry structures to horizontal structures, relying on ecosystems. While this change has been pervasive throughout most sectors of the economy, it has been most salient in technology industries with short product life-cycles. As a result, the nature of competition and competitive advantage has shifted away from pursuing quality through tightly integrated vertical "stacks" of components and towards providing the best possible "multi-sided platforms",⁵ connecting various types of complementors and end-users (e.g. videogame consoles and game developers; Windows and software application developers).

Personal Computers (PCs): the quintessential ecosystem

Ecosystems are most simply defined as constellations of firms producing complementary products or essential components of the same system. Today's PC industry is the archetype of modern ecosystems. There are two critical layers - the

⁵ Cf. Evans Hagiu and Schmalensee 2006.

operating system and the microprocessor. They are essentially controlled by two companies – Microsoft and Intel. The other ecosystem participants “gravitate” around the two “ecosystem leaders” (cf. Gawer and Cusumano 2002): original equipment manufacturers (OEMs) like Dell, HP, Toshiba and Sony, independent software developers such as Intuit and Adobe Systems, third party suppliers of hardware accessories and, last but not least, end users. Ecosystem leadership is defined by three elements: i) control of the key standards and interfaces which allow the components supplied by various ecosystem participants to work with each other (e.g. the application programming interfaces controlled by Windows); ii) control of the nature and timing (pace) of innovation throughout the industry (e.g. Intel’s successive generations of microprocessors and Microsoft’s successive versions of Windows) and iii) ability to appropriate a large share of the value created by the entire ecosystem.

Microsoft in particular has positioned its Windows multi-sided platform at the center of the PC ecosystem. Its power comes from generating network effects through the interdependence between the participations of the other ecosystem members: the value to users increases with the number and quality of independent application developers which support Windows and vice versa, third-party software vendors are drawn to Windows in proportion to the latter’s installed base of users.

[I don’t know if it belongs here but something like: One restraint on Microsoft and Intel abusing their eco-system leadership is the existence of second-tier players in their markets who could provide alternatives should other ecosystem participants find that Microsoft and Intel are capturing too much of the value. Thus Linux, Corel’s office suite, AMD, and Apple act as brakes on the possible misuse of ecosystem leadership on the part of the Microsoft and Intel. The fear of anti-trust action further restrains Microsoft and Intel from seeking to profit too much from the ecosystem

It is important to emphasize that the horizontal PC ecosystem that we know today has little to do with the structure of the PC industry at its beginning in the early 1980s. And even less to do with the structure of the computer industry in the early 1950s. At that time, each computer was on its own island. Only large corporations, government agencies, and universities bought mainframe computers, and they did so from a few large

companies like Burroughs, UNIVAC, NCR, Control Data Corporation, Honeywell and IBM. Customers were buying vertically integrated hardware-software systems. IBM emerged as the clear leader from this pack by being first to adopt a modular and ecosystem-based approach with its System 360: it adopted standardized interfaces and allowed outside companies to supply select parts of the computer system (e.g. external hard drives). Still, this was still largely a vertically integrated approach as the main components – hardware, processor and operating system - were done in house. The radical change occurred in 1980, when IBM decided that the only way to get ahead of its competitors in the PC business (Apple, Commodore and Tandy) was to outsource the operating system and the microprocessor to Microsoft and Intel in order to speed up the innovation cycle. The strategy worked in that the IBM PC became the dominant personal computer. It backfired when Microsoft and Intel took control of the PC ecosystem and licensed their platforms to other OEMs such as Compaq, HP and Dell, which eventually relegated IBM to “one of the crowd”. IBM’s PC business, Think Pad, is now a subsidiary of the Chinese conglomerate Lenovo.

Economic drivers of vertical disintegration and ecosystem structures

While at first glance it may seem that every step of vertical disintegration in the computer industry was a strategic decision involving real tradeoffs (e.g. giving up some control vs. accelerating investment throughout the ecosystem) that could have gone either way, there is a clear sense in which the process of vertical disintegration was inevitable. And this process has occurred (or is occurring) in many other technology industries: videogames, PDAs, wireless mobile services.

This begs the question: what are the economic forces driving vertical disintegration? In broad terms, there are three fundamental ones. First, rapid technological progress leads to economies of specialization. Except in the very early stages of an industry, vertically integrated firms cannot move the innovation frontier at all layers of the value chain. As industries grow, there is scope for specializing in some layers (a key strategic decision is then which layers to keep in-house and which to open to third parties) and bringing other firms on board in order to develop the others.

The second important factor in the evolution of technology-based industries is modularity and the emergence of standards (cf. Baldwin and Clark 1999). Increasing productivity throughout the value chain naturally drive firms to design their products and services in a modular fashion, with well-specified interfaces, which can be used by different production units within the same company or by third-party suppliers if applicable (cf. first point above).

The third and final driver of vertical disintegration is increasing consumer demand for product variety. Again, the vertically integrated model works well for one-size-fits-all solutions. As soon as customers demand horizontally differentiated products, it becomes hard for one integrated firm to satisfy the entire spectrum of customer demands. This tension was famously described by Henry Ford: “We are happy to supply any car color as long as it is black.” Therefore, vertical disintegration is more likely to occur in industries with a large number of consumers with diverse needs than in markets with a small number of clients with similar needs. For example, Airbus and Boeing, the two biggest players in the commercial airliner business, have increasingly relied on outsourcing and risk-sharing partners. Boeing’s latest jetliner, the 787, relies on risk-sharing partners involved in key R&D decisions, and much of the plane is actually not made but Boeing itself. However, neither Airbus nor Boeing have created an ecosystem similar to the PC industry. Both companies sit at the apex of the industrial pyramid, make the key decision, and sell the product to the customer (as opposed to Microsoft and Intel, where PCs are actually sold by the manufacturers such as Lenovo or Dell, which assemble the computers). This can be explained, among other factors, by the small number of customers (airlines and governments), the need to maintain extremely demanding and well-documented safety standards, and the direct involvement of governments in a sector with close links to national defense.

Ecosystems are the natural consequence of vertical disintegration. They have become the most efficient market based solution to the problem of producing complex systems, satisfying a large variety of end user demands and maintaining a sufficiently high rate of innovation through the system.

In light of our argument in this paper it may seem perhaps surprising that the best description of the necessity of relying on ecosystems that we have encountered comes from a senior executive at a Japanese high technology firm – NTT DoCoMo, Japan’s leading mobile operator. In discussing the reasons behind the success of NTT DoCoMo’s i-mode mobile Internet service, he explained: “*In today’s IT industries, no major service can be successfully created by a single company.*”

In the three case studies below, we argue that, despite the success of a few remarkable ecosystem leaders (NTT DoCoMo, Toyota and Sony come to mind), these were exceptions in Japan’s broader industrial landscape. Most of Japan’s ecosystems remain strikingly similar to vertical hierarchies and the ecosystem leaders (i.e. the companies at the top of these hierarchies) are predominantly domestically focused, which makes it hard for everyone in the subordinate layers to compete globally. Though, in the case of Toyota, this hierarchical system has produced a highly-competitive international business. One reason, as we note in the following questions, is that Toyota is a manufacturer rather than a service provider or a producer of soft goods.

3. Historical background on Japan’s innovativeness

In the decades which followed the Showa War (1931-45⁶), Japanese industry showed a great capacity to innovate, both in the area of manufacturing processes and also with the development of new products. Moreover, by breaking the stranglehold of trading companies (sogo shosha 総合商社) Japanese businesses such as Toyota, Sony, and Nitendo were able to conquer international markets. In particular Toyota displayed some of the key strength of Japanese industry. Its constant focus on product improvement and quality control gave it the credibility to win foreign market share and make its brand, unknown overseas until the 1970s, synonymous with quality. Moreover,

⁶ To use the term which Yomiuri Shimbun chose among several (Great East Asia War, Pacific War, etc.) to denote the decade and a half of fighting which ended with Japan’s capitulation on 15 August 1945.

Toyota was able to export its industrial ecosystem. As it built factories overseas, many of its Japanese suppliers followed suit, establishing their own plants in foreign countries. In a way, Toyota functioned as a sort of trading company for its suppliers by opening the doors to foreign markets which on their own they would not have been able to access.

Yet, in recent years, as our paper demonstrates Japan has either lagged in innovation or, as in the case of mobile telephony, developed services which are innovative but have failed to succeed in foreign markets.

Let us now look at some of the historical background which will help us understand Japan's current predicament.

Britain, as the leader of the Industrial Revolution entered the industrial age on its own terms. Japan had a radically different experience. To preserve their hegemony over the archipelago, the House of Tokugawa, which established the Edo shogunate (1600-1868), banned almost all foreign trade after the 1630s. Despite its isolation, the country was not backward. It possessed a well-functioning bureaucracy and a good transportation network; there was no banditry, and literacy was high by the standards of the age. Commercial activity was modern for the era. Japanese merchants devised some of the world's first futures trading instruments for Osaka's commodities exchanges.

But isolation froze Japanese technology at a 17th century level. There were improvements here and there during the two centuries of shogunal power, but nothing on the scale of what occurred in Europe. Whereas Europe embraced innovation, the shogunate was fundamentally committed to a static posture. Therefore, when western gunboats breached Japan's seclusion in the 1850s, the country did not have a single railroad track, whereas Britain, smaller than Japan, already had 10,000 kilometers of railways in 1851.⁷ Nor did Japan have any modern industrial base comparable to the ones being developed in Europe and North America. Japan lacked not only hardware, but also the "software" necessary to succeed during the Industrial Revolution. There was

⁷ Encyclopedia Britannica Online, "History > Great Britain, 1815–1914 > Social cleavage and social control in the early Victorian years > The pace of economic change", <http://www.britannica.com/eb/article-44926/United-Kingdom> 6 November 2006

no effective civil law system. “Law” meant government edicts; there was no formal concept of civil arbitration with the state acting as a referee by providing both courts and enforcement mechanisms.⁸ In fact, Japan did not have a bar with lawyers until the late 19th century.⁹

As long as Japan was cut off from other countries, it could live in peace with its 17th century palanquins in a 19th century world of steam engines. Unfortunately for Japan’s shoguns, once the Europeans, Russians, and Americans approached the country’s shore, its industrial immaturity put the very existence of the nation in jeopardy as the westerners enforced unequal treaties on Japan, giving themselves unilateral advantages in trade and investment in their dealings with Japan (what are known as the “unequal treaties”)

Trade therefore took on another meaning for Japanese than it did for Britons. For British economists, buying and selling were mutually beneficial transactions, but for Japanese trade was conceptualized as a form of war by other means.

Consequently, it is understandable that Frederich List, and the other foes of free trade, appealed to the Japanese¹⁰. For List, and other German political economists of the historicist school, trade, like war, was fundamentally a zero-sum game.

Though Japan has changed much, the lessons drawn from the Meiji era (1868-1912, when Japan embarked on its modernization program following the collapse of the Edo regime) and the 1930s remain in 21st century Japanese economic DNA. In the 1930s, List’s ideas were replaced by national-socialistic views of international economics which were fundamentally similar. Post-war Marxian thought, which influenced even conservative Japanese, continued to provide intellectual ammunition against free trade abroad and economic liberalism at home.

⁸ See Haley, John Owen. Authority without Power: Law and the Japanese Paradox. New York: Oxford University Press, 1991 (1995 Oxford UP paperback).

⁹ See Mayumi Itoh, The Hatoyama Dynasty. (New York: Palgrave MacMillan, 2003), p. 21ff.

¹⁰ See Bai Gao, Economic Ideology and Japanese Industrial Policy: Developmentalism from 1931 to 1965. Cambridge: Cambridge University Press, 1997.

The consequences of this intellectual heritage for innovation are threefold. First, it has fostered a strong manufacturing bias, based on the idea that a nation without production facilities is a weak nation. Unfortunately for Japan, many of the recent innovations which have increased productivity and made possible the development of new industries are not related to manufacturing. New ways of dealing with new ecosystems, platform-based industries, legal developments in intellectual property (IPR), new financial instruments (admittedly a field currently enjoying a rather negative reputation) are fundamentally tied to the service sector. Japan has been intellectually ill-equipped to deal with them.

Second, besides a continued focus on industry, hostility to outsiders remains. When a foreign takeover beckons, Japanese corporate leaders' first reflex is often, though not always, to band together against the alien, rather than seek a way to profit from the new investor. The merger of Nissin and Myojo, both leaders in instant noodles, orchestrated to prevent Steel Partners of the US from acquiring Myojo, is an illustrative example. It kept the foreigners at bay but deprived Myojo's shareholders of the higher price offered by the Americans. There are, of course, cases of successful foreign investment into Japan (e.g. Nissan) but overall, among the major developed economies, Japan is the least hospitable to foreign capital. Xenophobia is not unique to Japan, but statistics show how low foreign investment as a percentage of GDP is in Japan compared to other advanced economies.¹¹ Obviously; this has slowed innovation by preventing foreign ideas and managers from playing a bigger role in the economy.

Third, Japan, like some continental European states from which its economic ideology is derived, has historically been far more tolerant of monopolies and oligopolies. Though anti-trust enforcement has gained somewhat in recent years, it remains deficient by Anglo-American standards. This can have a particularly nefarious impact on innovation. Companies that are already actively involved in the international market will continue to innovate even if they enjoy mono/oligopolistic advantages in their home market in order to remain competitive abroad. But businesses which are not international

¹¹STATISTICS TO BE ADDED.

and benefit from economic rents derived from monopolistic or oligopolistic arrangements will likely lack innovative powers.

Industrial structure

The US Occupation authorities dismantled the zaibatsu (財閥 - “financial cliques” – are the same ideographs as the word “chaebol,” used to denote Korea’s family-controlled conglomerates). These were large financial-industrial family conglomerates that controlled Japanese industry and finance. But in the decades following the war, partly as a way to prevent foreign takeovers, Japan developed a complex form of cross-shareholdings known as “keiretsu,” 系列 or “affiliated companies” by opposition to the family-owned zaibatus. In some cases these keiretsus were vertical, with one large corporation at the top and affiliates in a subordinate position. In other cases, there was no real center, with several corporations linked by cross-shareholdings and informally coordinated by their top managers.¹²

Legal systems

A second factor with a significant bearing on innovation is the legal system. “One of the principal advantages of common law legal systems,” wrote John Coffee of Columbia University Law School, “is their decentralized character, which encourages self-regulatory initiatives, whereas civil law systems may monopolize all law-making

¹² On corporate governance, see Gilson, Ronald and Curtis J. Milhaupt. “Choice as Regulatory Reform: The Case of Japanese Corporate Governance.” Columbia University Law School Center for Law and Economic Studies Working Paper No. 251 and Stanford Law School John M. Olin Program in Law and Economics Working Paper No. 282, 2004; Hoshi, Takeo and Anil K. Kashyap. Corporate Financing and Governance in Japan: The Road to the Future. Cambridge MA: The MIT Press, 2001; Jackson, Gregory. “Toward a comparative perspective on corporate governance and labour.” Tokyo: Research Institute on the Economy Trade and Industry, 2004 (REITI Discussion Papers Series 04-E-023); Milhaupt, Curtis J. “A Lost Decade for Japanese Corporate Governance Reform?: What’s Changed, What Hasn’t, and Why.” Columbia Law School, The Center for Law and Economic Studies, Working Paper No. 234, July 2003; Miyajima, Hideaki and Fumiaki Kuroki. “Unwinding of Cross-shareholding: Causes, Effects, and Implications.” (Paper prepared for the forthcoming Masahiko Aoki, Gregory Jackson and Hideaki Miyajima, eds., Corporate Governance in Japan: Institutional Change and Organizational Diversity.) October 2004; Patrick, Hugh. “Evolving Corporate Governance in Japan.” Columbia Business School, Center on Japanese Economy and Business, Working Paper 220 (February 2004).

initiatives.”¹³ This is especially true in new industries where the absence of laws governing businesses leads to officials opposing their veto to new projects on the grounds that they are not specifically authorized by existing regulations. In the United States, innovative legal developments based on the jurisprudence of courts and new types of contracts have facilitated the development of new industries, something that is harder in Japan and in other code law legislations.

For example, some analysts have noted how U.S. law gives more leeway to create innovative contractual arrangements than German law,¹⁴ on which most of Japan’s legal system is built. Thus entrepreneurs, and businesses in general, are more likely to face legal and regulatory hurdles in code law jurisdictions where adapting the law to new technologies, new financial instruments, and other innovations, is more cumbersome.

3. Three industry case studies

The following case studies are designed to illustrate how certain aspects of Japanese industrial organization foster innovation, while others either stifle it altogether (software) or limit its reach to the domestic market (animation and mobile telephony). From these industries, we can draw some lessons on the steps which Japan could take to enhance its capabilities to harness its strong innovative capabilities.

3.1. Software

Given the degree of high-technology penetration in the Japanese economy and the international competitiveness of the hardware sector of its consumer electronics industries, the weakness of the Japanese packaged software industry looks puzzling. Indeed, the software industry in Japan has historically suffered from chronic fragmentation among incompatible platforms provided by large systems integrators

¹³ Coffee, “Convergence and Its Critics,” 1 (abstract).

¹⁴ Steven Casper, “The Legal Framework for Corporate Governance: The Influence of Contract Law on Company Strategies in Germany and the United States,” in Hall and Soskice, eds. Varieties Of Capitalism, 329.

(Hitachi, Fujitsu, NEC) and domination by customized software. Despite efforts by the Ministry of the Economy, Trade and Industry (METI, formerly MITI), there are very few small to medium-size software companies in Japan compared to the United States or even Europe. As a result, even the domestic market is dominated by foreign software vendors such as Microsoft, Oracle, Sales force and SAP. Not to mention that there are virtually no standalone software exports from Japan to speak of. There is of course the videogame exception, which we do not include in our discussion here because the videogame market has a dynamic of its own, largely independent of the evolution of the rest of the software industry.

There are two root causes for this peculiar situation: a strong preference for customized computer systems by both suppliers and customers and a long-standing bias (also on both sides) in favor of hardware over software. These two factors has perpetuated a highly fragmented, vertically integrated and specialized industrial structure, precluding the emergence of modular systems and popular software platforms (e.g. Windows). In turn, the lack of such platforms has thwarted the economies of scale needed to offer sufficient innovation incentives to independent software developers, which have played a critical role in the development of the IT industry in the United States.

Historical evolution of the Japanese software industry

In the early 1960s MITI orchestrated licensing agreements that paired each major Japanese computer system developer with a U.S. counterpart. Hitachi went with RCA then IBM, NEC with Honeywell, Oki with Sperry Rand, Toshiba with GE, Mitsubishi with TRW and Fujitsu went on its own before joining IBM. The intent was to make sure Japan embarked on the computer revolution and that it competed effectively with then-almighty IBM (France's 1966 "plan calcul," also aimed at creating a domestic computer industry, bore some similarities but it aimed a greater national autonomy and prioritized military applications) . However, since each of Japan's major computer system suppliers had a different U.S. partner, each had a different antecedent for its operating system. In fact, even IBM-compatible producers only had the instruction set licensed from IBM in

common; their operating systems were incompatible among themselves. Very rapidly, each of the Japanese companies found it profitable to lock-in its customers by supplying highly customized software, often free of charge, which meant that clients had only one source of upgrades, support and application development. Over time, many of the former U.S. partners were forced to exit the industry due to intense global competition from IBM. However, their Japanese licensees remained and perpetuated their incompatible systems.

Next, in the United States, following a highly publicized antitrust suit, IBM was forced to unbundle its software and hardware in 1969. The IBM System/360 was the first true market platform in the computer industry in that it was the first to support third-party suppliers of software applications and hardware add-ons. It marked the beginning of the *vertical disintegration* and *modularization* of the computer industry. Computer systems were no longer solely provided as fully vertically integrated products; rather users could mix and match a variety of complementary hardware and software products from independent suppliers. This led to the development of an immensely successful software industry. The new industry became prominent with the workstation and PC revolutions in the early 1980s, which brought computing power into the mainstream through smaller, cheaper, microprocessor-based machines. An important consequence was the great potential created for software/hardware platforms, which a handful of companies understood and used to dominate their respective segments: Sun Microsystems in the workstation market, Apple and Microsoft in the PC market.

By contrast, in Japan there was no catalyst for such a sweeping modularization and standardization process. Despite the adoption of a US-inspired Anti-Monopoly Law in 1949, enforcement of antitrust in Japan has been insignificant (cf. Miwa and Ramseyer 2005), so there was no one to require the large systems makers to unbundle. There were also no incentives to achieve compatibility. During the last three decades, the customized software strategies became entrenched. Each supplier found it profitable to lock its clients into proprietary hardware/software systems that it alone could provide, and clients set up their own software divisions to further customize the proprietary systems they received, thus increasing sunk costs and reducing the likelihood of switching to newer systems. This vicious cycle essentially locked out any would-be standalone software vendor in the mainframe and minicomputer markets.

Japanese computer manufacturers tried to extend the same strategy to the workstation and PC market, but failed due to competitive pressure from foreign (especially American) suppliers. The best known example is NEC, which until around 1992 held a virtual monopoly on the Japanese PC market with its "PC-98." Its hardware platform architecture was closed (like Apple's) and its operating system, though based on DOS, remained incompatible with the popular MS-DOS PC operating system. In the end, however, NEC's monopoly was broken by Dell, Compaq and low-cost Taiwanese PC makers (1991-92).

The prevalence of closed, proprietary strategies prevented the economies of scale necessary for the emergence of a successful independent Japanese software industry. No single computing platform became popular enough with users to provide sufficient innovation incentives for packaged application software.¹⁵

There also seems to have been a preference for customized computing systems and software on the demand-side of the market. In Japan, like everywhere else in the world, the first users of computer systems (mainframes in the beginning) were corporations. However Japanese corporations have traditionally been keen on preserving the secrecy of their processes and adhering to internal business procedures, leading to a "how can we modify the software to fit our operations?" mindset, rather than the "how can we adapt our operations in order to take advantage of this software?" reasoning that prevailed in the U.S. For this reason, Japanese companies preferred to develop long-term relationships with their hardware suppliers and to depend on those suppliers, or on vertically related¹⁶ software developers for highly customized software solutions. As major Japanese companies have generally relied on professionals hired straight of college who stayed with the same employer for their entire professional lives, each Japanese conglomerate has developed its own corporate culture to a greater extent than in the United States where a liquid labor means there is a much greater level of cross-

¹⁵ Even at its height, the standardized NEC PC-98 platform commanded a market roughly four times smaller than its U.S. counterpart for a population half the size of the U.S. Furthermore, it was incompatible with the MS-DOS PC standard platform, which isolated Japanese PC software developers from the worldwide PC market.

¹⁶ That is, belonging to the same *keiretsu*.

fertilization between firms and consequently less divergence than in Japan in their corporate culture.

Government policies and the hardware over software bias

The second important factor which has shaped the evolution of Japan's software industry is the longstanding bias in favor of hardware over software. Japanese computer companies' business strategy had always involved giving away software for free along with their hardware systems as a tool to lock in customers. Ironically, this bias was probably inherited from IBM, whose success they were seeking to emulate. IBM itself remained convinced that hardware was the most valuable part of computer systems and this led to its fateful (and, some say, strategically misguided) 1981 decision to outsource its PC operating system to Microsoft, whose subsequent rise to power signaled the beginning of the software platform era.

This development was lost on Japanese computer makers, however, for several years. And MITI, which still viewed IBM as Japan's main competitor, was at that time immersed in a highly ambitious "Fifth Generation Project," a consortium that aimed to build a new type of computer with large-scale parallel-processing capabilities, thus departing from the traditional von Neumann model. The drawback, however, was that the project focused everyone's attention on building highly specialized machines (basically mainframes), whereas the computer industry was experiencing a significant paradigm shift toward smaller, general purpose machines based on open and non-proprietary architectures (Unix workstations) or on proprietary but very popular operating system platforms (PCs), which greatly expanded the computer market. MITI and member companies of ICOT¹⁷ realized only later the potential of making a common, jointly-developed software platform available to the general public rather than concentrating on systems designed for a handful of specialized machines. This led to MITI's next initiative, The Real-time Operating-system Nucleus (TRON). The main idea of TRON was to build a *pervasive* and *open* (i.e. non-proprietary) software/hardware platform in response to the market dominance of Intel and Microsoft. TRON was supposed to be a cross-device

¹⁷ The research institute of the Fifth-Generation consortium.

platform: computers and all sorts of other devices everywhere would be linked by the same software, thus finally providing a popular platform for Japanese software developers. Although TRON was a promising platform concept; it unfortunately received little support from the major industrial players, in particular NEC, which viewed it as a direct threat to its PC monopoly. More importantly, it could not break into the crucial education market¹⁸ precisely because it was incompatible with both the NEC PC-98 DOS and the IBM PC DOS standards, both of which had sizable advantages in installed bases of users and applications. Thus, TRON was too little too late: the big winners of the PC and workstation revolutions had already been defined and none of them were Japanese computer companies. Most importantly, the intended creation of an independent Japanese software industry did not materialize.

Comparative studies of the U.S. and Japanese software industries also mention several other factors that further explain the phenomenon described above. One is the relative underdevelopment of the venture capital market for technology-oriented start-up companies in Japan compared to the United States, where venture capital had widely supported the emergence of successful small and medium-size software companies. This gap, however, has been narrowed due to recent METI policies designed to improve the availability of venture capital to technology firms. Another factor is the Japanese permanent employment system for employees of large businesses, which results in low labor mobility and is quite compatible with the "closed garden" approach to technological innovation. By contrast, high labor mobility has been a crucial driving force behind the "Silicon Valley model" of technological innovation, which is based on spillovers, transfers, cumulative inventions and a high degree of modularity. The latter model seems to have been more appropriate for creating a vibrant software industry.

¹⁸ Callon (1995) contains an informative account of the conflict between METI and the Ministry of Education regarding the adoption of TRON by public educational institutions.

3.2. Animation¹⁹

Few Japanese industries are as specific to Japan and as creative as animation - or “anime”²⁰. Contrary to popular perception in the West, Japanese anime extends far beyond cartoons for children: “to define anime simply as Japanese cartoons gives no sense of the depth and variety that make up the medium. Essentially, anime works include everything that Western audiences are accustomed to seeing in live-action films—romance, comedy, tragedy, adventure, even psychological probing of a kind seldom attempted in recent mass-culture Western film or television.” (Napier 2005)

The Japanese anime market was worth ¥234 billion in 2005 in revenues. It was composed of four segments: TV anime series (¥35 billion: anime made up 6% of all TV programs); anime movies (¥29 billion²¹: this included foreign-made animations such as *Finding Nemo* by Pixar/Disney); video and DVD sales and rentals (¥167 billion) and internet downloads (¥3 billion; however, this was the fastest growing segment with a 300% annual increase from 2004).

Japanese anime had gained global popularity: it was estimated to account for 60% of TV anime series worldwide (Egawa et al. 2006). TV series of *Pokemon*, one of the most successful Japanese anime, had been aired in 68 countries in 25 languages. The aggregate size of the markets related to *Pokémon* including sales of licensed goods was estimated to be around ¥200 billion. And anime had influenced many creators outside Japan: the setting of *Terminator 2* was influenced by *Akira*, a classic Japanese anime series; the director of *Lilo & Stitch* (Disney’s 2002 animation film) admitted that it was inspired by Hayao Miyazaki’s *My Neighbor Totoro*; *The Matrix* movies owed the starting point of their story to *Ghost in the Shell*, a Japanese anime movie created by Production IG; Disney’s immensely popular *Lion King* (released in 1994) was based on *Kimba the White Lion*, a 1964 Japanese TV anime series.

But despite the global influence of Japanese animation, the Japanese anime production companies have never been able to capitalize on the popularity of their

¹⁹ This subsection draws heavily on Egawa et al. (2006).

²⁰ In this case study “anime” refers to animation motion pictures, as opposed to manga cartoons.

²¹ In 2004, total box office anime revenues had been ¥62 billion. The variance was extremely high in this segment due to the hit/miss structure.

creations. The industry is highly fragmented (there are about 430 animation production companies) and dominated by distributors—TV stations, movie distributors, DVD distributors and advertising agencies -, which control funding and hold most of the copyrights on content. As a result, most animation producers are small companies laboring in obscurity. No Japanese animation production company comes even close to the size of Walt Disney Co. or Pixar. In 2005 Disney had revenues of \$32 billion, whereas Toei Animation, the largest animation production company in Japan, had revenue of only ¥21 billion (\$175 million at the average 2005 exchange rate). Whereas Disney and Pixar spend in excess of ¥10 billion to produce one anime movie; Japanese anime production companies' average budget is ¥0.2-0.3 billion (Hayao Miyazaki's Studio Ghibli is an exception: it invests ¥1-3 billion in one production). And while Japanese animes are omnipresent in global markets, Japanese anime production companies have virtually no international business presence. Their lack of business and financial strength can be traced down to the inefficient mode of organization of the Japanese anime "ecosystem".

Background on Japanese anime

The first animation in Japan was created in 1917 with ten minute add-ons to action films. Thereafter, short animation films were produced for educational and advertisement purposes. In early 1950s, Disney's animation and its world of dreams became very popular in the aftermath of defeat in World War II. In 1956, Toei Doga (current Toei Animation) was established as a subsidiary of Toei, a major film distributor, with the stated objective to become "the Disney of the Orient."

Some anime industry experts trace the current plight of Japanese anime production companies back to the 1963 release of *Astro Boy*, the first TV anime series. Its creator and producer was Osamu Tezuka, a successful *manga* (comic book) writer. Being more concerned with making *Astro Boy* popular rather than with turning it into a financial success, Tezuka accepted the low price offered by a TV station in exchange for distributing the series. In order to keep the production cost to a minimum, he reduced the number of illustrations to a third of the Disney standard (from 24 images per second to 8

images). He felt that Disney's stories were too simplistic and lacked depth, therefore he believed that the complexity of the *Astro Boy* story would compensate for the inferior animation quality. *Astro Boy* became the first big hit in the history of Japanese TV animation, reaching a viewership of over 40% of households. However, due to intensified competition and lack of business acumen, Tezuka's anime production company (Mushi Production) subsequently ran into financial difficulties and in 1973 filed for bankruptcy.

From the early days, the majority of anime productions had derived their content from *manga*. In 2005, roughly 60% of anime contents were based on *manga* - the rest were based on novels or original stories created by the production companies themselves. The sales of *manga* - comic books and magazines - in 2004 were ¥505 billion, and accounted for 22% of the published goods. This was twice as much as the anime industry sales.

Popular anime characters were licensed to toy, game and other consumer product companies. In 2004, Japanese anime character goods market was around ¥1.64 trillion (\$14.3 billion), several times larger than the anime market. Toys were the largest segment accounting for 40%, followed by household goods 15.8% and apparel 13.9%. Licensing revenue remained rather stable, showing a slight decline over the last five years.

Production committees

The structure of the anime industry had not evolved much since its beginnings. The approximately 430 production companies worked essentially as contractors for the powerful distribution companies: TV stations, movie distributors, DVD distributors and advertising agencies. And only 30–40 of the producers had the capacity to become main contractors; the rest worked as subcontractors for those main contractors. Main contractors were responsible for delivering the end products to TV stations or movie distributors, and had the capability to do the majority of the processes. Subcontracting companies had capacity to handle only one or two processes. It usually took 4–5 months to produce one 30-minute TV episode. Production of anime movies was even more labor intensive and time consuming: a 60-minute anime movie usually took over one and a half

years. In both TV anime series and anime movies, the labor intensive process of drawing and coloring animations was often outsourced to Asian countries including China, Korea, Taiwan, Philippines, Thailand, Vietnam and India.

Most anime projects in Japan were done by “production committees,” an institution specific to the Japanese market, which provided financing and coordinated the distribution of the resulting contents through various channels. These committees had been created in the mid-1980s in order to alleviate the scarcity of funding sources for animation. Indeed, Japanese banks had traditionally been reluctant to lend to businesses which were exclusively focused on “soft” goods (content, software, etc.), particularly when they involved a high degree of risk.²² As a result, TV stations often had to fund the production cost of TV anime series since production companies were small and financially weak. Similarly, movie distributors used to fund the production of anime movies. However, as production costs increased and new distribution channels appeared, production committees emerged as the standard funding vehicles for both TV series and movies. At the same time, they also took control of the creative process, as well as marketing and final distribution of the final products.

Several types of companies came together in a production committee: TV broadcasting stations, the powerful advertising agencies (Dentsu and Hakuodo), sponsors (e.g. merchandising companies), movie distributors, video/DVD publishers, and the publishers of the original *manga* (comic book) whenever the content was based on it.

The production committee funded the anime projects and shared revenues and profits from the investments. Each member of the committee made an investment and in exchange received: (a) a share of the copyrights (and the associated licensing revenues) linked to the anime in proportion to the initial investment; and (b) the right to distribute the resulting content through the particular member’s channel—broadcasting right for TV stations, distribution right of videos/DVDs for video/DVD publishers. All committee members contributed to some part of the value chain, but TV stations often led the committee because television was the primary distribution channel.

²² Indeed, like for most creative content businesses (movies, novels), only 10 out of every 100 animations made any profits.

Production committees contracted the production of anime works with anime production companies. In most cases, anime productions received only a fixed payment (about ¥10–¥15 million), which oftentimes was barely sufficient to cover the production cost. Due to the lack of financial resources, production companies had to rely on production committees for funding and in exchange had to give up copyrights to their own work to the production committees. They were usually not a member of the production committees and as a result did not have access to licensing revenue and could not share in the upside of successful projects. When anime was the original creations of anime productions, they became a member of the production committee, but typically owned a very small stake. Therefore, original creations resulted in higher profits for anime production companies, but they were also riskier, and it was harder to persuade the production committee members to undertake those projects.

This system created a vicious cycle for animation production companies, which maintained them weak and subordinate to the production committees.

Recently, several initiatives have emerged in order to strengthen the rights of animation production companies and to create funding alternatives for anime projects. First, the Association of Japanese Animation was established in May 2002 under the leadership of the Ministry of Economy, Trade and Industry (METI). In the United States, Financial Interest and Syndication Rules (Fin-Syn Rules) established in 1970 by the Federal Communication Commission (FCC) stated that copyrights belonged to production companies.²³ METI tried to initiate cooperation among anime production companies so that they have stronger claim to their creations. Second, intellectual property became legally defensible through trust arrangements in December 2004. And Mizuho Bank (one of the top four Japanese banks) initiated the securitization of profits deriving from anime copyrights.²⁴ This allowed Mizuho to extend financing to anime production companies such as Production I.G, which did not have tangible assets suited for collateral. In turn, production companies could invest the proceeds in production

²³ The Ministry of Economics, Trade and Industry, *Research on Strengthening Infrastructure for Contents Producer Functions: Animation Production*, p. 27, http://www.meti.go.jp/policy/media_contents/.

²⁴ “Mega Banks Expanding Intellectual Property Finance,” *Nihon Keizai Shimbun*, April 17, 2004.

committees. Mizuho had financed over 100 anime titles this way. Third, the funding sources for anime production companies diversified. Mizuho had raised a ¥20 billion fund to invest in new movies including anime. And GDH, a recently founded animation production company, created its own fund for retail investors to finance its new TV series.²⁵

3.3. Mobile telephony²⁶

Like animation, mobile telephony provides another illustration of a highly innovative Japanese industry, which has not been able to export its domestic success. Today, Japanese owners of cell phones have access to the world's most advanced services. With a simple wave of their handsets, they can pay for purchases in convenience stores and for subway fares. They can also access all sorts of digital content and services via dedicated mobile web systems – NTT DoCoMo's i-mode being the domestic pioneer and leader.

However, this superior innovativeness of Japan's mobile communications sector has been achieved through an industry structure which is quite different from that prevailing in other parts of the world. In Japan the operators (DoCoMo, KDDI, and Softbank) hold most of the power and dictate specifications to handset makers. By contrast, carriers in other countries have much less leverage in their relationships with handset makers and are willing to make significant compromises in exchange for exclusive rights to highly popular handsets – such as Motorola's Razr or Apple's iPhone.

As a result Japanese mobile phone manufacturers, despite their design skills, have developed almost no independent capabilities for market research and innovation. They act as fairly passive subcontractors to the R&D, marketing and design teams of the big operators. The latter, however, have practically no international presence, nor do they

²⁵ “Rakuten Securities, JDC, and Others Raise Funds from Individual Investors to Produce Anime,” *Nikkei Sangyo Shimbun*, July 28, 2004.

²⁶ THIS CASE STUDY IS PRELIMINARY AND INCOMPLETE: THIS VERSION SUMMARIZES THE GIST OF THE ARGUMENT.

understand foreign markets. It is striking that, with a few minor exceptions, DoCoMo, the largest Japanese player in mobile telephony and creator of the world's most successful mobile Internet service, has been unable to export i-mode overseas. It is not surprising then that Japanese handset makers are also virtually absent from international markets as they lack the capacity to operate in markets where they must assume responsibility for market research, design, and negotiations with operators by themselves. Samsung, LG, Nokia and Motorola, on the other hand, did not develop as junior partners to operators. They are therefore capable of winning in international markets, as they have shown in the world's largest mobile telephone market, China. There, the top three sellers currently are Nokia with 29.5% market share; Motorola 18.5% and Samsung 10.8%. The largest Chinese handset maker has less than 5% market share.

4. Discussion and policy implications

“Inefficient” and self-sustaining industry structures

As we have noted, Japanese industry is surely capable of innovation but it operates in an environment that is not conducive to mobilizing the innovative capabilities of soft goods and service sector businesses, especially in the international arena. Fundamentally, this stems from a mismatch between the country's vertical and hierarchical industrial organizations and the horizontal, ecosystem-based structures prevailing in “new economy” sectors. The former have proven very efficient in pursuing manufacturing perfection – a domain in which Japan has excelled. However, as we have argued in section 2, the latter have been the far more effective form of “industry architecture” for driving innovation in most of today's technology industries, on which services and soft goods rely.

This mismatch makes the current organization and performance of some Japanese sectors appear as stuck in inefficient equilibria. Indeed, one important common denominator across the three industry case studies presented above is the prevalence of

self-reinforcing mechanisms which have locked the corresponding sectors into highly path-dependent structures. The weakness (or, more precisely, virtual absence) of Japan's software industry has been perpetuated by large computer system suppliers which have locked their customers from early on into proprietary and incompatible hardware-software systems; as a result, these customers have always found it in their best interest to deepen the customization and rely on the same suppliers for more proprietary systems. Absent any external shock (or public policy intervention), it is hard to see a market opportunity for potential Japanese software companies. In animation, production committees have established a bottleneck over the financing of animation projects, which allows them to obtain most of the copyrights, which in turn deprives anime production companies from the revenues that would enable them to invest in producing their own projects and acquire the corresponding intellectual property rights. Of course, this bottleneck has been perpetuated by the absence of alternative forms of financing: bank loans (Japanese financial institutions have had a long-standing reluctance to invest in businesses with only "soft" collateral) and venture capital (an industry which remains strikingly underdeveloped in Japan). Finally, the wireless communications sector in Japan has developed a top-down way of innovating, in which the mobile operators control end-customers and dictate terms to handset manufacturers, which in turn have never had sufficient incentives to develop their own marketing and independent R&D capabilities.²⁷

The second aspect that needs to be emphasized is that the hierarchical forms of industrial organization that prevail in some Japanese sectors are *not* uniformly less innovative than the more horizontal modes of organization. However, by subordinating everyone to the "ecosystem leaders" (i.e. the companies at the top of the industry structure), hierarchical structures can create large inefficiencies by preventing companies at lower levels of the hierarchy from capitalizing on their innovations outside of the vertical structure – in particular, in global markets. Indeed, while software has clearly been the Achilles' heel of Japan's high-tech and service sectors, animation and mobile telephony are two industries in which Japan has innovated more than any other country in

²⁷ I.e. R&D at the mobile service level, as opposed to R&D that simply pushes handset technology, while taking the level of innovation in service and corresponding standards as *exogenously given*.

the world. The problem there is that the “ecosystem leaders” – production committee members such as TV stations and, respectively, mobile operators – have Japan-centric interests (television stations and mobile phone service are essentially local businesses due to regulations). This ends up restraining the other members of the ecosystems to the domestic market, when in fact their relevant markets are global. Of course, in contexts in which the leader is a global-minded company - such as Sony and Toyota -, all members of the ecosystem benefit. But those situations are the exception rather than the norm.

Policy measures to break from inefficient industry structures

Extrapolating from the three case studies above, there are several initiatives which Japanese policy-makers could take to remedy the issue of inefficient industry structures.

First, despite recent improvements, Japan remains deficient in the enforcement of anti-trust. Monopolies and oligopolies are particularly nefarious in industries where there is a need for constant and fast innovation. The self-reinforcing mechanisms we described earlier (augmented by the importance of established, long-term relationships in Japan) creates high barriers to entry in most Japanese industries which protect incumbents and make it harder for Japanese innovators to succeed. If there is one lesson from Silicon Valley which Japanese policy-makers should take to heart it is that the birth *and* the death rate of businesses there is extremely high as it should be in innovative sectors.

For example, in the US, one essential catalyst of the PC era and the rise of Microsoft and other software platforms was the unbundling of IBM – the result of antitrust intervention. There was no such intervention in Japan to break the stranglehold of the large computer system manufacturers and enable entry of smaller, innovative software companies. Similarly, as we noted earlier in this paper, antitrust has placed significant constraints on Microsoft’s ability to extend its PC OS monopoly power to the Internet and/or mobile telecommunications. The objective was to make sure the emergence of new software ecosystems and platforms is not stifled. As it grows more powerful, Google must also now take into account the risk of anti-trust prosecution. This forces it to be tread more carefully in its dealings with partners and potential competitors

in online search and advertising than it might otherwise do if the anti-trust regime were weaker.

Second, besides anti-trust, the development of new industries based on ecosystems which are not defined by hierarchical relationships requires a strengthening of the legal system. In hierarchical *keiretsu* systems, the controlling corporation (or corporations) which sit at the top of the pyramid perform arbitration and enforcement functions for the entire eco-system. Since what is good for the eco-system is – usually – good for them, they have a built-in incentive to take good decisions, though in some cases the interests of minor suppliers might be at risk. However this cannot be a sustainable substitute for developing a legal infrastructure which supports and encourages innovation and entrepreneurship. In the more flexible and non-hierarchical ecosystems which define many of the innovative industries we have discussed, there is a need for effective third-party enforcement. In the United States, this is performed by civil courts which can adjudicate contractual disputes, and in some cases may involve criminal law, for example in the case of anti-trust violations. In Japan, these mechanisms are less well-developed. Despite changes to the regulations pertaining to the bar exam, there is still a shortage of attorneys. Moreover, the entire economy has historically been less reliant on legal remedies, making the entire legal system underdeveloped in this area.

Third and also part of the legal system remedies is enforcement of intellectual property rights (IPRs). This is perhaps the key institutional ingredient for innovation, especially in the soft goods sector. For many businesses in these industries IPRs are their main asset, in some cases their only one. Japan's weak IPR regime undermines the balance sheet of innovative companies, makes it harder for them to obtain financing, and diminishes their bargaining power. Animation is a case in point: the production committees have emerged to fill in the institutional gap of recognition and enforcement of copyrights, which would enable anime production companies to finance themselves and develop their own projects.

Fourth, venture capital markets, despite some efforts, remain underdeveloped in Japan, which presented an additional hurdle for small companies trying to break away from constraining industry organizations (e.g. animation). Unlike anti-trust and IPRs,

this is an area where government action in itself cannot resolve the entire problem. However, the regulatory regime can be altered to make it easier for the venture capital industry to grow faster in Japan.

Finally, a necessary policy measure is to further open the country to foreign investment. The difficulty which foreign investors face in Japan deprives Japanese innovative companies of equity partners and business partners, further locking them into domestic ecosystems which may stifle their development. It also makes it harder for Japanese companies to succeed overseas, since foreign investors could help them capture markets outside of Japan.

5. Conclusions

Japan presents a unique case of industrial structures which have produced remarkable innovations in certain sectors but which seem increasingly inadequate to produce innovation in modern technology industries, which rely essentially on horizontal ecosystems of firms producing complementary products. As our three cases studies of software, animation and mobile telephony illustrate, there are two potential sources of inefficiencies that this mismatch can create. First, the Japanese hierarchical industry organizations can simply “lock out” certain types of innovation indefinitely by perpetuating established business practices: this is the case with software, an industry in which Japan is strikingly weak. Second, even when the vertical hierarchies produce highly innovative sectors in the domestic market – as is the case with animation and wireless mobile communications - , the exclusively domestic orientation of the “hierarchical industry leaders” can entail large missed opportunities for other members of the ecosystem, who are unable to fully exploit their potential in global markets.

We have argued that improving Japan’s ability to capitalize on its innovations will require certain policy measures, aiming to alter legislation and incentives that stifle innovation: strengthening antitrust and intellectual property rights enforcement, strengthening the legal infrastructure, lowering barriers to entry for foreign investment.

On the other hand, private sector initiative is also critical, for example developing the venture capital sector, which is a key and necessary ingredient for stimulating innovation in modern industries.

Understanding the nature of the new innovation-producing ecosystems which have developed in platform industries will help Japanese policy-makers and managers develop better ways for Japanese business to take advantage of its existing strengths to expand innovation beyond the industrial sphere into the realm of internationally-competitive service and soft goods sector enterprises.

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