The Role of Content Services Within a Firm's Internet Service Portfolio: Case Studies of Naver Webtoon and Google YouTube*

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In recent years, many Internet giants have begun providing their own content services, which attract online users by offering personalized services based on artificial intelligence technologies. This study investigates the role of two firms' content services within the firms' online service network. We examine the role of Naver Webtoon, which can be characterized as a professional-generated content, within Naver's service portfolio, and that of Google YouTube, which can be characterized as a user-generated content, within Google's service portfolio. Using survey data on viewers' use of the two services, we analyze a valued directed service network, where a node denotes an online service and a relationship between two nodes denotes a sequential use of two services. We found that both Webtoon and YouTube show higher out-degree centrality than in-degree centrality, which implies these content services are more likely to be starting services rather than arriving services within the firms' interactive network. The gap between the out-degree and in-degree centrality of YouTube is much smaller than that of Webtoon. The high centrality of YouTube, a user-generated content service, within the Google service network shows that YouTube's initial role of providing specific-content videos (e.g., entertainment) has expanded into a general search service for users.

1. Introduction

In recent years, the content industry has been growing rapidly. The Korea Creative Content Agency (KOCCA), a government agency that oversees and coordinates the promotion of the Korean content industry, defines content as including broadcasting, music, games, comics, animation, and character

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licensing, among others.[1] According to a Statista report published in 2021,[2] the sales revenue of the content industry in South Korea continued to increase from 2014 (94.94 trillion South Korean won) to 2018 (119.61 trillion South Korean won). The sales revenue is also projected to have increased much more since the COVID-19 outbreak began. With the growth of the content industry, many firms have developed content services that are now competing in the market. It is interesting that not only companies that specialize in content (e.g., CJ Entertainment and Netflix), but also major Internet service giants (e.g., Naver, Google, Amazon, and Kakao) are providing content services. Coupang, one of the major online retailers in Korea, recently launched its own content service, Coupang Play, as well. This study was motivated by the fact that most Internet service giants include content services in their service portfolio. Our aim was to examine the role of the content service in the service portfolio of two online service firms.

Nowadays, Internet users increasingly consume content for many hours a day (Kar, 2020), and the performance of the content service is determined by multiple factors, including the content quality, provider quality, and service quality (Joo and Sohn, 2008). Naver and Google are all-encompassing service platforms that combine the main feature of the search engine with various content services.

Naver offers V Live, Webtoon, TV, Music, and Movie, whereas Google offers YouTube, Music, and Movie/TV. The content services can have various roles. The content services themselves create revenue, but they also contribute to other services within the service platform by attracting users to the Internet site, complementing other services, and bridging or linking to other services. One of Amazon's key strategies is to bundle various content and e-commerce services into Amazon Prime. According to Amazon's annual report, it spent $11 billion on content for its streaming video and music services in 2020, the latest sign of its willingness to invest heavily in entertaining Prime members.[3] As Jeff Benzos remarked in a conference,

When we win a Golden Globe, it helps us sell more shoes. And it does that in a very direct way. Because if you look at Prime members, they buy more on Amazon than non-Prime members, and one of the reasons they do that is once they pay their annual fee, they're looking around to see, "How can I get more value out of the program?" And so they look across more categories—they shop more. A lot of their behaviors change in ways that are very attractive to us as a business. And the customers utilize more of our services.[4]

Among the content services provided by Internet service giants in Korea, we study the cases of

1) Source: https://www.kocca.kr

2) Source: https://www.statista.com/statistics/1155001/south-korea-sales-revenue-content-industry/

3) Source: https://www.cnbc.com/2021/04/15/amazon-spent-11-billion-on-video-and-music-content-last-year.html

4) Source: https://www.businessinsider.com/amazon-ceo-jeff-bezos-said-something-about-prime-video-that-should-scare-netflix-2016-6

Naver Webtoon and Google YouTube because both are regarded as successful services with their own platform business models. Naver and Google are two major firms in the Korean search engine market, and they provide a variety of online platform services. In 2021, Naver's market share in the Korean search platform market was 58.1% and Google's was 36.0%.[5] Since 2017, when Naver's market share was 87.3% and Google's was 0.2%, Google has taken up more of Naver's market share.[6] Both IT platforms are partaking in various other services, such as fintech, cloud, content, and e-commerce, and advertisements related to the search engine make up more than half of the profit.[7]

The purpose of this study is to investigate the role of Naver Webtoon in Naver's service portfolio and that of Google YouTube in Google's service portfolio and to identify commonalities and differences between the two content services in terms of their role within each company's service network. Although both Naver Webtoon and Google YouTube depend mainly on user participation, they are different in terms of the types of creators. Naver Webtoon can be described as a professional-generated content (PGC) service, in which the content is created by professional webtoon writers. Google YouTube, on the other hand, can be described as a user-generated content (UGC) service (Susarla et al., 2012), in which anyone can upload videos onto the YouTube platform (Kim, 2012).

This study applies demand-side synergy and the network effect theory as theoretical frameworks to observe customers' usage patterns of different services provided in the service portfolio of the IT platform giants. The platform acts as the mediating entity that enables the exchange of products and services by arranging interactions between two or more independent groups of stakeholders (Hoelck and Ballon, 2015). The content service for these large IT platforms may create synergistic value for consumers to use the rest of the Internet services within the firm's service portfolio. This study poses the following research question: What complementary roles and positions do content services occupy within the network of an IT platform?

The remainder of this study proceeds as follows. Section 2 outlines the related literature, while section 3 summarizes the research methodology and sample construction. In sections 4 and 5, the cases of Naver Webtoon and Google YouTube are introduced, followed by a cross-case comparison of the two services in section 6. Finally, we conclude with the research contributions and future research directions in Section 7.

2. Literature Review

Methods of the social network analysis have provided an important framework to explore the various facets of the content service such as

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5) Source: https://www.mk.co.kr/news/it/view/2021/05/463524/
6) Source: https://www.mk.co.kr/news/it/view/2021/05/463524/
7) Source: Naver Business Report (2020), https://businessquant.com/google-revenue-by-segment

diffusion patterns, user-behavior, and competitive dynamics. Ha et al., (2011) analyze the behavioral patterns of bloggers and structural characteristics of the Korean blogosphere by identifying the characteristics of a scale-free network. Kang et al., (2011) investigate the influence of social networks' structural and relational attributes on the knowledge sharing patterns in community-driven knowledge services Yahoo! Answers and Naver Knowledge iN. Hwang et al., (2012) examine online news traffic patterns through the concepts of in-degree and out-degree to compare user satisfaction of Naver versus Daum news services. Another stream of work empirically demonstrates the structural properties of popular videos on UGC video services such as YouTube and Daum Videos (e.g., Cha et al., 2009; Susarla et al., 2012; Yoganarasimhan, 2012). Susarla et al. (2012) posit that the influence of central video content on YouTube stems from their structural position in the networked structure of interactions on the platform.

While the content service has been studied in earlier IS research, research gaps exist between this study and previous work. First, we consider a company's online services to be a service network in which individual services are linked to the user's sequential use flow. Second, we look at how content services fit into the Naver and Google service portfolios. Third, we explicitly compare the rank for degree centrality as well as the brokerage roles of Naver Webtoon and Google YouTube.

2.1. Professional-Generated Content (PGC) and User-Generated Content (UGC)

Naver Webtoon centers around PGC, whereas Google YouTube centers around UGC, although both services have elements of both PGC and UGC. For instance, Webtoon allows aspiring Webtoon creators to upload their work onto the platform, and YouTube directs original series for its premium membership users; however, these crossovers are not the main features of the respective services. The inherent difference between PGC and UGC is the ability to control the content (Cheong and Morrison, 2008). An issue with UGC that platforms face is the lack of ability to control the content that is uploaded onto the platform (Cheong and Morrison, 2008). Because of this characteristic, YouTube has expanded from its main feature of entertainment and moved onto a knowledge-sharing platform. UGC is typically produced for small audiences, such as family members (Cha et al., 2007), but for YouTube, as the platform grew, the volume and diversity of the video content being uploaded grew exponentially as well, enabling the search function. In contrast, PGC is relatively easy to control compared with UGC, which allows Naver to consistently produce quality web comics and focus only on the entertainment function of the platform.

2.2. Demand-Side Synergy

Demand-side synergy can be defined as a means to create value for consumers by offering service combinations that together increase the consumer

utilities offered by individual services (Schmidt et al., 2016). For example, Ye et al., (2012) identify demand-side synergy in the collocated laundry and tanning businesses. In the online service business, demand-side synergy can be used to explain why online service firms offer more than one service, including content services, in their service portfolio. The importance of the customer has been stressed by Drucker (1954), "The customer is the foundation of a business" (p. 61). The rise of the World Wide Web has led to the online business model in which the number of users and traffic on the website is directly related to the financial performance of the business via advertising revenues (Massa et al., 2017; Subramanian et al., 2021).

Competition for customers becomes fiercer in the platform business because it allows platform participants from two sides to interact with each other on the platform (Subramanian et al., 2021). The number of users on one side of the platform is generally followed by the number of the users on the other side. Having a large number of Internet users is a necessary condition for entering a virtuous circle in a profitable platform business; thus, creating demand-side synergies is an effective way to increase the number of Internet users.

Online service firms, such as Naver and Google, can use the demand-side synergy in strategic decision making of their service portfolio (Adner and Zemsky, 2006). A customer will benefit when the knowledge developed while using a service reduces the learning time required to use another service. If an online service firm understands users' pattern of consuming online services, the firm can

provide service combinations that maximize the demand-side synergy, which can increase the efficiency of their service operations. For example, a Naver Webtoon user will be familiar with the user interface of Naver Music or other Naver services, which reduces the learning time when using the other services. The user does not need to create a new account and manage that account to use the other Naver services.

2.3. Network Effects

Network effects occur when the value of a product perceived by users is dependent on the number of users (Gallaugher and Wang, 2002; Katz and Shapiro, 1985; Qiu et al., 2015). Network effects are important for the value that these platform businesses create. Network-based competition can be classified into two types of network effects: direct or customer network effects and indirect network effects (Gao and Iyer, 2006). *Customer network effects* are demand-side economies of scale that come with customers' degree of adoption (Katz and Shapiro, 1994; Lee, 2001). For example, a customer network effect is produced when the number of Facebook users directly influences the value of the Facebook service. *Indirect network effects* are those that accrue from complementary relationships, and platforms benefit from the indirect effects (Srinivasan and Venkatraman, 2010). For YouTube, Google's video platform, having more users means that more content is being uploaded onto the platform, which engages more consumers and entices greater participation from

advertisers. As the platform becomes more popular, network effects make it more difficult for competitors and new entrants to survive. Indirect network effects are the economies of fitness or the strategic complements that come with the availability of supporting products and services added to the portfolio, which indirectly enhance the value of the products purchased by users (Katz and Shapiro, 1985). Naver, for instance, has strengthened its content pools by adding serialized web novels to its web comic platform. The portal's decision to acquire Munpia, one of the largest web novel platforms in South Korea, further exemplifies such an expansion strategy.[8]

Customers' repeated use of and attachment to YouTube videos and Webtoon comics have initiated strong network effects over the years, which have become the driving force for continuous growth and change. For instance, Webtoon began as a place to upload published comic books as electronic books but has evolved to its present business model, in which the company hires talented artists and storytellers to upload web comics on a weekly basis. Likewise, YouTube began as a video dating website where people could upload videos of themselves talking about the partner of their dreams. The business models of Webtoon and YouTube have been revolutionized since then to monetize the platforms in various ways (e.g., advertisements, exclusive access, etc.). Through these efforts, Webtoon raised more than $7 million in revenue in 2020,[9] and YouTube generated nearly $20 billion in revenue in 2020－about 13% of Google's total advertising revenues.[10]

3. Research Method

To examine the role of Naver Webtoon within Naver's service portfolio and that of Google YouTube within Google's portfolio, we use the methods of social network analysis with UCINET. Data were collected through a survey conducted in January 2020. The data were obtained from the responses of 231 Internet users who use both Naver and Google. The majority of the survey participants were in their 20s (60.17%) and the remainder were in their 30s (22.08%) and 40s (17.75%). Fifty-two percent of the participants were university students, whereas 48% were full-time employees. For the social network analysis, two types of data were needed, attribute data and relational data. Survey participants were asked to evaluate the usage rate, frequency, and length of usage time and their satisfaction with individual Internet services. Their responses were used for the attribute data on individual services. Table 1 shows the services offered by Naver and Google that were included in the social network analysis. Although all the services offered by Naver and Google were included in the questionnaire, the 21 Naver services and 14 Google services that participants

8) Source: https://www.chosun.com/economy/economy_general/2021/10/01/CS6HKASXOVGSDE2LYGIP3RT7CA/

9) Source: https://www.sedaily.com/NewsVIew/22L9TGAZV8

10) Source: https://www.cnbc.com/2021/05/18/how-does-google-make-money-advertising-business-breakdown-.html

〈Table 1〉 Naver Services and Google Services Included in the Social Network Analysis

Category	Naver services	Google services
Search Platform	Search, Blog, Knowledge iN, Café, News, Maps	Search, Maps
Commerce	Shopping, Pay	NA (used very little by Korean users)
Fintech	Stock, Real Estate	NA (used very little by Korean users)
Content	V Live, Webtoon, TV, Music, Movie	YouTube, Music, Movie/TV
Cloud	Calendar, Address, Cloud	Docs, Sheets, Slides, Drive, Photos, Calendar, Address
Communication	Mail, Band, Line	Gmail, Messages

Note. NA, not applicable.

reported using the most were included in the analysis, based on frequency of their uses in the survey responses. Thus, the Naver service network consisted of 21 services, and the Google service network consisted of 14 services in this study. Individual Naver services were grouped into different business segments according to Naver's 2020 annual report.[11] In the annual report, the company categorized these services as search platform, commerce, fintech, content, cloud, and communication. Matching Google services were further sorted into the same categories. Google services were categorized into search platform, content, cloud, and communication (see Table 1).

For the relational data, we define the relationship between two services as the flow from one service to the other service within either Naver or Google, and the data collected describe a directed valued network. Participants were also asked about their typical usage patterns from one service to another, and their responses were converted to relational data for the social network analysis. Participants were asked to check the first service they usually

used, followed by the next service they usually used, if any. For example, if a user read a digital comic on Naver Webtoon first and then searched for a specific keyword from the webtoon content via a Naver Search, the directional relationship from Naver Webtoon to the Naver Search was coded as 1. If other participants usually visited Naver Webtoon first and then used a Naver Search next, the number of the participants was added onto the value of the relationship. We found 179 relational ties in the Naver network and 96 in the Google network. The survey used for the collection of the network data is provided in the appendix to clarify the data coding process.

4. Case Study of Naver Webtoon

4.1. Naver Webtoon and the Naver Service Network

Naver's Webtoon platform (a merging of the words "web" and "toon") was introduced in 2004

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11) https://www.navercorp.com/navercorp_/ir/businessReport/2021/NAVER_business_report_2020.pdf
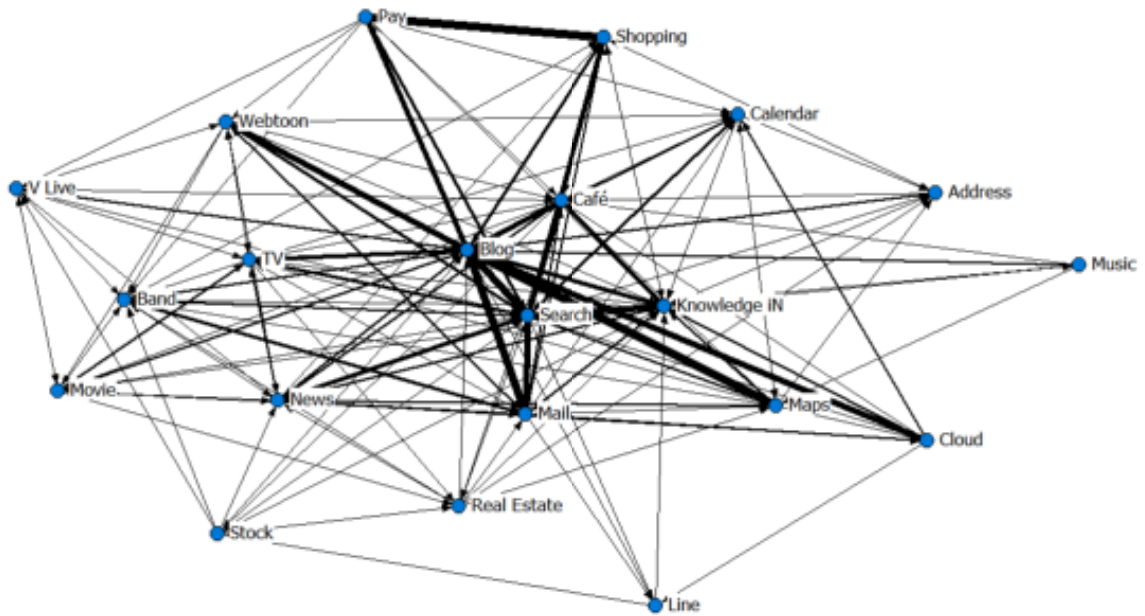
〈Figure 1〉 Network of 21 Naver services

as a merging of old and new media on the web. It became a transmedia phenomenon (Shim et al., 2020) and has now evolved into a recognizable format, with a colorful palette that allo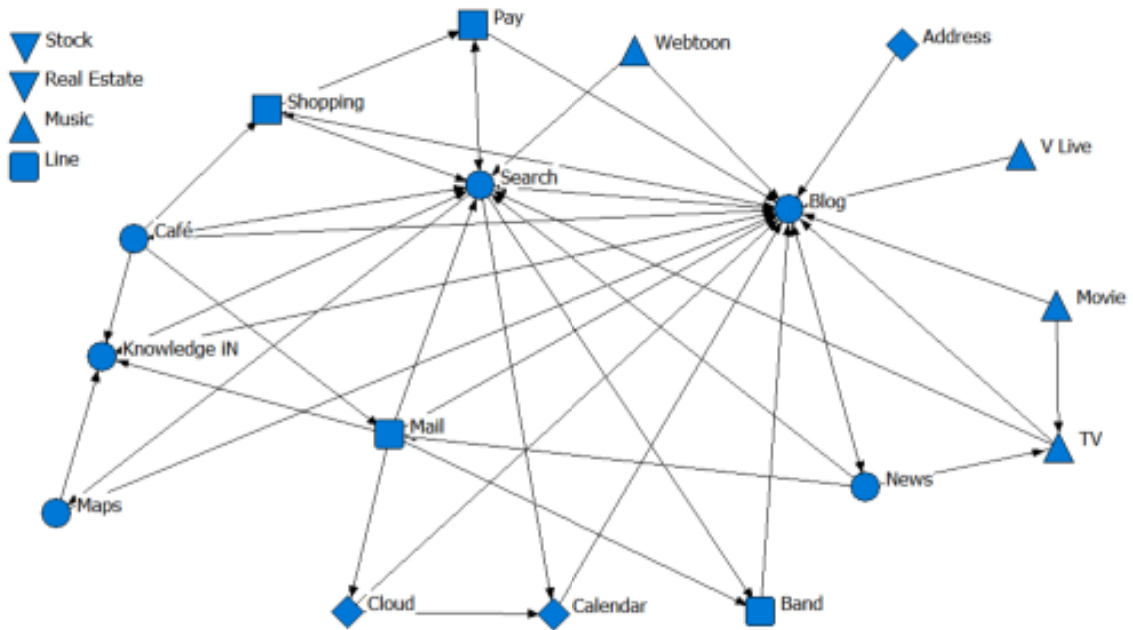ws consumers to scroll each episode vertically in less than 3 minutes. The platform invites talented web comic creators with various levels of professional experience to tell fictional stories in these formats while engaging readers and motivating them to click on the weekly uploads and to post comments. Webtoon consumers have come to expect a regular weekly upload of comics of diverse genres, including adventure, romance, science fiction, sports, superhero stories, crime, horror stories, thrillers, war stories, dystopian societies, and fantasy (Shim

et al., 2020). Because of its increasing popularity not only among Korean users, but also among overseas users, Naver Webtoon was established as a separate corporation in 2017, when the company revealed that it had made more than $29 million in revenue that year.[12] In 2020, Webtoon reported earning $115 million in revenue.[13]

In its early days, Webtoon was free to all viewers. Its main objective was to drive traffic toward the commercial services and products hosted on the company's search portals (Shim et al., 2020). In recent years, it has adopted various monetization models, ranging from free to freemium services. It operates a micro-payment model that allows a pay-per-view system in which

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12) Source: http://news.bizwatch.co.kr/article/industry/2021/08/02/0024

13) Source: http://news.bizwatch.co.kr/article/industry/2021/08/02/0024

〈Figure 2〉 Network of 21 Naver services based on tie strength

users gain access to premium Webtoon episodes earlier than the release date (Shim et al., 2020). Moreover, certain Webtoon episodes are completely geared toward promoting public service announcements (e.g., nonsmoking campaigns) or the company's products. In these instances, the episodes themselves become commercial platforms.

Figure 1 presents the network of 21 Naver services, which form a valued directed network. Tie strengths are expressed by the thickness of the edges, whereas the shapes of the nodes signify the subgroup to which each service belongs. This network diagram illustrates what a service is linked to and from which services as well as the frequency of individual links. The diagram shows that out of 21 Naver services, Search has the greatest number of out-degree connections and that

Mail, Café, Shopping, and Blog have high out-degree connections as well. Blog has the greatest number of in-degree connections, followed by the services of Search, Knowledge iN, Café, and Pay. In a directed network, *in-degree centrality* refers to the number of predecessor services, and *out-degree centrality* refers to the number of successor services. This result implies that users who visit webpages for Search, Mail, Café, Shopping, or Blog are more likely to use other Naver services, and users who use a Naver service are more likely to continue to use another Naver service, such as Blog, Search, Knowledge iN, Café, or Pay.

Figure 2 presents a simplified Naver service network in which only significant tie strengths are shown. The categories of the services are presented

〈Table 2〉 Core–Periphery Analysis of 21 Naver Services

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Search		47	34	24	1	8		10	1	2	1		4	1	1	14	1		5	7	1
2 Blog	24		13	26	7	2	7	1	1			1	1			1		1	3		1
3 Knowledge iN	40	22		5	5		2		1				1		1				4	1	
4 Café	30	32	21		6		10		1	2		4	1		1				8		
5 News	24	11	3	2			3				1	3	7		1			1	7	2	
6 Maps	1	53	7	2	5								1			2	1	1	2	2	
7 Shopping	31	16	3	4				52									1				
8 Pay	13	31	1	1							1	4				2				1	
9 Stock	4	2			2					2	1									1	
10 Real Estate	4	4	1	2	2	3										1			1	1	
11 V Live	1	10		1								1	2		1					2	
12 Webtoon	20	41	4	4							1		1		3	1			1	2	
13 TV	14	23	3		1				1		1					1			1	1	
14 Music	1	6	1	1		3															
15 Movie	2	10	1		1				1	2		7								1	
16 Calendar	1	12	3	2		1												1			
17 Address		7	2	1			1														
18 Cloud	3	41	5	1												10					1
19 Mail	39	51	7	1		1		6				6	2		1	2		9		13	1
20 Band	3	9			3		1														
21 Line		2	1						1												

in shapes of the circle (search platform), triangle (content), square (commerce), down triangle (fintech), diamond (cloud), and round square (communication). Search platforms Search and Blog have strong inbound connections with the rest of the services within the network. Content service Webtoon has an outbound link toward search platforms Search and Blog. Other content services such as V Live, Movie, and TV only show significant outbound links toward Blog. Music has no notable connection within the entire network. Out of the three Communication services,

Mail acts as a gateway to other service categories such as search and cloud, while Line is relatively isolated from the network. Fintech services Stock and Real Estate have relatively weak connections with the rest of the services in the network.

A core‑periphery analysis distinguishes between a higher density of actors (core) and a lower density of actors (periphery) based on how close the actors are to each other. Table 2 presents a core‑periphery analysis of the service network of Naver. In the service network of Naver, 19% of Naver's services take up the core position (Blog,

⟨Table 3⟩ Top 14 Services for Out- and In-Degree Centrality out of 21 Naver Services

Rank	Service	Out-degree centrality	Normalized out-degree centrality		Rank	Service	In-degree centrality	Normalized in-degree centrality
1	Search	162	0.153		1	Blog	430	0.406
2	Mail	139	0.131		2	Search	255	0.241
3	Café	116	0.109		3	Knowledge iN	110	0.104
4	Shopping	107	0.101		4	Café	77	0.073
5	Blog	89	0.084		5	Pay	63	0.059
6	Knowledge iN	82	0.077		6	Band	34	0.032
7	**Webtoon**	**78**	**0.074**		7	News	33	0.031
8	Maps	77	0.073		8	Calendar	33	0.031
9	News	65	0.061		9	Mail	32	0.03
10	Cloud	61	0.058		10	Shopping	30	0.028
11	Pay	54	0.051		11	TV	27	0.025
12	TV	46	0.043		**12**	**Webtoon**	**20**	**0.019**
13	Movie	25	0.024		13	Maps	18	0.017
14	Calendar	20	0.019		14	Cloud	12	0.011

Knowledge iN, Café, Search), all of which belong to the search platform group. The core services are closely related to each other, whereas the periphery services have less contact with each other. Webtoon, which is a peripheral actor, shows a strong connection to the core actors Blog and Search while showing weaker connections to the core actors Knowledge iN and Café.

4.2. Centrality

Centrality is an important measurement for gauging the degree of centralization of the entire network. In an IT platform network, services in the center of the network are more likely to obtain information and resources, allowing them to have greater power and a stronger influence than other services. *Degree centrality* refers to the number of direct ties of a node, which reflects the number of

connections between services. When a service is directly connected to many other services, then its degree centrality is high and it is at the center of the entire network. Because connections can be directional, degree centrality can be divided into out-degree centrality and in-degree centrality (see Table 3).

Naver Webtoon's out-degree centrality, 78, is ranked seventh out of 21 services, which is much higher than its in-degree centrality, 20. Out of 231 survey participants, 78 participants reported that they usually visit another Naver service webpage right after reading comics on Naver Webtoon, whereas only 20 participants said that they usually visit Naver Webtoon right after using another Naver service. This result shows that a significant proportion of users are likely to continue to use another Naver service right after reading comics

〈Table 4〉 Top 11 Services for Out- and In-Closeness Centrality out of 21 Naver Services

Rank	Service	Normalized out-closeness centrality
1	Search	0.87
2	Blog	0.769
3	Mail	0.741
4	News	0.714
5	Café	0.69
6	Maps	0.69
7	Knowledge iN	0.667
8	**Webtoon**	**0.667**
9	Real Estate	0.645
10	TV	0.645
11	Pay	0.625

Rank	Service	Normalized in-closeness centrality
1	Blog	1
2	Search	0.909
3	Knowledge iN	0.87
4	Café	0.8
5	Band	0.714
6	News	0.667
7	TV	0.667
8	Mail	0.645
9	Calendar	0.625
10	Shopping	0.606
11	**Webtoon**	**0.606**

on Naver Webtoon. Naver Webtoon appears to play the role of attracting users and passing them on to other Naver services; thus, the business value of Naver Webtoon seems to be greater than the performance of the service itself. Webtoon helps other Naver services increase their user traffic or revenue.

Closeness centrality is a measure that indicates how close a service is to other services in a service network. A service with a high in-closeness centrality is located in a position in which other services are close in the network. Naver Webtoon's normalized out-closeness centrality, 0.625 (8th out of 21 services) and its normalized in-closeness centrality, 0.606 (11th out of 21 services) do not differ significantly. This result shows that the Webtoon service is relatively close to other services as well as to other services in the Naver service network. Table 4 lists the top 11 services in terms of the out- and in-closeness

centrality of 21 Naver services, and it shows that the Search and Blog services can reach other services in the shortest distance.

4.3. Brokerage Roles

Brokers in social network analysis are the actors that connect different subgroups in the network. Brokers have an advantageous position in the network in that they have the bridging capability to connect different subgroups (Burt, 1992). Hargadon (2003) has argued that brokers are necessary for innovation because they are able to introduce new ideas from different groups. Although several methods can be used to measure brokers, this research uses ego-brokerage configurations that categorize the broker into the coordinator, consultant, gatekeeper, representative, and liaison based on the brokerage score of the ego (Gould and Fernandez, 1989). The coordinator and consultant are within-group brokerages. If the brokerage node, the

〈Table 5〉 Brokerage Role Analysis (Top 9 Naver Services for the Total Number of Brokerage Roles out of 21 Services)

Service	Group	Coordinator	Gatekeeper	Representative	Consultant	Liaison	Total
Search	Search Platform	3	24	34	13	97	171
Blog	Search Platform	3	31	21	11	91	157
Café	Search Platform	0	11	13	5	48	77
Knowledge iN	Search Platform	0	14	8	7	44	73
News	Search Platform	0	6	16	4	22	48
Mail	Communication	0	9	0	4	26	39
TV	Content	1	3	9	0	11	24
Maps	Search Platform	0	3	3	2	12	20
Webtoon	**Content**	**2**	**6**	**4**	**0**	**5**	**17**

〈Table 6〉 Brokerage Role Analysis of the Naver Webtoon Service
(a Service Group Linked from, Row, and a Group Linking to, Column)

Category	Search Platform	Commerce	Fintech	Content	Cloud	Communication
Search Platform	0	0	0	3	2	2
Commerce	0	0	0	2	0	1
Fintech	0	0	0	0	0	0
Content	2	0	0	2	1	1
Cloud	0	0	0	0	0	0
Communication	0	0	0	1	0	0

starting node, and the destination node all belong to the same group, the brokerage node is called a *coordinator*. A *consultant* is the brokerage between members of the same group, but the consultant itself is not a member of that group. The gatekeeper, representative, and liaison are between-group brokerages. A brokerage node is a *gatekeeper* when only the source node belongs to a different group while the broker node and destination node are involved in the same group. Conversely, when the source node and broker node are in the same group but the destination node is in a separate group, the broker is a *representative*. A *liaison* broker situation is created when the source, broker,

and destination nodes are independent groups of one another.

Table 5 shows the number of five brokerage roles that Naver Webtoon plays: twice as a coordinator, six times as a gatekeeper, four times as a representative, none as a consultant, and five times as a liaison. This brokerage analysis can tell whether links from and to Naver Webtoon occur within its service group or across the group. For example, the role of the gatekeeper indicates that a user's clickstream goes from a Naver service in a group other than the content group to Naver Webtoon, and then moves to a service within the content group. The role of the liaison indicates that

a user's clickstream goes from a Naver service in a group other than the content group to Naver Webtoon, and then moves to a service in a group other than the content group. Table 6 shows that two visits to Naver Webtoon are linked from a service in the search platform group, one visit from a service in the cloud group, and one visit from a service in the communication group. For the outbound visits, three clicks from Naver Webtoon go toward a service in a search platform group, two clicks toward a service in the commerce group, and one click toward a service in the communication group.

The service group making up the top brokers in the network is the search group, with significant contributions made by Search, Blog, Café, and Knowledge iN, which simultaneously occupy the core position in the core‐periphery analysis. It is interesting that these services play the liaison role, in which all nodes belong to different groups. Thus, Naver's search portfolio of search services connects unrelated services with each other, triggering users to take advantage of diverse services provided by Naver. Among the content group services, Naver TV is the highest contributor as a broker, which goes hand-in-hand with the betweenness centrality score.

5. Case study of Google YouTube

5.1. Google YouTube and the Google Service Network

YouTube is an online video-sharing and social media platform that launched in February 2005. Video categories on YouTube include music videos, audio recordings, livestreams, vlogs, short films, documentaries, and movie trailers, among others. Although most of the content is generated by individual YouTubers, established corporations or record labels, such as Disney, CNN, and SM Entertainment, have created corporate YouTube channels to reach a larger audience. Through the years, features have been added to the video-sharing platform to facilitate social networking among its viewers. Users with a Google account can watch and upload videos, comment on videos, like or dislike videos, create playlists, and subscribe to other channels. Viewer engagement is used by the YouTube algorithm to provide users with a list of related videos to further encourage users to stay on the platform and increase their watch time (Gill et al., 2007). Advertisements are displayed in the banner below the video, or the videos are interrupted by commercial breaks to generate revenue from ad placement.

In October 2006, YouTube was acquired by Google for $1.65 billion.[14] Google's ownership of YouTube has brought a diversified monetization model. YouTube launched YouTube Red, a freemium service that offers paid content, such as

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14) Source: https://www.bbc.com/news/business-35460398
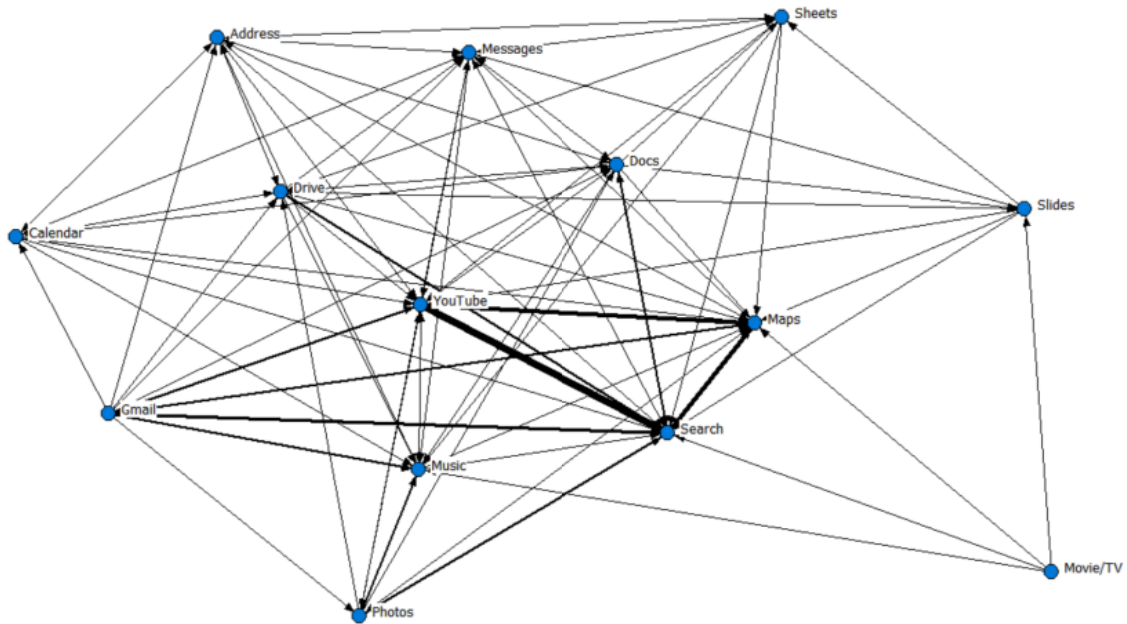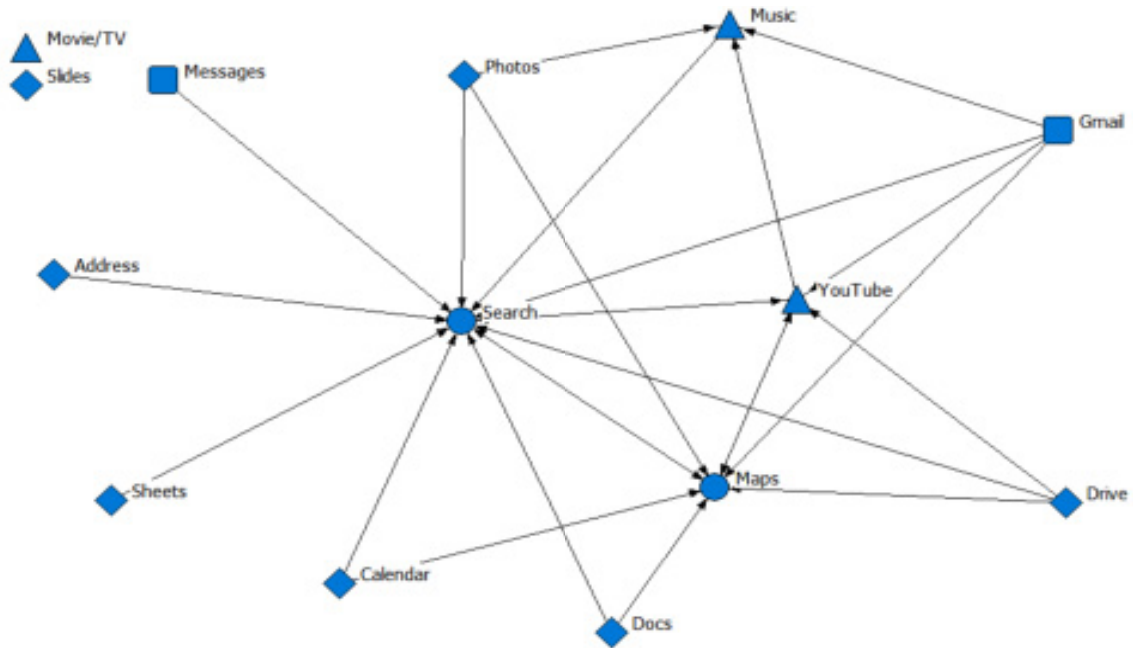
⟨Figure 3⟩ Network of 14 Google services

movies and exclusive video content. YouTube Red has since been rebranded as YouTube Premium, a monthly subscription service that offers original content curated by the YouTube team. Since its purchase by Google, YouTube has expanded beyond the website into mobile apps and network television. It reported a revenue of $19.8 billion in 2020.[15]

Figure 3 illustrates the value directed network of 14 Google services. The network diagram shows that among 14 Google services, YouTube has the greatest out-degree of connections, and Gmail, Search, and Maps also have a high out-degree of connections. Search has the greatest in-degree of connections, and Maps, YouTube, and Messages

services also have a high in-degree of connections. This result suggests that users who visit YouTube, Gmail, Search, and Maps are inclined to use other Google services, and those who are Google users are inclined to use Search, Maps, YouTube, and Messages.

Figure 4 presents a simplified Google service in which links between nodes that have significant tie strengths are considered. The categories of services are presented in shapes of the circle (search platform), triangle (content), diamond (cloud), and round square (communication). Search platforms Search and Maps have relatively strong inbound connections with all service categories. Content service YouTube and Music also have relatively

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15) Source: www.sec.gov

〈Figure 4〉 Network of 14 Google services based on tie strength

〈Table 7〉 Core–Periphery Analysis of 14 Google Services

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Search		**48**	11			1							5	1
2 YouTube	**88**		49	8		1				5			4	4
3 Maps	46	10								2		2	1	
4 Music	6	2	3									1		
5 Movie/TV	2		2	1				1						
6 Docs	11	2	7	2			3	2	3			1		1
7 Sheets	8	2	5	1					2					1
8 Slides	4	1	4				3		1					1
9 Drive	12	7	6	1			2	2				3		4
10 Photos	19	2	6	11		1			4					2
11 Calendar	8	2	6	2		1			2			1		3
12 Address	7	3	4	2		1	1		1		1			3
13 Gmail	36	12	14	10		1			4	1	1	2		5
14 Messages	7	1	3	2		1				1	2	1		

⟨Table 8⟩ Fourteen Google Services Classified by Their Out- and In-Degree Centrality

Rank	Service	Out-degree centrality	Normalized out-degree centrality		Rank	Service	In-degree centrality	Normalized in-degree centrality
1	**YouTube**	**159**	**0.139**		1	Search	254	0.222
2	Gmail	86	0.075		2	Maps	120	0.105
3	Search	66	0.058		**3**	**YouTube**	**92**	**0.08**
4	Maps	61	0.053		4	Music	40	0.035
5	Photos	45	0.039		5	Messages	25	0.022
6	Drive	37	0.032		6	Drive	17	0.015
7	Docs	32	0.028		7	Address	11	0.01
8	Calendar	25	0.022		8	Gmail	10	0.009
9	Address	23	0.02		9	Photos	9	0.008
10	Sheets	19	0.017		10	Sheets	9	0.008
11	Messages	18	0.016		11	Docs	7	0.006
12	Slides	14	0.012		12	Slides	5	0.004
13	Music	12	0.01		13	Calendar	4	0.003
14	Movie/TV	6	0.005		14	Movie/TV	0	0

crucial inbound connections to other categories. YouTube is connected to at least one service in every category in Google's service portfolio. Contrastingly, content service Movie/TV is relatively isolated. Cloud services and communication services have low inbound links and high outbound links to either the search or content categories. Services within the cloud and communication categories have minor links to each other.

Table 7 presents a core‐periphery analysis of the service network of Google. Fourteen percent of Google's services (Search and YouTube) account for the core position in the network. The rest of the services have a relatively lower density in the entire network compared with those of Search and YouTube. As a core actor, YouTube is well connected to all the services within the Google network, showing notably strong connections with Search and Maps, which belong to the search platform category.

5.2. Centrality

YouTube's out-degree centrality, 159, is ranked first out of 14 services, higher than its in-degree centrality, 92, which is ranked in third place among its in-degree centrality scores (see Table 8). Survey participants were more likely to visit another Google service after using YouTube than they were to visit YouTube after accessing a Google service. Thus, Google serves to draw users into its service and engage them in using other Google services afterward, increasing the traffic for its other services.

⟨Table 9⟩ Fourteen Google Services Classified by Their Out- and In-Closeness Centrality

Rank	Service	Normalized out-closeness centrality	Rank	Service	Normalized in-closeness centrality
1	Gmail	0.722	1	Search	1
2	Docs	0.684	2	Maps	1
3	Address	0.684	3	**YouTube**	**0.929**
4	Drive	0.65	4	Messages	0.813
5	Calendar	0.65	5	Music	0.813
6	Messages	0.65	6	Docs	0.684
7	**YouTube**	**0.619**	7	Address	0.684
8	Photos	0.619	8	Drive	0.684
9	Sheets	0.591	9	Photos	0.591
10	Slides	0.591	10	Sheets	0.591
11	Search	0.565	11	Gmail	0.565
12	Movie/TV	0.565	12	Calendar	0.542
13	Maps	0.542	13	Slides	0.52
14	Music	0.52	14	Movie/TV	`0.25

⟨Table 10⟩ Brokerage Role Analysis (Top 9 Google Services for the Total Number of Brokerage Roles out of 14 Services)

Service	Group	Coordinator	Gatekeeper	Representative	Consultant	Liaison	Total
YouTube	**Content**	**0**	**3**	**4**	**10**	**10**	**27**
Maps	Search Platform	0	0	2	11	13	26
Messages	Communication	0	0	0	17	7	24
Search	Search Platform	0	0	2	5	13	20
Docs	Cloud	6	13	0	0	1	20
Address	Cloud	4	11	0	0	3	18
Gmail	Communication	0	1	0	0	12	13
Drive	Cloud	9	2	1	0	0	12
Photos	Cloud	0	4	0	0	2	6

YouTube's normalized out-closeness centrality, 0.619 (seventh out of 14 services) is lower than its normalized in-closeness centrality, 0.929 (third out of 14 services). Whereas other Google services are able to reach YouTube with ease following Search and Maps, YouTube users are relatively farther away from other services. Table 9 indicates that Gmail, Docs, Address, and Drive can reach other services most efficiently.

5.3. Brokerage Roles

Table 10 indicates that among the five brokage roles, YouTube acts as the gatekeeper 3 times, representative 4 times, consultant 10 times, and liaison 10 times. YouTube also ranks number one

〈Table 11〉 Brokerage Role Analysis of Google YouTube Service (a Service Group Linked from, Row, and a Group Linking to, Column)

Category	Search	Content	Cloud	Communication
Search	0	2	2	1
Content	0	0	2	2
Cloud	0	1	9	7
Communication	0	0	0	1

among the services that play brokerage roles. YouTube plays prominent roles as the consultant and the liaison. In the consultant role, the broker belongs to a different group while the two services the broker connects come from the same subgroup. To illustrate, YouTube, which belongs to the content group, links two services from the same subgroup outside the content group. In the liaison group, all the nodes belong to a different group, meaning that YouTube, which belongs to the content group, links two different services that come from two different subgroups, such as the search, cloud, or communication group. Thus, YouTube leads its users to try out nonentertainment services.

Table 11 shows that two visits to YouTube are linked from a service in the cloud group and two visits are linked from the communication group. For the outbound visits, three clicks from YouTube go to a service in the search group, and one click goes to a service in the cloud group. The top brokers are YouTube, Maps, Search, and Messages, which belong to all four groups in the Google network. Although Search and YouTube are in the core position in the core‐periphery analysis and the remaining services are in the periphery, the brokerage analysis implies that all

four groups of Google services are likely connected to each other through the brokers (YouTube, Maps, Search, Messages) of each group.

6. Discussion: Comparison of Naver Webtoon and Google YouTube

The degree centrality of Webtoon and YouTube in their respective service networks show high levels of out-degree centrality compared with in-degree centrality. Both Webtoon and YouTube are likely to act as the starting service within the interactive network. High out-degree centrality suggests that the content service may motivate the user to access other services. The different patterns of degree centrality between Webtoon and YouTube show that overall, YouTube's degree centrality is higher for both out-degree centrality (0.139) and in-degree centrality (0.08) compared with Webtoon's position within the network. This result alludes to the expanded service of YouTube as a content platform. Although users view YouTube as an entertainment platform, they also consume it as a search platform to seek general information.

Unlike the rank for degree centrality, the rank for closeness centrality changes for out-closeness and in-closeness scores. For Webtoon, the out-closeness centrality (0.667) is higher than the in-closeness centrality (0.606), which implies that Webtoon's inward distance from other services is relatively low. For YouTube, on the other hand, the out-closeness centrality (0.619) is lower than the in-closeness centrality (0.929), which ranks third in the Google network. YouTube's high in-closeness centrality indicates that most services are likely to be directly connected to YouTube and that users of those services regularly access YouTube after using those services. This result alludes to YouTube's high service recognition level among Google services.

The brokerage role analysis suggests that Webtoon plays a distinguished role as the gatekeeper, whereas YouTube has prominent roles as the consultant and liaison. The gatekeeper role of Webtoon suggests that Webtoon connects users to other content services provided by Naver. In contrast, YouTube, as the consultant and liaison, connects services that are outside the content group, thus strengthening cross-group ties and further strengthening the diversification pattern seen in YouTube.

7. Conclusion

Competition among IT giants in the Korean market, such as Naver, Kakao, and Google, has become fiercer as they continue to expand their online services. These online service firms expect their service combinations to be complementary to each other. To our knowledge, our study is the first to analyze the online services of a firm as a service network, in which individual services are related to the flow of the user's sequential use. In the case studies of Naver Webtoon and Google YouTube, we identify the roles of content services within a firm's service portfolio. Results of the network analysis show that the content services of a firm are very effective at motivating their users to stay and continue to use other services within the firms' online service portfolios.

Because Naver Webtoon and Google YouTube have different aspects to their services as PGC and UGC respectively, our analysis helps elucidate the different roles these two content services play. Compared with Naver Webtoon, the overall contribution of Google YouTube to the Google service portfolio is much more significant. It is interesting to observe that the out-degree centrality and the number of brokerage roles of YouTube are greater than Google Search and Gmail, which implies that the content platform may be a substitute for the original search services. YouTube's successful business model of user-generated content may explain the outstanding role of YouTube, which is the most prominent content platform in use today in terms of variety and the number of content uploads.

The assessment of how customers are connected in a service network has important implications for strategy development. For instance, it is possible for managers to exert control over the interaction

of two services at the focal level in an IT platform network if the relationship affects the performance of the focal firm. If the revenue from a content service itself is small but the out-degree centrality is high, the content service will help the overall profitability of the firm. As such, the choice of certain relationships and investment decisions can affect the relationship dynamics in the network and the subsequent strategic outcomes (Eng, 2008). Improving the quality and linkage of two different services that are connected at a network level through the joint development of resources can give rise to a competitive advantage for an IT platform such as Naver or Google. Thus, the approach used to capture the user's routine pattern of accessing one service from another within an IT platform at a point in time provides potential guidance for strategic planning. Customers' repeated use of and attachment to videos and web comics allows the content to serve as gateways to consuming other services within the portfolio of offerings, thereby having implications for management practices related to resource planning to strengthen synergistic services.

As with all research, this study has several limitations. Survey participants are relatively homogeneous. The majority consisted of university-enrolled 20s who are expected to have a sense of familiarity with the Internet. For future analyses, we would like to include users with various levels of experience, educational background, age, and geographic location (rural and urban). Another limitation is the operationalization of the relational data. Survey participants were asked

about the services they use on a daily basis and the order in which they access these services. As a result, their perceived order of access to these services was reflected in the dataset. As such, there could be services that they access unknowingly through online links and pop-up windows. There could also be attendant problems with memory and recall accuracy in the survey. Even so, studies based on survey and interview-based self-tracking methods provide researchers with meaningful implications for assessing users' perceived online behavior.

These results are limited to capturing users' routine pattern of accessing platform services at a single point in time. This presents the opportunity for a longitudinal approach to service usage over several years, coupled with the changing market share and profit ratio of the services in the portfolio. Besides their roles in extending the range of firm variables, Webtoon and YouTube are not thoroughly analogous in the nature of their content. Although the content of both Webtoon and YouTube is visual, unlike Webtoon, YouTube has moved past pure entertainment and expanded to cover the knowledge-sharing territory, which is the role of Naver's Knowledge iN, Blog, and TV. YouTube videos serve various purposes for their viewers, depending on what the viewers are looking for. Nevertheless, this limitation has practical implications for Naver in terms of strengthening and diversifying its entertainment platform to provide users with an interesting and accessible means of knowledge sharing and information searching. Naver's traditional competitive advantage

compared with its competitor Daum's search portal has been the user engagement on knowledge-sharing platforms,[16] which we verified through the high centrality scores. Because Internet consumption trends are moving toward video presentations and younger generations are increasingly deviating from Knowledge iN participation, Naver would benefit from using its resources and experience to engage Blog creators and Knowledge iN experts in changing their outlet into video presentations on Naver TV. Because Naver TV already plays a liaison role, strengthening this role has the potential to lead to the use of other Naver services, with the possibility of monetization. Investment in Naver TV with the synergistic joint development of Knowledge iN, Blog, and Webtoon will allow Naver to gain a competitive advantage in the era of video content.

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16) Source: https://www.mk.co.kr/news/economy/view/2020/07/779373/

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〔Appendix〕 설문 문항

1. 다음은 귀하의 인적 사항에 관한 질문입니다.
- 귀하의 성별은 무엇입니까? (여성, 남성)
- 귀하의 연령은 어떻게 되십니까?
  (20세 이하, 21~30세, 31~40세, 41~50세, 51~60세, 61~70세, 71세 이상)
- 귀하의 학력은 어떻게 되십니까? (고등학교 졸업, 대학교 졸업, 대학원 졸업, 기타)
- 귀하의 직업은 무엇입니까?
  (대학생, 대학원생, 판매/서비스업, 사무직(IT관련), 사무직(비IT관련), 자영업, 전문직, 전업주부, 기타)

2. 다음은 네이버 서비스에 관한 질문입니다.
(네이버와 구글 서비스 질문에 대한 순서는 반씩 변경되어 진행됨)

- 다음 네이버 서비스 중 알고 있거나 들어본 적인 있다면 "알고 있다"를, 그렇지 않은 경우에는 "모른다"를 선택해 주세요. 그리고 해당 서비스를 이용하고 있다면 이용 빈도, 1일 평균 방문 빈도, 이용 시간, 만족도 및 서비스 제공에 대한 질문에 답해 주세요.

항목	인지도 ▼	이용빈도▼	1일 평균 방문 빈도▼	평균 연속 이용시간 ▼	만족도▼	네이버가 이러한 서비스를 제공하는 것에 대한 느낌은? ▼	만약 네이버가 이러한 서비스를 제공하지 않는다면? ▼
항목값	1. 알고 있다. 2. 모른다.	1. 사용안함 2. 월 1회 이하 3. 월 2~3회 4. 주 1~2회 5. 주 3~4회 6. 거의 매일	___ 회	1. 15분 미만 2. 15-30분 3. 30분 - 1시간 4. 1-2시간 5. 2시간 이상	1. 매우 만족 2. 만족 3. 보통 4. 불만족 5. 매우 불 만족	1. 마음에 든다. 2. 당연하다. 3. 아무런 느낌이 없다. 4. 마음에 안들지 만 할 수 없다. 5. 마음에 안든다	1. 마음에 든다. 2. 당연하다. 3. 아무런 느낌이 없다. 4. 마음에 안들지 만 할 수 없다. 5. 마음에 안든다
블로그							
검색							
...							

- 귀하께서 이용하는 서비스 중, 하루 시작 시 처음 이용하는 네이버 서비스는 무엇입니까?

- 다음은 귀하께서 이용 중인 서비스들을 보여주고 있습니다. 각 서비스를 이용한 후 바로 다음에 이용하는 서비스가 있다면 선택하고, 없다면 "없음"을 선택해 주세요.
  (예. 네이버 쇼핑-> 메일, 뉴스->없음 등)

3. 다음은 구글 서비스에 관한 질문입니다.

(네이버와 구글 서비스 질문에 대한 순서는 반씩 변경되어 진행됨)

● 다음 구글 서비스 중 알고 있거나 들어본 적이 있다면 "알고 있다"를, 그렇지 않은 경우에는 "모른다"를 선택해 주세요. 그리고 해당 서비스를 이용하고 있다면 이용 빈도, 1일 평균 방문 빈도, 이용 시간, 만족도 및 서비스 제공에 대한 질문에 답해 주세요.

● 귀하께서 이용하는 서비스 중, 하루 시작 시 처음 이용하는 구글 서비스는 무엇입니까?

● 다음은 귀하께서 이용 중인 서비스들을 보여주고 있습니다. 각 서비스를 이용한 후 바로 다음에 이용하는 서비스가 있다면 선택하고, 없다면 "없음"을 선택해 주세요.
(예. 구글 검색->Gmail, 주소록->없음 등)

국문요약

기업의 인터넷 서비스 포트폴리오 내 콘텐츠 서비스의 역할: 네이버 웹툰과 구글 유튜브의 사례 연구

최지원* · 조우제** · 정윤혁*** · 권영옥****

최근 몇 년간 많은 인터넷 대기업이 인공 지능 기술을 기반으로 한 개인화 서비스를 제공하여 온라인 사용자를 끌어들이는 자체 콘텐츠 서비스를 제공하고 있다. 본 연구에서는 기업의 온라인 서비스 네트워크에서 콘텐츠 서비스의 역할을 분석한다. 네이버의 서비스 포트폴리오에서 전문 제작 콘텐츠로 특징지어질 수 있는 웹툰의 역할과 구글 서비스 포트폴리오에서 사용자 제작 콘텐츠로 구분될 수 있는 유튜브의 역할을 확인한다. 네이버와 구글 서비스 이용에 관한 설문 조사 데이터를 바탕으로 방향성 계량 서비스 네트워크를 분석한다. 온라인 서비스 네트워크에서 노드는 온라인 서비스를 나타내고, 노드 간의 관계는 포트폴리오 내의 특정 서비스를 순차적으로 사용하는 것을 나타낸다. 연구 결과, 웹툰과 유튜브 모두 내향중심성보다 외향중심성이 더 높다는 것을 알 수 있다. 즉, 콘텐츠 서비스는 기업의 양방향 네트워크에서 도착 서비스의 역할보다 시작 서비스의 역할을 수행할 가능성이 높다. 유튜브의 외향중심성과 내향중심성의 차이는 웹툰의 외향중심성과 내향중심성의 차이보다 상대적으로 적다. 구글의 서비스 포트폴리오에서 유튜브의 높은 중심성은 엔터테인먼트 위주였던 초기 역할에서 검색 플랫폼으로 성장하였음을 보여준다.

주제어: 콘텐츠 서비스, 서비스 포트폴리오, 수요측 시너지, 네트워크 효과, 소셜 네트워크 분석

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