

Big Data and Policy Directions for Korean Service Firms

Kang Minsung

1. Introduction

With the development of IT technology and the emergence of online platform business models, data accumulation is increasing exponentially, and unit accumulation cost is decreasing exponentially. Most of all, data is recognized as a new economic resource.

The following summarizes concerns about the role of governments in promoting industrial and corporate development through the use of data, a new economic resource:

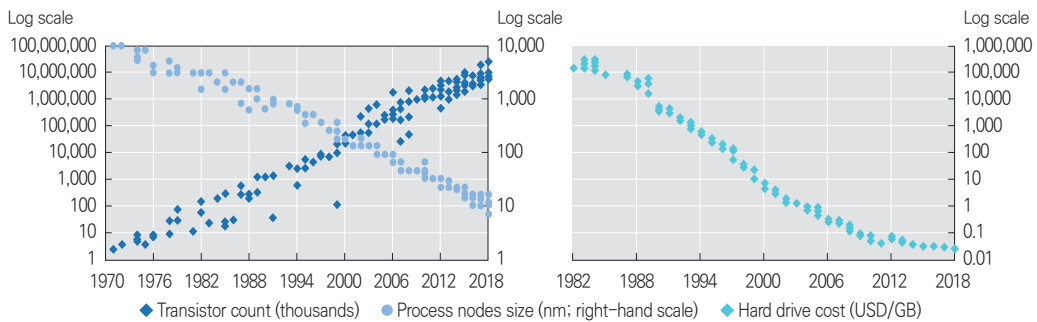
“The ability of public authorities to respond

effectively to new and possibly disruptive market and technological developments and business models will also be critical. This could include investment in new technology that supports public action, including big data analytics, to gather more detailed information on online platforms ecosystem”.

Source: European Commission (2016), “Online Platforms and the Digital Single Market – Opportunities and Challenges for Europe”, p.5.

Policy considerations of the economization of data — and in particular, the expansion of investment in the accumulation and analysis of big data — and the enhancement of

Figure 1. Trends in Data Accumulation and Unit Costs of Hard Drives



Source: OECD (2019), “Measuring the Digital Transformation”, p.38.

response capabilities are now a challenge for most countries.

The purpose of this study is to grasp the proliferation status of big data usage from the perspective of companies, which are the main agent accumulating and utilizing big data. From this perspective, companies are not only producers but consumers in the data economy.

2. Usage of Big Data Analytics (BDA) by Service Sector of Korea

(1) Survey Overview

This paper describes the results of a corporate survey on the current status of and reasons for the use of big data by service sector, prospects of expanding investment in the future and the expected timing and main reasons for introduction (for non-introduced companies). Through this, I will examine the degree of

spread of big data utilization, awareness of the importance of big data, and future prospects for service companies in Korea.

In this study, a corporate survey was conducted based on the Korean Standard Industry Classification. The service industries included in this survey can be found in Table 1 below.

In addition, to reflect the differences in characteristics owing to company size, companies belonging to each industrial group were divided into large, medium and small companies. The scale was based on annual sales in 2018, and in the case of the financial industry, the scale was classified based on the assets of the company, rather than sales, due to the nature of the industry.

The survey itself was conducted over about a month and a half, from August to September 2019 through a mixture of online, written and in-person surveys. Industrial classifications and sizes of service companies and the

Table 1. Industry Classification and Sample Distribution by Annual Sales

| Service industry | Annual sales (100 million KRW in 2018) | | | Sample size | | | |
|---|--|-------------|-------------|-------------|-------|--------|-------|
| | Small | Medium | Large | Total | Small | Medium | Large |
| Wholesale and retail trade | 500~1,000 | 1,000~5,000 | Above 5,000 | 92 | 45 | 26 | 21 |
| Transportation and storage | 200~400 | 400~1,000 | Above 1,000 | 85 | 40 | 25 | 20 |
| Information and communication | 200~600 | 600~2,000 | Above 2,000 | 86 | 40 | 28 | 18 |
| Accommodation and food service | 50~100 | 100~200 | Above 200 | 85 | 40 | 25 | 20 |
| Financial and insurance | 800~2,000 | 2,000~5,000 | Above 5000 | 66 | 25 | 28 | 13 |
| Real estate | 200~400 | 400~1,000 | Above 1,000 | 86 | 40 | 25 | 21 |
| Human health and social work | 50~100 | 100~200 | Above 200 | 86 | 44 | 26 | 16 |
| Professional, scientific and technical activities | 200~400 | 400~1,000 | Above 1,000 | 59 | 19 | 30 | 10 |
| Administrative and support services | 200~400 | 400~1,000 | Above 1,000 | 43 | 19 | 13 | 11 |
| Arts, entertainment and recreation | 80~200 | 200~400 | Above 400 | 28 | 14 | 7 | 7 |
| Total sample size | | | | 716 | 326 | 233 | 157 |

Table 2. Sample Distribution by Industry and Corporate Size

| Service industry | Sample size | Ratio | Small | Medium | Large |
|---------------------------------|-------------|-------|-------|--------|-------|
| Whole sale and retail trade | 92 | 12.8 | 48.9 | 28.3 | 22.8 |
| Transportation and storage | 85 | 11.9 | 47.1 | 29.4 | 23.5 |
| Information and communication | 86 | 12.0 | 46.5 | 32.6 | 20.9 |
| Accommodation and food services | 85 | 11.9 | 47.1 | 29.4 | 23.5 |
| Financial and insurance | 66 | 9.2 | 37.9 | 42.4 | 19.7 |
| Real estate | 86 | 12.0 | 46.5 | 29.1 | 24.4 |
| Human health and social work | 86 | 12.0 | 51.2 | 30.2 | 18.6 |
| Other service industries | 130 | 18.2 | 40.0 | 38.5 | 21.5 |
| Total | 716 | 100 | 45.5 | 32.5 | 21.9 |

distribution of 716 samples actually collected is shown in Table 1.

In analyzing the survey results of the sample, the professional, scientific and technical activities sector, the administrative and support services sector, and the arts, entertainment and recreation sector, which all have relatively fewer samples than other industries, would be integrated into a single classification, “other service industries”.

Looking at the composition of the samples by industry, they are evenly distributed around the 10 percent mark, with only Other service industries at 18 percent accounting for a relatively higher proportion. This is because in the case of other service industries, samples for three individual services were collected and then summed. By size, small companies account for about 46 percent of the total, medium companies 33 percent and large companies 22 percent. However, in the case of the financial and insurance industry, the proportion of medium-sized companies

is about 42 percent, compared to 38 percent being small companies and 20 percent being large companies.

(2) Survey Results for Corporate Adoption of BDA

□ Adoption of BDA

According to the result of a survey on the adoption of BDA, 124 companies (which accounted for about 17.3 percent of all respondents) said that they are using big data.

By company size, the utilization rate of large companies was the highest at 20.4 percent, followed by small enterprises 17.8 percent and medium enterprises 14.6 percent. Comparing the results of small and medium-sized enterprises, this is a result that deviates from the general expectation that as the size of the enterprise increases, the amount of data accumulated will increase and the interest in employing big data technologies will increase.

On the contrary, the survey results showed that medium-sized companies had relatively low participation rates in big data innovations. It can be seen that big data is being adopted mainly by large companies that have an advantage in data, labor, technology and capital, and small companies with high interest in new technologies and business models.

Looking at each industry, it can be seen that the utilization ratio in the information and communication sector is very high, at 45.3 percent, followed by the financial and insurance sector at 28.8 percent and the human health and social work sector at 22.1 percent. The ICT sector is involved in the production, utilization, and accumulation of big data and the financial and medical related service industries seem to lead industries in adopting of BDA. On the other hand, the transportation and storage, accommodation and food services sectors' utilization rates were low, at 8.2 and 9.4 percent, respectively. In particular, the real estate showed little utilization of big data.

In the case of the wholesale and retail trade industry, the adoption rate of big data by large companies is very high at 33.3 percent, and it seems that the ratio is high due to the nature of businesses that access information on various purchase patterns of many consumers in real time. In the case of the accommodation and food service sector, the ratio of small businesses was very low at 2.5 percent, which is remarkable considering that many Korean service startups exist in this sector. In particular, it is important to encourage the management of small-scale firms in the accommodation and food service industry to use BDA. BDA shows remarkable results in the analysis of commercial areas based on consumers' purchases and movement patterns. In the case of the human health and social work sector, the utilization rate by small enterprises was 38.6 percent, more than three times higher than that of large enterprises (12.5 percent). This seems to reflect the nature of the activities of small and entrepreneurs who are trying

Table 3. Adoption Rate of Big Data by Industry and Company Size (%)

| Service industry | rate | small | Medium | large |
|---------------------------------|------|-------|--------|-------|
| Whole sale and retail trade | 12.0 | 2.2 | 11.5 | 33.3 |
| Transportation and storage | 8.2 | 7.5 | 4.0 | 15.0 |
| Information and communication | 45.3 | 45.0 | 42.9 | 50.0 |
| Accommodation and food services | 9.4 | 2.5 | 16.0 | 15.0 |
| Financial and insurance | 28.8 | 32.0 | 21.4 | 38.5 |
| Real estate | 1.2 | 0.0 | 4.0 | 0.0 |
| Human health and social work | 22.1 | 38.6 | 0.0 | 12.5 |
| Other service industries | 15.4 | 19.2 | 14.0 | 10.7 |
| Total | 17.3 | 17.8 | 14.6 | 20.4 |

to pioneer new business models using personal biometrics and medical information.

□ Big Data Usage Type and Frequency

Looking at the results of the survey on how companies use big data (duplicate responses allowed), it was found that 124 companies

that adopted BDA prioritize the internal accumulation of big data. Seventy-five percent of companies that adopted BDA used big data in this manner. Building and operating analytical systems or environments on its own accounted for 55 percent. On the other hand, there were relatively few companies that reported purchasing big data externally, using an exter-

Table 4. Big Data Usage Types (Number of companies)

| Usage type of Big data | Internal accumulation | External purchase | Building and operating the analysis system on its own | Use of the external analysis system | External subscription | Etc | Total | Average usage type per corporate |
|------------------------|-----------------------|-------------------|---|-------------------------------------|-----------------------|------|-------|----------------------------------|
| Small | 46 | 17 | 25 | 12 | 13 | 1 | 114 | 1.97 |
| Medium | 26 | 19 | 21 | 17 | 16 | 0 | 99 | 2.91 |
| Large | 21 | 12 | 22 | 9 | 13 | 0 | 77 | 2.41 |
| Total | 93 | 48 | 68 | 38 | 42 | 1 | 290 | 2.34 |
| Probability | 0.75 | 0.39 | 0.55 | 0.31 | 0.34 | 0.01 | | |

(a) by corporate size

| Usage type of Big data | Internal accumulation | External purchase | Building and operating the analysis system on its own | Use of the external analysis system | External subscription | Etc | Total | Average usage type per corporate |
|--------------------------------|-----------------------|-------------------|---|-------------------------------------|-----------------------|-----|-------|----------------------------------|
| Whole sale and retail trade | 5 | 3 | 9 | 3 | 5 | 0 | 25 | 2.27 |
| Transportation and storage | 7 | 1 | 6 | 2 | 1 | 0 | 17 | 2.43 |
| Information and communication | 25 | 23 | 24 | 18 | 21 | 0 | 111 | 2.85 |
| Accommodation and food service | 5 | 4 | 5 | 3 | 4 | 0 | 21 | 2.63 |
| Financial and insurance | 12 | 9 | 9 | 6 | 4 | 1 | 41 | 2.16 |
| Real estate | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1.00 |
| Human health and social work | 19 | 3 | 4 | 3 | 1 | 0 | 30 | 1.58 |
| Other service industries | 19 | 5 | 11 | 3 | 6 | 0 | 44 | 2.20 |
| Total | 93 | 48 | 68 | 38 | 42 | 1 | 290 | 2.34 |

(b) by industry classification

Table 5. Usage Frequency of Big Data (percent)

| Usage frequency | Real time | daily | 1/day | 1/2-3days | 1/week | 1/2weeks | 1/month | 1/quarter | 1/6month | 1/over 6month |
|-----------------|-----------|-------|-------|-----------|--------|----------|---------|-----------|----------|---------------|
| Small | 17.2 | 31.0 | 15.5 | 3.4 | 17.2 | 1.7 | 10.3 | 0.0 | 0.0 | 3.4 |
| Medium | 26.5 | 32.4 | 8.8 | 2.9 | 11.8 | 2.9 | 14.7 | 0.0 | 0.0 | 0.0 |
| Large | 18.8 | 25.0 | 15.6 | 0.0 | 21.9 | 0.0 | 6.3 | 6.3 | 3.1 | 3.1 |
| Total | 20.2 | 29.8 | 13.7 | 2.4 | 16.9 | 1.6 | 10.5 | 1.6 | 0.8 | 2.4 |

nal analysis environment or subscribing to a big data service.

By company size, medium-sized enterprises showed relatively even utilization types, at about 2.9 types per company. This reflects the fact that mid-sized companies are approaching big data utilization in a passive way that relies on external companies' data, operating environments and services rather than their own big data accumulation. By industrial category, it can be seen that the information and communication sector uses big data in various categories. The information and communications industry showed the highest number among all industry classifications on average, at about 2.85 items per big data firm that had adopted big data analysis technologies. The accommodation and food service, transportation and storage, wholesale and retail trade and other service industries sectors showed relatively high utilization items. On the other hand, the human health and social work and real estate sectors had relatively few items of use and concentrated on the internal accumulation of big data.

Among usage behaviors, the proportion of cases in which big data was used multiple times

a day was the highest, followed by in real time use of big data. These two usage behaviors accounted for 29.8 and 20.2 percent, respectively, of all usage types. In these two cases, it can be seen that the utilization frequency is very high when big data is adopted. In other cases, it was often used once a day or once a week.

□ Importance Evaluation of BDA

As a result of evaluating the importance of BDA for each management item, the average score for small businesses was highest, with an average of 74.6. Next, large enterprises scored 66.1 and medium enterprises scored 63.5. As mentioned earlier, small companies and start-ups that value business models using big data seems to have exerted significant influence on the results. Looking at each item, customer management, monitoring, and marketing were the most important. Next, the use of big data was important in performance management and analysis, and corporate resource and competitiveness management items.

On the other hand, items such as forecasting market demand through big data, risk management, or developing and improving products

were found to be management activities where the importance of big data is not relatively high. The last item, using big data itself for commercial purposes, was ranked to have the least importance.

By corporate size, small and large companies showed very similar results, but medium-sized companies showed different results. In the case of medium-sized enterprises, they were characterized by giving high importance scores to market demand forecasting and the devel-

opment and improvement of new products. It is judged that medium-sized companies are more passive than other companies in using big data. In other words, there is much room to interpret that the management of medium enterprises are relatively hesitant about using big data directly.

Looking at the results by industry, the importance evaluation scores in the information and communication and accommodation and food service sectors are high. In the case of

Table 6. Importance Evaluation of BDA Adopted Enterprise

| Importance evaluation | Customer management, monitoring, and marketing | Developing and improving products | Corporate resource and competitiveness management | Performance management and analysis | Risk management | Forecasting market demand | Commercial purposes | Average |
|-----------------------|--|-----------------------------------|---|-------------------------------------|-----------------|---------------------------|---------------------|---------|
| Small | 82.9 | 76.2 | 76.7 | 76.4 | 73.0 | 72.4 | 64.4 | 74.6 |
| Medium | 64.1 | 64.2 | 63.5 | 67.4 | 64.1 | 65.0 | 55.9 | 63.5 |
| Large | 72.2 | 67.2 | 71.8 | 72.5 | 67.0 | 66.1 | 46.1 | 66.1 |
| Average | 73.1 | 69.2 | 70.7 | 72.1 | 68.1 | 67.9 | 55.5 | 68.1 |

(a) by corporate size

| Importance evaluation | Customer management, monitoring, and marketing | Developing and improving products | Corporate resource and competitiveness management | Performance management and analysis | Risk management | Forecasting market demand | Commercial purposes | Average |
|--------------------------------|--|-----------------------------------|---|-------------------------------------|-----------------|---------------------------|---------------------|---------|
| Whole sale and retail trade | 73.2 | 69.7 | 74.4 | 75.6 | 70.6 | 69.2 | 65.7 | 71.2 |
| Transportation and storage | 71.1 | 67.8 | 68.9 | 73.3 | 70.0 | 72.2 | 67.8 | 70.2 |
| Information and communication | 86.1 | 79.4 | 77.6 | 76.8 | 75.1 | 77.0 | 67.5 | 77.1 |
| Accommodation and food service | 83.3 | 80.3 | 81.1 | 84.2 | 78.1 | 77.8 | 63.6 | 78.3 |
| Financial and insurance | 59.6 | 61.4 | 57.6 | 56.0 | 52.9 | 55.8 | 21.1 | 52.1 |
| Real estate | 60.0 | 70.0 | 70.0 | 80.0 | 80.0 | 70.0 | 60.0 | 70.0 |
| Human health and social work | 69.3 | 55.7 | 66.0 | 69.6 | 66.5 | 48.8 | 43.7 | 59.9 |
| Other service industries | 72.2 | 65.6 | 67.7 | 65.9 | 58.7 | 67.1 | 53.7 | 64.4 |
| Average | 71.8 | 68.7 | 70.4 | 72.7 | 69.0 | 67.2 | 55.4 | 67.9 |

(b) by industry classification

the information and communication industry, using big data in customer management, monitoring and marketing was viewed as particularly important, while in the accommodation and food industry, customer management, monitoring and marketing, and performance management and analysis items were given high scores. The scores of the wholesale and retail trade, transportation and storage and real estate sectors were relatively high. The scores of other industries were low. In particular, financial and insurance averaged 52.1 points, showing the lowest score. This is a remarkable result considering that the industry has the largest share of big data-using companies along with information and communication, and that big data adoption is very active and discussions on related policies are being conducted vigorously in this field.

The results could be interpreted with further analysis. Looking at the scores in two criteria — industry classification and company size — it was common for small enterprises in most industries to assign BDA high importance scores. The difference in scores between business sizes is distinctive. In the case of firms in the financial and insurance industry, the difference in scores based on business size is larger than in other industries. In other words, the scores of large and medium enterprises were very low compared to small ones. These findings, which suggest that financial conglomerates which have big data and are expected to play a big role in the big data ecosystem are not

yet aware of their own importance and that medium-sized financial enterprises' awareness of the importance of big data is very weak, carry very important policy implications.

□ Investment Expansion Prospects for BDA

In 2019 a survey was conducted on corporate plans to expand investment in relation to BDA over the next three years.

The survey results suggest that the expansion of investment in accumulation and management of big data gradually increases over time. If investment in 2019 is assigned a value of 100, it was found that there were plans to expand investment in the accumulation and management of big data by about 11.3 percentage points compared to 2019 over the next three years, from a value of 108.6 in 2020 to 111.3 in 2022.

Looking at the results by company size, as of 2022, large companies exhibited aggressive expansion plans with an increase of 14.5 percentage points, followed by small companies with 10.5 percentage points, while medium-sized companies only increased by 8.8 percentage points. This is similar to the previous results. In other words, it seems that medium-sized enterprises' willingness to use big data weaker than that of small and large enterprises.

It was found that, with the exception of the accommodation and food service, real estate and human health and social work sectors,

Table 7. Investment Prospects for BDA (2019=100)

| Accumulation and management of Big data | 2020 | 2021 | 2022 |
|---|-------|-------|-------|
| Small | 105.7 | 107.2 | 110.5 |
| Medium | 107.4 | 108.2 | 108.8 |
| Large | 112.6 | 113.6 | 114.5 |
| Average | 108.6 | 109.7 | 111.3 |

(a) by corporate size

| Accumulation and management of Big data | 2020 | 2021 | 2022 |
|---|-------|-------|-------|
| Wholesale and retail trade | 104.9 | 107.4 | 109.0 |
| Transportation and storage | 117.2 | 117.2 | 117.2 |
| Information and communication | 105.1 | 108.2 | 114.5 |
| Accommodation and food service | 105.4 | 105.4 | 105.4 |
| Financial and insurance | 116.9 | 117.8 | 118.6 |
| Real estate | 100.0 | 100.0 | 100.0 |
| Human health and social work | 106.2 | 105.0 | 105.0 |
| Other service industries | 106.4 | 108.4 | 110.8 |
| Average | 107.8 | 108.7 | 110.1 |

(b) by industry classification

service enterprises plan to expand investment by more than 10 percentage points in 2022. In particular, there was a strong willingness to expand investments in the financial and insurance, transportation and storage and information and communication industries. In the transportation and storage industry, expectations for new management techniques are very high for reasons including increased cargo volume and fierce cost competition.

(3) Survey Results for Companies that have not Adopted BDA

□ Adoption Prospects

In 2019, a survey was conducted on the future

plans for companies that did not adopt BDA. Looking at the results, it seems very unlikely that companies that did not adopt BDA will actively introduce it to management in the near future.

Looking at BDA adoption plans, only 19 out of 592 respondents said they would introduce big data to management at some point between 2019 to 2023. In addition, nine out of the 19 companies that did respond said that they expected to adopt BDA technologies some time after 2023, indicating uncertainty regarding the technology. On the other hand, 102 companies said that even while they see big data as necessary for management, they do not have any plans to adopt big data into their management strategies. The remaining

471 companies answered that it is unnecessary to adopt big data analysis to management, accounting for the majority of respondents.

Looking at this ratio, only 3.2 percent of respondents said that they would introduce big data, and 17.2 percent of companies revealed that they had no plans to introduce big data analysis while admitting BDA is necessary. Furthermore, 79.6 percent of companies said that they did not need to adopt BDA.

When looking at the results by company size, a trend emerged suggesting that the bigger the company, the greater the importance placed on BDA. In the case of small enterprises, 12.3 percent of companies revealed that they had no plans to introduce BDA, whereas 17.6 percent of medium-sized companies and 27.2 percent of large companies said that their firms have no adoption plan in place, while

BDA adoption is necessary company ratio that found it unnecessary to introduce big data, 85.4 percent were small businesses, 80 percent for medium-sized companies, and 66.4 percent large companies.

Looking at the proportion of BDA introduction plans for all companies surveyed regardless of whether or not they had adopted BDA, 124 of 716 companies had already adopted big data analysis technologies, accounting for 17.3 percent of all firms. The number of companies to be adopt BDA is 2.7 percent. Therefore, about 20 percent of all companies are adopting big data or planning to introduce it in the years. In addition, it was found that 14 percent of companies said that BDA is necessary but did not have an adoption plan, and 66 percent answered that BDA adoption is unnecessary.

Table 8. Adoption Prospects of BDA by Corporate Size

| Adoption time | 2019 | 2020 | 2021 | 2022 | 2023 | 2024~ | Necessary, no plan | Not-necessary | Total |
|---------------|------|------|------|------|------|-------|--------------------|---------------|-------|
| Small | 0 | 0 | 1 | 2 | 0 | 3 | 33 | 229 | 268 |
| Medium | 1 | 0 | 0 | 1 | 1 | 2 | 35 | 159 | 199 |
| Large | 0 | 2 | 2 | 0 | 0 | 4 | 34 | 83 | 125 |
| Total | 1 | 2 | 3 | 3 | 1 | 9 | 102 | 471 | 592 |

(a) counts

| Adoption time | 2019 | 2020 | 2021 | 2022 | 2023 | 2024~ | Necessary, no plan | Not-necessary |
|---------------|------|------|------|------|------|-------|--------------------|---------------|
| Small | 0.0 | 0.0 | 0.4 | 0.7 | 0.0 | 1.1 | 12.3 | 85.4 |
| Medium | 0.5 | 0.0 | 0.0 | 0.5 | 0.5 | 1.0 | 17.6 | 79.9 |
| Large | 0.0 | 1.6 | 1.6 | 0.0 | 0.0 | 3.2 | 27.2 | 66.4 |
| Total | 0.2 | 0.3 | 0.5 | 0.5 | 0.2 | 1.5 | 17.2 | 79.6 |

(b) percentage

Table 9. Adoption Prospect of BDA by Corporate Size (for all respondents)

| | Adopted | Will adopt | Necessary, no plan | Not-necessary | Total |
|--------|---------|------------|--------------------|---------------|-------|
| Small | 58 | 6 | 33 | 229 | 326 |
| Medium | 34 | 5 | 35 | 159 | 233 |
| Large | 32 | 8 | 34 | 83 | 157 |
| Total | 124 | 19 | 102 | 471 | 716 |

(a) Number of firms

| | Adopted | Will adopt | Necessary, no plan | Not-necessary |
|--------|---------|------------|--------------------|---------------|
| Small | 17.8 | 1.8 | 10.1 | 70.2 |
| Medium | 14.6 | 2.1 | 15.0 | 68.2 |
| Large | 20.4 | 5.1 | 21.7 | 52.9 |
| Total | 17.3 | 2.7 | 14.2 | 65.8 |

(b) percentage

Taken together, it seems that about one-third of companies judged that big data is necessary for management activities. Currently, about half of them are already utilizing big data; of the other half, most do not yet have specific plans. It is evident that larger companies more intensely feel the need for BDA.

Looking at the results by industry, the majority of respondents said that the introduction of big data is unnecessary in most service industries except for the information and communication sector. In that industry, only 32 percent of companies responded that BDA adoption is unnecessary, and 57.4 percent of respondents reported that big data is needed, but had no specific plans. In addition, 10.6 percent of the respondents said they have plans to introduce BDA in the future, which is a very high proportion compared to other industries.

In the case of other industries, financial and

insurance enterprises are comparatively willing to utilize big data; 10.6 percent of firms said they plan to introduce big data within the next few years, which is the rate as reported by firms in the information and communication sector. However, 75 percent of firms in the finance and insurance sector also reported that BDA adoption is unnecessary.

□ Reason for Introduction

We now will attempt to discern why BDA technologies were not adopted at certain firms. Survey results of companies that introduced big data revealed smaller companies placed more importance on BDA than large and medium-sized enterprises, in that order. On the other hand, the results for companies that had not adopted any big data technologies showed that, on average, medium and large companies placed similar importance on BDA, while

Table 10. Adoption Prospects for BDA, Classified by Industry

| Adoption time | 2019 | 2020 | 2021 | 2022 | 2023 | 2024~ | Necessary, no plan | Not-necessary | Total |
|--------------------------------|----------|----------|----------|----------|----------|----------|--------------------|---------------|------------|
| Wholesale and retail trade | 0 | 1 | 0 | 0 | 0 | 0 | 7 | 73 | 81 |
| Transportation and storage | 0 | 0 | 0 | 1 | 1 | 0 | 9 | 67 | 78 |
| Information and communication | 0 | 0 | 1 | 0 | 0 | 4 | 27 | 15 | 47 |
| Accommodation and food service | 0 | 0 | 0 | 0 | 0 | 1 | 9 | 67 | 77 |
| Financial and insurance | 0 | 0 | 1 | 1 | 0 | 3 | 7 | 35 | 47 |
| Real estate | 0 | 1 | 0 | 1 | 0 | 0 | 3 | 80 | 85 |
| Human health and social work | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 54 | 67 |
| Other service industries | 1 | 0 | 1 | 0 | 0 | 1 | 27 | 80 | 110 |
| Total | 1 | 2 | 3 | 3 | 1 | 9 | 102 | 471 | 592 |

(a) Number of firms

| Adoption time | 2019 | 2020 | 2021 | 2022 | 2023 | 2024~ | Necessary, no plan | Not-necessary |
|--------------------------------|------------|------------|------------|------------|------------|------------|--------------------|---------------|
| Wholesale and retail trade | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 8.6 | 90.1 |
| Transportation and storage | 0.0 | 0.0 | 0.0 | 1.3 | 1.3 | 0.0 | 11.5 | 85.9 |
| Information and communication | 0.0 | 0.0 | 2.1 | 0.0 | 0.0 | 8.5 | 57.4 | 31.9 |
| Accommodation and food service | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 11.7 | 87.0 |
| Financial and insurance | 0.0 | 0.0 | 2.1 | 2.1 | 0.0 | 6.4 | 14.9 | 74.5 |
| Real estate | 0.0 | 1.2 | 0.0 | 1.2 | 0.0 | 0.0 | 3.5 | 94.1 |
| Human health and social work | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 19.4 | 80.6 |
| Other service industries | 0.9 | 0.0 | 0.9 | 0.0 | 0.0 | 0.9 | 24.5 | 72.7 |
| Total | 0.2 | 0.3 | 0.5 | 0.5 | 0.2 | 1.5 | 17.2 | 79.6 |

(b) percentage

small companies scarcely trailed far behind.

These results can be interpreted as reflecting differences in the composition of the small enterprises under investigation. Small businesses pursuing a business model that utilizes big data are simply not categorized under

firms that do not introduce big data, the targets of the survey, because many such companies were founded as adopter of BDA. As a result, the survey results could be interpreted to suggest that small businesses underestimate the importance of big data.

Examining reasons for adoption or non-adoption, results were similar to those companies that had already adopted BDA. Customer management, monitoring, and marketing scored the highest. Performance management and analysis and corporate resource and competitiveness management also scored relatively high. As before, commercial purposes received the lowest score.

The results by industrial classification revealed that importance scores were similar to

the results reported by companies that had adopted BDA technologies. In other words, the importance of big data to management activities in the information and communication and accommodation and food service sectors was relatively high. By category, customer management, monitoring, and marketing scored high, as well as performance management and analysis and corporate resource and competitiveness management. There are some observable differences in the results however,

Table 11. Evaluation Score of Reasons for BDA Adoption

| Reason for adoption | Customer management, monitoring, and marketing | Developing and improving products | Corporate resource and competitiveness management | Performance management and analysis | Risk management | Forecasting market demand | Commercial purposes | Average |
|---------------------|--|-----------------------------------|---|-------------------------------------|-----------------|---------------------------|---------------------|---------|
| Small | 61.8 | 58.5 | 58.7 | 59.3 | 58.6 | 57.3 | 51.5 | 58.0 |
| Medium | 66.6 | 63.2 | 64.6 | 65.3 | 63.9 | 62.9 | 57.4 | 63.4 |
| Large | 66.1 | 61.5 | 64.4 | 66.6 | 63.5 | 62.6 | 52.1 | 62.4 |
| Average | 64.9 | 61.1 | 62.6 | 63.8 | 62.0 | 60.9 | 53.7 | 61.3 |

(a) by corporate size

| Reason for adoption | Customer management, monitoring, and marketing | Developing and improving products | Corporate resource and competitiveness management | Performance management and analysis | Risk management | Forecasting market demand | Commercial purposes | Average |
|--------------------------------|--|-----------------------------------|---|-------------------------------------|-----------------|---------------------------|---------------------|---------|
| Wholesale and retail trade | 67.0 | 64.2 | 63.9 | 62.9 | 60.9 | 62.6 | 61.5 | 63.3 |
| Transportation and storage | 58.5 | 53.2 | 57.3 | 59.5 | 57.6 | 56.8 | 56.4 | 57.0 |
| Information and communication | 73.1 | 66.8 | 68.9 | 73.8 | 70.0 | 68.0 | 64.7 | 69.3 |
| Accommodation and food service | 72.2 | 67.3 | 67.7 | 66.0 | 65.6 | 64.0 | 58.6 | 65.9 |
| Financial and insurance | 57.2 | 57.9 | 60.1 | 59.9 | 57.8 | 59.8 | 32.3 | 55.0 |
| Real estate | 57.3 | 55.8 | 55.2 | 55.4 | 55.4 | 53.6 | 51.2 | 54.9 |
| Human health and social work | 70.3 | 65.7 | 67.7 | 69.9 | 68.1 | 61.9 | 54.8 | 65.5 |
| Other service industries | 63.3 | 58.1 | 59.6 | 62.8 | 60.6 | 60.7 | 50.0 | 59.3 |
| Average | 64.9 | 61.1 | 62.6 | 63.8 | 62.0 | 60.9 | 53.7 | 61.3 |

(b) by industry classification

and scores for purposes related to using big data strategically, such as risk management and forecasting market demand, were also relatively high. It can be interpreted that companies not utilizing have higher expectations for the usability of big data than companies that are already using it.

Similar to the results shown above, the importance scores for each management item in the financial and insurance sector were low. In the previous case, the scores differed according to the size of the company, and they were characterized by large and medium-sized companies assigning them low importance scores. In the current case, the importance assigned to BDA by company was low regardless of the size of the company. This can be interpreted as companies being aware of the importance of big data, especially small businesses, having already instituted BDA utilization; therefore companies in the current survey would respond saying they have relatively low expectations for BDA. Fundamentally, there is a need for research on whether the financial and insurance sector, which could greatly benefit from big data, is underestimating the importance of BDA.

3. Policy Suggestions

As shown in previous chapter, the BDA adoption rate by service companies in Korea is not high except for some industries such as information and communication, financial and in-

surance. It has also been found that there is a skepticism about the usefulness of BDA. The biggest obstacle seems to be conflict between the two values of privacy protection and the utilization of big data.

Looking at the current state of the legal system related to big data in Korea, after many years of debate, representative laws to promote the use of big data passed the National Assembly in early 2020. Nevertheless, a social consensus between the protection of personal information and the industrialization of data has not been achieved. In order to overcome this deadlock, it is very important to first address individuals' fear of corporations using personal data by establishing what is termed "Data Portability".

Data Portability refers to the method of restraining the circulation of personal information between companies. Individuals whose information is in question here, are able to download personal information from platform companies voluntarily and store it. This endows personal information with an appropriate contractual relationship when requested by another company. In such a situation, concerns about the risk of personal information misuse and personal identification will be greatly reduced because individuals have control over their own information.

On the corporate side, if the Data Portability is established, it becomes a way for startups, companies and other firms to collect and accumulate individuals' personal data in

exchange for providing financial or non-monetary services directly to consumers. The monopolistic structure of personal information-related data, which is the fundamental resource of the big data business ecosystem, is relaxed, and a path for data resources to be

distributed emerges.

Under this judgment, individuals should have the capability to extend Data Portability rights to platform companies, and in order to support this, preparations for data standardization must be made urgently.

Kang Minsung | Associate Research Fellow | Center for Service Industry | Mins.kang@kiet.re.kr