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What to Learn from Three Years (2018-2021) : Trends of Digital Platform Research

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What to Learn from Three Years (2018–2021)

: Trends of Digital Platform Research

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Abstract

In recent years, there has been a vigorous discussion on digital platform due to their emerging significance in the digital ecosystem. Despite common interests in digital platform, the comprehensive literature review on the topic is still limited. In addition, no study has examined whether there is a link or gap between research on digital platform and reality in global digital platform markets. This study aims to offer a systematic and interdisciplinary review of the literature on digital platforms by collecting and analyzing a sample of 703 articles published from January 2018 to January of 2021.

Keywords: Digital Platform, Online Platform, E-Commerce Platform, Social Media Platform, Platform Hegemony, Interaction

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1. Introduction

The term 'platform,' itself indicates essential infrastructures for electronic commerce, online communication, and digital social relationships (Quarta, 2020). Despite its integrated nature, the industry expands without limit; starting from fintech to e-commerce, digital platforms remove boundaries in the digital economy, turning to be 'the operating system of our lives' (Nieborg, 2019). Platform, therefore, is not an option anymore, but an essential tool and the core of the digital ecosystem.

Therefore, the value of the platform as a research topic is immense. Although digital platforms are the primary factor of economics, it is necessary to examine the term digital platform in various social science fields. This includes but is not limited to: the influence of digital platforms in the public sector, new labor issues due to the gig economy, the controversy on the regulation of e-commerce platforms, an explosive rise of remote medical service and education by the COVID-19 outbreak (Liang, 2020). Many other issues including culture and environment are also crucial when discussing digital platforms. Consequently, many social scientific aspects are entangled within the platform research, encompassing a wide range of research fields. Despite common interests in digital platform, the comprehensive literature review on the topic is still limited. In addition, no study has examined whether there is a link or gap between research on digital platform and reality in global digital platform markets. As the influence of the platform as well as its complexity are growing rapidly, we intend to scrutinize the research trend on digital platforms and bridge the gap among research subjects.

This paper, therefore, aims to summarize the ongoing research trend of digital platforms and to offer a systematic and interdisciplinary review of the literature on digital platforms. In addition, this review paper will offer an insight by linking the platform hegemony in the real world and in the research outcomes.

2. Literature Review

2.1. Literature reviews on digital platform

There are a few literature reviews on the topic of digital platforms. Dokhanchi and colleagues conducted a literature review focusing on the social campaign on online platforms (Dokhanchi et al. 2019). Kaine and Josserand (2019) studied digitally enabled gig economy driven by the digital platform industry. Similarly, Ranjbari and his colleagues presented a comprehensive framework on the sharing economy (Ranjbari et al, 2018). Hermes and his colleagues reviewed digital platforms and market dominance (Hermes et al, 2020). Many of them limit the sample data to specific sector such as IS literature and management science (Faik & Kankanhalli, 2018; Setzke et al, 2019)

The previous literature reviews, therefore, have been largely concentrated in the economic field by limiting to economic journals and suggesting the specific industrial phenomenon. Few studies have approached to comprehend the wider scope of the research field and there is a need to analyze its impact on a multidisciplinary field.

Platform study, indeed, encompasses various social fields. For instance, considering a global concern over digital sovereignty and its market position, policy study deals with digital surveillance, privacy, and its regulation. Especially, multiple researches concerning online cultural sovereignty of European countries are noticeable (Vlassis, 2019). Recent research on the regulatory situation of the European Union (EU) describes the risk of American platform dominance due to its digital platform gap (Hermes, 2020). Social study includes but not limited to cultural, educational and health study. Platform is actively discussed in a public sector such as the educational and medical sector as well, implying its societal impact and usage. The study shows the evident increase in 2020, presumably due to the increasing need for distant learning and health care caused by Covid-19 outbreak (Liang, 2020). Overall, in an era of rapid technological change, various research subjects on platforms are being actively conducted. However, all these previous studies have not been compiled yet in an appropriate framework.

Moreover, most of those researchers study this industry within a specific research area or the countries they are affiliated with. Turillazzi investigated how the digital platform can preserve cultural heritages and regenerate historical sites in Bologna, Italy (Turillazzi, 2020). Geng collected data from China's largest C2C e-commerce platform, Taobao, in order to study the relationship between consumer's order effects and internet celebrity endorsement on marketing (Geng, 2020). Last but not least, Rietveld (2020) explained in-depth lessons about platform competition through literature reviews based on samples from western countries. Above-mentioned studies exemplify how most researchers restrain one's investigation within the national scope.

Therefore, by presenting an extensive literature review without limiting the regional boundaries and research fields, this study aims to investigate digital platforms in academia during the most recent three years. Considering the explosive rise of interest in digital platforms, the focused literature review is significant in figuring out the most up-to-date academic trend. In order to cover up the prospects of digital platforms, articles published from January 2018 to January 2021 have been collected. Accordingly, this paper presents this research question.

RQ1. What is the current trend of academic research on 'platform' in a social science field?

2.2. Platform hegemony in real world and in academia

With digital transformation such as platformization and datafication, the capability to utilize platforms determines not only the firms' competitiveness but also the success of the national power. Platform is regarded as an indicator of national competitiveness not only because it plays a key role in the economy, but it also creates value among various social fields. Currently, the United States and China are fiercely competing by promoting domestic platforms. The Europe, lacking its own digital platform, suffers from a so-called platform gap, and is trying to cope with the current situation through cooperation and active regulations (Hermes, 2020).

This platform hegemony brings up the question of its situation in the real world

and in the academic field. How one is interrelated to others or not is the main concern. Therefore, by presenting a comprehensive review paper on the platform research as well as real hegemony situations, this study is expected to provide a navigational map for future research.

RQ2. Do the countries leading academic research on platform have real dominance in the global platform industries?

3. Methodology

3.1. Methodology of literature reviews

This study employed a literature analysis of platform in a social science field. The data was collected based on the following condition. Article and review papers were collected from three international databases: SCOPUS, Web of Science (WoS) and Proquest. The papers published from January 2018 to January 2021, were collected based on the main term, *platform*. Considering the multi-dimensional nature of the platform, a total of five prefixes were utilized: digital, online, e-commerce, internet and business. Conference paper, book chapters and notes were excluded in order to ensure the quality and the reliability of the collected data. Past systematic reviews also emphasize the importance of limiting the data to peer-reviewed publications (Johnson & Schaltegger, 2020; Frese, Rousseau, & Wiklund, 2014; Rousseau et al., 2008). The language of paper was limited to 'English' considering its dominant position as a lingua franca.

In order to minimize any subjectivity and to ensure a multidisciplinary perspective of this study, the data was collected through a database search engine. If the words, "digital platform," "online platform," "e-commerce platform," "internet platform" and "business platform" were either in title or keywords, the papers were selected. In the search formula, abstract was initially included along with title and keywords; however, due to inaccurate coverage of research papers, it was later excluded.

While SCOPUS provides the research category of the social science field, WoS and Proquest provide specific sub-fields. With the researcher's consensus, each sub-

field was manually categorized under the social science field. Sub-fields include but are not limited to business, law, humanity, psychology, and communications. Since the researchers analyze and categorize the papers personally, individual perspectives can be intervened. In order to guarantee objectivity, we conducted an inter-coder reliability test among three coders. Three coders were each given 40 same papers for coding, and reliability was calculated from the online website Deen Freelon, Ph.D which offers ReCal utility. The average was 0.84951, a relatively high figure.

As a result, we obtained a total of 703 research papers excluding technical papers. Technical papers were exempt from the collection in order to solely focus on the academic trend in the social science area. Table 1 and 2 summarize the overall process of inclusion and exclusion of articles and the final count of articles.

Table 1. Inclusion Criteria with Article Count

Inclusion Criteria	
1	Articles in SCOPUS, Web of Science and Proquest
2	Finalized search string is : (TI,IF("online platform") OR TI,IF("digital platform") OR TI,IF("internet platform") OR TI,IF("e-commerce platform") OR TI,IF("business platform")) AND (TI="online platform"OR TI="digital platform" OR TI="internet platform" OR TI="e-commerce platform" OR TI="business platform" OR AK="online platform"OR AK="digital platform" OR AK="internet platform" OR AK="e-commerce platform" OR AK="business platform")
2	Articles written in English language from January 2018 to January 2021
3	Academic journal articles and reviews
4	Articles with social science related subjects, including Business, Law, Policy, Communication, etc.
Total	SCOPUS (25008) + Web of Science (376) + Proquest (336) = 25720 Articles

Table 2. Exclusion Criteria with Article Count

Exclusion Criteria		
1	Articles not written between January 2018 to January 2021	-8535
2	Articles not written in English language	-62
3	Duplicate articles among the databases	-1178
4	Excluded letters, notes, and publisher's notes, book chapters, conference paper	-6
5	Articles without social science related subjects, including Computer Science, Mathematics, Engineering, Medicine, etc.	-15170
6	Unavailable articles	-66
Total		703

While quantitative study took place in these 703 papers, study on the definition requires second selection of the articles. Among these 703 studies, therefore, we selected 119 papers that provide the definition of platform (see Appendix A for the detailed list of authors and publication date). Selected papers had been fragmented and classified into 23 kinds of platforms with extraction of 150 keywords. Definitions with more than two kinds of platforms were multi-coded.

3.2. Methodology on platform hegemony research : Herfindahl–Hirschman Index

In order to discover any relationship between the dominant players in academia and those in reality and to illustrate its numerical analysis, the Herfindahl–Hirschman Index (HHI) was calculated to analyze paper concentration on affiliated countries and the market concentration on leading platforms. Determining the dominant players in digital platforms, authors utilized statistical data of social media platforms and e-commerce platforms to study world-leading services in mentioned industry. The HHI was utilized to analyze the market concentration in terms of the leading corporations as well as the countries. In fact, the HHI is a common measurement for market concentration and is used to determine market competitiveness. The HHI is the sum

of the squared market shares for all firms in a given market. The calculation of HHI is as follows.

$$HHI = S_1^2 + S_2^2 + S_3^2 + \dots S_n^2$$

where S_n is the percentage of market share in each firm, expressed as a whole number. In the context of this paper, the market share may be interpreted as a different unit, which may be explained further in 4.2, and the firms may be interpreted by either the corporations or the countries owning the platform service for finding not only the market concentration in terms of the corporations but also the relationship between the affiliated countries in academia and those in the real world.

4. Results

4.1. Result of literature review on digital platform (RQ 1)

4.1.1. Articles by year / articles by quarter

Table 3. Number of Articles regarding Platform in Year and Quarter

Year	Quarter	# of Articles (Quarter)	# of Articles (Year)	Percentage
2018	1	32	143	19.35%
	2	30		
	3	33		
	4	41		
2019	1	58	213	28.73%
	2	43		
	3	42		
	4	59		
2020	1	60	312	42.67%
	2	84		
	3	69		
	4	87		
2021	January	31		4.41%

Etc	-	34		4.84%
		Total	703	100.00%

The overall increase in numbers of published articles is evident every year, showing the growing attention on studying platforms. Table 3 depicts the yearly increase of platform research from 2018 to 2020. A quarterly distribution of publications also illustrates the general increase in academic concentration to platform overtime.

4.1.2. Affiliated country of authors

Table 4. Number of Articles by Continents and Countries

Continent	Countries	Percentage
Europe	The United Kingdom (10.26%), Italy (5.18%), Netherlands (4.64%), Germany (4.21%), Spain (3.78%), Belgium (2.48%), France (2.48%), The Russian Federation (2.38%), Finland (2.16%), Sweden (1.40%), Switzerland (1.30%), Norway (1.19%), Denmark (1.19%), Romania (1.08%), Portugal (1.08%), Austria (0.86%), Ireland (0.76%), Ukraine (0.54%), Greece (0.54%), Poland (0.54%), Turkey (0.43%), Slovakia (0.22%), Luxembourg (0.22%), Lithuania (0.22%), Estonia (0.22%), Albania (0.22%), Slovenia (0.11%), Hungary (0.11%)	49.95%
North America	The United States (18.36%), Canada (1.40%), Mexico (0.11%)	19.93%
Asia	China (10.04%), India (2.38%), South Korea (1.73%), Japan (1.08%), Indonesia (0.76%), Malaysia (0.43%), Thailand (0.32%), Taiwan (0.32%), Singapore (0.32%), Viet Nam (0.32%), Kazakhstan (0.22%), Uzbekistan (0.11%), Philippines (0.11%), Pakistan (0.11%), Nepal (0.11%)	18.42%
Oceania	Australia (5.72%), New Zealand (0.54%)	6.28%
Africa	South Africa (0.97%), Tunisia (0.22%), Nigeria (0.22%), Morocco (0.22%), Kenya (0.22%), Zambia (0.11%), Uganda (0.11%), Rwanda (0.11%), Ghana (0.11%), Ethiopia (0.11%), Egypt (0.11%)	2.49%
South America	Brazil (1.40%), Venezuela (0.11%), Peru (0.11%)	1.63%

Middle East	Iran (0.43%), Saudi Arabia (0.32%), Israel (0.32%), United Arab Emirates (0.22%), Qatar (0.11%), Kuwait (0.11%), Jordan (0.11%)	1.64%
Total	69 Countries	100%

*Papers with more than two affiliations were multi-coded.

The affiliation of the collected article reveals the imbalance in the platform study by continents and countries. Table 4 provides a broader view of which continents/countries are relatively putting more effort on studying platforms. Interestingly enough, Europe had a total of 461 articles published, which is almost 50% of all articles, prominently the first rank of all continents. North America, the second highest, wrote 184 articles, taking 20% of the platform study, and Asia published 170 articles which is about 18%. Nearly 90% of collected articles are from these major continents, showing the excessive concentration of platform study.

If it is categorized by country, out of 703 papers, the United States easily outnumbered all countries by 170 papers, owning up to 18% of all articles. The second rank, the United Kingdom, drops down dramatically to 95 articles, and China took the third with 93 papers, which are still a considerable contribution to data, both owning up to 10% of data. The affiliation of the articles, undoubtedly demonstrates how platform study is concentrated in a few countries.

4.1.3. Methodology

Table 5. Distribution of Articles by Methodology

Main Methodology	Sub-Methodology	Count	Sum	Percentage
Qualitative	Case Study	158	797	66.42%
	Experiment	53		
	Literature Study	147		
	Illustrative/Discursive /Descriptive	200		
	Interview	109		
	Observational	18		
	Scenario	9		

	Theoretical	103		
Quantitative	Data Analysis	235	356	29.67%
	Survey	121		
Etc.		47	47	3.92%
	Total (Multi-coded)		1200	100.00%

Identifying the trend of methodology in the study is significant in the way it reveals the approach of researchers towards the platform study. More than 60 percent of total sample studies have been conducted from qualitative measures (66.42%), twice more than quantitative approaches (29.67%). Methodologies are then classified into 10 specific methodologies. Data analysis, the method utilizing the collected data set, has been widely used in the platform study (19.58%). Second is the illustrative/discursive/descriptive method (16.67%). Case study, literature study, and survey are followed as third, fourth and fifth most used methodology.

4.1.4. Distribution of articles by research field, journals, funding, open access, and citation

Table 6. Distribution of Articles by Various Categories

Field	Research	Journal	Funding	Open Access	Citation
Business & Economics	322	253	130	104	44
Public	56	41	17	23	5
Humanities	77	83	25	33	2
Law & Policy	95	100	22	39	2
Media & Communication	64	66	18	35	14
Health	37	26	17	17	2
Education	64	50	22	33	2
Medical	9	20	7	4	0
Engineering	11	92	7	5	1
Etc	35	93	12	25	5
Total (Multi-coded)	770	824	277	318	77

*Total values may be different from the reading due to the multi-coding of articles.

The articles have been categorized into various standards that could statistically elaborate its distribution by different fields of research. First, the articles were divided by which research field they focused on. A significant amount of articles concentrated on Business & Economics, followed by Law & Policy. When the articles were divided by which field of journal were published, it also showed the most papers in the Business & Economics and second most in the Law & Policy. Out of 259 articles that had been funded either by organizations or the government, research regarding the Business & Economics was the most financially supported field and the research on the Humanities took the second.

Open Access means the article is provided for free publication and is open to anyone who is willing to read the article. 279 articles were provided open access to the public. 104 of the open access articles were from the Business & Economics, and the Law & Policy took the second.

Lastly, there were a few articles that had been frequently cited by other articles. The top 10 percent that had been mostly cited, which is a total of 71 articles, were selected and the distribution of research fields was analyzed. As a result, nearly 60% of the articles were from Business & Economics and the articles from the Media & Communication were the second most cited.

Additionally, regarding the distribution of articles by research fields, a further investigation was undertaken in order to look for any correlation between two different research fields. To be specific, starting from 2018 to 2020, any possible relationship between the change in number of quarterly publications from one research field and that of another was an interesting research subject. Therefore, Pearson correlation was utilized for the analysis.

As a brief explanation, within the significance probability of $p < 0.01$, there were high positive correlations between the Business & Economics and Public, the Business & Economics and Law & Policy, and Humanities and Law & Policy, with the correlation coefficient of 0.869, 0.715, and 0.721, respectively. This indicates that within the 99% confidence interval, there is a strong relationship in change of number of publications between the Business & Economics and Public, the Business & Economics and Law &

Policy, and Humanities and Law & Policy. Therefore, the outcome may not link to firm evidence of any relationship of increase/decrease in publication from one specific research field to those of the others, but is sufficient enough to be an indicator to discover the answers in the future research.

4.1.5. Definitions on platform

Table 7. Categorization of the Platform Kinds

Category	Platform Kind	Quantity	Percentage
Digital Platform	Digital Platform	69	55.65%
Online/Internet Platform	Online Platform, Internet Platform	17	13.71%
Multi-Sided Platform	Two-Sided Platform, Multi-Sided Platform	12	9.68%
Business Platform	Business Platform, Platform Business Model, Online B2C Platform, Digital Labour Platform, Service Platform, Social Trading Platform, Technology Platform	8	6.45%
E-Commerce Platform	E-Commerce Platform, SME E-Commerce Platform	6	4.84%
Open Platform	Open Digital Platform, Open-Access Platform, Socio-Digital Platform, Crowdfunding Platform, Digital Participatory Platform	5	4.03%
Platform Economy & Ecosystem	Platform Economy, Digital Platform Economy, Platform Ecosystem	5	4.03%
Platformization	Platformization	2	1.61%
Total (Multi-Coded)		124	100%

The 23 kinds of platforms had been further categorized into 8 frames: digital platform, online/internet platform, multi-sided platform, business platform, e-commerce platform, open platform, platform economy & ecosystem, and platformization.

'Digital Platform' has been sorted into a unilateral concept, due to its highest frequency of use. 'Online Platform' and 'Internet Platform' have been classified into a single kind, since they mutually focus on the platform's feature of being presented online, or via the Internet. 'Two-Sided Platform' and 'Multi-Sided Platform' were considered as an identical notion. 'Business Platform', 'Platform Business Model', 'Online B2C Platform', 'Digital Labour Platform', 'Service Platform', 'Social Trading Platform', and 'Technology Platform' were categorized into an independent 'Business Platform', because of their characteristics very relevant to business. 'Open Digital Platform', 'Open-Access Platform', 'Socio-Digital Platform', 'Crowdfunding Platform', and 'Digital Participatory Platform' were grouped as 'Open Platform', regarding their peculiarity of openness and participation. Although 'Platform Economy & Ecosystem' and 'Platformization' cannot be defined as an actual platform, the necessity to include both phenomena due to their importance to understand the platform was consented by all researchers. Table 7 clearly depicts the grouping of terms into 8 key definitions.

The term 'Digital Platform' is emphasized by keywords such as 'Interaction', 'Value Creation', 'Infrastructure', 'Transaction', 'Architecture', 'Exchange', and 'Intermediary'. Parker and his colleagues defined a digital platform as a business based on interactions between external producers and consumers (Parker et al, 2016). Furthermore, it is also described as an open, participative infrastructure which can set governance for value-creating transactions (Sharam et al, 2018). In other words, it can be explained as an open, participative intermediary for interactions and exchanges which can create value for all participants.

Keywords including 'Interaction', 'Value Creation', 'Multi-Sided Market', 'Marketplace', 'Efficient', 'Network', 'Public Sphere' were highlighted in describing 'Online Platform' and 'Internet Platform'. As a socio-technical architecture, it has been characterized as a tool to steer interaction and communication among users through the collection, processing, and circulation of user data (Helberger et al, 2018). Some

studies also identified online platforms as two (or multi)-sided markets, which uses the Internet to enable interactions between two or more distinct but interdependent groups of users so as to generate value for at least one of the groups (Pano & Gjika, 2020).

'Interaction', 'Intermediate', 'Transaction', and 'Value Creation' were the keywords underlined for 'Multi-Sided Platform'. It is regarded as an organization that creates value primarily by enabling direct interactions between two or more distinct types of affiliated customers. (Yablonsky, 2020). Another study understood two-sided platform as a marketplace which mediates transactions and interactions between two groups of users, and multi-sided platforms as an intermediary between at least three groups (Veisdal, 2020). Therefore, it is an innovative organization that creates value through interactions and transactions of two or more distinctive groups.

The main keyword for 'E-Commerce Platform' was 'Interaction'. The definition of e-commerce platform is centered on its function to enable interaction and transaction between buyers and sellers. Bai and fellow researchers perceived e-commerce platform as a platform for businesses or individuals to negotiate online transactions (Bai et al, 2020). According to Hu and his colleagues, it can also be defined as a two-sided or even multi-sided market with endogenous side decisions, which connects buyers, sellers, suppliers, complementary parts suppliers and other relevant resources for the sustainable development (Hu et al, 2020). Thus, e-commerce platform can be defined as an online marketplace which networks buyers, sellers, and suppliers to interact.

Represented by the keyword 'Innovation', the 'Business Platform' has been characterized as an intermediary or marketplace which facilitates the transaction and exchange of various individuals and businesses. Yablonsky (2020) defined a business platform as a platform which provides common standards, interfaces and tools to power core technologies to increase the productivity and profitability of a company, a set of companies or users. Song and fellow researchers defined online B2C platform as an intermediary that facilitates economic transactions between buyers and merchants by enabling them to search for feasible contracts (Song et al, 2018), while Rani and Furrer (2020) concentrated on digital labour platforms, saying that they are

multi-sided marketplace that facilitate exchange between service providers, clients and workers.

‘Open Platform’ is a digital core opened for third parties to contribute for improvements and add complements for each other (Karhu et al, 2018). Some other studies expanded the concept as a physical and logical infrastructure for processing and communicating information that allow two or more users to interact directly with each other, with recreational, professional, or commercial intentions (Dantas, 2019). It is also supposed as a specific type of civic technology built for participatory, engagement, and collaboration purposes (Falco & Kleinhans, 2018). Synthetically, it is a new form of technology and opened infrastructure for various types of interaction.

Although it’s not an actual specific type of platform, phenomena related to platform are important to understand the overall influence of platform. ‘Platform Economy and Ecosystem’ is conceptualized as a new structure of inter-firm economic relations (Tavalaei, Cennamo, 2020). It is also recognized as a technology-enabled hub-and-spokes business model (Haberly et al, 2019) Through platform economy and ecosystem, participants can create a ‘Digital Trust’ and enable them to create value (Maffie, 2020). On the other hand, the term ‘Platformization’ refers to the dominant infrastructural and economic model of the social web with the rise of platform (Beresheim, 2020).

In sum, ‘Interaction’, ‘Value Creation’, ‘Infrastructure’, ‘Transaction’, ‘Architecture’, ‘Intermediary’, ‘Exchange’ were the most frequently used keywords overall. Differences in the definitions were found depending on the characteristic of each category, however in general, the description that platform is an innovative technology or marketplace which networks people to create value was concurred.

4.2. Result of platform hegemony research (RQ 2)

4.2.1. Platform research concentration

Any possible relationship between the countries with the most platform research in social science and those holding dominant platform services in the real world was investigated. The Herfindahl-Hirschman Index was utilized in order to

observe the platform research concentration. Prior to the calculation, out of 69 countries collected in the data, 21 countries listed in the EU were grouped as one since it is one entity that regulates the digital platform on the overall continent of Europe. The HHI in terms of platform research is given in Table 8 with the top ten affiliated countries to better display the observed data.

Table 8. Herfindahl–Hirschman Index of the Academia in Platform Research

Affiliated Country of Authors	Number of Papers	S Squared
The European Union	247	1,234.48
The United States	170	584.77
The United Kingdom	95	182.62
China	93	175.01
Australia	53	56.84
India	22	9.79
The Russian Federation	22	9.79
South Korea	16	5.18
Brazil	13	3.42
Canada	13	3.42
...
Total / HHI	703	2,279

According to the table, the HHI came out to be 2279, which is less than 2500, meaning the academia in platform research is a moderately concentrated field. While the EU accounts for the most papers, by focusing on individual countries, The United States, The United Kingdom, and China are the key players in studying platforms, respectively. Therefore, the academic world in platform research is slightly concentrated to certain affiliations; the key players in this field are the EU, The United States, the United Kingdom, and China.

4.2.2. Concentration in social media

In order to analyze the hegemony using the HHI in social media platforms, globally leading social media services were collected as of January 2021, ranked by the active number of users (Statista, 2021). Services were classified in accordance with the corporations and the countries who own the service for the numerical measurement. The data are given in Table 9. The table shows the HHI calculated in terms of corporations and countries, successively.

Table 9. Herfindahl–Hirschman Index in terms of Corporations and Countries by the Number of Active Users

Corporation / Country	# of Active Users (mil)	S Squared	HHI
Facebook	7,261	2,012.40	2,464
Google	2,291	200.34	
Tencent	1,830	127.83	
ByteDance	1,289	63.42	
Sina Weibo	511	9.97	
Telegram	500	9.54	
Snap Inc.	498	9.47	
Kuaishou	481	8.83	
Pinterest	442	7.46	
Reddit	430	7.06	
Twitter	353	4.76	
Quora	300	3.44	
The United States	11,575	5,114.03	5,769
China	4,111	645.08	
The Russian Federation	500	9.54	

In terms of corporations, the HHI turned out to be 2464, which is less than 2500, meaning the market is moderately concentrated. However, assembling the corporations by their originated countries, the HHI increased upto 5769, which is way over 2500, meaning the market is highly concentrated to specific countries and can be inferred as a monopolized competition. The HHI of The United States itself is over

5000, clearly indicating how the United States is grasping the control over the social media platform, followed by China as a second dominant player. Interestingly enough, The United States and China are from the list of the top three affiliated countries in platform research, owning up to more than one third of the total papers. Exceptionally, Russia owns Telegram and ranked the sixth of the global social media platforms. Considering that Russia ranks 10th place with 22 published papers on digital platform, its output of providing one of the popular social media services is quite noticeable. Thus, it is presumed that, because the United States and China are the two giants in platform academia, by measuring and interpreting the market concentration in social media platform, there may be a relationship between countries who are leading the platform research and those who hold platform hegemony in reality, which may be discussed at the last paragraph of 4.2.3.

4.2.3. Concentration in e-commerce

The top e-commerce services by market capitalization were collected from the companiesmarketcap.com. E-commerce companies that are not publicly traded were excluded from the list and have been ranked by their market cap. The market cap was interpreted as a unit to calculate the market concentration of the e-commerce platform. Further details will be provided later in the reading. The following table shows the HHI calculation account for the e-commerce service by its corporation and country.

Table 10. Herfindahl-Hirschman Index in terms of Corporations and Countries (E-commerce)

	Market Cap. (in bil)	HHI
Corporation	Amazon (\$1,625.00), Alibaba(\$586.98), Pinduoduo(\$156.51),Shopify(\$153.28) Sea(\$131.58), Jindong Mall(\$115.96), Coupang(\$70.67), MercadoLibre (\$67.73), JD Health(\$43.66), Wayfair(\$31.94), Chewy(\$30.57), Zalando(\$26.84), Etsy(\$20.93), Rakuten(\$17.47), Adevinta(\$13.27), Monataro(\$11.61), Schibsted(\$10.65), Zozo(\$10.44), Lightspeed POS(\$9.44), Mercari(\$7.51), B2W Digital(\$6.40), ContextLogic(\$4.91), Revolve(\$4.00), BigCommerce(\$3.82), Overstock.com(\$3.67), IndiaMART(\$3.10), Jumia(\$2.87), Cimpres(\$2.58), The RealReal(\$1.58), Groupon(\$1.37),	3,045

	Infibeam Avenues(\$0.83), Liquidity Services(\$0.79), CarParts.com(\$0.78), 1-800-PetMeds(\$0.58), Casper Sleep(\$0.37), Leaf Group(\$0.30), MSTC Limited(\$0.26), Natural Health Trends(\$0.08)	
Country	The United States(\$1,731), China(\$903), Canada(\$163), Singapore(\$132), South Korea(\$71), Argentina(\$68), Germany(\$30), Japan(\$47), Norway(\$24), Brazil(\$6), India(\$4), Ireland(\$3)	3,824

In terms of e-commerce corporations, the HHI is 3045, indicating a possible hegemony in the e-commerce platform. The similar results can be seen in the country's concentration level as well; the HHI is 3,824, which is more than 2500. The United States and Amazon both take the largest portion with more than 50% of the whole market. It is followed by China and Alibaba, showing its power in the e-commerce industry with respectively 28% and 19%. Considering these two countries are main players in the platform research as well, it suggests the possible relationship between e-commerce players in the real world and in academia.

The actual hegemony can be seen in the e-commerce market share in the United States, China and the United Kingdom, the countries with the most platform research. Firstly, the U.S. e-commerce market is largely dominated by Amazon, taking 40% of its total ecommerce sales. It is then followed by Walmart with 7.1% of its market, and Ebay with 4.3% (Droesch, 2021). In the case of China, Alibaba holds the dominant market share, taking nearly 56% of its total retail e-commerce sales (Charlton, n.d.).

On the other hand, the United Kingdom's e-commerce market is dominated by Amazon. By e-commerce net sales, the U.K. top online stores are Amazon with 9,756 million USD net sales, followed by Tesco (4,364 million USD) and Argos (3,754 million USD) (Statista, 2019). Though Tesco and Argos are from the United Kingdom, Amazon takes twice more e-commerce net sales currently. Considering the top online stores worldwide in 2019, such hegemony is evidently shown; Amazon ranks first with the e-commerce net sales of 86,194 million USD. It is followed by JD with 69,979 million USD, and then by Apple with 26,192 million USD (Statista, 2019). As top 7 online

stores by e-commerce net sales are all based on the United States and China, one can assume US and China's hegemony in the e-commerce industry. In conclusion, as the various statistical data shows the United States and China have dominant platform service in e-commerce, the HHI in terms of the market cap is a plausible indicator to support the platform hegemony in the real world. Thus, it is presumed that, along with social media, because the United States and China are the two giants in platform academia, there may be a relationship between countries who are leading the platform research and those who hold platform hegemony in reality.

4.2.4. Interpretation of the HHI

The overall interpretation of the HHI in platform research, social media, and e-commerce is as follows. The United States and China's dominance on platform research might be the foundation for gaining digital hegemony in the real world by providing a universal digital platform. They could become the giants in the platform business with the accumulated research behind, providing detailed speculation and possibility in platform industry. In short, the excellence in academia led to market competitiveness, and research may be the starting point for technological innovation, new business models and finally market dominance.

From the EU's point of view, with the platform gap already in its hand and being dominated by the the U.S. platforms, it stepped in late on platform research, especially in the regulation field, as a defense mechanism to protect its continent. According to our data, more than half of all articles regarding the regulation are published by the countries from the EU. Europe's strategy is to survive from the overwhelming platform dominance by vigorous research in law and policy and find political solutions for its platform absence. Overall, The EU's scholarly movement is to tackle this hegemony at the governmental level. In conclusion, the United States and China were able to become the global giants in platform industry with the back-up of diligent studies, whereas the EU put much effort in the regulatory aspect and related research as a defense mechanism.

5. Discussion and Conclusion

5.1. Implications

The findings demonstrate that there is a certain gap regarding the dominance of platform industry and studies between major countries/continents and others. It also suggests some possible future research and actions for the solution of such imbalance.

As for practical aspects, the status of platform industry and platform research should be diversified. Since the United States and China are the dominant players in platform research and hold hegemony in platform services, it urges for a multifarious platform ecosystem worldwide in order to keep such superiority in check. These changes should not be restricted to certain countries, but need to be occurred on a global scale. Currently, nearly 80% of the whole academic studies relevant to the platform are conducted in Europe, United States, and China. It is desirable for scholars from different countries and continents to seek ways to build a balanced ecosystem. For instance, countries including Korea and Russia, which holds a domestic platform possessing a valid share, despite competing with platforms from the United States, China, and Europe, should especially concentrate to increase participation and support for platform studies.

Moreover, the fact that more than 40% of the articles focused on Business & Economics infer that it is encouraged to have attention on other research subjects to reduce the imbalance of research field. Especially, China has shown heavy concentration on researching economic sector, taking over 70% of its output. Also, the percentage of qualitative methodology was as twice as much of the percentage of quantitative methodology. Although Data Analysis was the most used sub-methodology, the majority of the articles utilized qualitative methods to scrutinize the general phenomena and issues related to platform. Even if it can be interpreted as the intention to focus on social science, to deeply understand and practically apply the studies to actual site, social science should accept more quantitative methods and diverse perspectives.

As for future research, the study which can compile the specific definition of digital platform is needed. Since the platform is utilized in various areas, presenting

concrete, specified definitions divided by each usage can be the basis for future academic works. Furthermore, academic research which examines the platform competition between the United States and China is also worthy considering its timeliness. With in-depth qualitative research, analyzing papers conducted by the United States and China, scholars will be able to recognize which field the leading countries are focusing on the most, and predict how their competition will unfold in the future.

5.2. Limitations

The present study is not without limitations and can be extended in several directions. First, during the process of collecting the articles, there were lists of papers mentioned in the online database that, however, were not available for access. Even though the list of the unavailable papers were acquired through the university database, only 14 out of 80 were delivered hard copies, and the rest of 66 papers could not be coded due to the time constraint. Proactive measurement on gathering papers offline would enlarge the total number of papers and therefore yield more comprehensive analysis on scholarly trends of the platform.

Second, collected data only includes international publications written in English. In order to search for the global phenomenon on platform research, papers written in the most influential language, English, were accepted for the analysis. However, authors acknowledge that the local papers from different languages are absent, which may have caused limitations in data collection. Moreover, extending the search engines to local databases may also have produced more comprehensive result.

Last but not least, the analysis on 703 papers could have approached more qualitative research. The standard procedure to conduct a literature review is to undergo a careful reading of individual paper. However, authors put on an early effort to accumulate the maximum number of papers within the most recent years and dissolve them into various categories to understand the present wave of platform- the initial stage to guide the future direction for research. The present study may have focused on a quantitative analysis, but have contributed to understanding the overall

academic trend of platforms and relationship between the dominant players in academia and those in reality. Therefore, this study advances the understanding of digital platform in recent days, serving as a stepping stone for future research.

Appendix

List of Authors and Publication Year regarding the Extraction of Definition of Platforms, in Alphabetical Order

Business Platform		
Frey et al. (2019)	Rani & Furrer (2020)	Song et al. (2018)
Harris & Wonglimpiyarat (2020)	Reith et al. (2020)	Yablonsky (2020)
Digital Platform		
Abbate et al. (2019)	Gawer (2020)	Mishra & Tripathi (2020)
Akhmedova et al. (2020)	Hanafizadeh et al. (2020)	Müller et al. (2018)
Anderson (2019)	Hassan (2020)	Nandakishore et al. (2020)
Baber et al. (2019)	Helfat & Raubitschek (2018)	Nooren et al. (2018)
Beetson et al. (2020)	Hollebeek et al. (2020)	Nuccio & Guerzoni (2019)
Broekhuizen et al. (2020)	Hracs & Webster (2020)	Ojala et al. (2018)
Brogi (2020)	Ikeda & Marshall (2019)	Park et al. (2020)
Cane & Parra (2020)	Ivanova et al. (2020)	Partin (2020)
Chen et al. (2020)	Karhu et al. (2020)	Peticca-Harris et al. (2020)
Ciulli et al. (2020)	Kazan et al. (2018)	Ranjbari et al. (2019)
Constantinides et al. (2018)	Kenney et al. (2019)	Rolland et al. (2018)
Costa et al. (2020)	Kiesling (2020)	Sadowski (2020)
Croitor & Benlian (2019)	Kim & Yu (2019)	Salido-Andrés et al. (2019)
Croitor et al. (2020)	Kopljenovic (2019)	Senyo et al. (2020)
De Blasio & Selva (2019)	Krämer & Schnurr (2018)	Sharam et al. (2018)
de Reuver et al. (2020)	Lanamäki et al. (2020)	Surie (2020)
Drewel et al. (2020)	Leszczynski (2020)	Syromyatnikov et al. (2020)
Eferin et al. (2019)	Li et al. (2019)	Tao (2020)

Eleodor (2019)	Lin (2020)	Thomas et al. (2020)
Feld (2020)	Malgonde et al. (2020)	Trabucchi et al. (2019)
Fuchikawa (2020)	Mancha et al. (2018)	Yang & Han (2020)
Fürstenau et al. (2019)	Mäntymäki et al. (2019)	Zhang (2020)
Garud et al. (2020)	Markeeva & Gavrilenko (2019)	Zoppelletto et al. (2020)
E-Commerce Platform		
Bai et al. (2020)	Holland et al. (2018)	Qin et al. (2020)
He et al. (2018)	Hu et al. (2020)	Wan & Chen (2019)
Multi-sided Platform		
Dell'Era et al. (2020)	Nan et al. (2019)	Veisdal (2020)
Fürstenau et al. (2019)	Santoso et al. (2019)	Yablonsky (2020)
Marrone & Finotto (2019)	Trabucchi & Buganza (2020)	Yablonsky (2020)
Müller (2019)	Trabucchi et al. (2019)	
Online/Internet Platform		
Begkos & Antonopoulou (2020)	Garben (2019)	Pano & Gjika (2020)
Bostoen (2018)	Helberger et al. (2018)	Santini et al. (2019)
Carvalho (2020)	Höhne & Sproll (2020)	Savin (2018)
Chen et al. (2020)	Hood (2018)	Wang et al. (2019)
Croitor & Benlian (2019)	Li et al. (2019)	Zhang et al. (2018)
Dokhanchi et al. (2019)	Nguyen et al. (2020)	
Open Platform		
Dantas (2019)	Karhu et al. (2018)	Varghese et al. (2018)
Falco & Kleinhans (2018)	Tan & Reddy (2020)	
Platform Economy		
Beresheim (2020)	Micheli et al. (2020)	van Dijck et al. (2019)
Haberly et al. (2019)	Tavalaei & Cennamo (2020)	Yuana et al. (2019)
Maffie (2020)		

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