Shadow Infrastructures and Youth Agency: K-Pop Fans in Beijing Universities under Institutional Restriction

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Abstract. With the strengthening of platform governance and content regulation, young people are reshaping the channels of cross-border cultural exchange. This paper studies how K-Pop fans at Beijing universities continue to be interested in South Korean popular culture after the main platforms for dissemination have been shut down. Based on the semi-structured interviews with the fifteen student followers and digital ethnography and textual scrutiny, it can be found that institutional constraints impact their daily media behaviour in the following ways. We find that the restriction is not easy to lift. Instead, it has reduced the public awareness of Korean media, made the forms of participation more formal, and raised the cost of accessing information; thus, fans have turned to other places instead of leaving. To maintain communication among themselves, the fans have built what is known as a "shadow infrastructure", which is an unofficial system organised by the fans that includes cloud storage, foreign platforms and geographically dispersed virtual groups, and this requires extra effort in terms of emotions, technology and management. These frameworks are not only temporary circumstances but also creative networks created by young people in the face of media restrictions. This idea has been applied to the study of fandom, platform analysis and transnational media to investigate the decentralized infrastructure supporting the spread of culture today.

Keywords: K-Pop fandom; shadow infrastructures; youth agency; transnational cultural participation; platform governance.

1. Introduction

The first days of the Internet had an open prospect, free from boundaries, and were supported by the free flow of data and an open technology. Therefore, the original intention will not be achieved. Today, the spread of cultural resources is as much a result of the policies of the government, the rules set by platforms and economic interests as it is of people's own will. Cross-border consumption is no longer an automatic result of market demand or people's own choices; it is now being reshaped and redefined by institutions. Since the digital infrastructure is now the main channel for the dissemination of culture, display status, accessibility and even the way users obtain it are all under the control of platform management.

Korean mainstream culture can give us an idea of the changes in practice. Almost all of the cultural products have become too dependent on digital platforms, web communities and foreign data sources for K-Pop and are thus highly susceptible to changes in the institutional environment. The Environment in China has been changing greatly over time. Unofficial restrictions on Korean cultural imports (which enthusiasts and scholars have referred to as "xianhan policies") have been combined with content supervision on digital platforms to reduce the popularity of K-Pop in society and change the behaviour of fans. These constraints did not only stop the engagement of young people with Korean cultural resources. Therefore, they reshaped their media time and sought other ways of meeting.

Foreign research has already explored the cross-border flow, platform management and user behaviour of many studies, but there is still a lack at the intersection of the three. According to the fandom study, participants are not just consumers but active participants; however, little attention has been paid to their engagement in transparent environments, and we do not know how enthusiasts remain united without the help of official channels [1]. Platform-centered analysis has found that ranking systems, supervision and distribution of visibility control the spread of information on the

Internet, but they have focused more on how platforms manage users than on how users organise themselves under the rules of the platform [2, 3]. Scholars of cross-border communication have studied the dissemination of artistic goods around the world but have given little attention to the micro-activities ordinary consumers undertake to maintain international connections outside of formal links [4].

To this end, this paper will address the problem of how young fans still participate in cross-border fan activities when the official distribution channel is closed. The main objects of study in this paper are university students in Beijing, and through semi-structured interviews, digital ethnography and text analysis, it will be explored how structural constraints and platform regulations have altered the daily lives of fans and how enthusiasts use unofficial online resources to stay updated with Korean popular culture. Shadow infrastructure is an alternative system that appears after the flaws in the official channel are revealed; that is to say, unofficial digital tools, virtual forums and foreign data streams fall under this category. A shadow infrastructure is not only a replacement for the public system but also a network run by ordinary people that shows the adaptability and ingenuity of young people in a constrained media environment.

The three new things in this paper are: First, fan studies are moving from participation in open spaces to the problem of cultural inheritance under constraints; Second, a system of shadow infrastructure has been put forward to explain how the unofficial network maintains contact with the outside world; Third, the concept of youth autonomy in the context of a limited media environment is defined.

2. Organization of the Text

2.1. Fan studies and youth agency

Research on fandom has long ago begun to study the transformation of passive viewers into active fans. Early studies of mass culture often positioned fans as the object of capitalism and considered their behaviour to be the consumption of mainstream goods. Participatory culture is not this way either. Jenkins thinks that fans are constantly creating new meanings by means of creative reinterpretation, socialisation and group organisation, and as a result, the boundary between viewers and creators has been blurred [1]. According to this view, fan activities are not only about leisure but also ways for people to feel a sense of cultural identity and community; with the development of the Internet, their forms have also changed.

Most studies to date have assumed that the media environment is open and have focused on how audiences can take part in it by using platform functions. It shows us how the followers are involved but offers very little information about why they lose interest after a period of success. It is a young group of consumers who are concerned. Youth-culture studies have shown that young people construct their identities, seek belonging, form relationships through cultural consumption, but this autonomy is not absolute freedom. It is to find space for action among the boundaries of organisation, technology and society [5]. Given that young fans are still holding on to a sense of global connectivity in the face of constraints, we should move away from the dichotomy of active/passive and investigate how they are mediating between structural pressure and individual behaviour.

2.2. Platform governance and cultural visibility

Electronic networks have begun to be used for cross-border cultural heritage, but they are not politically neutral. Through supervision, algorithm adjustment, economic policy and other ways, they change the status of various content and determine which content will be promoted or suppressed. Gillespie thinks that these systems are not just mechanical devices; they are also the regulators of social norms, monitoring, sorting society, and thus their administrative structure determines which media will draw the public's attention [2]. The platform ecosystem is also a type of structure that has begun to perform collective functions at these places, and its rules change how people participate in culture and how data is spread [3].

The importance of transnational culture is even more so. At first, the purpose of these platforms was to reduce the difficulties in distribution and enable people around the world to purchase foreign products easily. In recent years, with the strengthening of regulations and management systems by the platforms, the spread of this is now more dependent on the digital and structural conditions provided by the platforms. A person may be able to access a certain piece of content due to changes in the recommendation system. However, most of the previous studies have focused on how systems control materials and behaviour; little attention has been paid to how people change their paths to participate in the game after a change in accessibility. Transnational fandom is governed, but it does not mean that the participation of members has ceased; rather, they may have found new resources and other ways to engage.

2.3. Transnational cultural participation under constraint

Research on cross-border movement has traditionally been about how works of art are distributed in different countries and how people consume them across the world. K-pop is a typical case; although it has had strong popularity around the world, the reason is not only the quality of its works but also that it has benefited from various digital platforms and fan culture [4]. Mobility does not necessarily mean that there will be good communication. Scholars have begun to study how national regulations, international relations and cultural supervision regulate the distribution of online works around the world, so it is not just about moving across borders but is rather a product of institutional systems, platform rules and societal demands. For young people, international interaction is based on particular media environments and routes, and when these change, their behaviour will also change.

The Chinese situation is a good representative. Recently, the surrounding environment of Korean mass culture has changed; formal diplomacy, economic cooperation and spread via the Internet have all been affected to different extents. Therefore, such changes have not reduced the interest of young people in the topic; rather, they have changed how admirers collect information and preserve their feelings, leading them to use less formal and fragmented sources such as foreign websites, virtual forums and personal information networks. What has gone unnoticed is that the ordinary people voluntarily continue to build a connection in the face of such circumstances, and how these small-scale activities will eventually give rise to a new type of link on their own initiative.

2.4. The gap and an analytic frame

Collectively, the above research shows that there are still three problems in engaging with digital culture. Fan studies are creative and interactive open-ecosystem activities, but they can only give us a shallow sense of how fans adapt and continue to stay in touch after the path is closed. Research on platforms has been conducted to study how to spread content and manage its visibility, but little attention has been paid to how people are constrained in doing so and how they organise resources informally. Transnational scholars are paying more attention to cross-border products and industries than most people in a relatively closed system.

Therefore, we put forward the idea of shadow infrastructure. It is the support system that users build among themselves using non-official digital assets, social relationships and technical skills when there is no official channel or it does not work correctly [10]. The shadow infrastructure is not an opposition to the official system, but rather a mode of life that has appeared due to the limitations of structure [9]. The three traits are: It is rehabilitative and addresses the deficit of learning and experience that has resulted from the reduction of traditional educational institutions. It is cooperative, and the data exchange, psychological support and other activities of fandoms are also included. It can also be changed, and therefore, with changes in the platform's rules and institutional reforms, it will need to be adjusted accordingly. As shown in the above framework, fans are not just objects under control or free-willed individuals who act outside the rules; rather, they are participants who serve to maintain the overall link function of organisations, sites and groups.

3. Methods

3.1. Participants and sampling

Purposive sampling and snowball referral methods were used in this study to select university students in Beijing who are K-Pop fans, and it was found that transnational participation is altered in a different way within the system. The first reason for choosing Beijing is that. Serving as the main node that gathers students from all over China, it creates a group of people who are in the same environment but have different origins in different areas; thus, collective stories of restricted participation can emerge among various lives. In addition, college students are the group of people who use digital platforms the most frequently and are among the most active consumers of K-Pop and other global cultural exchanges; thus, their behaviour can provide us with a long-term and in-depth view of the interaction among structural environments, platform operations and fan behaviour.

Fifteen people had a brief chat. These people were either college students or graduate students at the time, mainly in their early twenties, had been active K-Pop fans for two to ten years, and followed various K-Pop groups from different generations, such as EXO, TXT, ITZY, NCT, RIIZE, and Boys Planet; therefore, diverse fan journeys and engagement patterns were all considered. All informants used pseudonyms to protect their privacy, and the general characteristics of these people are presented in Table 1. After collecting the data several times, by the 13th round, the repeated content did not have new fundamental problems; therefore, two more interviews were organised to confirm this, and a total of fifteen primary analysis sets were obtained.

Table 1. Profiles of the Fifteen Participants.

Handle	Age	Level	Years	Main group(s)	Overseas attendance
Zhu-00	21	Undergraduate	8	EXO	Yes (Hong Kong)
Liuji	19	Undergraduate	4	ITZY	No
Banggyu	23	Postgraduate	5	TXT	Yes (Korea)
Pingzi	21	Undergraduate	2	aespa	No
Xiaotu	21	Undergraduate	5	ITZY	No
Xcdeex	22	Undergraduate	3	BLACKPINK	No
Piaoling	19	Undergraduate	7	Girls' Generation; Red Velvet	No
Many	20	Undergraduate	6	BLACKPINK	Yes (Hong Kong, Thailand)
Kaka	18	Undergraduate	5	LE SSERAFIM	No
Jiangyan	24	Postgraduate	8	T-ara	Yes (Japan)
Panic	21	Undergraduate	3	GOT7	No
Youyu	20	Undergraduate	4	RIIZE	No
Weidu	22	Postgraduate	6	NCT WISH	Yes (Japan)
Ren	21	Undergraduate	2	AlphaDrive One	No
Gualian	22	Undergraduate	5	BTS	Yes (USA)

3.2. Data collection

Surveys were carried out during the winter break in December 2026 to learn how the subjects first came across K-Pop, what their interpretations of changes in its spread are, how they get daily information, how they use digital forums, and what specific ways they keep connected with the culture. Online ethnography was also used to study how fan groups spread information and data via hot topics on Weibo, WeChat groups, cloud storage distribution platforms, etc., and whether they have begun to use decentralised digital assets after the official account was closed.

3.3. Analysis and ethics

Thematic analysis of the records of interviews and observation was conducted. We have identified the sources of engagement to find the main themes of engagement, data access, social cooperation and use of digital resources, and then organised narratives and digital activities according to the above categories: altered visibility, ad-hoc resource sourcing and adolescent empowerment. The old ethical

rules were followed; the names and other personal information of the participants were not used in the study, and the materials gathered for research were handled properly.

4. Findings

4.1. Shifting platform visibility: from stumbling upon to seeking out

Due to the combined effect of Chinese Han policies and platform content regulations, the prominence of K-Pop on Chinese portals has changed in a different way. The material still exists; but now, it has been spread in a different way. Information that was once spread among the public through platform recommendations now usually has to be actively sought out by users or shared within fan groups.

The respondents have generally pointed out that the recommendation engines of Weibo, Douyin and Xiaohongshu gradually present content according to their own interests. Only those who have been in contact with us or subscribed to the same topics will continue to receive K-Pop news; otherwise, general users will rarely see such information in their public feeds. There is also a hierarchy among the fandoms; the algorithm will give more weight to recent groups that are active or have high engagement and disregard older groups that have not posted often. Zhu-00 (21, undergraduate, EXO, eight years old) remembered first learning about the group:

She has also recently added:

As a result, there is an uneven drop in visibility, and it has been corrected by means of algorithmic classification and platform operation. Communities with low participation or poor performance are removed from the list of popular sections; at the same time, new and popular groups will receive more attention. Therefore, visibility is now a kind of digital asset transmitted by platform effects, and it is not an essential attribute of the physical thing itself. This is also the case in some places. Liuji (19, college student, ITZY fan for four years) believes that now, to find suitable wallpapers or profile pictures, one needs to know which "master fan" accounts have recently posted fan pictures from events and airports; at the same time, Weibo super-topics have become the main area for internal dissemination [14]. The assets have not disappeared, but they now live in places managed by the community itself rather than in the public feed [11, 12].

Data from the open platform is also in line with this. On QQ Music, the 2013 single "Growl" by EXO has had about 20 million plays; only slightly more than 300,000 people have listened to the first song from their 2026 album. Playback indicators are affected by the pace of marketing, the demographic structure of the fan base, and changes in the audience of a platform; therefore, they cannot be taken in isolation. However, according to surveys, open statistics and fieldwork, a general sense has been developed that the mainstream visibility of K-pop in China has been declining. There are differing opinions based on experience: Veteran fans compare the current level of visibility with that of the peak period for K-pop in China and talk about "observing less and less", while young fans consider diligent search as a normal way to be a fan, so it is not an absolute decline but rather a tiered redistribution caused by a combination of institutional changes and platform algorithms.

As a result, less people are aware of the culture now. An increasing number of people are now shown in Weibo super-topics, WeChat circles, Baidu Cloud Storage and fan resource portals instead of traditional promotional channels. Regarding a movie featuring her favourite idol, Liuji said that she hoped to participate in the launch but could not reach Seoul, "so it is the cloud drive for me", Beijing being very unlikely to show the movie anyway. Ren (21, student, survival-show team, two years) put forward the problems of this way:

As visibility drops, the fans are still interested and continue to show their support for the idols and groups by asking many questions and organising collective activities. However, the time, money and information costs are increasing rapidly, and platform-based delivery is now a conscious activity based on the cooperation of fandoms. The distribution of students at Beijing University may be different, but in general, there will be a significant reduction in participation.

4.2. Contracting official channels: from being included to routing around

Given that decreased visibility means fewer people can access K-Pop content, fewer individuals will be interested in the Korean music industry as a result. For supporters, participation is not only about watching; they are also engaged in the organised channels for interacting with the industry, such as performances, fan meetings, official live-streaming platforms, music-program ranking contests, various digital and offline activities, etc. As the original paths have been shortened, the followers have continued to take part but have been forced to use more indirect and expensive substitutes.

Offline: Covering all parts of the country. Many of the attendees mentioned that the prospect of Korean performers holding in-person activities in mainland China has dropped considerably, and now most of the performances and gatherings are organised in Hong Kong, Japan, and other places. Campus residents in Beijing have moved from regional fandom to the world of online fandom. Liuji mentioned the upcoming tour:

As for the groups that have emerged in the early 2020s, she pointed out that a "regional" tour is mainly about Japan; most now release Japanese records, and a Tokyo Dome performance has become one of the main indicators of a band's popularity in the West. It will be larger than in the past, and the expenses will be high. Enthusiasts are used to dealing with local travel, accommodation and entrance tickets; now, they have to arrange visas, take flights abroad, find foreign houses, learn foreign languages and plan all sorts of schedules. For pupils who are still dependent on parental support or other small amounts of money, going to a live show abroad is no longer a matter of increasing the budget but requires precise coordination of funds, time and organisational ability. Reactions by group varied; some more wealthy people believed it was possible to visit Japan once or twice a year, while others were reluctant, saying they "did not even consider it" and would only watch live-streamed content. Some chose to split accommodation and transportation to save money - another form of digital resource-sharing for international fans. By spreading the activities beyond national borders, the reduction in formal physical venues has not diminished the people's desire to participate; rather, it has raised a new hurdle, and now live fandom is more closely linked to one's financial power and ability to organize.

Digital: Platform Regulation and the Change of Virtual Labour. Recently, Virtual Participation has also started to be more technical. The entertainment industry in South Korea has made streaming statistics, success in games, and rankings its main measures of stardom, so Chinese fans must get used to the assessment system used by Korean websites and understand their rules. Banggyu (23, graduate student, TXT, five years old) showed the scholar a "melon-cutting graph" made by a dedicated fan group - "melon-cutting" refers to the act of streaming and downloading from the Korean service Melon to increase the popularity of a song. Based on the calculation logic of the site, followers buy all sorts of bundles and meet their streaming obligations. Melon can only be played a maximum of once per user per hour; it does not have a mute function, skip or pause function, and looping a single piece of music does not earn points. A technical rule that hopes to limit algorithmic manipulation of charts has become a type of digital code of conduct for fan users and must be learned and used [7].

Under the above regulations, a system of special labour has been formed by the supporters, and there are "monthly cards" for those who can maintain the operation of a device to obtain continuous and stable streaming data, and "one-time cards" for fans who are offline and will use concentrated streaming when they return or during a busy period for the chart competition. As the main offline functions of Melon are for Android and Windows, some users of iOS have had their profiles managed by others and thus established an extra hardware cooperation structure. Banggyu explained:

The general plan for the task clusters in this study is: regular synchronisation for broadcasting, file retrieval, profile management, workload distribution, etc., and different people will take on various roles according to their own hardware conditions, time availability and skills. Some formal platform regulations have been established and are now a deeply organised, refined form of digital work within the fandom. Formal digital paths have remained open in the institutional environment, but

participation in them is still carried out via cross-media platforms, technical skills and cooperation among the people. For Beijing University enthusiasts, participating in the South Korean media sector is no longer only about emotion; rather, it is now an active way of learning to operate platforms, utilise technology effectively and conduct digital labour [6, 7]. By changing the path of participation, structural constraints have increased the time, funds and technology required for participation, and what was once a relatively normal habit has become an endless struggle to bypass and change the institutional system.

5. Discussion

5.1. How restriction reconfigures transnational fan participation

According to research, institutional constraints have not eliminated K-pop fans in Beijing from popular culture around the world. By altering the circulation path and form of participation, it has changed how people are involved. Due to a decrease in accessibility or changes in the pipelines for foreign labour supply, fans have proactively altered their search behaviour and begun to participate in cross-border labour activities driven by the development of the digital economy. Regulation will not decrease the quantity of cultural resources but change how they are utilised instead. The services that platform recommendations and official channels used to offer now require larger investments of time, funds and technology; as a result, the involvement of the general public in this kind of "hobby" has decreased, and now it is more driven by fan circles and individual effort.

It shows that people are currently talking about, but not yet doing, fan agency. Most studies at present have found that electronic platforms have expanded the creation capabilities of fans and formed social networks in all parts of the world. According to the recorded cases, due to the institutional environment and platform rules, this agency is still relatively restricted. Subjects did not increase their engagement expenses due to self-motivation alone; they changed their way of life in the face of a decline in formal channels and sought other means of connection. Therefore, the agency of a fan is not only about their own will but also how the institutional environment will shape the specific form of participation; thus, we have added institutional factors to the study of global fandom [1].

5.2. Shadow infrastructures as a mechanism of cultural maintenance

Based on the above observations, we compile the construction activities undertaken by Beijing University enthusiasts in the area of resources, data exchange, transboundary consumption and electronic cooperation under the concept of a shadow infrastructure. The terminology is not to construct a new theory of infrastructure, but rather to offer a way of thinking about how global culture continues to be passed down in a limited way. A shadow infrastructure should not be regarded as an independent building located off the main campus, as we have defined it. It is a system for cultural inheritance constructed from many informal channels, such as Weibo super-topics, WeChat clusters, Baidu Cloud Storage, foreign social media, resource portals, fan associations, etc. When the official distribution channel and the official outreach channel are closed, supporters will mobilise the cultural resources of their dispersed but interconnected networks to continue spreading transnational popular culture under the restrictions of institutions.

Traditional infrastructure is built by the government, platforms and corporations, but shadow infrastructure needs to be funded continuously by the fan community [10, 15]. Now, a number of works from the resources have been compiled, integrated and disseminated online by fans; at the same time, international exhibitions, charts and various other activities have been launched [16]. Cultural mobility will be promoted more through the self-organisation and continuous cooperation of fan groups than by the official services of digital platforms. It is believed that there is an impact from platform infrastructure, digital labour and global fan networks; it is also thought that these factors function in China. Previous research has focused more on how platforms promote the connection between celebrities and fans but not much has been done to investigate how to continue maintaining

this connection in the face of decreased exposure and the closure of state-controlled channels [8]. The institution environment affects how much spread there is and what organisations are used. Therefore, the shadow infrastructure does not aim to replace the official platform; it is also not fixed but rather operates alongside the official system to continuously correct problems in that system; thus, fans are always looking for a place to gather among restrictions.

5.3. Implications for transnational fandom research in the Chinese context

Most research on transnational fandom has focused on the development of digital infrastructure, participatory culture, international fan networks and cultural dissemination; the institutional system has been relatively ignored and thus does not fall under the category of dynamic changes in fan behaviour [11, 13]. Based on the study of K-Pop fans at Beijing University, it has been found that institutional environments, platform regulations and fan activities are closely related. It is proposed that, instead of providing a solid base for cross-border work, institutional restrictions may also limit people's attention to the platform, hinder the spreading of culture, change the way fans engage, and as a result, due to various reasons such as algorithm changes on the platform, content moderation and foreign cultural policies, participation has been restricted, and cross-border collaboration takes the form of an unstructured fan community.

At the same time, the shadow-infrastructure paradigm has also been the subject of many discussions about fan agency, digital toil and platform participation; that is to say, it does not consider fans to be passive objects or consumers but rather studies how they maintain their global connections through digital labour, communal synergy and cross-platform coordination - a way of thinking that can be applied to various groups of transnational youth living under the influence of structural environments. From this perspective, the spread of global culture is controlled by market logic or platform technology independently, but it is always under the guidance of institutions, platform management and user behaviour; at the same time, fans are also participating in this process and are key to the continuous circulation of culture. The study of the K-Pop case is not representative; in other contexts, around the world, there are still various modes of expression. Therefore, Beijing University K-Pop fans are not the focus of this study but rather a particular case that can provide a view of research on transnational fandom in the Global South.

6. Conclusion

The K-pop fans at the universities in Beijing are the subjects of this paper, and how and why their cross-border participation is positively or negatively affected by institutional constraints will be explored through semi-structured interviews and online ethnography. According to our study, such restrictions have not limited these people's engagement with South Korean pop culture; instead, through platform content regulation and the reduction of official channels, they have found new ways to learn about and participate in creative creation and the inheritance of overseas culture. More and more people are involved in proactive exploration, virtual cooperation, cross-border consumption and communal exchange; thus, transnational circulation has moved away from being led by structured portals and industrial frameworks to being driven by informal networks.

Based on the above results, we put forward the idea that shadow infrastructure can be used to study the maintenance process of fans under pressure, such as resource flow, information exchange and digital cooperation. It is not about the power of the platform, the independence of fans or digital workers; rather, it shows how the structural environment constrains all kinds of forms of participation and limits the spread or dissemination of content. Thus, the institutional environment will be included in the study of transnational fandom communities.

The following have certain shortcomings. The group of participants is restricted to K-pop fans at Beijing institutions, and as this group is relatively small, the results can only be applied to young people in this environment and cannot be generalised to other areas or different demographics. It has the quality of people's experiences and daily life; there is no systematic statistical analysis of changes

in platform algorithms or platforms based on data. In the future, research will increase the scope of the cohort and compare supporters from different regions, people of various ages, different types of international fandoms, and integrate interviews with platform data and digital-trace analysis to study the connections between institutional climate, platform regulation, cross-border activities, etc., more deeply. However, it is still limited; therefore, this case shows that although there are formal restrictions, cross-border interaction will find other ways to be realised in the continuous operation of institutions, platforms and fan behaviour.

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