Section 3
THE UTILIZATION OF DX IN KANSAI:
OPPORTUNITIES AND RISKS FOR FIRMS

OSHIMA, Hisanori

1. Introduction

DX is the abbreviation of "digital transformation" and broadly means business model reforms with ICT. According to the Ministry of Economy, Trade and Industry (METI), the definition[1] of DX is that a firm handles drastic changes in its business environment and reforms its products, services and business model using data and digital technologies based on customer and social needs, and that the firm reforms its operations, organization, processes, corporate culture and nature to establish competitive advantages. This paper will describe environmental changes, new opportunities and risks in Japan and the Kansai Area, assuming DX mainly for firms.

2. The Significance of DX in Japan and the Promotion Status

(1) The Significance of DX in Japan

In 2018, the METI pointed out the delay in DX in Japan and has prepared DX facilitation measures for firms since then. We will now look at the significance of advancing DX and its current status.

In Japan, commercial systems such as ERP are used with made-to-order software or customized general-use software in many cases. This may have been because the personnel system of long-term employment and career development was consistent with the long-held system operations that were improved when needed. However, it has been pointed out that operational expertise is lost due to staff replacements, which obscures the system. This becomes a hindrance that results in DX not being carried out. If an update of an operation system is delayed, "A user firm cannot fully utilize explosively increasing data and realize DX, which may lead to the firm losing digital competitiveness. The

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1) The word "digital transformation" was first used in Stolterman and Fors (2004) as the meaning of "changes that the digital technology causes or influences in aspects of human life."(p.689) Since then, the word has been used, emphasizing changes particularly in business.

absence of IT operation and maintenance staff also results in a great technical debt and difficulties in maintaining and inheriting the business foundation." These issues may surface as a massive economic loss. The METI estimates that an economic loss of JPY 12 trillion per year will incur after 2025.

(2) DX Promotion Status

The Japan Electronics and Information Technology Industries Association (JEITA) and IDC Japan surveyed Japanese and American firms with 300 employees or over. The survey shows that 37.5% of Japanese firms answered that they do not implement DX yet (the total responses of "Collecting DX information," "Do not implement DX," and "Do not know of DX"). This greatly exceeds the 17% of American firms (Figure 3-3-1). Another survey conducted by the Information-Technology Promotion Agency, Japan also concludes that many large and medium-sized firms are making little progress on DX practices.

Further, the Japan Users Association of Information Systems surveyed the firms that are listed on the first section of the Tokyo Stock Exchange or considered equivalent on the issues that they want to solve with ICT investment. The survey shows that an interest in "reforming the business model" increased for three consecutive years, but that other issues aiming to ascertain business performance and efficiency still ranked higher (Figure 3-3-2).

As seen, acceleration of DX is prompted in Japan. This paper will discuss opportunities and risks when advancing DX, based also on the environmental
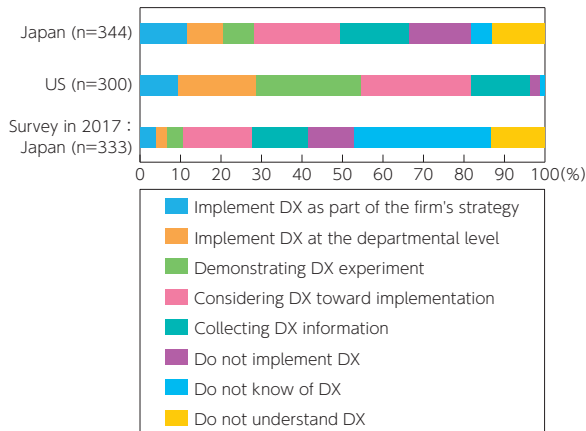
Part I

Part II

Part III

Part IV

Japan (n=344)

US (n=300)

Survey in 2017 :
Japan (n=333)

0   10   20   30   40   50   60   70   80   90   100(%)

- Implement DX as part of the firm's strategy
- Implement DX at the departmental level
- Demonstrating DX experiment
- Considering DX toward implementation
- Collecting DX information
- Do not implement DX
- Do not know of DX
- Do not understand DX

Figure 3-3-1   Comparison of the status of DX efforts in Japan and the US

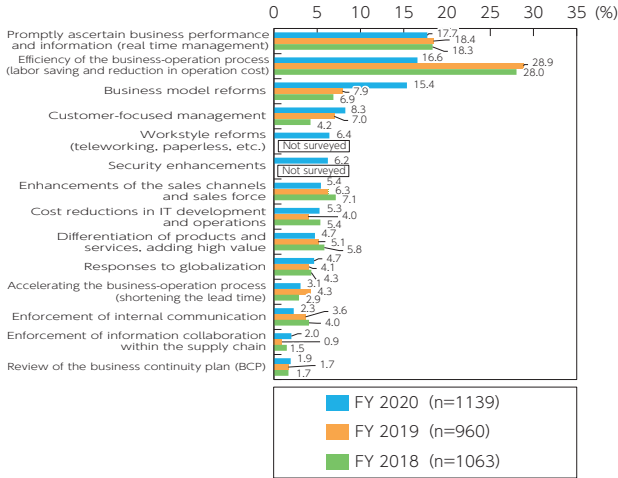Source: JEITA (2021), p. 4, extracted from "*3 The Status of DX Efforts"

Figure 3-3-2   Changes in medium and long-term management issues that firms want to solve with IT investment over the years (from FY 2018 to FY 2020)

Source: Japan Users Association of Information Systems (2021), p.73, Figure 2-2-3

changes due to the COVID-19 pandemic.

3. Changes in the DX Environment Due to the COVID-19 Pandemic

The COVID-19 epidemic that occurred at the end of 2019 has changed the world a great deal. We will now look at the social changes from three aspects: cities, firms and startups. When doing so, we will refer to trends observed at CES (former name: Consumer Electronics Show), a consumer technology exhibition held online in January 2021, and at South by Southwest (SXSW) conferences held online in March of the same year.

(1) Responsive Cities

One of the changes that has occurred due to the COVID-19 pandemic is that cities have demonstrated a "pivot" ability, which means changing flexibly and swiftly in line with environmental changes. Various activities in cities have avoided crowds and moved to rural areas from city centers. People's flow also changed its sphere from wide areas like traveling to narrow areas like daily life. In response to demand generated by these changes, new services have been created. Cities are evolving as "responsive cities," providing new services with the pivot

ability or demonstrating resilience[2].

A typical example of services that have grown with the pivot ability is Uber Eats. It has popularized a service that meets stay-at-home demand by using bicycles as the infrastructure and connecting the last one mile between restaurants and customers by creating a structure where the needs of restaurants, customers and delivery partners are matched.

There are also many kinds of support that can be provided with aging-population-specific services going forward. At the SXSW, a case where a supermarket's delivery network supports resilience was introduced[3]. In the healthcare field, Amazon Care started operations throughout the US in 2021 to provide medical services, and this is exactly what a delivery network is. It is a service that completes the whole process: remote diagnosis, delivery of medication, and dispatch of nurses. In the background to this is a matching technology for doctors and nurses' visits. Although Osaka Prefecture and Osaka City also have a healthcare concept in their smart city strategies, it is limited to remote diagnoses.

Note, however, that the pivot ability may change even the operations of tangible aspects in cities. The City of Austin, known as the venue of SXSW in Texas, has implemented an administrative measure for rapidly popularizing rental E-scooters, such as establishing ridable zones based on riding histories[4].

(2) Firms' Missions

The COVID-19 pandemic has also changed firms' viewpoints. Particularly notable points are that they highlight "social missions" more than ever before and that they have global viewpoints.

Along with the keynote speeches and press conferences at the CES, many firms conducted conferences and exhibitions focusing on changes in lifestyles and workstyles, such as stay-at-home and teleworking, and on sustainability, such as energy saving and climate change (for the keynote speeches, refer to Table 3-3-1). This did not seem unrelated to policy changes due to the US presidential election immediately before the CES, and the viewpoints already seen in the past CES exhibitions were apparently more emphasized. Japanese firms exhibiting there were also asked to show a deep understanding of diversity, the environment, and the seriousness of their initiatives.

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2) For example, from the panel discussion of the CES 2021 "Smart Cities: Traditional City-Living Makes Way"
3) From the panel session "Adaptable Cities: Tech & the Urban Evolution"
4) Refer to http://austintexas.gov/sharedmobility.

| Table 3-3-1 | Outline of each firm's keynote speech at CES 2021 |

Firm	Outline
AMD	Value creation for such sectors as education, jobs and entertainment by using new high-speed processors
Best Buy	Responses to the COVID-19 pandemic prioritizing consumers' safety, and initiatives concerning innovation creation and diversification
General Motors	Electric vehicles aiming for zero CO_2 emissions, and smart vehicles aiming for zero accidents and no traffic jams
Microsoft	Appealing to the importance of using technologies with a conscience, using security risks and the appropriate use of AI as examples
Verizon	Value creation in sports broadcasting, education, transportation and entertainment, etc. using 5G
Walmart	Measures to maintain supply chains in the COVID-19 pandemic, and initiatives concerning climate change and inclusion, including development of human resources

Source: Prepared by the author based on each firm's keynote speech

At SXSW as well, sessions were titled including the words "diversity" and "inclusion" along with global viewpoints, indicating an awareness that firms are a public organ of society. Japanese firms used to have some of these viewpoints. In fact, we may find answers to the latest issues around us and this might be an opportunity to study the old to understand the new.

I believe that advancing DX will require reliable ideas for businesses as well as a sense of crisis. Firms are realizing significant changes in the business background, but they also need to reform their awareness that values to be provided are becoming social factors. If they do not respond to this, they may be unable to maintain their businesses.

(3) Innovation Creation

In the COVID-19 pandemic, new services for meeting stay-at-home demand grew, such as home fitness, online games, and photo-sharing service. On the other hand, startup development aiming to solve medium and long-term social issues has been continuing regardless of the environmental changes.

In 2019, the EU established a fund for EIC (Europe Innovation Council) to support firms in implementing new technologies[5]. In addition, global smart cities in each country have shown developments aiming for innovation creation. One example is the City of Oslo, Norway, known as one of the most advanced smart cities in the world. The City introduced the large-scale event Oslo In-

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5) Refer to the website of the European Innovation Council (https://ec.europa.eu/commission/presscorner/detail/en/IP_19_1694)

novation Week as one of the sponsors at the SXSW[6]. Among municipalities in Japan, Aichi Prefecture sponsors an SXSW event as a startup support initiative[7]. Municipalities also recognize startups as something to bring forth and develop.

Many of such startups regard solving social issues as their primary reason for existing and aim to establish sustainable businesses. Further, startups form teams which attract various human resources with strong feelings. Global-scale competition to hire excellent human resources has begun among startups, and we need to create an environment where the competitiveness of Japan does not fall behind the world.

4. DX Status and New Opportunities in Kansai

(1) DX Status in Kansai

In addition to the environmental changes stated earlier, Kansai has unique environmental conditions concerning DX.

According to the Teikoku Databank's survey, the number of head offices moving out of the Osaka area (Osaka, Kyoto, Hyogo, and Nara Prefectures) exceeded the number of those moving into the area for 29 consecutive years up to 2019. Considering that highly successful DX initiatives are promoted by relatively senior staff like CEOs and officers (Figure 3-3-3), it may be becoming difficult to advance DX based on Kansai's business environment due to its loss of head office functions. I believe that reforming business models associated with DX requires obtaining broad and global information even from Kansai and to foster a sense of crisis and the necessity of DX. We need to consider more how an organization should be in the sense of preventing it from receiving biased information.

In terms of firms' assertiveness toward business model reforms in Kansai, notable movements have been observed in small and medium-sized firms and communities other than metropolitan areas. For instance, Miserubayao in Yao City is an example of a base facility that is jointly operated by small or medium-sized firms in the community for handing down manufacturing and cooperating for creating new value.

In terms of solving regional issues, some municipalities have recognized the need to take measures to address the severely decline population and to

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6) Appeared in the panel discussion of the SXSW "Scandinavia: Re-Thinking Mobility, Munch & Green Biz"

7) Startup Division of Aichi Pref. hosted the online session "Regional Startup Ecosystems by Academic Incubators" at the SXSW 2021 as part of supporting startups that aim for overseas business development. Five Japanese startups made a short presentation there.
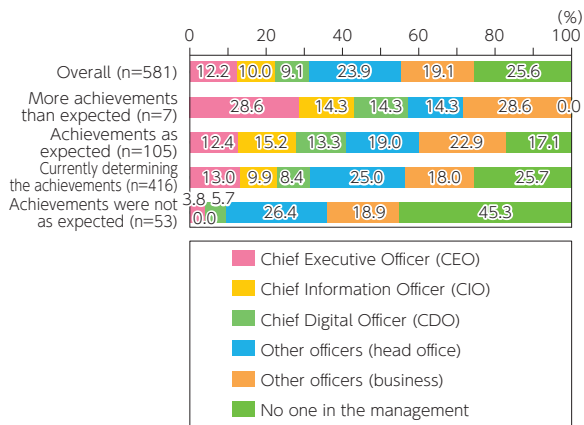
Figure 3-3-3   Digital promotion leader by achievement for digitalizing products and services

Source: Japan Users Association of Information Systems (2021), p. 138, Figure 4-5-3

promote industry, such as Aizuwakamatsu City, Takamatsu City and Kakogawa City. These cities are clearly DX-oriented as one of their future strategies, having a stronger sense of crisis about their survival than large cities. Compared to them, there is little broad collaboration among prefectures in Kansai and local collaboration sharing a sense of crisis.

It is notable that advanced cases with regards to a sense of crisis, speed of change and collaboration are occurring in small and medium-sized firms and provincial cities, or in slightly different places than conventionally.

(2) Trends in New Town Development
1. Large-Scale Projects in Osaka
As is widely known, new opportunities emerge in Kansai. In April 2021, aiming to be designated as the Cabinet Office's Super City-type National Strategic Special Zones, Osaka Prefecture and Osaka City applied for designation with three projects—the Yumeshima Construction, the Osaka-Kansai World Expo, and the Umekita 2nd Project—at two greenfield areas[8] (Yumeshima and the Umekita 2nd Project). In this application, state-of-the-art future social services are planned.

Meanwhile, there is a brownfield development plan for the district to the east of Osaka Castle. This area includes the Morinomiya district where the Osa-

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8) Greenfield refers to new development in undeveloped areas and brownfield refers to redevelopment in existing urban areas.

ka Metropolitan University's campus will be built, and innovation creation is planned with a central focus on the university.

All of these plans are raised in Osaka Prefecture and Osaka City's smart city strategies as area development cases, and they are expected to provide new business opportunities and to collect and utilize data as one of the measures to improve quality of life.

2. Participation of Civic Tech

The participation of civil engineering technology or "civic tech" in solving towns' issues has greatly increased, like the Tokyo Metropolitan Government's COVID-19 measures website, for example. At the same time, the regional administrations have also become generous and positive toward citizen participation. In Osaka's case, the Code for Osaka, a civic tech NPO, constructed Osaka Prefecture's COVID-19 measures website. It then concluded a business cooperation agreement with Osaka Prefecture and has engaged in activities related to towns' issues, such as holding a great many hackathons and other events.

In civic tech, the administration, citizens and engineers discuss, learn, identify issues and consider solutions together as a group. Looking at such an approach, the group formed should be suitable for these initiatives, find it easy to make decisions speedily and be the right size. I believe that it is essential particularly for large cities to go through the following process: 1) a measure is conducted experimentally in a small unit, 2) a sense of ownership is fostered through dialogue with citizens, and then 3) the measure is moved to a large-scale implementation. One example is the "super block" initiative in Barcelona, Spain, which puts small city blocks together into a large block and prohibits cars from driving into that block[9].

On considering the objective for solving issues in line with a community, it is important to have the value of "it is for the community." We need to consider how to enhance communication with the relevant people, starting first from a scale that is easy to function.

(3) Ecosystems for Business Creation
1. Place Creation by Firms and Universities

Innovation creation is impossible by a company alone and has increasingly been conducted through inter-firm and industry-academia collaborations as a matter

Part I

Part II

Part III

Part IV

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9) The concept of super block was planned by the Urban Ecology Agency of Barcelona, which ensured the explanations and information disclosure to residents using the civil participation website "decidim" (https://www.decidim.barcelona/). As a result, the super block was first tried in a small district, and then gradually implemented in wider areas in the city.

of course. Places are created for jointly considering new businesses.

Examples include LINKSPARK founded by NTT West to provide customers with DX support, Xport jointly founded by the Osaka Chamber of Commerce and Industry (OCCI) and the Osaka Institute of Technology as a cross-industry exchange base, and the Common Ground Living Lab founded by the OCCI specializing in cyber-physical technology. Monetizing the proof of new concepts will be an issue in the future for each project, but they will create ecosystems that will bring forth innovation from various aspects.

Universities have also expanded their role and increasingly provide places for industry-academia collaborations. For instance, the Osaka Institute of Technology founded and opened the Robotics & Design Center as a robotics base for industry-academia collaboration. The Osaka Metropolitan University mentioned earlier is also expected to play a role as the "innovation core" in the Morinomiya district.

2. Place Creation by the Administrations

Meanwhile, each administration also conducts startup creation initiatives in various forms.

In Osaka City, Osaka Innovation Hub (OIH) created over 350 projects since its establishment in 2013. Similarly, the municipalities provide support places like the ANCHOR KOBE in Kobe City and the Kyoto Open Innovation Network (KOIN) in Kyoto City. Places created by municipalities for raising startups, as stated earlier, have also expanded in Kansai (Table 3-3-2).

Table 3-3-2   Examples of open innovation places in Kansai

Name of Base	Location (city)	Founder
LINKSPARK	Osaka, Nagoya and Fukuoka	NTT West
Xport	Osaka	Osaka Chamber of Commerce and Industry Osaka Institute of Technology
Common Ground Living Lab	Osaka	Osaka Chamber of Commerce and Industry
Osaka Innovation Hub	Osaka	Osaka City
KOIN (Kyoto Open Innovation Network)	Kyoto	Kyoto City
ANCHOR KOBE	Kobe	Kobe City

Note: Osaka Prefecture's "Osaka Co-creation Business Program" is currently discontinued due to the COVID-19 measures
Source: Prepared by the author

5. DX Risks Requiring Special Attention

DX is part of the pivot ability to respond to environmental changes, and it can also be investment accompanied by significant shifts in businesses and operations. In order for the investment to be sustainable, the direction that an organization itself aims at should be reasonable. In addition, the organization needs to respond to various external risks, such as relating to security, the environment, and laws and regulations. Next, we will consider two aspects, security and ELSI (discussed later), and discuss the ideas that are required for handling them.

(1) Security

When DX is advanced, a large amount of data is placed on an IT system and the data itself generates a profit. For this reason, investment in security means protecting a profit source, and the significance of this has largely increased. In complex supply chains, it should also be noted that, if a firm allows an intrusion into the system from somewhere vulnerable, the damage will expand beyond the firm and organization to the upstream and downstream areas.

Further, new risks have emerged from the changes in workstyles due to the COVID-19 pandemic. The Information-technology Promotion Agency, Japan (IPA) selects 10 Major Security Threats every year based on information security cases in the previous year. According to the 2021 version, attacks on tele-working that has rapidly spread due to the COVID-19 pandemic appeared for the first time and ranked third, meaning that the issue was evaluated to be serious (Table 3-3-3).

| Table 3-3-3 | The 10 major security threats based on the security cases that occurred in 2020 |

Ranking	Threat	Last-year Ranking
1	Damage caused by ransomware	5
2	Theft of confidential information by a targeted attack	1
3	Attack on new normal workstyles, such as teleworking	NEW
4	Attack by exploiting weaknesses in the supply chain	4
5	Financial damage caused by fraud business e-mail	3
6	An information leak caused by internal fraud	2
7	Business suspension due to the unexpected failure of the IT infrastructure	6
8	Fraudulent access to an online service	16
9	Damage such as an information leak caused by carelessness	7
10	Increase in the misuse of published information on vulnerability measures	14

Source: IPA website

Part I

Part II

Part III

Part IV

Against such a backdrop, the METI has put great efforts into security-related measures in recent years. In addition to developing guidelines for proprietors, the METI creates a support system for small and medium-sized firms and compiles ideas about ensuring security with a "digital twin," in which manufacturing is conducted in cyberspace based on real data. Further, it supports the formation of a security-related community in each region.

We should be prepared, being aware that security is important as much as it is indispensable for DX. The conventional method of applying patches to a legacy system complicates the system more than necessary and causes vulnerability. We should be aware that, taking the opportunity provided by DX, we can greatly contribute to security improvements by simplifying systems and adapting to the latest technologies.

(2) ELSI

ELSI is the abbreviation of "Ethical, Legal, and Social Issues," and indicates the perspectives to note when implementing new technologies in a society. In addition to the laws and regulations stipulated, we need to pay attention to society's reactions, even though they are not legalized yet, which arise from a sense of ethics and emerge as public opinions in many cases. Detecting people's flows with street cameras and handling personal data are applicable to the new technologies. In DX, some risk reduction measures should be taken in advance for activities for which public opinions are unreadable, such as trying the activity on a small scale first and informing people about it as well.

Taking Uber Eats as an example of legal issues, deliverers or riders' behaviors and legal positions on the road have drawn much attention as an issue alongside the popularization of the service, because the main infrastructure is the bicycle. In addition, many delivery partners undertaking the actual delivery work do it in their spare time. Overseas judiciaries are recognizing such so-called "gig-workers" as employees[10], which may impact on discussions in Japan down the road.

From an ethical viewpoint, raising the satisfaction levels of all relevant people including employees also contributes to the sustainability of a business. Uber Eats improves business operations every day by introducing AI technology to match demand and supply among restaurants, customers and delivery partners

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10) The respective Supreme Court successively ruled that Uber Eats delivery partners were to be recognized as employees in France and the UK in March 2020 and February 2021, respectively. Note that the referendum conducted in November 2020 in California, the US, resulted delivery partners being treated as independent contractors. At the moment, there are different perspectives in Europe and the US.

in a well-balanced manner.

ELSI is a concept that should be positioned higher than mere technology management due to its broad coverage. In particular, the idea of ELSI in DX does not seem to have been sufficiently recognized yet. From a viewpoint of solving social issues, we can enlarge the scope of identifying issues when expanding the users of new services realized by DX. For example, issues will extend to what reactions are expected from an expanded range of users to children and elderly people, and what impacts are expected on future children and the Earth's resources. Civil participation discussed earlier can be a structure that complements this enlarged scope in terms of incorporating various viewpoints

6. Conclusion

Assuming a situation in which COVID-19 continues for a while, firms need to perceive changes in the social environment and to adapt to these changes with business and operational reforms.

This paper provided an overview of the status of DX in Japan and Kansai and future opportunities using the pivot ability, and it discussed the need for global viewpoints and sustainable perspectives to make DX investment more effective. Japanese firms may originally have a sustainability perspective, as was said by Konosuke Matsushita, as part of their DNA. This paper also discussed that DX sustainability will be improved by two factors: securing security and considering ELSI accompanied by introductions of new technologies.

Toward the post-COVID-19 period, a new scene is expected to appear in which firms in Japan and Kansai will solve social issues and respond to needs by starting to prepare for environmental changes in society with measures, including for DX, from now. Conversely, firms should consider that a delay in responding to such changes may result in them having to discontinue conventional business activities.

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