The Services Transformation and IT Network Regulation

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Abstract:

There is currently a fundamental transformation of services, a transformation central to the growth of productivity and competition in the global economy. This transformation, a response to commodification generated by decomposition of production and intensified competition in global markets, is driven by developments in IT tools, the uses they are being put to, and the networks they run on. The service transformation is changing how firms add value, affecting the underlying economic activity in countries around the world.

This paper introduces the notion of the services transformation, placing it in the historical context of production and competition. Second, it traces the advent of the Internet as a critical building block of this transformation. Third, we consider national strategies for capturing value in this new era. The experiences of Japan and Korea, successful in deploying high-speed IT networks, but facing unexpected challenges in using them to capture value, highlight several features of the services transformation.

Introduction

There is currently a fundamental transformation of services, a transformation that is central to the growth of productivity and competition in the global economy. This transformation is driven by developments in IT tools, the uses they are being put to, and the networks they run on. The service transformation is changing how firms add value, altering the underlying economic activity in countries around the world.

The purpose of this paper is threefold, unfolding in three parts. First, it introduces the services transformation, a new vantage on the transformation of services. It is the transformation of services activities, not the scale of the services sector that matters.

Second, we put this transformation in the historical context of production and competition, as a response to increasing pressures for commodification from global markets. We then show how TCP/IP and the Internet as a common, open platform which grew out of the US regulatory and market context, was a critical building block for the transformation.

Third, this paper considers national strategies for capturing value in this new era. The first focus was on IT network infrastructure, with countries around the world racing to gain high-speed access to the Internet as a platform. The experiences of Japan and South Korea, which succeeded in this task, reveal the nature of challenges of using those networks. We find that the politics, policies, and market conditions conducive to building IT networks are very

different from those needed to foster experimentation and innovation to capture value from services utilizing the high-speed IT network environments, and that countries face new roadblocks in taking domestic service innovations abroad.

Part I: The Services Transformation

Service activities themselves are changed when they can be converted into formalizable, codifiable, computable processes, processes often with clearly defined rules for their execution – an Algorithmic Revolution (Zysman, 2006a; Zysman, Nielsen, Breznitz, & Wong, 2007). The core story of the services transformation is not about the growth in quantity or value of the activities we label services, a residual category of non-manufacturing in national accounts. Rather, it is about how the application of rule-based information technology tools to these service activities has the potential to *transform* the services component of the economy, altering how activities are conducted and value is created. This transformation involves a fundamental change in business strategy and market competition, work and its organization, the basic rules of the economy, and the macro-economic dynamic. Firms are being reorganized, markets reconfigured, business models transformed, and entirely new service offerings generated.

Services: From Sinkhole to Driving Productivity

Services were once seen as a sinkhole of the economy, immune to significant technological or organizationally driven productivity increases – as Baumol put it in the 1960s, it still takes the same amount of labor to play a Beethoven quintet (Baumol, 1967; Baumol & Bowen, 1966). Baumol has recently reasserted his core claims that the productivity-stagnant portion of services will hinder productivity growth – claims which have been largely taken up by social science literature (Baumol, 2007). However, services are now widely recognized as a source of productivity growth and dynamism in the economy that will change the structure of employment, the division of labor, and the character of work and its location (Triplett & Bosworth, 2004).

The conventional view, summarized effectively by the National Academy of Sciences, is that growth since the mid-1990s was largely driven by the rapidly falling cost of processing power (following "Moore's law," which predicted that the number of transistors in integrated circuits – roughly, processing power – would double every two years) and heavy corporate investments into IT (Jorgenson, Ho, & Stiroh, 2005; Jorgenson & Wessner, 2007).[2] However, remarkably, the NAS report only notes the significance of services and IT in a couple sentences; "A structural change most associated with the New Economy today is the transformation of the

[2] As Jonathan Murray of Microsoft puts it, Moore trumped Baumol. (Murray, 2007)

Internet from a communication media to a platform for service delivery [which has] contributed to the remarkable growth of the U.S. service economy… new business models, enabled by the web… will contribute to sustaining the productivity growth of [sic] U.S. economy." (Jorgenson & Wessner, 2007, pp. 22-23)[3] What they treat as an endpoint, this paper takes as the beginning.

The Services Transformation in Historical Context

We must situate the current transformation of services historically, as it is the latest chapter in the evolution of production and competition – nationally grown developments interacting on a global stage.

Mass production, epitomized by Henry Ford's Model T, was the first major 20th century revolution in production. It was, in essence, an American innovation, characterized by "high-volume output of standard products made with interchangeable parts connected using machines dedicated to particular tasks and manned by semiskilled labor." (Zysman, 2006b, p. 24) Mass production also represented a set of organizational innovations that could unleash radical productivity gains from a new "enabling" technology – electricity – which took approximately half a century to realize.[4] (This point is germane when considering the

[3] For the first insight, they cite: (O'Reilly, 2005)

[4] With electric motors powering individual machines, factory floors could be reorganized around a new logic of production, rather than around the need for machines to be connected by belts and shafts to a central steam engine. However, these organizational innovations and their implementation took nearly half a century, since without the reorganization of factory floors and organizations, early electric motors were simply substituted for the central steam

"productivity paradox" of the 1990s, when economists could not find productivity gains from the heavy investments in IT since the 1980s until organizations could take advantage of the technology (Cohen, De Long, & Zysman, 2000).)

The era of American industrial primacy was challenged by a set of Japanese innovations, loosely labeled *flexible volume production* or *lean production*, in which volume production was reconceived and reorganized (Cohen & Zysman, 1987; Womack, Jones, & Roos, 1991). Japanese lean production was the product of corporate attempts to reduce and eliminate excess inventories and build quality control into the production process itself, in the national context of an industry initially protected from imports but gradually exposed to international competition. Lean production enabled incremental quality and design improvements and a wide variety of product offerings, while decreasing costs. Production became a strategic tool and gave Japanese firms, particularly in complex mechanical and electro-mechanical goods, considerable advantage in global markets (Tyson & Zysman, 1989).

The second challenge to American industrial primacy came from Europe, with production systems variously labeled *flexible specialization*, or *diversified quality production* (Boyer & Saillard, 2002; Piore & Sabel, 1984; Zysman, 2006b). Often based on principles of craft production and employed by groups of small companies in particular regions of Italy and

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engine. (David, 1990)

Germany, flexible specialization delivered distinctive performance or quality, adding high value in short production runs. Skills and the flexibility in their deployment through horizontal linkages between producers, rather than low wages or Japanese-style production process improvements, were the basis of competitiveness.

An American comeback followed. It was built on the emergence of new consumer electronics, digital electronics from PCs through Internet backbone equipment, and a reconfiguration of industrial production. Component driven competition facilitated vertical de-integration of companies and gave decisive market power to suppliers of critical elements in final products (Baldwin & Clark, 2000). It was a period in which the winners were companies like Microsoft with its Windows operating system and Intel with its processors – a production paradigm which Zysman and Borrus have labeled "Wintelism" (Borrus & Zysman, 1997). The development of cross-national production networks allowed American producers to specialize in design or particular elements of production, outsourcing what they perceived to be low value-added activities.(Borrus, Ernst, & Haggard, 2000) Thus, the rebound of American producers was not based on a reversal in their loss of advantage in producing electromechanical products, but was instead a shift to advantages rooted in software, control of particular segments of final assembled products through intellectual property, and chip-based system given

functionality by software.[5]

The era of Wintelist production and cross-national production networks set the stage for the current global, digital era. The new challenge for companies in advanced industrial countries is to avoid ever-faster commoditization – pure price competition for essentially substitutable goods and services. IT driven services is increasingly an escape route from commodization.

Creating Value in a Global, Digital Era: Services to Escape Commodification

In the classic view, global competition begins with falling transport and communication costs leading firms to do more and more business over distance. It becomes a flat world in which IT tools, cross national production networks, outsourcing and offshoring allow corporations to reconstitute themselves as orchestrating lego block-like nodes of activity, buying R&D from here, production capacity from there, and so forth (Berger & MIT Industrial Performance Center., 2006; Friedman, 2005). The decomposition of value chains with outsourced manufacturing allowed multiple points for innovation and entry by new actors. Governments are constrained since activities of home-grown firms can relocate anywhere, with "immobile resources" chasing "mobile assets."[6]

[5] Apple CEO Steve Jobs put it, poor software was what undermined Japan's consumer electronics industry. (Markoff, 2007)

[6] Quote from Niels Christian Nielsen. (Omae, 1999; Strange, 1996)

However, although the global does mean a larger set of points for innovation, more competitors, and factor price convergence, it is still a story about national developments interacting on a global stage. Lean production, developed in Japan, clearly diffused to production processes around the world. Although not all Japanese companies adopted the Toyota production innovation, lean production would not have developed were the Japanese nascent auto industry not protected from imports and direct investment while gaining access the US and global export markets. Similarly, the Finnish firm Nokia was a unique firm within Finland, but it much less likely to have dominated global mobile handset markets were GSM not adopted as the mobile standard in Nordic, then European markets.[7] China's current trajectory of development was rooted in cross national production networks and policies harnessing inflows of foreign capital. India's success as a business process outsourcing and offshoring destination depended on telecommunications liberalization within India combined with an oversupply of transpacific fiber cable, a relic of the US dot-com boom.[8]

The sequence of national stories produces a sequence of challenges in the form of new competitors and new competitive strategies for companies and countries. The result is an enduring tension between the dislocations and challenges of the global against adaptations and

[7] Finland's concerted efforts toward attaining mobile prominence occurred in the context of a broader Finnish move away from supplying the Soviet Empire to become a technology-based innovator. See (Hyytienen, Paija, Rouvinen, & Yla-Antilla, 2006)

[8] See (Dossani & Kenney, 2008; Friedman, 2005).

adjustments of particular firms and places.

Consider next the digital. As information is digitized, it can be stored, moved, and manipulated, allowing information-based activities to be relocated, transformed, and recombined. Traditional product sectors break down into "domains" of competition between businesses generating or using similar types of information. For example, Cannon's greatest global competitor in the domain of generating digital images may be Nokia, with camera-embedded mobile handsets. The block of plastic and electronics we carry as a cell phone already functions as a PDA, music player, watch, GPS locator, and in some countries a television, train pass, barcode reader, and biometric scanner, challenging incumbent firms and products in previously distinct sectors.

Competition in the global, digital era is characterized by unexpected, constant disruption, both from countries and companies. A myriad of new entrants in various points along value networks and production processes, combined with the increasing ability for granulized production and the purchase of business processes on markets, causes firms to experience an intensified struggle against ever-faster commodification.[9]

It is in this context that services are increasingly seen as a way to avoid commoditization, a source of adding value. IT tools allow the fundamental reformulation of business models – not

[9] By commodification, we refer to a good or service exchanged on markets without particular advantage to any buyer or seller, with little possibility by sellers for charging a premium to gain a substantial margin.

just automation, but a reformulation. Transformed business models allow application of the new tools, which can then realize vast productivity gains, much as electric power unleashed dramatic productivity gains only after factory floors and production systems were reorganized. Before turning to the services transformation itself, we must first differentiate our Algorithmic Revolution-enabled services transformation from other commonly understood transformations of services.

The Fourth Service Transformation: Revolution and Delusion

The conventional discourse emphasizing the importance of services in the economy often conflates and confuses four interconnected stories (Zysman, 2006a). The *first service story* is an accounting error, or perhaps better a matter of financial engineering. Activities outsourced from manufacturing were relabeled as services; a window washer working in a GM car plant was classified as a manufacturing employee, but when the job was outsourced, the same employee performing the same task was counted as a services employee (Cohen & Zysman, 1987). While outsourcing often does facilitate innovation, we must be clear that much of the early growth in the proportion of services in the national accounts was capturing only the transformation in where the activities were housed. *The second story* is about changes in what consumers buy and what businesses use to produce and distribute their products and services. As incomes rise and

commodity product prices drop, a larger proportion of the consumer market-basket shifts to services.[10] The *third service story* involves the transformation and outsourcing of household tasks. Especially as enter the workforce, previously unpaid domestic work such as washing, child-raising, and grocery delivery, is converted into commercial, marketized services.[11]

The transformation of services that is our focus, is the *fourth* transformation, with services activities changing with the application of IT tools, when they can be converted into formalizable, codifiable, computable processes – the Algorithmic Revolution.

It is also important to note that we not focused solely on the evolution of IT tools themselves or precisely how they are deployed. The delusion that often accompanies the algorithmic revolution is the belief that the tool alone will add value. While IT tools open possibilities for value-creation, capturing those possibilities and actually creating value means reorganizing social and business activities, processes, and strategies.

Understanding the Services Transformation

Let us now outline key characteristics of the services transformation, not as an exhaustive overview, but to show the texture of this new thrust of inquiry.[12]

[10] This is shown by per-capita income and personal consumption figures constructed from U.S. Department of Commerce, Bureau of Economic Analysis July 2001.
[11] For a complex and interesting analysis of this transition see: (Thistle, 2006)
[12] See Stuart Feldman, Jonathan Murray, Niels Christian Nielsen, and John Zysman (forthcoming) for details.

Services are increasingly where firms attempt to locate their value-added activities, in a variety of ways. Leading-edge firms are reformulating their business models by embedding products within service offerings, and giving them new functionality to avoid commoditization. IBM repositioned itself, shifting from selling servers to selling business services with servers embedded, getting rid of its PC division entirely. Apple's iPod is a (outsource manufactured) product, but it owes much of its commercial viability and success to its seamless connection to the iTunes software and online store (a service). The contrast is with Sony, whose manufacturing capabilities could have matched those of the iPod, but could not link it to an attractive service package, nor take advantage of its massive store of content in Columbia entertainment. Intevia, a company listed on the Australian stock exchange, provides high end clients such as Boeing, not simply with "fasteners," but "intelligent fastening solutions" that allow computers to wirelessly control the action of fasteners. All these firms use the Internet as at least part of the delivery for their services.

The line between product and service is blurring, especially with the advent of web-enabled services. Software which used to be a product in the sense that it was distributed on physical media, is now increasingly repositioned as a service. Quicken, a software product if purchased on a CD in a box, becomes a service if the same software engine runs on the web, charging for access. Even enterprise solutions and applications targeted at corporate use are

increasingly delivered over the web, with users paying by the amount they use the service.

Firms are increasingly becoming agglomerations of services purchased on markets. Production capacity and R&D capabilities, accounting, other business functions, and even corporate strategy are part of the portfolio available, with information to coordinate the various tasks flowing through the Internet backbone. Outsourcing is not new, but increased standardization (and the increase of raw computing power that renders software bridges across different standards practical) of the software interfaces between enterprise solutions for functions such as accounting, personnel management, and the like, is allowing market-purchased corporate activity to go deeper into core firm activities than ever before. Firms are therefore looking to find new combinations of market-purchased services and core competencies to give them market advantages, since the services themselves are available to competitors as well.

The Algorithmic Revolution facilitates breaking apart activities and sending some portions across the world, actions which companies are undertaking to pursue higher value-added activity. Well known examples include doctors in India reading X-rays taken in the US and sent as digital images, and the McDonald's branch where the drive-thru order microphone connected to an operator miles away, who entered the information into the IT system which sent it back to the local kitchen and cashier. Industrial operations can also be transformed and taken offered abroad as services. A Chilean mining company began using IT

tools to operate machinery remotely from outside mine for safety, but discovered that once it did so, it could offer mining "services" around the world. The Finnish crane and elevator company, Konecranes, originally operating mostly in shipyards, harbors, and industrial manufacturing, has repositioned itself as offering "lifting solutions and services" to attain higher value.

Entirely new services, such as Google and social networking sites, have also used the web as a playground for experimentation, innovating in new services that alter the very way people use the Internet. A wave of "Web 2.0" services such as Google and Wikipedia become platforms in of themselves, taking advantage of individuals adding their own value to create self-sustaining network effects, reaching the edges of the web, often engaging in on-the-fly improvements and constant experimentation (perpetual Beta). With applications such as Gmail and Google Docs, Google showed that full-fledged web-based applications are viable, and the ease with which Google Maps data can be hacked or pulled out of the searches have led to "mashups" where data from Google maps has been overlayed with data from another source, such as Craigslist (www.housingmaps.com) (O'Reilly, 2005).

As existing services activities are transformed by IT tools, so are the worker skills required. Long term nursing in a home is different from data monitoring and intervention, and even more distant from the skills to develop the systems in the first place. Different people in different places trained in different ways will be involved.

Much of the innovation is around the adoption and effective implementation of IT tools. As Stephen Cohen, Bradford De Long and John Zysman have argued, "At each point in the past forty years the critical step in the transformation of technical potential into economic productivity has been the discovery by users of information technology of how to employ their ever-greater and ever-cheaper computing power to do the previously-impossible."(Cohen et al., 2000, p. 15). The point is that the advantage of IT tools is captured by organizations. The revolution is about more than just new technology, it is "about where and how these new technological tools, these tools for thought, are used by industries, organizations, and people to transform what they do and how they do it and to do wholly new things." (Cohen et al., 2000, p. 8). The IT enabled Service Transformation is driven by the advantage that can be captured from private and public entrepreneurs reorganizing firms, administrations, reconfiguring markets, inventing new business models, reconstructing existing services and generating entirely new service offerings.

Socially Rooted Services – Recasting Rules, Regulations, and Conventions to Capture Value

Services are deeply rooted in social rules, conventions, and regulations. Consequently, capturing the value possibilities in the algorithmic transformation inherently means recasting the rules, regulations, and conventions in which the services are embedded. There are implications

both for the process of transformation, what it takes to accomplish the transformation, and for the kinds of services and tools that evolve.[13]

The implementation of new technologies, and the adoption of new business models and strategies, involve complex transitions. These transitions are not just about adopting a new technology, or about a shift from one market equilibrium to another, but rather a broader shift from one policy regime and set of market signals to alternate policy regime and set of market signals. Social and economic transformations always involve winners and losers, and hence are, in both a large and small sense, political. It is a tumultuous process as economic wellbeing and social positions are recast and reinvented.

In a small political sense there will be the struggles around and within the organization of companies, about shifts in required work skills, the relocation of work and displacements of workers. Again, even these smaller stories are never just technical, but, involving shifts in position and roles, they are always fraught with conflict.

In a larger political sense there will be battles about the rules of providing services, who can be providers, how quality is maintained, who gets to use what information, as well as about how losers are compensated and potential winners supported. Those who would implement the new tools, reorganize services and service delivery, must understand, almost begin with, the

[13] Scholars on services innovation fail to make the comparative analysis of regions; for most authors, regions are flat and strategies are fungible across time and space. We counter that this is not true.

entrenched social character of services, of market regulation and labor market dynamics. That will apply to the end user, a health care company or a bank, to the IT services company, or to the regulator.

Many aspects, many constituent elements, often unexpected, can be changed or even globalized. For example, an IT service organization for the Danish government was first reorganized, then privatized, and then sold to IBM. But the processes of change, the dynamics, will be rooted in the structure of rules and regulation.

As such, this thrust of inquiry can contribute to ongoing scholarship exploring the varieties seen across the world in how political economies of advanced industrial and emerging countries are organized, how they are changing, and what is driving those changes (Berger & Dore, 1996; Hall & Soskice, 2001; Streeck & Thelen, 2005). By understanding the nature of the services transformation, we can explore new pressure points for change, and how those pressures play out across differently configured regions. We now turn to the national origins of one of the foundations of the services transformation.

Part II. The Evolution of Networks and the Services Transformation

One of the critical building blocks for the IT-enabled services transformation was the emergence of the Internet as a common, open platform. This open platform, enabling firms to experiment, innovate, refashion their business models and reorganize their activities to capture productivity gains, grew out of a specific set of US regulations over IT networks. The three layer model we introduce in this section is useful to sort out the interactions between policy and market actors in its creation.

US firms were able to take advantage of the platform at an early stage, enabling them to play a major role in driving the services transformation. This early US advantage focused the attention of other countries on creating domestic infrastructure to connect to the Internet.

The Internet as a Platform for Transforming Activities

Often obscured by the dramatic increases in processing power following Moore's Law, and a conception of the changing nature of communications as simply a lowering of costs, the emergence of the Internet as an open platform was a critical foundation of the transformation of services.

The advent of the Internet as a platform for services delivery has transformed business models. Software, which often used to be a product delivered on removable, and hence, relatively easily duplicated media, was dependant on intellectual property laws (and their

frequent lack of enforcement) in various countries around the world. However, with software delivered over the Internet or via a Web interface, users could only access the front end of the software to input data, then receive output. The business model of Microsoft's Windows operating system when it was delivered on a floppy disc or CD relied heavily on copyright protection and intellectual property rights. Now with Internet-based registration and authentication, it is much less so. Google started out with its algorithms behind the firewalls of its web interface. Moreover, software-as-service, often delivered over the web, allow business models in which providers charge users by how much use the software. The list of transformed business models is long indeed if one thinks of the range of activities commonly performed over the Internet, enabled by business models that depend on the Internet for participation or delivery.

The Internet as a platform greatly facilitated the reorganization of business processes. As large corporations adopted so-called "Service Oriented Architecture" IT systems based on core Internet open standards, they could build IT systems with unprecedented flexibility and extendibility – rapidly, and at low cost. This greatly facilitated the outsourcing and offshoring of business activities, since previous generations of IT systems were often a patchwork of older, legacy systems that could not interface easily with one another. (Hence the large market for "system integrators.")[14]

[14] Murray, J. (manuscript). The GAP Principles: Enabling e-government through effective Information Technology

More recently, the new business models harnessing the web, known collectively, and somewhat amorphously, as "Web 2.0" use the Internet as a platform to radically reorganize the source of value-added activity. Many harness user-generated data to create network effects (such as customer reviews on Amazon or Google maps) or become automated intermediaries that reach the "edges" of the web (such as e-Bay who can intermediate a vast number of small-scale individual transactions) or take advantage of the "long tail" of small websites that account for the majority of sites (such as Google's Adsense that does not require contracts from each website to list its ads) (O'Reilly, 2005). Social networking sites and other web-based applications can function as a platform in of themselves, and peer-to-peer architecture has enabled massive networks such as those of Skype to hold together without substantial reliance on central servers.

The origins of the Internet are well documented elsewhere, but not as a nationally-rooted building block for the services transformation, and not always with a focus on the market dynamics put in place by a set of concrete US policies (Cowhey, Arronson, & Richards, 2008). We engage in a brief review utilizing a convenient three-layer conception.

Governance, Architecture and Procurement. Microsoft Corporation. As Stu Feldman, former VP at IBM noted, the robust nature of the Internet as a platform was highlighted on 9/11/2001, when the loss of a large number of important nodes located in New York's World Trade Center buildings did not bring the entire Internet down.

US Policy Origins of the Internet

The task of sorting out the various actors, complex market dynamics, and myriad of policies affecting the development of IT networks in the US and the Internet as a platform can be simplified by conceiving IT networks in a three-layer stack.[15] The bottom layer consists of *infrastructure*, the physical networks consisting of transmission lines, switches, and other physical elements – in short, the "pipes" for voice and data. The middle layer is a *platform*, consisting of the core open protocols underlying the Internet, as well as certain applications such as the World Wide Web (actually the "killer application" of the Internet in a technical, rather than our functional, conception) and certain Web 2.0 applications and services that can act as a platform in of themselves for services delivery, business process reorganization, and application development.[16] Before the advent of the Internet, this platform layer was a *control* layer, consisting of various private corporate data network providers and early online services that controlled data flows on top of the infrastructure layer. The top layer consists of the *applications/services* that run on top of the platform layer, taking advantage of open protocols. As seen with software-as-services, the distinction between applications and services is

[15] This is a simplified notion that may not satisfy specialists, but the purpose here is to present the core essence to a non-specialists. We draw our three layer conception from the work of Francois Bar and Michael Borrus used a three layer conception of infrastructure, a control layer, and applications/services to great effect in sorting out various market actors, the effects of policy, and understanding misconceptions surrounding policy debates in the mid-1990s. (Bar, 1990) (Borrus, Bar, & Berkeley Roundtable on the International Economy., 1993)

[16] We should note that the World Wide Web, transforming the Internet into a widely accessible platform, was developed in large part by Tim Berners-Lee at CERN (Centre Européen de Recherche Nucléaire) in Geneva, Switzerland. Our intent is not to take give solely credit the US with creating the Internet as a platform.

increasingly blurred, and it is through the applications and services layer that corporations reorganize their activities and innovate with new business models.

Until the 1960s, all three layers were owned and dominated by AT&T; it owned the local and long distance physical telephone infrastructure, exclusively controlled the flow of information (overwhelmingly voice communications), and was the sole provider and developer of applications (telephony). US regulations from the 1960s chipped away this dominance, creating a market structure in which telephone companies were limited to a highly regulated infrastructure layer (AT&T itself was broken up in 1984),[17] the control layer was opened to non-telephone companies such as corporate data networks and consumer online services to create new architectures for data networks,[18] and the applications/services layer, least regulated, was opened up to a variety of new entrants for experimentation and innovation.[19] Although these US regulations were not strategic in the sense of being unified, coherent, and centrally coordinated, and indeed were often halting and uneven, their trajectory remained consistent, supported by key court decisions (Borrus et al., 1993).

[17] In the 1950s and 60s, a court ruling, and later, FCC policy forced AT&T to connect third party equipment to its telephone network. This eventually opened the way for computer modems, innovated and provided by third parties (not AT&T), allowing data exchange over conventional telephone networks. In 1982, the Justice Department's litigation against AT&T (initiated in 1974) culminated in a consent decree breaking up AT&T. It became a long distance company that kept the name, seven local carriers restricted from long distance services and equipment manufacture, and a research and equipment company (which became Lucent). (Nuechterlein & Weiser, 2005).

[18] Therefore, early providers of services reliant on control of data flows, such as corporate data networks, consumer online services, and later, Internet Service Providers (such as Compuserve and AOL), enjoyed relatively light regulatory obligations, and could run their value-added services on top of the traditional telephone network without fearing that the local carriers would offer their own services while excluding the newcomers from using the same transmission capacity.

[19] See (Bar et al., 2000); (Nuechterlein & Weiser, 2005)

By the early 1990s, three layers consisted of the following. A highly regulated market at the infrastructure level was comprised of incumbent local telecom firms and long distance and international telecom firms.[20] The control layer, less regulated, consisted of a variety of firms competing to provide corporate data services, large corporations that had constructed their own data networks, and consumer online services such as Compuserve and America Online, which could access the infrastructure owned by incumbent telecom firms, but were protected from being dominated by them. At the top layer, applications and services were largely those that were tied into proprietary data networks, such as terminals on a large corporation's data system connected to servers in a central location. It was this configuration of markets, strongly shaped by US policy which separated the actors and markets in each layer, that facilitated adoption of the Internet as a common, open platform for experimentation and innovation.

The Internet itself, as a decentralized "network of networks" which exchanged information through a set of common protocols was itself largely a product of US policy and support. It is well documented, but worth reviewing that the original architecture was conceived and physical backbone infrastructure deployed by the Defense Department's Advanced Research and Projects Administration (DARPA) in the 1960s out of concerns about a information security and the possibility of nuclear attack on AT&T centralized circuit-switched network. (AT&T

[20] Regulatory obligations included fees to fund "universal service" obligations to offer services to remote and unprofitable areas.

carried much of the government's communications traffic, and its network was vulnerable to collapse by an attack to one part.) DARPA created the ARPANet, a decentralized network, with "intelligence" residing in the terminals rather than in the network itself.[21] The Internet as we know it today grew out of the ARPANet, which used packet-switched data transmission, the set of open protocols TCP/IP, and was open to anybody that wanted to develop applications and content.

As the Internet developed to link various university project networks, (its open architecture allowed networks with various architectures to connect to each other at a meta-level through the open protocols), the government directly supported the Internet through funding to universities, National Science Foundation grants.[22] It is often forgotten in popular discourse that even after the government privatized the fundamental infrastructure of the Internet to the private sector in the early to mid-1990s, antimonopoly oriented policies actively prevented the Internet backbone from being dominated by specific firms.[23]

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[21] The conventional circuit switched telephone network is just the opposite, with "intelligence" in the network itself that connects the origin of a call to any destination almost instantly.

[22] Measures included: ARPA funding Berkeley to incorporate TCP/IP into the UNIX operating system; the defense department requiring its contractors to adopt TCP/IP to coordinate their systems; National Science Foundation (NSF) grants to a group that evolved into the governing body of the Internet, the Internet Engineering Task Force (IETF), and direct NSF investments of more than 200 million dollars to a TCP/IP network linking universities (NSFnet). (Nuechterlein & Weiser, 2005, pp. 129-130).

[23] After the US government decided to shift the ownership and management of the Internet (NSFnet) infrastructure to the private sector in 1993, Internet Service Provider subsidiaries of major US long distance carriers became the most important firms to carry Internet traffic, since much of the fiber optic backbone of the Internet was owned by US long distance carriers. A "peering and transit" market, largely unregulated, developed among ISPs of different sizes to carry Internet traffic. (For more on peering and transit markets and their emergence, see (Group, Chapin, & Owens, 2005)) In 1998 when WorldCom acquired MCI, an affiliate of Worldcom, UUNet had the largest backbone marketshare worldwide, followed by MCI's affiliate, InternetMCI. Fearing that the combined market share of over

In sum, US telecommunications deregulation and reregulation created a multi-tiered regulatory and market structure that allowed a variety of actors to innovate and experiment in the control and applications layers, which, when combined with the advent of the Internet and the World Wide Web as platform (settling the previous battles over the control layer), became the building block enabling radical transformations of services activity, services offerings, and business models.

The US Early Adopter Advantage

Growing out of this environment, many US firms were able to move quickly in innovating in the services and applications layer with the Internet as a platform to pursue higher value added strategies. Many of these firms were then able to create strong positions in international competition. Moreover, consumer based Internet firms were able to use a large domestic population of Internet users (though mostly through dialup until the late 1990s and early 2000s) to experiment.

Enterprise solution database producers such as Oracle and Peoplesoft, as well as the plethora of companies that specialize in implementing corporate data solutions such as IBM and

50% would allow it to dominate the Internet backbone market, the Justice Department and the European Union forced them to sell InternetMCI. Out of similar concerns, the Justice Department and European Union blocked the proposed merger between MCI-Worldcom and Sprint. ((Nuechterlein & Weiser, 2005, p. 134)

other consulting firms were able to gain vast swaths of industry across the world as their clients.[24] A broad spectrum of innovative and heavy users of IT, ranging from Wall Street, offering sophisticated financial products, to Wal-Mart, relentlessly pursuing efficiency by linking global supply chains with inventory management IT systems, were able to leverage the US front-runner position. Entirely new service innovations, taking advantage of the early adoption of the Internet, beginning with Yahoo, EBay, Amazon, Napster, Kazaa, and later following through Google, Youtube, Myspace, and Facebook grew out of the US as a launching pad, fundamentally shifting the very uses of information around the world.

Let us sum up what this paper has covered so far. The first section introduced a new thrust of inquiry in to the transformation of services, enabled by the algorithmic revolution. We placed it in the historical context of production and competition as the latest chapter in a digital, global world of ever-faster commodification. We differentiated this transformation from other notions of transformations in services, and elaborated on several characteristics of our notion of the services transformation. Second, in this section we presented the emergence of a common, open platform in the form of the Internet as a critical building block, and how US firms enjoyed an early adopter advantage in global competition. This leads us to the third part of this paper –

[24] It should be noted that another thrust of American industrial advantage in international competition was driven by business services firms offering solutions to firms all over the world. As an illustration, even the Japanese market, long a difficult market for US and other foreign firms to enter despite being the second largest economy for the past couple decades, offered lucrative business opportunities for American firms that offered services unmatched by the Japanese competitors.

the national strategies for capturing value in this new era, and the new challenges they face.

Part III: Beyond Networks, Unexpected Roadblocks for Services Innovation

Our broad research agenda is to analyze how the services transformation unfolds across the globe – the complex political, economic, and social transitions as new technologies and new business models interact with varied national contexts. As a first step, this paper examines one area in which the challenges facing national strategies for capturing value are thrust directly into the domain of the services transformation.

Seeing the US early adopter advantage of the Internet as a platform, countries around the world focused on building IT networks to enabling high-speed Internet access.[25] Yet, countries that succeeded in building high-speed IT networks discovered unexpected roadblocks and challenges to *use* those networks to pursue higher value-added activity through services. The experiences of Japan and South Korea, among the first to succeed in extensive high-speed broadband deployment, illustrate some of these challenges.

[25] A pervasive fear was that businesses would get left behind in productivity growth, and national populations would lose opportunities to gain skills needed to compete internationally. These concerns were magnified and deployment plans accelerated with the advent of consumer broadband, allowing high speed access to the Internet for residential users as well. Developing the networks was the first phase, in which many countries were successful – often arguably more successful than the US (Fransman, 2006).

Building Infrastructure and Broadband: the Easy Part

From the mid-to-late 1990s, Japan and South Korea (hereon, Korea) moved quickly to develop Internet backbone infrastructure and provide high-speed Internet access to their businesses and general populations. Through a mix of direct government investment programs and reregulating the telecommunications markets, both countries succeeded beyond their own expectations.

First, reacting to the US government's "information superhighway" policy initiatives of the mid-1990s aimed at creating high-speed backbones and widespread Internet access, Japan and Korea created government initiatives of their own. They heavily subsidized the construction of nationwide Internet backbone infrastructures.[26] As these backbones came online in the late 1990s, in the context of the US IT bubble, the world's attention shifted to the possibilities of high-speed broadband. Japan and Korea's next focus was therefore to provide broadband Internet access to as much of their respective populations as possible.

The policy challenge for most countries to create broadband access to households is that incumbent telecommunications carriers own the "last-one-mile" of infrastructure, and may not be interested in providing broadband. For most countries, with the telecommunications markets

[26] Korea's "Korea Information Infrastructure Initiative," launched in 1995 and completed in 2005 included various programs to build a backbone, and the Ministry of Information and Communications offered a range of financial support, such as loans and tax subsidies, to service providers. The Japanese government explicitly aimed at creating fiber optic infrastructure to cover virtually all the population, offering carriers investing in broadband facilities loans through the Development Bank of Japan, interest subsidies and liability guarantees through the Telecommunications Advancement Organization of Japan, and a variety of tax breaks. See (Kushida & Oh, 2007)

dominated by former government-owned or monopoly incumbents, the task is therefore to liberalize markets and reregulate incumbents to facilitate competition of a form which yields widespread broadband penetration. Though in somewhat different ways, Japan and Korea succeeded in this task.

Korea's liberalization policies involved licensing new competitors at the local level while strengthening regulations over the dominant incumbent, Korea Telecom (KT).[27] As a result, new entrants began offering DSL, leading to spectacular broadband growth.[28] Seeing this, the incumbent, fearing it would be left behind, shifted course to offer DSL of its own, participating in price wars to maximize its share. These dynamics of competition drove Korea's population penetration of broadband from 9 out of 100 people in 2000 to 25 out of 100 by mid-2005, the highest for any OECD country at the time (Kushida & Oh, 2007).

In Japan, partially as a reaction to Korea's success in expanding broadband penetration, the political leadership initiated a policy drive explicitly aimed at creating market dynamics that would foster broadband buildouts. It strengthened regulation over the former state-owned

[27] The Korean government's policy aim was to attain "facilities-based" competition at the local level, with competitors to KT owning and operating their own infrastructure. To do this, the Ministry of Information and Communications (MIC) could use its existing policy tools – licensing new entrants and regulatory authority over KT – to orchestrate new firms into the market and tighten restrictions over KT to prevent it from engaging in internal cross-subsidization and obliterating the new competitors. The local competitor, Hanaro shifted the terms of competition, as other startups entered the market, and KT abandoned its plans to invest in ISDN, which charged for access by the minute and was potentially more lucrative. See (Kushida & Oh, 2007).

[28] A startup firm, Hanaro, gained over one million subscribers in eighteen months, in a nation of approximately 49 million

monopoly incumbent, Nippon Telegraph and Telephone (NTT), to allow DSL providers to access its infrastructure.[29] A new entrant took advantage of this new regulatory environment, igniting a series of price wars for DSL, and another newcomer began offering high speed Fiber-to-the-Home (FTTH) Internet services (with speeds of 100Mbps, approximately 50 times the speed of the fastest DSL in the US at the time).[30] NTT had little choice but to shift course and embrace DSL and FTTH at low, price-war level market prices.[31] As in the case of Korea, as the incumbent began to dominate DSL and especially FTTH markets, the effect was to rapidly spread broadband penetration. As a result, since 2002, Japan has had the fastest and cheapest broadband in the world (Kushida & Oh, 2007).

Thus, the national strategies of both Japan and Korea were spectacularly successful in attaining widespread, high-speed access to the Internet as a platform. Broadly speaking, direct investments in backbone infrastructure, and reregulating markets towards strategic ends fit within their previous patterns of industrial development. However, they discovered an array of

[29] The government's strategy, the *e-Japan strategy*, explicitly targeted increasing broadband diffusion by means of fostering competition yielding low prices. Rather than attempting to foster competing local infrastructure in the manner of Korea, Japan was focused on forcing NTT to allow other firms to access its infrastructure at favorable terms. The Ministry of Internal Affairs and Communications (MIC) strengthened regulations over NTT, forcing it to offer interconnection into its network at a formula-determined price, and allow collocation rights at low prices. (Collocation refers to the act of placing equipment of competitors within the facilities of the infrastructure owner to enable broadband DSL services, which sends high frequencies carrying data over the same copper lines carrying telephone signals.) MIC also forced NTT, Japan's incumbent former state-owned monopoly carrier, to lease out its excess fiber capacity to other operators.

[30] Softbank, a relatively new startup shifted the terms of competition in 2001 when it initiated a price war in DSL, offering subscriptions at half the market rate. Another startup, Yusen, began offering Fiber-to-the-Home (FTTH) at DSL-influenced low prices

[31] NTT had been investing massively in nationwide ISDN networks and a proprietary fiber service.

impediments to using their network infrastructure towards international competitive value-added strategies, which are proving more difficult to address.

Unexpected Roadblocks and the Complexities of Regulatory Reform

Promulgating and implementing national strategies to facilitate new technologies and service business models taking advantage of the new network environments turned out to be politically and bureaucratically complex. This complexity was driven by the nature of services, which are socially embedded and therefore subject to a wide array of regulations – many of which have their own political logic of reform, making policy coordination all the more difficult.

After Japan's "e-Japan Strategy," the umbrella policy initiative to foster market dynamics to spread broadband, was considered a success, the government initiated a follow-up strategy in 2003, the "e-Japan Strategy II," explicitly aimed at using the network environment to pursue higher value-added economic activity. Target areas included healthcare, food, lifestyle, small medium business finance, intellectual property, labor, and government services, and international competitiveness (IT Strategy Headquarters, 2004).

However, the implementation of this second strategy required policy coordination with a myriad of legislative actors, each with their own jurisdiction over some of the targeted areas,

many of whom had their own institutional prerogatives and concerns over jurisdictional turf.[32] For example, developing new healthcare services and applications utilizing the Internet as a platform, running on top of Japan's high speed broadband and third-generation wireless networks fell under the policy domains of the Ministry of Health and Welfare (MHW), the Ministry of Economy, Trade, and Industry (METI), and Ministry of Internal Affairs and Communications (MIC). The MHW's almost exclusive focus on domestic health-related issues, even at the expense of the international competitiveness of industry, was difficult to reconcile with METI's focus on international competitiveness. Moreover, METI and MIC were bureaucratic rivals to some degree, each trying assert jurisdiction over IT network-enabled services. They set up somewhat parallel organizations and strategies, with METI focused on raising the productivity of various service-related industries, and MIC's "u-Japan" strategy aimed at fostering the use of Japan's "ubiquitous networks."[33] Compared to building the networks, which fell under the jurisdiction of MIC, policy coordination towards strategic ends in services such as healthcare was clearly more difficult.

In Korea, once the Ministry of Information and Communications deemed the spread of broadband to be a success, in 2004 it promulgated the "IT839" strategy to promote 8 IT services

[32] In the Japanese political system, politicians rely heavily on the expertise of elite bureaucracies to promulgate legislation.

[33] Firms occasionally complained that it was unclear which bureaucracy with which they should be consulting.

to develop within 3 or 4 years, targeting 9 component and hardware industries for development. In 2005, it updated this strategy with a conception of "u-Korea," focusing on creating "ubiquitous networks" that could help develop various service industries to become growth engines in of themselves. However, the hardware and network-centered ministry had difficulty articulating concrete policy tools and useful conceptions to foster service innovations, leading to critiques that "u-anything" became an unnecessary fad, and that new business models for services had not been generated.[34]

Unexpected regulatory roadblocks also appeared. In 2006, the Japanese government launched a project linking academia, business, and the government to create a new, national search engine. Though Google and Yahoo were by far the dominant search engines used within Japan, participants pointed to the success of Naver.com in Korea (more popular than Google or Yahoo), and to the potential of Japan's network environment to yield innovations and technological advances in optimizing searches for video, images, and sound (Shigemori, 2006).[35] However, these plans were blindsided by a conflict with Japan's copyright laws.

In late 2007, it became clear that many of the activities that search engines rely upon were illegal according to Japan's copyright laws. Search engines typically send small "robot"

[34] For one such critique, shared by several government participants, see (Misawa, 2006).
[35] Korea's portal, Naver.com used a combination of search engine and Wikipedia-like elements, enabling user-generated content to augment searches.

programs to scour the web, copying websites to their own servers to "cache" them, and create indexes from that information, often including thumbnail pictures and excerpts. As a government deliberation council noted, no matter how interpreted, under Japan's copyright laws, the act of copying websites with copyrighted material on them to "cache" them was illegal, and the acts of creating thumbnails and including excerpts of copyrighted material on search results pages constituted "editing," which was also illegal (MEXT, 2007). In the US, "fair use" interpretations and the Digital Millennium Act made these actions legal, and court cases in Korea had ruled in favor of their legality (Kitaoka, 2007), observers were alarmed that that search engines were not immune from legal risk. Moreover, the government was put in an awkward position of funding and promoting the development of a national search engine, then finding that typical search engine activities were illegal.

The seemingly obvious solution of revising the copyright laws was not as easy as one might expect. Copyright laws fell under the jurisdiction of the Agency for Cultural Affairs within the Ministry of Education, Science and Technology (MEXT). MEXT was not known to be focused on Japan's international industrial competitiveness, and was less inclined to listen to the wishes of business and industry associations compared to METI – the Ministry promoting the development of a Japanese national search engine.[36] Deliberations to amend the law were still

[36] Politician-sponsored legislation can break potential bureaucratic jurisdictional struggles, but these are relatively

underway as of this writing. The cases presented here, of articulating national strategies to take advantage of networks, and unexpected roadblocks, illustrate the potentially complex nature of national strategies facing services. Issues can cut across previously policy jurisdictions that were historically relatively separate, bringing together different sets of regulatory actors and policymaking dynamics.

Skill Composition and Business Environment

Another set of roadblocks in taking advantage of highly developed network environments may lie deeper in the organization of a country's political economy. They may include the composition of skills and the overall business environment. The search for a solution entails a real policy dilemma – simply attempting to copy some elements from successful cases (perhaps too often seen as the US) may not play to the strengths of a nation, but doing nothing is not a political option.

For example, in the US, startup firms and new entrants drove much of the Internet-enabled business model and services innovation. Seeing this, the Japanese and Korean

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rare in Japan, with the vast majority of legislation originating in the elite bureaucracies. For bureaucracy-sponsored legislation, policy coordination is also required with the Ministry of Justice, often criticized by industry for placing a higher priority on the internal coherence of Japan's common law codes than considering the need for rapid implementation of legislation deemed necessary for the nation's industrial advantages. Moreover, another institutional veto point, the Cabinet Legislation Bureau, examines "drafts of all bills, regulations, Cabinet orders, and treaties for consistency with the constitution and legal precedents" regardless of whether they were politician or bureaucrat sponsored (Samuels, 2004).

governments have continually struggled to foster an environment conducive to startup firms. However, they have run up against a wide range of factors in their respective political economies, ranging from the configuration of firms, labor, and the education system.[37] Countries around the world have attempted, with varying degrees of success, to implement a Silicon Valley-style legal and business environment, but since there may very well be multiple paths to sustained success, it is not simply a matter of optimization (Breznitz, 2007).

Yet, certain competencies and skills in a population can matter more than others, and as a policy matter, doing nothing may not be an option (Zysman et al., 2007). For example, Japan is experiencing a shortage of system engineers and software programmers, threatening the ability of firms attempting to offer high end IT systems and business services.[38] This has driven outsourcing and offshoring of much activity – not a problem in of itself, unless the core value-added elements increasingly need to be outsourced, limiting firms' options to pursue high value-added business models.

[37] To illustrate, in Japan since the late 1990s, a range of policy reforms covering areas such as employee compensation (stock options), tax ("Angel" investors tax), university industry ties, and corporate laws (limited liability companies) have made it easier to create startups and reduce the risk that a failed venture leads to personal bankruptcy with no second chance. In addition, business practices and other social and corporate "infrastructure" such as accounting firms, law firms, head hunters, and university-based technology licensing offices have been developing towards a favorable environment for start-up firms. However, disincentives for employees to move from large firms to startups, such as the lack of pension plan portability, a shortage of early stage funding, and general expertise from banks and venture capitalists, still persist. Moreover, the powerful lawyers' industry association blocked attempts by foreign law firms, often considered a part of the "Silicon Valley" model of development by dispensing valuable legal and business advice, to enter Japan until recently.

[38] The Nihon Keizai Shimbun newspaper estimated the shortage of system engineers at 150 thousand, citing cases of major Japanese solution providers such as NEC having to decline major potential clients due to lack of staff. The Nikkei estimates that over half of the approximately 50 thousand experts in high end financial systems software are tied up in the major bank mergers and privatization of the postal saving system, leaving other financial institutions scrambling to find engineers, driving outsourcing and offshoring to India and China. ("System Engineers," 2007)

The solution here may be for the government to assist shifting the skill composition of the nation, such as increasing the numbers of engineers trained as systems engineers, or future "services scientists."[39] However, altering education systems, even in (or perhaps, especially in) countries where governments have extensive control over both public and private university funding, is likely to involve complex political processes and negotiated settlements.[40]

The Domestic Market as a Playground for Experimentation by Others

A potential irony of successfully building advanced domestic IT networks, but lacking the skills or business environment to take advantage of them, may be that the domestic environment becomes a playground for experimentation by others – others who may extract the high value-added elements and sell them elsewhere, including back to the host country.[41]

Japan and Korea are facing this prospect, as some of the IT-enabled massive business process reorganizations are feeding expertise to foreign firms, and data generated from the domestic networks is being analyzed elsewhere. As a dramatic example, Japan's postal service,

[39] UC Berkeley receives a flood of visitors from around the world who want to learn about programs to educate "services scientists," though it is not clear at this stage that anybody is certain what they are.

[40] In Japan, predictably, many are calling for an increase in the number of system engineers trained by Japanese universities, and some parts of the government (METI) are actively interested in changing universities to expand computer science departments. (many graduates of even respected universities end up getting certifications from third party training schools to better their job prospects). However, educational reform is under the jurisdiction of the Ministry of Education, Science and Technology, which tends to be less focused on international and industrial competitiveness, and which some criticize for creating too many universities for a shrinking population as post-retirement berths for bureaucrats.

[41] One example of this dynamic is illustrated by Accenture, which originally offered services to pharmaceutical companies to manage their clinical trial data, but leveraged that to monitor the reactions of test subjects to drugs. ("Outsourcing: External Affairs," 2007)

privatized in October 2007, hired the Silicon Valley startup, Salesforce.com to operate its customer information database. All servers would be located in the US, connected via the Internet ("Postal Outsourcing," 2007). While NTT Data played an intermediary role, given that Japan's population is half the size of the US, with a large proportion of the population with customer data in the post office, this was a non-negligible amount of privacy data to move abroad, into the hands of a startup firm. Salesforce.com may gain significant expertise from managing a database of this magnitude, which may be applicable elsewhere.[42] The Japanese firms that were not chosen to manage the data lost such opportunities (though managing such data clearly does not guarantee the potential to create new value).

Likewise, in 2007, Google and Microsoft began to manage several Japanese university email systems, free of charge to the universities. In effect, this gave them access to laboratories to analyze data flows from young Japanese users – many of whom regularly access email via high-speed third generation cellular handsets with embedded GPS positioning systems and mobile commerce services, potentially allowing Google and Microsoft to develop and experiment with location-based and content-based advertising, possibly linked to spending data. (It is worth noting that core data algorithms and service applications by Google and Microsoft are not developed in Japan, and Japanese have a small role to play in developing them.)

[42] Refer to the Accenture case in the previous footnote.

Moreover, Japan's highly developed broadband environment can actually accelerate the diffusion of "killer applications" from elsewhere. Yahoo and Google dominate search in Japan, and Apple's iTunes store quickly became the dominant online music vendor. The fast broadband speeds fostered rapid penetration and use of Youtube, spawning popular domestic competitors, but without fundamentally new business models.

Domestic Traps of Infrastructure

Success in building advanced domestic infrastructure can also trap innovations in services, applications, and business models in the domestic market if they depend on particular characteristics of infrastructure, or platforms only available in the domestic market.

Both Japan and Korea ran ahead of the world in deploying third generation (3G) cellular infrastructure and services {Kushida, 2008 in press #39}.[43] Carriers, working closely with hardware manufacturers and applications firms, introduced an array of services, including cell phones as debit cards, commuter passes, GPS terminals, biometric scanners, broadcast television receivers, video conferencing, music players with song download services, and access to Internet content optimized for cellular handsets. These services, have, however, remained in their

[43] In 2004, over 85 percent of the approximately 15 million 3G subscribers worldwide were in Korea and Japan. CDMA2000 1x (an earlier version of full-scale the 3G standard CDMA2000) was introduced in Korea in October 2000, and W-CDMA in Japan in May 2001.

domestic markets, largely because many of these services were offered directly by carriers, which continue to be nationally-based. Thus, even if high end handsets capable of these services were sold abroad, they could not be taken advantage of unless carriers offered the services. Even if applications and services firms involved in developing these high end services were to go abroad, they would need to pick countries whose infrastructure was capable of utilizing their services, and convince carriers to adopt their service offerings.

Finally, services that depend on particular "services infrastructure," such as flat-rate 3G data transmission subscriptions for streaming video, are also trapped in the domestic market unless this "services infrastructure" becomes available elsewhere.

Japan's Mobile Internet: Open Innovation in a Domestic Trap

Even if the applications layer is opened up to experimentation and innovation, if the platforms on top for which they run are confined to particular domestic markets, the services and applications are trapped. Japan's mobile Internet services are just that – innovations on top of "open-but-owned" platforms controlled by domestic infrastructure firms, trapped in the domestic market.[44] First introduced in 1999, Japan's mobile Internet platform allowed third party content providers to use it as a platform for experimentation, yielding a variety of application and

[44] The term "open-but-owned" was coined by Steven Vogel and John Zysman. (Vogel & Zysman, 2002)

services optimized for cellular handsets (such as location-based advertising and search) becoming a sizable market in of itself.[45] However, since the platforms exist only in Japan, content providers and service innovators were trapped in the domestic market.

Japan is moving ahead to create another potential domestic trap for open innovation. NTT's fiber-optic based Next Generation Network adds a variety of security and personal identification features, promising to become a platform with which applications and service developers can experiment and innovate. While the fast connection speeds and a variety of infrastructural features not currently available on the open Internet may yield new business models and services, there is a real danger that this will become a platform for another domestic trap.

The contrast for these domestic traps is that Japan's postwar rapid industrial development harnessed competition in the domestic market as a springboard for exports (Tyson & Zysman, 1989). Services, if reliant on services or network infrastructure available only in the domestic markets, cannot develop internationally following this springboard logic {Kushida, 2008 in press

45 Developed as a result of a race between the three nationwide cellular carriers to create services that connected cell phones to the Internet, the "mobile Internet" platforms allowed access to the Internet, but also provided a platform optimized for applications and services optimized for cellular oriented content. NTT DoCoMo, a subsidiary of the NTT, pioneered a revenue sharing business model with its i-mode service, introduced in 1999, by allowing applications and content providers to pay DoCoMo to list their sites on the i-mode menu portal and include monthly subscription fees (usually around $3 per month), with DoCoMo's cellular bill. DoCoMo's two competitors soon followed, with different underlying technologies. However, third parties were free to create content for the "mobile Internet" services, coded in variants of html developed by the carriers, including search engines. Banks, retailers, and entertainment companies, and a myriad of independent service and applications providers ended up creating content, and many businesses reorganized themselves around the flexible information flows this enabled. For a more detailed overview, see {Kushida, 2008 forthcoming #38}

#39}.

Regulating Services: The Tradeoff Between Rapid Adoption and Potential Innovation

Finally, attempts to directly regulate particular services to facilitate their adoption can entail a tradeoff between limiting the scope of a particular service by closely defining it, versus keeping open the possibility for innovation by leaving it unregulated, but risking slow deployment (Kushida & Ogata, 2007).

The contrasting experiences of the US and Japan in the spread of Voice over IP (VoIP), or IP telephony, in which voice data travels over the Internet as packets of data, suggest this dynamic may hold true especially for services dependent on access to incumbent carriers' networks. VoIP spread much more rapidly in Japan than in the US, where it was innovated, largely due to Japan quickly extending its regulatory framework over VoIP. By meeting certain performance criteria, one set of telephone numbers were allocated to VoIP services, and by meeting more rigorous criteria, conventional numbers could be allocated. However, in the US, although conventional numbers could be allocated, the FCC delayed settling the regulatory framework by postponing defining VoIP as an "information" or "value-added" service. This opened the door for incumbent carriers to challenge US VoIP providers through a variety of regulatory arenas, including state governments and courts. Yet, Japan's VoIP is now limited in scope to the government's definitions, while a variety of business model innovations can take

place more easily in the US. In the broad picture, VoIP may be a relatively benign case of this tradeoff between defining to facilitate diffusion and potentially fostering innovation, but in areas such as Next Generation Networks, this tradeoff needs careful consideration.

Conclusion

This paper is a first step in a broader research agenda examining the transformation of services, the domestic political economic dynamics of that transformation, and its influence on competition and politics as that transformation unfolds across the globe. Service activities are transformed with the application of IT tools, altering how value is created as firms seek to avoid commodification. The services transformation fundamentally changes business strategies, market competition, and work and its organization. Firms are being reorganized, markets reconfigured, business models transformed, and entirely new service offerings generated. The services transformation is the next chapter in the historical evolution of production and competition, distinct from the other observed changes in services. A critical building block of the transformation was the advent of the Internet as a common, open platform enabling experimentation and innovation, transforming activities.

Since services are embedded in social rules, conventions, and regulations, capturing the value possibilities inherently means recasting the rules, regulations, and conventions in which the

services are embedded – complex transitions for varied national economies. These transitions do not simply entail adopting new technologies, or shifting from one market equilibrium to another, but rather involve a broader shift from one policy regime and set of market signals to an alternate policy regime and set of market signals.

Capturing the possibilities for adding value from the services transformation entails struggles between different sets of actors, configured differently across countries. Issues include the organization of companies, shifts in required work skills, relocation of work and displacements of workers, battles over the rules of providing services, who can be providers, how quality is maintained, who gets to use what information, as well as about how losers are compensated and potential winners supported.

In this paper, we introduced the experiences of Japan and South Korea with IT network and service development as an initial investigation into how these dynamics unfold. Seeing the US early mover advantage, countries around the world focused on developing their IT networks and facilitating broadband penetration. However, for Japan and Korea, national strategies for building infrastructure and reregulating telecommunications sectors to create market dynamics conducive to spreading high-speed broadband were much easier than using them.

The embedded nature of services gave rise to unexpected challenges, roadblocks, and tradeoffs – ranging from difficulties in articulating strategies to government jurisdictional issues,

skill composition and economic structural challenges. The two countries' experiences also highlighted the unforeseen dilemma in creating advanced IT networks – by running ahead of the world, even if new platforms and network environments for open innovation and experimentation are created, value-add activity and services can be trapped in the domestic markets. This may especially be the case if countries are leaders, but in a direction where there are no followers.

Whenever the fundamental nature of production transforms, with firms altering how they pursue value, we have witnessed complex political, economic, and social transitions. The transformation of services is the latest shift in production and adding value. As we closely examine how this transformation is unfolding across varying national contexts, we will be writing the next chapter in the evolution of global political economy.

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