Rethinking the Failure of E-Government: Industrial Policy and IT Procurement in Japan

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Abstract
Why do governments fail to harness the potential of information technology (IT)? E-government remains strikingly inefficient in many countries, even though governments have poured in substantial financial resources into upgrading their IT infrastructures. In order to answer this question, this paper focuses on the case of Japan’s failed attempt to introduce the Juki-card, a national ID system that has been largely ignored by Japanese citizens. Based on newly-acquired data on IT procurement in Japan’s local governments since the 1960s, this paper argues that the promotion of the domestic IT industry before the age of e-government unintentionally resulted in the proliferation of vendor-specific systems that were incompatible with each other, making it difficult for the government to later introduce a national ID system based on a unified communication network. This paper suggests that a successful industrial policy for the IT industry may subsequently have had a perverse effect on the development of e-government.
1. Introduction

Although many have argued that the power of information technology (IT) will drastically improve the performance of government organizations, IT infrastructure has yet to meet its potential.

When e-government is narrowly defined as “the tools of citizen-government online transactions” (Behn 2007, 219-220; Mayer-Schönberger and Lazer 2007, 1-6), e-government can be considered highly successful in many countries. Industrial countries are generally ranked highest on the United Nations (UN) E-Government Development Index (EGDI). West (2005) also shows that governmental websites are of greater quality in countries with higher per capital GDP.

When e-government is broadly defined as “the entire use of information and communication technologies in the public sector” (Janssen, Rotthier, and Snijkers 2004), the record of success is much more uneven. Based on this definition, e-government not only requires the installation of IT infrastructure, but also a strategy for managing the flow of government information. While there is widespread acknowledgement that the level of e-government services can be measured by a more comprehensive set of indicators (Potnis 2010; Accenture 2014; United Nations 2014), and that there will be a linear development of e-government according to a number of “stages of development” towards the vertical and horizontal integration of existing organizations (Hiller and Belanger 2001; Layne and Lee 2001; Wescott 2001), recent literature has shown that there has been generally very little progress in adopting organizational changes even in the most advanced countries (Coursey and Norris 2008; Norris and Reddick 2013).

In order to explain the underdevelopment of e-government, this paper conducts a case study of Japan. Despite its huge success in creating an indigenous IT industry, Japan has nevertheless been slow to adopt many of the e-government policies that have been promoted by its advocates (Sunada 2013, 11). When compared with South Korea, a country that is similarly known for its high-tech industry and also for its highly advanced e-government, Japan’s score on the UN’s EGDI is almost identical, even though Japan’s e-government has lagged far behind its neighbor. 32.9 percent of South Korean citizens have used digital residential certificates in 2014 (MOPAS and NIA 2014), while the same figure for Japanese citizens was only 5.7 percent (MIC 2013). As of today, e-government has very little presence in Japanese public life. This paper shows that a key element of this failure in implementing e-government is actually a legacy of Japan’s highly
successful industrial policy in the IT sector.

The rest of the paper proceeds as follows. The second section briefly describes the problem in Japan’s e-government, and shows why the previous theories of e-government development do not provide an adequate explanation. The third section traces the development of Japan’s postwar industrial policy in the IT sector, and explains how Japan’s industrial policies had the unintended effect of locking local governments into vendor-specific contracts, closing off the path to a development of a nationally integrated communication network. In the final section, this paper will discuss the limits and implications of this research.

2. Explaining Japan’s Inefficient E-Government

2.1 The Problem of Network Integration

Japan’s e-government is highly fragmented and notoriously difficult for ordinary citizens to access. Citizens are required to purchase a special-purpose device to use the electronic tax filing system of the National Tax Agency. Private companies need to install special software for the electronic submission of social insurance claims to the Ministry of Health, Education, and Welfare. As a result of these inefficiencies, there is a large gap in the number of users between e-commerce (78.3 percent) and e-government (16.2 percent) (MIC 2013). This discrepancy demonstrates that while the Japanese public is ready to reap the benefits of e-government, the government has been slow in providing the adequate services.

The most recent attempt to upgrade Japan’s e-government was the establishment of the Social Security and Tax Number System (My Number), a new national identification (ID) system. Starting in October 2015, the government has begun providing every resident with a 12-digit ID, for the purpose of integrating personal information on taxes and social security. By replacing the Basic Resident Registration Card, the “Juki-card” system, the My Number has been celebrated by many analysts of Japanese e-government as a major institutional change. In contrast to the strict limitation on the use of personal information under the Juki-card system, the new ID system enables a more extensive use of registration information by government organizations¹ (CLIC 2012, 13-15). In theory, the My Number will make it much easier for Japanese government agencies to integrate their databases, and provide a wider range of online services to citizens.
The My Number was created as an entirely new ID system despite the vast amount of financial resources already devoted to the Juki-card, because the previous system was a complete failure. After being launched in 1999 as Japan’s first attempt at connecting its local government’s residential registry system through a single communication network, this system had been largely ignored by Japanese citizens. By 2013, the number of ID cards (Juki-cards) issued by the government was only about 6.7 million (MIC 2015), meaning that no more than 5 percent of the whole Japanese population had ever used the system.

Why did the Juki-card system fail? While there were several factors that led to the limited use of the Juki-card, the foremost problem was the disintegration of its computer network system, the Basic Resident Registration Network System (“Juki-net”). In late 2013, the network experienced a massive breakdown, with broken characters appearing on-screen when local government officials tried to read the information that had been previously stored on the network (Nikkei Computer 2013). Involving as many as 231 local governments, this malfunction triggered criticism from analysts who were concerned about the future of the Juki-card system.

The reason for this systemic breakdown was the incompatibility of character codes used by the mainframe computers in Japan’s local governments. In general, character codes should follow the international standard (ISO), and the character code of the Juki-net was also initially designed as an open system according to the ISO standard². However, when it came to actually implementing the Juki-net, the government could not begin from a blank slate: the network was built by simply connecting the mainframe computers that were already in use in local governments before the launch of the Juki-net. Since each of the vendors that supplied the computers to the local governments had created their own character codes tailored for their own systems, those computers were not built to be compatible with each other. Therefore, the Juki-net had to create a new set of character codes by combining the codes that were used by those vendors. As a result, the Juki-net became incompatible with standardized operating systems such as Linux (Yasuoka 2013, 827).

Therefore, the key to accounting for the failure of Japan’s e-government is to explain the lack of integration of the IT infrastructure among the government organizations. Although many critics both within and outside Japan have criticized the Juki-card system as an attempt to build a “surveillance society” (Wood, Lyon, and Abe
2007; Ogasawara 2008), these critics have overlooked the organizational failure that prevented this ID system from reaching its full potential. The aim of this paper is to bridge this gap and thereby provide a new way to explain the development of e-government.

2.2 Theories of E-Government

In contrast to the optimistic predictions “linear models” of e-government that predicted a steady integration of government organizations (Hiller and Belanger 2001; Layne and Lee 2001; Wescott 2001), the actual organizational adoption of e-government policies is still relatively under-theorized. It has been argued that both internal and external factors work against the use of information technologies in public organizations.

On the one hand, organizations tend to maintain their previous patterns of behavior even after the installation of new IT equipment. Fountain (2001)’s case studies of the U.S. government show that government actors resist new technologies when these technologies require them to change their organizations against their institutionalized patterns of behavior. Other case studies that focus on developing countries also tend to emphasize institutional or cultural contexts and deny a linear progression, showing that in many cases, the models of e-government in developed countries did not work in developing countries (Heeks 2002; Basu 2004; Maumbe 2008; Schuppan 2009).

On the other hand, the power of the IT industry may prevent the government from introducing the appropriate technologies. Dunleavy et al. (2006) explore the external factors that weaken government IT performance through a cross-national analysis of seven countries, and show that the power of the IT industry has a negative influence on the effectiveness of government IT projects, and that competitive markets result in better government IT performance. In the case of Japan, they highlight the lack of IT expertise of Japanese bureaucrats and the power of the vendors.

These arguments partly explain why Japan has failed to build an integrated computer network among its government organizations. Bureaucrats have been blamed for their lack of expertise in hanging on to the notoriously expensive vendor-specific “legacy systems” purchased long ago (E-Japan Committee 2003). In turn, IT vendors have been blamed for securing their contract at an exceedingly low price for the initial development of the computer systems, and then renewing the contracts over the subsequent years at a far higher price for maintenance of those systems. In general, it has been difficult for the agencies and local governments to switch to a different vendor once
they have made the initial choice for developing their computer systems (Ishibashi 2005, 14).

However, these arguments do not explain the more fundamental causes that created those conditions in the first place. If the IT vendors have prevented the government from creating a more integrated digital network, how did those IT vendors become so powerful in the first place? Considering that Japan's bureaucrats have been regarded as much more powerful than their counterparts in United States or Europe (Johnson 1982; Samuels 1987; Okimoto 1989; Evans 1995), it is unclear why they have failed to control those IT corporations.

This paper argues that Japan's failure in building an integrated computer network among its government organizations was an unintended consequence of its industrial policy in the past. In the language of historical institutionalism in political science, Japan's failure to develop an efficient e-government was an outcome of a highly "path-dependent" process. According to this perspective, governments initially choose their policies by focusing on short-term interests without regard to its long-term consequences. Those policies then become locked in as they generate their own supporters within society by providing them with resources and information (Pierson 2004, 30-40). In this sense, policies become institutions over the long run, making it difficult for later policymakers to reverse course, even after the policy environment has been completely changed. The next section shows how the Japanese government promoted the IT industry during the early postwar period and thereby created a highly fragmented structure of IT contracts, subsequently becoming locked into this inefficient outcome before the age of e-government.

3. Case Study
3.1 Japan's Postwar Industrial Policy

Japanese societal use of information technology has seldom lagged far behind other advanced countries. Japan has been one of the largest markets for computer purchases. Figure 1 plots the cross-national relationship between the size of the economy and the scale of computer purchases in 1973. The x-axis shows the size of the economy on a log scale, measured as the Gross Domestic Product (GDP) for each country. The y-axis shows the annual computer purchases within each country in US dollars. The graph shows a strikingly linear relationship, especially among the advanced democracies. Japan is
approximately in the same position as Germany and the United Kingdom, which were at roughly the equivalent level of economic development.

However, these figures do not show where these computers were produced. This is an important factor to consider in judging the overall development of the government’s use of computer technology, especially because the computer industry has always been deeply involved with government policies since its beginnings in the United States. The U.S. government and the military have influenced not only the progress in computer technology, but also the commercialization of computers. On the one hand, the U.S. Navy poured funds into organizations that promoted the development of computer technology during the Second World War because they had a strong interest in mechanizing cryptanalytic activities. On the other hand, the Korean War that began in 1950 catalyzed IBM’s pouring of resources into the computer business in response to the demand created by the war effort (Flamm 1988, 34-75).

**Figure 1. Computer purchases amount and economic scale, 1973**
total share of U.S. firms exceeded 90 percent of the world market by 1971 (Anchordoguy 1989, 107). Despite the fact that European countries also promoted their national computer firms, the European computer industry was not powerful enough to compete even in their own national markets. Figure 2 shows the percentage of computers purchased in each country that were produced by U.S. firms. It is clear that the share of U.S. computers has gradually increased in the United Kingdom, and has stayed stable in France and West Germany. In 1974, the British firms’ share of the national market had declined to 25 percent, and the same figures in France and West Germany were less than 15 percent (Flamm 1988, 135).

**Figure 2. Percentage of computers installed by U.S. firms**


However, Japan was a clear outlier to this trend. In fact, its computer market was not dominated by the United States. The market share of U.S. companies had actually declined in Japan throughout the 1960s. In 1973, more than half of the computers sold in Japan were produced by Japanese firms (Flamm 1988, 135).

The success of Japan’s IT sector has frequently been regarded as a favourable
outcome of industrial promotion by the Ministry of International Trade and Industry (MITI). The MITI had controlled not only the supply side by limiting foreign competition and ensuring access to foreign technology, but also the demand side by purchasing Japanese computers in government offices and setting up a “quasi-private” company providing a rental system\(^4\) (Evans 1995, 99-103). This outcome is clearly anomalous since its performance is much better than other countries, especially France, which has been considered similar in terms of its active market intervention through its industrial policies (Zysman 1983, 16-18).

Among analysts of Japan’s computer industry, there are both positive and negative assessments of the effects of MITI’s industrial policies. Earlier studies by American scholars tended to focus on the positive effect of government involvement, which enabled the Japanese IT industry to survive in the midst of the dominance of IBM and the failure of “national champions” in the European IT industry (Anchordoguy 1989; Evans 1995; Okimoto 1989). However, more recent studies by Japanese scholars have argued that the industrial policy has created a non-competitive market, and has interrupted IT innovation in Japan, which has been largely left behind in the “Internet Revolution” that occurred in the United States (Takahashi 2009, 269-277).

There are two reasons why the same policies have received starkly different evaluations. First, the evaluations have been based on different standards. Positive views come from the comparison between the Japanese and European IT industries, while the comparison with the U.S. IT industry attracts negative views. Second, previous studies have only focused on the direct effects of government involvement, which concentrate on the commercial performance of the IT industry. Considering that Japan’s IT industry has suffered a decline from its heyday in the 1980s, their assessment is driven by the fluctuations of the international market.

These opposite perspectives both ignore the effect that Japan’s industrial policy for the IT sector has had on government organizations. The effect was that the government became one of the largest users of Japanese computers during the 1960s.

### 3.2 IT Procurement in Japan’s Local Governments

To explain the robust growth of Japan’s IT industry, previous works have pointed to two features of Japan’s industrial policy for computer manufacturers. First, government procurement became the major instrument for securing customers. Second, instead of
creating a single “national champion”, the Japanese government allowed multiple local firms to gain cheap access to technology in return for giving foreign manufacturers the right to enter the domestic market (Anchordoguy 1988, 515-516; Evans 1995, 100; Flamm 1987, 143-144).

What these studies have ignored was how these two features interacted with each other to produce a highly fragmented market for IT procurement, which developed in Japan’s local governments after they made their first purchases in 1961.

The main reason why this effect has gone largely unnoticed is because of the lack of data. A study of market structure on IT procurement requires data on the number of government offices that purchased Japanese computers as a result of industrial policy, and the type of manufacturers that were chosen by those governments organizations.

This paper attempts to solve this problem by obtaining new data on the government purchase of computers between the 1960s and the 2000s. The data comes from official publications by Japanese central and local governments on their IT procurement. These documents contain information on the details of government computer purchases, frequently including the exact amount of money that was paid to each vendor. Both the central government and local governments have been continuously publishing the same kinds of documents that contain information on the computers that they have purchased5. This data allows us to gain a close look at the types of computers that various levels of government have procured over the years.

For an observer of Japanese government, it might seem counterintuitive that the government has published such a transparent set of data, despite its reputation for being notoriously closed to outside scrutiny. Indeed, it was only in 2001 that the Access to Government Information Act allowed the citizens to demand disclosure of government information6. For most other kinds of public procurement, especially those related to public works projects, the government has begun disclosing its information only recently after being criticized for being engaged in corruption.

The reason why the Japanese government has been so frank about its IT contracts was the fact that the introduction of information technology was part of an administrative reform package in the 1960s. While it has been rarely acknowledged by foreign observers, Japan’s high-growth era was also an age of administrative reform. Because the Income-doubling Plan under the Ikeda cabinet resulted in massive pay raises in the public sector, the government began considering reforms to constrain the expansion of personnel costs
(Maeda 2014, 149-175). One of the important means of reform was to install computers into government organizations. The purpose of publishing official reports on IT contracts was to advertise the efforts for improving their services. Typically, in the first few pages of these documents, the comment to “improve efficiency of public administration” is always included. In other words, the intentions of the officials were to show their achievements in streamlining their organizations, not necessarily to provide information on government contracts.

Figure 3 provides an overview of IT procurement among Japan’s local municipalities in the period when they first introduced computers into their offices in the mid 1960s. This is the level of analysis that is the most relevant for the purposes of this paper, since the computer systems that contain residential information have been managed by the municipalities, not the prefectures. Each dot on the map shows the IT vendor that supplied the computer. Strikingly, 96 percent of the computers purchased by municipal offices were made by Japanese corporations, and IBM has made almost no inroads into this market despite being the undisputed leader in the global market at that time. Especially interesting is that there was no single manufacturer which was clearly dominant. While there were only 163 municipal offices that had introduced computers by 1972, as many as 11 manufacturers were competing in this market. This means that the industrial policy for promoting the IT industry resulted in the growth of several major IT companies competing for government contracts, rather than competing with American manufacturers in the global market.
This decision by local governments to favor domestic IT vendors was driven by the orders from the central government. A Cabinet decision in 1963 explicitly encouraged government offices to purchase domestic products, explaining the purpose for this policy as a way to save foreign currency reserves⁹ (Cabinet Secretariat 1963). In the early 1960s, Japan was facing frequent balance of payment problems under the fixed exchange rate. The MITI had the authority to allocate the scarce foreign exchange reserves, which allowed them to implement their policy for promoting the Japanese industry (Johnson 1982, 242-251). As a result, the local governments were pressured into purchasing domestic products, even if they did not intend to support the Japanese IT industry.

When government offices initially introduced the computer, it was mostly considered as a data processor, not a communication device. The local governments mainly used the computer for tax collection, population statistics, and other services that
required extensive calculation. This meant that the officials never imagined that the computer would one day be used for changing their organizational structure through the connection of all government organizations into a unified network system. The computer was simply a huge machine that increased the speed of data processing. After the introduction of personal computers, government officials have called these central processing units “Mainframes” or “Host computers” to distinguish them from personal computers.

Once local governments made their initial purchases, it became increasingly difficult for them to switch to other vendors. Figure 4 shows the manufacturers of mainframe computers used in Tokyo’s administrative ward offices between 1965 and 1995. Each color on the map shows the vendor that supplied the computers to each district, and the map shows a strong continuity in many of the ward offices. Among the IT vendors, NEC, Fujitsu, Hitachi and IBM were seldom displaced by other manufacturers once they established their contracts. The mainframe computers installed by Mitsubishi, Toshiba and Oki were replaced by other manufacturers, not because those systems were compatible with the new computers, but because the products of those vendors did not offer a large enough storage capacity, and therefore could not keep up with the increase in the data requirements. In the case of Nakano Ward, the government never changed the mainframe computer vendor over the whole period after it began procuring its computers from Fujitsu. When officials decided to replace their mainframe computer FACOM241-D in 1974, they simply chose FACOM230-38 because they were concerned that their officials could not operate other systems with the skills that they had acquired on their old computer (Nakano-ku 1975).
This fragmented structure of computer purchases in Japan’s local governments became the direct cause of the inefficiency of the Juki-net when it was launched in 1999. The fact that Japanese computer manufacturers focused on surviving in the market of government contracts had a significant impact on how they developed their systems. If Japan’s IT industry had targeted the global market, they would have designed their products as open systems that would have been compatible with IBM computers that had the dominant position in the global market. If IBM dominated the market, it would have been much easier to build a single network. However, since Japanese manufacturers did not face any incumbents in the domestic market, they took a completely opposite strategy. As a result, most Japanese manufacturers built their computers on their original standards. In the long run, Japan’s local governments were filled with computers that were not meant to be integrated into a unified communication network.

4. Conclusion

This paper has found two features of IT procurement done by the Japanese
government. First, a large number of domestic manufacturers have divided the market among themselves. From an early period, foreign manufacturers have never gained a strong foothold, and there has never been a clear national champion. Second, the local governments have become locked into vendor-specific contracts over time, because Japanese IT vendors have created their own standards for their computer systems. This paper argues that this was a result of Japan’s industrial policy. Because this policy employed the government procurement as an instrument for stimulating the demand for domestic computers, IT vendors focused on capturing a larger share in the national market rather than competing on the global market, when they initially began supplying computers to government offices.

With a focus on the unintended consequences of industrial policies, this paper offers a new perspective on why e-government in Japan has been riddled with inefficiencies. First, concerning the power of the IT industry (Dunleavy et al. 2006), the industrial policies for protecting domestic computer manufacturers have resulted in the proliferation of vendor-specific system modifications that were not compatible with other manufacturers’ computers. This prevented the central government from creating a unified computer network among local governments, which became an important part of the failure of the Juki-net. Second, the way in which computers were introduced in the Japanese government offices also had important consequences for the institutionalized patterns of organizational behavior (Fountain 2001). For forty years, before their computers were connected through LAN cables, government officials have used computers for data processing, not for networking.

Although this paper is a case study of a single country, it has implications beyond Japan. The irony of the Japanese case is that the government had enjoyed a great success in promoting the IT industry before the age of e-government. In fact, it was the very IT industry that it explicitly promoted that has haunted it as a barrier to developing a mature e-government. This means that technological progress itself cannot simply solve the current problems of e-government. In order to devise solutions for current problems, this paper suggests the need to explore the different historical contexts in each country.
Footnotes

1. The My Number was introduced for the purpose of merging tax and social security information, whereas the usage of the Juki-card was strictly limited only to registration services.

2. A standardized character code is needed to input and output information on the standardized operating systems (OS). The character code of the Juki network system was based on JIS X 0221-1, which is one of Japanese translation of the Universal Coded Character Set (UCS) (Yasuoka 2013, 827).

3. The data is from Angus Maddison’s data.

4. In 1960, the Ministry of International Trade and Industry (MITI) set up the Japan Electronic Computer Corporation (JECC), which was owned jointly by the major computer producers: Oki, Toshiba, NEC, Hitachi, Fujitsu, Matsushita, Mitsubishi. JECC purchased computers from the producers and created a rental system for stimulating computer demand. In this way, the owner firms of JECC could set production plans in the non-competitive market (JECC 1968, 21-23).

5. The documents were collected by consulting public libraries and government offices. For the 23 wards in the Tokyo metropolitan area, data on 15 of the wards were obtained from public libraries. Six documents were not able to be found through the library searches, and were obtained from local government offices. In order to fill in the data that was missing from these documents, the purchasing information of 3 local governments were obtained through interviews. Interviews were conducted with officials of the information system division in Sumida-ku, Toshima-ku and Edogawa-ku.

6. This law is formally called the Law Concerning Access to Information Held by Administrative Organs. Although similar policies began earlier in local governments, they began only after the 1980s. In 1982, Kaneyama Town in the Yamagata Prefecture became the first local government that established such policies (Agata 2002, 71).

7. The data is from LASDEC. (1972).

8. Municipal offices in this article include the offices of Shi Ku, Cho and Son.

9. According to JECC, the Cabinet Secretariat’s document affected computer purchases in the government (JECC 1968, 39).

10. Fujitsu and Hitachi changed their strategy in 1970, and released computers that were compatible with IBM’s computers after this period. Developing the IBM-compatible computer was a big challenge for Fujitsu because IBM opened their source code only for
their customer service. Nevertheless, Fujitsu tried to develop the IBM-compatible computer and abolished their original system for taking IBM’s market share before capital liberalization (Ijuin 2007, 22-38).
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