

## 1. Overview

The fourth industrial revolution is expected to bring about significant changes in global value chains (GVCs).<sup>1)</sup> With the advent and development of new technologies and services, digital companies have emerged to play a key role in GVCs. According to the World Investment

well-known Korean MNEs such as Samsung Electronics, LG Electronics, and SK Hynix are globally known in the area of IT devices and components, when it comes to the digital sectors, including internet platforms, digital solutions providers, digital content platforms and e-commerce more broadly, it is hard to identify one as a truly global player. According

# The Rise of Digital Companies and Strategies: Case Studies in the U.S. and Korea

Report (henceforth UNCTAD 2017),<sup>2)</sup> the number of technology-related digital companies among the top 100 multinational companies more than doubled from 2010 to 2015. Digital companies are expected to extend their influence in industries beyond the borders of their respective businesses. McKinsey (2017)<sup>3)</sup> argues that digitalization will lead companies to break the boundaries of traditional industries, expand globally, and create a business ecosystem centrally.

Although Korea is home to globally competitive multinational enterprises (MNEs), it is hard to say there is a globally competitive digital enterprise from Korea. While large and

to UNCTAD (2017), digital companies' overseas sales accounted for 70 percent of their total global market value and about 50 percent of their global assets. Presumably, these firms' businesses are largely globalized. However, while Korean IT companies have a higher ratio of overseas sales compared to other top 100 global companies, among these firms there are no large digital enterprises operating in overseas markets.

The impact of digital companies is not limited to those firms' industries or domestic markets; they also play a key role in expanding to global markets and creating new businesses or sectors. Investments in digital sectors will have

1) According to a KIET-GVCC joint study, "Korea in Global Value Chains: Pathways for Industrial Transformation" (Frederick et al., 2017), recent changes in the global economy and GVC dynamics related to the fourth industrial revolution were found to be 1) the development of new production technologies (automation/additive manufacturing) and 2) servicification.

2) UNCTAD (2017), *World Investment Report 2017: Investment and the Digital Economy*, United Nations Conference on Trade and Development.

3) Bughin, J., LaBerge, L., & Mellbye, A. (2017), "The case for digital reinvention", *McKinsey Quarterly*, 2, 1-15.

a significant influence on productivity and employment both directly and indirectly across industries in the era of the fourth industrial revolution. As the recent expansion of digital companies continues across all industries in addition to the incumbent sector, an in-depth understanding and analysis of these trends is required. And in Korea especially, given its relatively small domestic market, it is necessary to enter and compete in global markets in the face of constant industrial change. While Korea's historical development centered on large corporations, understanding the new dynamics in GVCs brought about by the digital sector will be essential to ensure the country's continued participation in those very same value chains.

Due to a lack of well-organized data, few studies on digital companies have been conducted in Korea.<sup>4)</sup> This also stems from the fact that digital companies are a relatively new concept. Basic concepts and tools to evaluate the status of digital companies objectively are needed, given the recent rise of those companies in the global economy. This paper is designed to provide a foundation and starting point to understand digital companies, to aid in the conduct of follow-up research and to frame future policies for digital industries.

## 2. Digital Companies and GVCs

The increasing importance of digital firms and the digital economy is evidenced by statistics from multiple sources. For example, in UNCTAD (2017), the number of technology-related digital companies (from four to ten), those companies' share of assets (from four percent to 11 percent) and digital firms' operating revenues (from five percent to twelve percent) among the top 100 multinational companies more than doubled from 2010 to 2015.

The PwC 2018 Global Innovation 1000 looks at R&D spending at publicly-held companies.<sup>5)</sup> In 2017, there were 125 companies in the digital economy, representing 13 percent of firms in the study (1,000 total).<sup>6)</sup> These firms accounted for 16 percent of R&D expenditures and 6 percent of revenue. In 2012, they represented 12 percent of R&D spending and 4 percent of revenue.

In the IT services sector, revenues from digital professional services are expected to make up 38 percent of all revenues in IT professional services by 2021, up from 19 percent in 2016.<sup>7)</sup> The rise of the digital economy can also be seen elsewhere, such as in the increasing share of sales made via e-commerce transactions. E-commerce retail sales increased by 118 per-

4) Despite a shortage of comprehensive data for researching recent digital companies, a few studies are being conducted primarily based on case studies. For example, "Exploratory Story on Digital Transformation of Manufacturing-Based MNCs" (Kwon, 2018) provided implications for the digitization of manufacturing based on Huawei and Siemens case studies.

5) <http://www.strategyand.pwc.com/innovation1000>

6) Relevant industries in the PwC Global Innovation 1000 representing the digital economy include (1) Web Portals/ISP, (2) Internet and Direct Marketing Retail, (3) Internet Software and Services, (4) IT Services and (5) Software.

7) CFRA (2018), IT Consulting & Other Services, New York, February.

cent between 2012 and 2017, going from 1 trillion to 2.3 trillion USD and representing approximately 11 percent of all retail sales in 2017.<sup>8)</sup> The growth of the digital economy is also seen in the rising number of users of social media sites such as Facebook and its subsidiary, Instagram.

### (1) Changes to GVCs in the Era of the Fourth Industrial Revolution

Over the past two decades, developed and developing countries alike have competed to participate in different industries, shaping a series of policies based on the existing understanding of the distribution of value within the chain and the particular requirements of each of those stages. The development path followed by many developing countries has been to attract segments of GVCs utilizing their comparative advantage in labor, performing routine manual and service work for global industries at a lower cost. Developed countries have focused on research, design and technological development, in addition to branding and marketing, as well as negotiating trade and investment policies to leverage the benefits of low-cost locations.

These current trends are altering the dynamics of GVCs, affecting their value distribution, governance structure, and geographic composition. As a result, the calculus for outsourcing and offshoring value chain activities by firms may change, affecting the development prospects of countries.<sup>9)</sup>

First, the rise of services creates new industries and stages in GVCs and alters the distribution of value within existing GVCs. Manufacturing-related services, particularly those previously considered “after-sales” are becoming just as important as sources of revenue, if not more so, than the manufacturing operations themselves.<sup>10)</sup> In some capital equipment sectors, after-sales services already account for more than half of manufacturing firms’ revenues. Across sectors, there is a shift to more of a pay-per-use model as opposed to outright ownership or a fixed-price contract.

Second, there is a shift in the balance of industrial power amid the emergence of new leading firms. Traditional leading firms are facing competition by new digital companies such as Amazon, Google and Uber, all of which have successfully created new service platform technologies to take on major coordination

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8) eMarketer (2014), Global B2C Ecommerce Sales to Hit \$1.5 Trillion This Year Driven by Growth in Emerging Markets, Available at [www.emarketer.com/Article/Global-B2C-Ecommerce-Sales-Hit-15-Trillion-This-Year-Driven-by-Growth-Emerging-Markets/1010575](http://www.emarketer.com/Article/Global-B2C-Ecommerce-Sales-Hit-15-Trillion-This-Year-Driven-by-Growth-Emerging-Markets/1010575).

9) Frederick, S., Bamber, P., Brun, L., Cho, J., Gereffi, G., & Lee, J. (2017), *Korea in Global Value Chains: Pathways for Industrial Transformation*.

10) Low, Patrick and Gloria Pasadilla (Eds.) (2016), *Services in Global Value Chains: Manufacturing-Related Services*, Singapore: World Scientific Publishing for Asia-Pacific Economic Cooperation Secretariat.

roles between buyers and suppliers.

Finally, these trends also change the potential geographic distribution of chain activities, with implications for which countries can participate. While automation may foster the relocation of manufacturing activities closer to primary markets for finished goods, increased digitalization allows for the globalization of services. Countries no longer have to be manufacturing hubs to participate in manufacturing GVCs; services such as data analysis for lifecycle management can be carried out anywhere in the world with the right mix of human capital availability and infrastructure. Currently, many of these activities are being carried out in the advanced industrial countries.

## (2) Characteristics of Digital MNEs Compared to other MNEs

Digital MNEs have unique characteristics compared to traditional firms. Digital MNEs have a corporate value structure possessing comparatively more intangible assets and current assets (cash), with more value is attributed to brand, know-how, and IP.<sup>11)</sup> Digital companies are also highly profitable and maintain large cash reserves for investment.

A unique feature of companies in the new internet software and services sector focused

on the consumer market is the difference between the products and services they provide and their sources of revenue. Many companies engaged in the platform segment earn most of their revenue from digital advertising. Companies such as Google and Facebook offer end-users free accounts on their websites and earn revenue from businesses that advertise on these websites using data provided by the users in the creation of their accounts. The rise of digital ads is seen in the share of digital ad buys as a proportion of total media ad spending. Globally, 34.4 percent of advertising outlays were for digital ads. In Korea, that figure stands at 36.7 percent. In the U.S., it is 35.8 percent, and in mainland China, 51.8 percent of all ad spending is digital ad spending. Regionally, digital ad spending is highest in the Asia-Pacific region at 38.8 percent of all advertising expenditure.<sup>12)</sup>

A large share of digital MNEs hail from the U.S., with more domestic subsidiaries than MNEs as a whole.<sup>13)</sup> This is also supported in the PwC Global Innovation 1000 study, where 57 percent of firms in digital economy-relevant industries are from the United States. In comparison, only 24 percent of industrial (38 out of 157 firms) MNEs are from the U.S.

Rather than a single technology, it is the convergence of multiple technologies that,

11) UNCTAD (2017), *World Investment Report 2017: Investment and the Digital Economy*, United Nations Conference on Trade and Development (UNCTAD).

12) eMarketer (2016), *Global Digital Ad Spending*: eMarketer.

13) UNCTAD (2017), *World Investment Report 2017: Investment and the Digital Economy*, United Nations Conference on Trade and Development (UNCTAD).

in combination, enables firms to adopt new ways of doing business. The agents of change are often not the incumbent firms in each industry but instead new entrants providing new digital technologies, suppliers who embrace digital opportunities to move up the value chain, and even customers who are not just on the receiving end of a product or service but are actively co-creating it.<sup>14)</sup> The largest companies in the digital economy were all established over 20 years ago, with several starting as early electronics hardware companies. These large companies often acquire the smaller, more niche players from the application software and internet software and services sectors, a key growth strategy for large digital firms.

M&A activity is significant and M&A deals in tech are some of the largest, with many valued over 1 billion USD every year. Based on data from the CBI (1998-2018), the digital economy (represented by the Internet, mobile and telecommunications and software: non-Internet/mobile sectors) had over 100,000 financings and a total financing value of 931.6 billion USD (excluding IT services) with 27,000 exits. The most active sector in terms of M&A is the Internet sector, comprising 58 percent of all M&A financing. Financing in the software sector accounted for just 11 percent of all financing.

An increasing share of non-tech companies are investing in tech start-ups. Even though tech or telecom companies only account for 12 percent of Fortune 500 companies, they have historically been responsible for the most investment activity in tech companies.<sup>15)</sup> However, tech investments by non-tech corporations are on pace to surpass those of tech corporations for the first time in 2018.

### (3) Trends in GVCs Due to the Digital Economy

The rise of the digital economy is evidenced by several trends, which can be seen in individual case studies. In the digital economy, the ability to do business across borders is much easier, particularly in the area of services. As such, firms have an increasingly larger share of revenue from foreign sources. In the UNCTAD (2017), digital MNEs had more foreign sales and assets than traditional MNEs.

More firms earn a larger share of revenue by performing services than by selling physical goods. For example, IBM's revenue in 1997 and 2017 was nearly the same (79 billion USD). However the composition of that revenue is quite different. In 1997, hardware sales accounted for 46 percent of earnings, while making up just eight percent of revenue in 2017. Microsoft is another

14) UNCTAD (2017), *World Investment Report 2017: Investment and the Digital Economy*, United Nations Conference on Trade and Development (UNCTAD).

15) CB Insights (2017), *Fortune 500 Tech Investment and M&A Report*, New York, NY: CB Insights, August 17.

example. The share of revenue from services (particularly in the commercial cloud sector) increased from 19 percent in 2015 to 36 percent in 2017. Twenty years ago, over half the company's revenue came from operating system software.

Competing in the digital economy requires workers with skills in programming and data analytics. As such, demand for workers with these skills has increased significantly, with these workers earning wages significantly above the national average in related occupations in the United States. Computer systems design and services and software publishers are among the industries with fast-growing employment and wages, with compound annual rates of change (2016 to 26) of two and 1.8 percent respectively, compared to 0.7 percent for the overall total.<sup>16)</sup>

And collaborating with companies in different industries has shown to be important to digital MNEs. These firms often bring key stakeholders together, whether through an annual conference or through other events organized according to geographic proximity or topical area. This increases awareness of the company and provides opportunities for collaboration. Google, Amazon, IBM, Red Hat and Salesforce among others all hold an annual event. Among Korean firms, Naver also holds such an event.

The digital economy has led to a rise in new

forms of education: namely, certifications. All major software and service providers offer education and training for their products to enable workers to attain various levels of certification. This is both a means of revenue for the company and an alternative to more formal education. Google, IBM, Oracle, Microsoft, Red Hat, Citrix and Salesforce all offer training and certifications for their products.

### 3. Basic Statistics of Digital Companies

#### (1) Basic Statistics of Global Digital Companies

The digital economy is composed of firms engaged in software development, IT services and Internet software and services (ISS). ISS is the most diverse sector, but the central theme is that these businesses are dependent on the Internet and are entirely digital companies. Many of these are newer companies established after 1995. In the UNCTAD (2017), these include the platform companies, digital content firms, e-commerce companies and some digital solutions companies, which includes software companies. Companies in this segment earn revenue from advertising or fees paid by other companies to access the platform. According to IDC, the digital transformation entails four areas: big data and analytics,

<sup>16)</sup> US Bureau of Labor Statistics.



cloud, mobile and social. The total addressable market is 91 billion USD.

Of the top 100 digital MNEs by sales or operating revenues in 2015, two-thirds (67 percent) of digital MNEs were U.S.-based firms. Twenty-three percent were European, four firms were Japanese, two were Chinese and one each hailed from Korea, Canada, Mexico and South Africa (UNCTAD, 2017). The Korean firm on the list, Naver, is in the internet platforms category. Of the top IT software and service companies, only one is from Korea (Samsung SDS).

## (2) Analysis and Implications for Korea Digital Companies

This section examines the status of the digital economy and companies in Korea using statistics. For this analysis, we define the digital economy based on Korea Standard Industrial Classification (KSIC) codes.<sup>17)</sup>

In general, digital sectors have been growing rapidly in recent decades. The number of establishments, employment and total sales have been on the rise. According to Figure 1, the number of establishments more than doubled from 9,512 in 2006 to 22,777 in 2016.

Employment also increased from 177,491 to 323,198, as did sales, which went from 28 to 69 trillion KRW. From the figures, we also observe that since the Great Recession that there has been a significant increase in the number of new establishments.

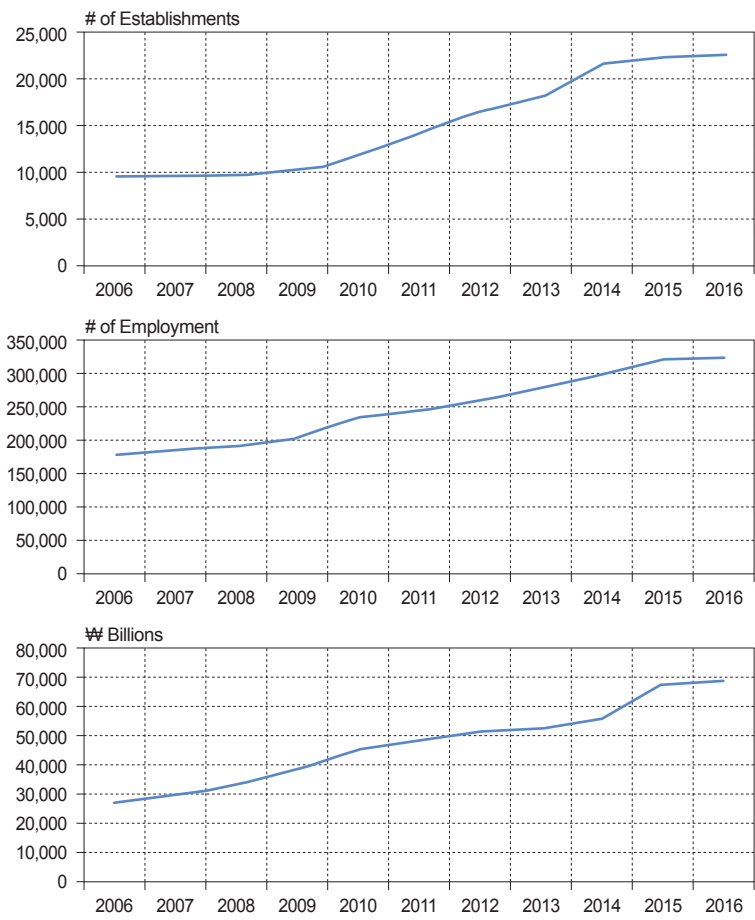
Despite the growth in the digital sector, the average size of companies has decreased recently. Figure 2 shows sales and employment per establishment. Average sales per establishment decreased steadily from 3.8 billion KRW in 2010 to 3.0 billion KRW in 2016. The average number of employees per business also declined steadily, from 20.2 workers in 2009 to 14.2 in 2016. This has resulted from the continuous influx of new businesses into the sector since the Great Recession, as shown in the previous figure. Therefore, we can see that the growth in that sector is reflected largely by the entry of new companies.

Along with the growth of digital sectors in Korea, their share of the overall economy is also increasing. Over the past decade, growth in the number of establishments, employment and total sales in digital sectors has been 9.1 percent, 6.2 percent, and 9.6 percent, respectively, surpassing the two percent, 3.3 percent and eight percent figures that the overall econ-

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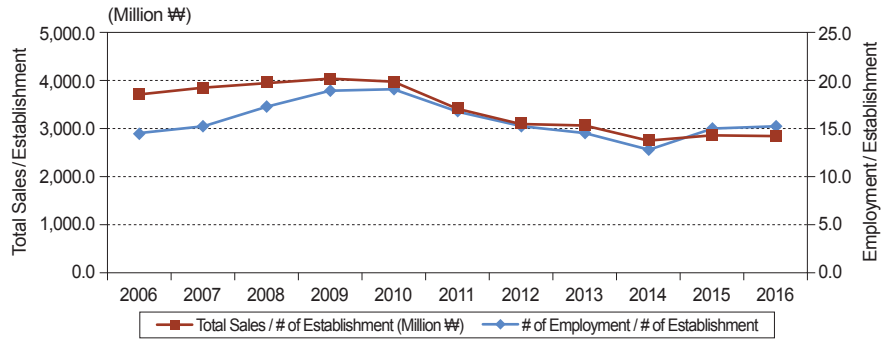
17) The KSIC codes for the digital economy were defined based on a consideration of ISIC (International Standard Industrial Classification) revision 4. It includes KSIC 582: Software publishing, KSIC (620): Computer programming, consultancy and related activities, and KSIC 631: Data processing, hosting and related activities; web portals. KSIC 63991: Database and Online Information Services, possibly related to digital industry, is not included in the digital economy category for this study because there is no matching ISIC code. And the proportion of the data regarding sales, employment and number of establishments constitutes less than five percent of the total digital economy analyzed in this article, so the following quantitative consequences would not be significantly altered. However, we note that whether or not to include this data should be discussed in future studies.

Figure 1. Number of Establishments, Employment and Sales in the Digital Sector



Source : All data except for 2010 and 2015 are from the Service Industry Survey of Statistics Korea. 2010 and 2015 data are from Economic Census by Statistics Korea.

Figure 2. Total Sales and Employment per Establishment



Source : All data except for 2010 and 2015 are from Service Industry Survey of Statistics Korea. 2010 and 2015 are from Economic Census of Statistics Korea.



omy posted in the same period.<sup>18)</sup>

Among digital sectors, software publishing is the largest, followed by computer programming consultancy and related activities. In 2016, software publishing accounted for 57.8 percent, 56.7 percent and 48.3 percent respectively, while computer programming, consultancy and related activities recorded slightly lower proportions of 34.1 percent, 34.9 percent and 42.6 percent. Data processing, hosting and related activities account for an even lower portion compared to the other two sectors.

### (3) Comparison of U.S. and Korean Digital Companies

Digital companies make similar overall contributions to the economies of Korea and the U.S. in terms of employment and output, based on 2016 data. In the U.S., digital economy industries account for 1.9 percent and 2.9 percent of employment and output, respectively. In Korea they account for similar shares, making up 0.6 percent of firms, 1.5 percent of employment and 1.9 percent of total sales.

The actual size of the U.S. digital economy, however, is much larger. There are 2.9 million people employed by digital companies in the U.S., compared to 323,198 digital workers in Korea. In terms of sales/output, Korea's sales were 61 billion USD compared to U.S. output

of 806 billion USD.

In the U.S., the largest sector of the digital economy (based on North American Industrial Classification System or NAICS codes) is computer systems and related services, followed by data processing and other information services and lastly software. In Korea, software is the largest segment.

## 4. Case Studies of Korea and Global Digital Companies

This case study considers the largest firm in each of the three segments using the definition drawn from KSIC codes: Samsung SDS in IT Services, Naver in data processing and Kakao for software.<sup>19)</sup> Here we compare companies in the United States and Korea in similar segments of the digital economy. In the software segment, we compare Kakao and Microsoft; in IT services, Samsung SDS and IBM. And in data processing and hosting, Naver and Google. For both countries, the firms selected are the largest in their respective sectors. We compare the information of the selected digital companies from various sources mentioned in Chapter 1.

### (1) Implications Carried by Case Studies on Structural Characteristics

First, we provide observations from the case

18) During the same period the manufacturing sector grew by 2.3, 1.9 and 6.4 percent, respectively.

19) We identifies the largest digital companies in Korea based on five-year average sales using KisValue.

studies in terms of their size and business structure. Google and Naver were established at nearly the same time (1998 and 1999). IBM is much older than Samsung SDS (1911 compared to 1985), however many of the activities of Samsung SDS would have been in the past carried out by Samsung internally, putting the year established of the two firms much closer (1911 and 1938). Microsoft is approximately 20 years older than Kakao.

*i. Korean firms are small (based on sales and employment) – Based on FY 2017 data*

Samsung SDS is reportedly the largest digital company in Korea (about 8 billion USD in sales with 23,000 employees), however it is a fraction of the size of any of the U.S. digital firms included here. Similarly, sales for Naver and Kakao are both under 5 billion USD, and both have fewer than 6,000 employees. U.S. digital firms are much larger, with revenues of 110 billion USD at Alphabet, 79 billion USD at IBM and 90 billion USD at Microsoft, and at least 80,000 employees per company.

*ii. Korean firms are often captive or closely tied to Korean MNEs, with few independent companies*

As with Samsung SDS, even if firms are independent from an ownership perspective, they are still highly dependent on their parent company for sales. Of the top 25 technology

companies in Korea, this pertains to not only Samsung SDS, but also to LG, Hyundai AutoEver, Lotte IT Tech, H Solution (previously Hanwha S&C Co., Ltd.), and Daewoo Information Systems.

This is also described in the PwC (2018) report.<sup>20)</sup> While there are 36 Korean firms listed, only 19 of them are unique firms. Again following PwC (2018), Korean digital companies such as Samsung SDS, Hyundai Mobis and LG Display supply mainly to relatives in the parent firm's orbit. And the principal owners of those firms are other companies within the same conglomerate. Even if they are legally separate entities, they are still dependent in other ways.

*iii. Korean firms have a lower share of foreign sales*

While Naver reported 29 percent of sales outside Korea in 2017, this is primarily from Japan, with only two percent of sales coming from other overseas locations.

Although Samsung SDS has ostensibly entered the overseas market through its overseas subsidiaries, its actual business model is not independent from Samsung Electronics. Looking at the location of Samsung SDS's overseas subsidiaries compared to those of Samsung Electronics in 2017, 46 out of 56 overseas subsidiaries owned by Samsung SDS were located in the same cities as those

20) PwC (2018), *Global Innovation 1000*, PriceWaterhouseCoopers (PwC), <http://www.strategyand.pwc.com/innovation1000>

owned by Samsung Electronics. In addition, eight cases were located in countries where Samsung Electronics' overseas companies are located, even if they were not in the same city. Only two Samsung SDS affiliates were found to exist independently in a location where no Samsung Electronics subsidiary was located. Also, given that all of Samsung SDS' overseas subsidiaries were established after those of Samsung Electronics, we can presume that Samsung SDS's overseas subsidiaries are closely linked to the Samsung conglomerate's overseas subsidiaries.

The U.S. firms, on the other hand, all earn at least half of their sales from foreign sources: 53 percent, 62 percent and 50 percent for Google, IBM and Microsoft, respectively.

## (2) Implications from the Case Studies Regarding Growth Strategies

Traditional companies build their digital portfolios and domain expertise in three ways: (1) organically (i.e., through human capital and R&D), (2) through M&A activity and (3) via joint innovation with partners to help expand their reach. As such, these are key factors we will compare among firms and companies.

### i. *Internal - Korean firms in digital sectors generally spend less on R&D*

Data on R&D expenses as a share of revenue from the PwC (2018) survey indicate

that digital firms spend an average of 12 percent of revenue on R&D, eight percent more than the overall corporate figure of four percent. However, Korean firms in the digital sector actually spent less on R&D (PwC 2018), and there were few Korean firms in the sample. Of the 125 firms, only three are from Korea (Naver, NCSOFT, Samsung SDS).

Korean firms as a whole also spent less on R&D in general. Of the 37 countries in the PwC report for 2017, Korea ranked 21st in terms of R&D spending as a percentage of revenue across all industries, with an average of three percent of revenue going toward R&D (the global average is 4 percent).

The company case studies provide mixed results in terms of R&D expenses. Naver spent more than Alphabet (24 percent versus 15 percent), Kakao and Microsoft spent similar shares (12 percent and 14 percent) and IBM spent significantly more than Samsung SDS (1.4 percent and 7.3 percent). All six of the companies have a department or subsidiary focused on research and development.

### ii. *Korean firms make fewer acquisitions than U.S. firms*

In order to enter new segments of the value chain or new product areas, it is common for firms to acquire companies that exhibit expertise in these areas. This provides a quick way for firms to gain access to key knowledge, intellectual property or access to new geographic

markets.

In the United States, M&A activity in the digital sectors is significant. The three US companies analyzed in this study have acquired at least 165 companies each over the course of the last 15 years. The Korean firms, on the other hand, have acquired at most 15 firms each, with most of that M&A activity occurring in the last five years.

As an alternative to acquisitions, it is also common for digital firms to set up venture capital arms to monitor and invest in promising start-ups. Korean firms appear to be slightly more active in this arena than in M&A. All three of the company cases have established one or more venture capital arms. Kakao and Naver are the most active in this area.

### *iii. Korean firms have fewer partnerships and collaborations with international partners*

Strategic partnerships between digital firms in different sectors and in different parts of the world are commonly formed to expand into new product and geographic markets. As the top search engine globally with over 90 percent of the global market share, Google is the most international in terms of forming alliances and setting up offices in foreign countries. IBM and Microsoft have locations in over 100 countries and over 40 percent of Microsoft's workforce is outside the United States.

Naver partnerships are mostly limited to other firms in Korea, with the exception of the new Space Green investment in the Sta-

tion F incubator in France. Kakao's partnerships are also predominantly in Korea, with the exception of a partnership with Tencent (China).

## 5. Conclusion

The study provides an empirical analysis using various sources to show the rising importance of digital companies in GVCs due to the recent advent of new Internet-based technologies and services. To that end, we discussed changes in the global economic environment resulting from the recent emergence of new technologies and made an attempt to define digital companies. We also provided industry classification codes for this sector, and following our definition, described how these digital businesses have grown using statistical evidence.

In addition, we employed case studies in comparing leading global digital firms with their Korean counterparts. In combining them, this study attempts to derive implications carried by the empirical evidence for a digital economy that is growing increasingly important in GVCs.

### (1) Summary of Results

A summary of the results of the empirical analysis follows.

- i. The rise of companies in the digital sector

in the overall global economy is notable, and businesses in the digital sector are also emerging in Korea. The growth of the digital sector in Korea seems to be mainly attributable to the entry of new establishments, but slower growth in the size of individual companies is observable.

ii. In general, the size of the digital economy in Korea is much smaller than the size in the United States, however the share of employment and sales in digital sectors account for a similar share of each economy's overall activity. Furthermore, the size of digital firms in Korea is much smaller than that of global digital companies.

iii. Global digital companies earn 50 percent or more of revenue from overseas markets, while digital companies in Korea make a comparatively low percentage of their sales from foreign markets, particularly from countries outside East Asia.

iv. Korean digital companies are closely connected with related conglomerates and are less independent than global digital companies.

v. Although M&A with either startups or incumbents is an essential strategy for the growth of global digital companies, M&A activity has been relatively uncommon in Korea.

## (2) Limits of the Study and Future Research Directions

Although this study is meaningful in that it provides a definition of the digital economy and analyzes empirical data of the digital economy, it relies on case studies of only a few major digital companies in Korea and the U.S. to derive its major implications. To overcome this and come to a more general conclusion, it is necessary to carry out more research that takes yet more corporate case studies into account in reaching broad conclusions on the digital economy. Through more case studies, researchers will be able to derive further implications that might eventually aid in formulating policies for the relevant industries.

Second, further discussion on the definition of the digital economy, which is related to national statistical data, should continue. For example, the digital sector considered in this study includes game-related companies. In terms of the rise and importance of digital companies in global value chains, further discussions and reconsiderations are necessary to help determine whether gaming companies fit the definition of a digital company. Establishing a standardized industrial code for this sector has limitations, but is necessary in order to perform comparative analyses.

Furthermore, since the impact of the digital economy goes beyond the digital sectors identified in this report using KSIC codes, future

research should also consider more information based on occupations, such as ONET data in the United States.

Finally, this study focuses mainly on deriving implications based on empirical analyses of objective statistics and the digital companies themselves. However, to produce richer results requires additional qualitative research in the future, such as analyses of digital companies' strategies.

And additional quantitative and qualitative extensive analyses will prove valuable, since the digital field is expected to affect other

industries in all directions across global value chains.

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