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# Harnessing the stream: algorithmic imaginary and coping strategies for live-streaming e-commerce entrepreneurs on *Douyin*

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## Abstract

When an algorithm is embedded into the platform economy as a digital infrastructure, it affects the visibility of information, the distribution of interests, and the labor process. In the context of live-streaming e-commerce, entrepreneurs interact with algorithms and consumers in real time to obtain more traffic. Compared with platform users, entrepreneurs are more sensitive to changes in the algorithm when facing great uncertainty in live-streaming and have become "algorithm experts". This paper focuses on the short video platform Douyin and adopts the methods of field research and in-depth interviews. We interviewed 45 live commerce entrepreneurs and explored how entrepreneurs understand and interact with algorithms, particularly how their understanding of algorithms differs from that of users. By examining algorithmic imaginaries and coping practices, the authors hope to further the understanding of the relationships among labor, technology, and economic activity in new social contexts. In our study, we found that unlike platform users, who are often resilient, entrepreneurs have more active attitudes to learn about and interact with algorithms. They use words such as "admission tickets" and "like the wind" to describe algorithms. Unlike content creators, entrepreneurs' understanding of arithmetic is influenced by the logic of traditional trade business when faced with traffic uncertainty. To seek certainty from a blurry stream, they adapt the methods of farther learning, frequent algorithm tests, more sophisticated work division, and resignation to fate. This study enriches the research perspective in the field of STS from a social-economic perspective and discusses the impact of technology on individual movement in the context of e-commerce. At the same time, this study also explores the technological ideology behind precarious work, which reflects individuals' expectations of social order.

**Keywords:**  Algorithmic imaginary, Live streaming e-commerce, Human–computer interaction, Algorithmic visibility, Douyin

## Introduction

The development of platform technologies has given rise to new economic forms such as platform e-commerce, the sharing economy, and paid content. In *Platform Capitalism*, Nick Srnicek proposes that "platforms are digital infrastructures that enable two or more groups to interact" (Srnicek 2017: 50). Van Dijck and colleagues define an online "platform" as a programmable digital architecture that is designed to organize interactions between users, not just end users but also corporate entities and public bodies (Van Dijck et al. 2018: 4).

In the context of e-commerce, platforms act as the infrastructure that connects consumers, advertisers, suppliers and service providers. Platform users can not only buy the goods, information, and services they need on a platform but also conveniently produce or sell products, content, and services on the same platform. Platforms provide new opportunities for anyone who wants to start businesses and become grassroots entrepreneurs. With the rapid development of live streaming in recent years, an increasing number of people have begun to sell and buy goods through streaming or short videos. The data show that as of June 2022, the number of Chinese live streaming users reached 716 million, including 469 million live streaming e-commerce users, accounting for 44.6% of overall internet users in China.[1] The market size of China's live streaming e-commerce industry exceeded 1.2 trillion RMB yuan in 2020, and the number of streamers in the industry has reached 1.23 million.[2]

Douyin, which was launched by ByteDance in 2016, is now one of the most successful short video and livestreaming platforms in China, with more than 400 million daily active users. It is also the leading live e-commerce platform. TikTok is the international version of Douyin. Douyin has a well-established e-commerce business model and is highly competitive in the industry due to its algorithmic recommendation technology that accurately matches content with users' needs. In 2018, Douyin enabled the selling function, and in 2022, it launched an e-commerce center.

In live-streaming e-commerce, entrepreneurs insert links leading to the products for sale at the bottom of the video screen, guiding consumers to click on the links and place orders. The platform algorithms score and rank the videos according to the number of views, likes, and comments they receive and then allocate traffic. The videos are then recommended to the streaming home page for a longer or shorter period. Therefore, the visibility of the stream becomes extremely important to entrepreneurs. As programmable technological artifacts, algorithms and codes are core elements that underpin the functioning of the platform economy, influencing the visibility, circulation paths, and pricing strategies of information and goods in the platform (Cotter 2019; Gaw 2022; McDonald et al. 2021). The entrepreneurs' knowledge of the platform's rules becomes an important digital skill that is crucial for gaining traffic and achieving financial gains. In this process, e-commerce entrepreneurs develop their own perceptions and imaginations about platform technology.

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[1] China Internet Network Information Center: *The 50th Statistical Report on the Development of the Internet in China*, August 2022, p. 52.

[2] iResearch Consulting, "2021 China Live Streaming E-Commerce Industry Research Report", The Paper, 22 September 2021. Retrieved from https://www.thepaper.cn/newsDetail_forward_14589928。

The concept of imaginaries of science and technology refers to "sets of shared beliefs about how a world worth inhabiting can be realized through science and technology", offering a special analytical perspective in STS (Science, Technology and Society) (Felt 2017). Previous studies in this field have tried to explore expectations of ideal technological environments in science fiction, the psychological states of individuals when confronted with new technologies, and the connections between technology policies and social culture (McNeil et al. 2017; Cao 2021a, b). As technology evolves in digital society, the public's social technological imaginaries change accordingly, reflecting the human agency behind the interactions with technology and people's imaginaries of social order. Algorithms, as "black box" technologies that have significant impact on social life, can be understood through experience and communication. The "algorithmic imaginary" has become an important concept for humans to imagine and experience algorithms (Bucher 2017).

Current studies on "algorithmic imaginary" are mainly related to content consumers, specifically how social media users become aware of the algorithm in the context of unmet needs, disappearing privacy boundaries, and dysfunctional systems, and how they actively adopt resistance strategies such as uninstalling software, misleading algorithms, and reshaping algorithms (Hargittai et al. 2020; Bucher 2017; Cellard 2022). However, these research findings cannot explain the practices of content creators who use platforms as tools to make a living. In current platform economy studies, relevant explorations have mostly focused on the impact of algorithms on content distribution and creators' labor processes and lack research on algorithmic imaginary from the creators' perspectives and the human agency behind their interactions with algorithms. A large number of studies has examined Douyin, one of the most important platforms in China. However, current Douyin research has mainly focused on the creative labor or free labor of short video creators (Fung et al. 2022) but has failed to pay attention to the labor process of live-streamers who are e-commerce entrepreneurs.

Therefore, this paper aims to explore the algorithmic imaginary of e-commerce entrepreneurs on the Douyin platform and their coping strategies. How do live-streaming e-commerce entrepreneurs perceive algorithms, and how do they understand algorithms as technologies that play an important role in their business activities? What coping strategies do they adopt to increase the productive value of their labor? The authors hope to explore and explain the mechanisms of algorithm-driven platform capitalism, to comprehend the new implications of scientific and technological imaginaries and human agency in the platform economy and to further understand the more complex and profound relationships among labor, technology, and economic activities in the new social contexts.

## Algorithm and algorithmic imaginary

### Algorithms used for business logic and governance purpose

Gillespie (2014) considers an algorithm to be a set of coded programs based on specific computational rules that enable the input of data and the output of results. An algorithm's computational process follows a complete and rigorous set of sequencing and computational logic. Since platforms have both commercial and public attributes, they have two implications when algorithms are applied to the platform economy.

On the one hand, algorithms change the previous commercial logic of the market, affecting the labor process and revenues (Yu et al. 2022; Grohmann et al. 2022; Su 2023). Algorithms, as the underlying technical architecture of platforms, become the standard by which content is sorted, information is matched, and traffic is allocated (Gillespie 2014; Beer 2017). When platforms provide users with new entrepreneurial or employment opportunities, the more skillful users are in using the technology, the more likely they are to profit (Watkins 2022; Klawitter and Hargittai 2018). For e-commerce platforms, the main function of algorithms lies in the distribution of product information, where photos, titles, prices, number of buyers, and ratings of products are measured according to a set of criteria and then distributed to the common users.

On the other hand, algorithms as traffic distribution tools have to serve the needs of governance, in addition to the business purpose, to build a good ecology within platforms (Schmeiss et al. 2019). Digital platforms have become infrastructures in users' daily lives, so the content published on these platforms need to have decent quality and certain public value (Pierson 2021). Platforms themselves also need to comply with the requirements of the regulatory authorities of the state, so a series of technical methods have been developed, such as algorithm governance, social value assessment, and information-source check system (Lu et al. 2023). When new rules and requirements are issued by the relevant authorities, platforms need to amend and update them in time (Huang 2022).

Both the maintenance of market order and the screening of content can be achieved through platform algorithms, and every change to these algorithms impacts the participants on these platforms. Will the participants be able to perceive the rule changes? What measures will they take?

### Algorithmic imaginary: prerequisite for users' actions

The algorithmic imaginary reflects how users perceive algorithms, which leads to the following user actions. Eslami et al. (2015) found that users were not aware of the existence of the newsfeed curation algorithm in Facebook. Gran and colleagues developed a questionnaire to test social media users' "algorithm awareness" and found that education background influenced users' attitudes toward algorithms. The more educated users are, the more critical they are of algorithms. Differences in perceptions of algorithms may also contribute to the digital divide (Gran et al. 2021). In practice, the secrecy of commercial companies regarding algorithms and the size and complexity of algorithmic systems make it difficult for most users to fully understand them (Burrell 2016). Ordinary users can only perceive algorithms through their daily use experience (Cao 2021a, b; Zhang 2022; Hong and Chen 2022; Zhang et al. 2023). Users' algorithmic awareness and resistance are mostly triggered when their demands are not met, their experiences are negative and their privacy management is out of their control (Hong and Chen 2022). After acquiring certain algorithmic knowledge, users resist by using spatial isolation, rule reorganization, active embedding, and reverse regulation to escape algorithmic control (Zhang 2022).

By manipulating the visibility of content on platforms, algorithms also have an impact on the revenue of content creators (Petre et al. 2019). Content creators who are aware of algorithms employ strategies such as modifying keywords, adding hyperlinks, and

reposting on multiple platforms to increase the visibility of products in the platform, and algorithmic skills are becoming the new language that e-commerce entrepreneurs need to master (Klawitter and Hargittai 2018). According to Bishop's research, YouTube beauty bloggers discuss in Facebook groups how to gain visibility on the platform, and their informal exchange of information about algorithms is referred to by Bishop as "algorithmic gossip", a more recent popular concept in relevant research (Bishop 2019).

Much of the recent research on algorithmic perception takes the above two perspectives: first, how platform users can better optimize algorithms and improve their user experiences through resistance strategies; and second, how creative workers on platforms can learn the rules of the algorithms to improve the visibility of their content. Unlike the above two, the interaction between live-streaming e-commerce entrepreneurs and algorithms is somewhat unique because these individuals are simultaneously creators of content and sellers of goods. Entrepreneurs need to not only create high-quality content to attract users' attention but also learn and understand the algorithmic knowledge of their platform to obtain more traffic and merchandising opportunities.

### Live streaming traffic fluctuations and streamer labor

Live streaming combines hi-fi audio and video that conveys it to viewers (Hamilton et al. 2014). In contrast with traditional forms of media, live streaming allows content creators and viewers to interact in real time, helping to shape the interactive experience of streamers and viewers (Scheibe et al. 2016). It also increases audience engagement and community building (Wohn and Freeman 2020). People watch live streaming for various reasons. Social interaction, sense of community, meeting new people, entertainment, information seeking and a lack of external support in real life have been considered the main motivations (Hilvert-Bruce et al. 2018; Sjöblom and Hamari 2017). Currently, live streaming involves gaming, painting, cooking, selling goods and emotional communication. Major platforms such as TikTok, Twitch, YouTube and Facebook are all operating live streaming businesses.

In recent years, live-streaming e-commerce has seen an unprecedented surge in growth. The production of content on platforms is influenced by two main aspects: a range of metrics and the needs of users (Nieborg et al. 2019). Short video platforms represented by Douyin are highly dependent on algorithmic recommendation mechanisms. Data-driven algorithms have affected the production and circulation of created content, moving away from the path of previous social networks (Liang 2022). Changes in algorithmic rules have also affected creators' labor and thus their earnings.

Any data trace that users and streamers leave behind becomes an algorithmic reference in the platform (Liang 2022). In live music streaming, the platform stipulates that the income of the streamer is linked to the popularity of the streaming. A complex remuneration system is created to motivate the streamer to put in more work on the platform (Xu and Zhang 2022). In addition to the remuneration system, the technical architecture of the platform includes the metrics, ranking, and revenue behind the commodification of content, the way in which the streamers and viewers interact with each other and the media environment provided by the platform, all of which influence the form of labor of creative workers and encourage them to put in more work (Meisner and Ledbetter 2022). Not only do streamers need to work in front of the camera, but they also need

to work behind the camera (Johnson 2021). Whenever algorithmic rules change, content creators are under extreme pressure and tension to further develop their skills to increase the exposure of their content (Ayres 2022). The above studies have focused on how algorithms impact content distribution and creators' labor processes, leaving the "algorithmic imaginary" between algorithms and labor to be further developed.

## Methods

This study takes the Douyin platform as the research case and mainly applies the research methods of fieldwork and in-depth interviews. The field site for this study is Yiwu, a city in Zhejiang Province. The time period for the fieldwork was from April to May 2021 and from September to December 2021. Yiwu was chosen as the field site for the following reasons. First, due to Yiwu's advantages in the supply of goods, human resources, logistics and information, the infrastructure of Yiwu's e-commerce industry is well developed, attracting a large number of grassroots entrepreneurs to come to Yiwu to start live-streaming e-commerce businesses (Wu et al. 2016). Second, a chain of "live streaming training—streamer to sell goods—suppliers" has formed in Yiwu's live-streaming e-commerce industry, which attracted an increasing number of MCNs (Multi-Channel Networks) to Yiwu. Craig et al. define MCNs as the intermediary firms operating between platforms and creators, fostering and managing micro celebrities for the platform and offering support for content production and operation services (Craig et al. 2021: 114). MCNs in Yiwu provide sufficient skill training and industry resources to grassroots entrepreneurs with little experience in live-streaming e-commerce. As of July 2021, Yiwu hosted more than 40 MCNs of various types, built 15 live e-commerce bases, and established the first live e-commerce business school in the country.[3] Yiwu, as a microcosm of Chinese internet economy development, is undoubtedly a representative field site.

During the fieldwork, one author signed up for a training course at D live e-commerce school to approach more live-streaming e-commerce entrepreneurs and get to know more about what they have learned from MCNs. The author spent nearly 1 month staying with the e-commerce entrepreneurs, completing every task such as video-shooting, performing, and online selling as a team member. Having gradually gained the trust of the people around, the author found that the entrepreneurs in this training school have short period of time in the business, and the scale of their followers is below 100,000. To ensure the diversity of the research samples, the author visited other live-streaming e-commerce communities and conducted interviews with creators of various fan bases as well as other professionals within the industry, including instructors at training institutions, payment traffic managers and product manufacturers. Most of the time, the face-to-face interviews took place at training institutions, live streaming studios or other workplaces. Occasionally, audio interviews were conducted online. The questions centered around five themes, including entrepreneurial motivation, training system, labor process, livestream activities and algorithmic imaginaries.

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[3] Gong Shuhong, 'Yiwu carried out over 100,000 live-streaming sessions by micro-celebrities for selling goods in the first half of the year, with sales of nearly 15 billion RMB'. Retrieved from https://news.zgyww.cn/system/2021/07/26/010209524.shtml.

**Table 1** The position of the interviewees

| Job position | Anchor | Lecturer | Operator | Supplier | Total |
|---|---|---|---|---|---|
| Number of interviewees | 27 | 10 | 5 | 3 | 45 |

**Table 2** The account scale of the interviewees

| Number of followers | 0–1 k | 1 k–10 k | 10 k–100 k | 100 k–500 k | 500 k–1 m | Over 1 m | Total |
|---|---|---|---|---|---|---|---|
| Number of interviewees | 8 | 16 | 11 | 7 | 2 | 1 | 45 |

The 45 live e-commerce entrepreneurs who were interviewed held various job positions in the chain. As shown in Table 1, there were 27 live streamers, 10 training tutors, 5 business operators, and 3 suppliers of goods. For the follower sizes, which are presented in Table 2, there were 8 entrepreneurs with 0 to 1000 followers, 16 with 1000 to 10,000 followers, 11 with 10,000 to 100,000 followers, 7 with 100,000 to 500,000 followers, 2 with 500,000 to 1 million followers and 1 with more than 1 million followers. Table 3 presents the demographic profiles of the interviewees. Before the interview, the author informed verbally each participant the purpose of the study, risks involved, interview procedure, and the participant's right to withdraw at any time. After obtaining the consent, the author carried out the interview and left contact information after the interview so as to be reached when the participant felt necessary. For the privacy concern, the authors anonymized the interviewees in this paper.

## What is the algorithm, a judge or a money-making tool?

### "Algorithm is a fair judge"

The continuous growth of Yiwu's e-commerce economy has attracted groups of people who search for good life to start e-trade businesses in this city (Qian 2023). Out of achieving higher economic returns, greater autonomy and more freedom, they quitted the labor market and chose the self-employment path (Xia 2022). Xiaokui,[4] from Yunnan Province, is a typical young entrepreneur who is hopeful about live-streaming e-commerce. Born in 1997, Xiaokui went to work in a factory in Shenzhen after graduating from high school. Afterward, he worked as a real-estate agent. It became his early dream to start his own business. When he surfed short video platforms, he often watched the entrepreneurship stories recommended by the platform and was very inspired. In his opinion, making short videos and live streaming to sell goods is a good choice for starting up a business because the cost is relatively low, and he does not need to invest too much money into it.

He also told the author that compared to traditional e-commerce platforms such as Taobao and Tmall, which are the Chinese equivalent of Amazon, the number of Douyin e-commerce entrepreneurs is not yet saturated. Douyin expects more content creators to join it, so it provides a certain traffic subsidy to newcomers. That is, the platform allows creative newcomers to gain more exposure on the platform. He therefore

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[4] The pseudonym of the interviewee is used here for privacy concerns.

**Table 3** Summary of demographic profiles of the interviewees

| Pseudonym | Job position | Follower | Age | Gender | Birth year | Starting time | Type of goods | Interview time |
|---|---|---|---|---|---|---|---|---|
| Caoge | Supplier | 16 k | 49 | Male | 1973 | March 2018 | Agricultural products | April 2021 |
| Anan | Anchor | 854 k | 19 | Female | 2003 | March 2021 | Clothing | April 2021 |
| Yanjie | Anchor | 2 k | 49 | Female | 1973 | March 2021 | Daily necessities | May 2021 |
| Yanyan | Anchor | 4 k | 32 | Female | 1990 | April 2021 | Flowers | May 2021 |
| Yueyue | Anchor | 12 k | 31 | Female | 1991 | October 2020 | Daily necessities | May 2021 |
| Dongdong | Anchor | 265 k | 37 | Female | 1995 | March 2019 | Agricultural products | May 2021 |
| Shuoshuo | Anchor | 1 m | 28 | Female | 1994 | May 2019 | Fitness products | October 2021 |
| Xiaoming | Anchor | 4 k | 30 | Male | 1992 | October 2020 | Daily necessities | October 2021 |
| Huage | Anchor | – | 52 | Male | 1970 | October 2020 | Tableware | October 2021 |
| Xiaokui | Anchor | 9 k | 25 | Male | 1997 | August 2020 | Tea | October 2021 |
| Sufei | Anchor | 7 k | 19 | Female | 2003 | August 2021 | Daily necessities | October 2021 |
| Xiaopen | Operator | 60 k | 26 | Male | 1996 | March 2021 | Accessories | October 2021 |
| Youge | Operator | 9 k | 30 | Male | 1992 | March 2021 | Agricultural products | October 2021 |
| Xiaoji | Lecturer | 54 k | 24 | Male | 1998 | August 2021 | Daily necessities | October 2021 |
| Dage | Lecturer | 8 k | 24 | Male | 1998 | January 2021 | Training | October 2021 |
| Quange | Anchor | 110 k | 30 | Male | 1992 | October 2021 | Towel | October 2021 |
| Leilei | Anchor | 5 k | 33 | Male | 1989 | October 2021 | Daily necessities | October 2021 |
| Xiaoye | Anchor | 2 k | 34 | Male | 1988 | October 2021 | Daily necessities | October 2021 |
| Caicai | Anchor | 25 k | 33 | Male | 1989 | June 2020 | Snacks | October 2021 |
| Xiaoqian | Anchor | 0.2 k | 21 | Male | 2001 | October 2020 | Daily necessities | October 2021 |
| Wangjie | Lecturer | – | 47 | Female | 1975 | September 2021 | Daily necessities | October 2021 |
| Duge | Lecturer | 14 k | 52 | Male | 1970 | July 2021 | Gift bag | October 2021 |
| Fangjie | Anchor | 0.1 k | 50 | Female | 1972 | October 2021 | Beddings | October 2021 |
| Xiaozhi | Anchor | 6 k | 36 | Male | 1986 | June 2021 | Stationery | November 2021 |
| Xiangjie | Anchor | 0.2 k | 58 | Female | 1964 | September 2021 | Daily necessities | November 2021 |
| Lanlan | Anchor | 2 k | 35 | Female | 1987 | July 2021 | Rice wine | November 2021 |
| Xiaoqin | Lecturer | 8 k | 20 | Female | 2002 | December 2020 | Training | December 2021 |
| Fangfang | Lecturer | 25 k | 34 | Female | 1988 | August 2019 | Training | December 2021 |
| Xiaoyi | Lecturer | 8 k | 37 | Male | 1985 | September 2018 | Training | December 2021 |
| Huangge | Operator | 6 k | 42 | Male | 1979 | November 2021 | Decoration | December 2021 |

**Table 3** (continued)

| Pseudonym | Job position | Follower | Age | Gender | Birth year | Starting time | Type of goods | Interview time |
|---|---|---|---|---|---|---|---|---|
| Chaoge | Anchor | 750 k | 30 | Male | 1992 | March 2021 | Mask | December 2021 |
| Xiaomei | Anchor | 24 k | 30 | Female | 1992 | June 2021 | Mask | December 2021 |
| Guojie | Lecturer | 8 k | 54 | Female | 1968 | October 2020 | Snacks | December 2021 |
| Xiaojiang | Supplier | 8 k | 23 | Male | 1999 | June 2021 | Training | December 2021 |
| Zetian | Lecturer | 40 k | 33 | Male | 1989 | December 2019 | Training | December 2021 |
| Xiange | Anchor | 0.6 k | 57 | Male | 1965 | June 2021 | Daily necessities | December 2021 |
| Tangtang | Anchor | 110 k | 37 | Male | 1985 | December 2019 | Daily necessities | December 2021 |
| Jiangge | Anchor | 392 k | 32 | Male | 1990 | June 2021 | Clothing | December 2021 |
| Wangge | Operator | 392 k | 34 | Male | 1988 | August 2020 | Clothing | December 2021 |
| Zege | Operator | 392 k | 38 | Male | 1984 | March 2021 | Clothing | December 2021 |
| Yanyan | Supplier | 0.3 k | 37 | Female | 1985 | June 2020 | Scarf | December 2021 |
| Hongjie | Anchor | 20 k | 49 | Female | 1973 | March 2021 | Scarf | December 2021 |
| Xiaofan | Anchor | 195 k | 40 | Male | 1982 | May 2021 | Daily necessities | December 2021 |
| Xunge | Lecturer | 53 k | 39 | Male | 1983 | May 2021 | Mask | December 2021 |
| Yangjie | Anchor | 0.4 k | 52 | Female | 1970 | June 2021 | Paper cutting | December 2021 |

believes that Douyin is friendly to grassroots people who are not financially strong and gives every young person who wants to start a business the opportunity to do so. He has many friends who have already come to Yiwu, so he has followed his friends' footsteps.

Wangge, 35 years old, is a live streaming channel owner specializing in the sale of women's clothing. His collaborator describes him as a truly capable entrepreneur who truly understands algorithms, as being able to make their streaming channel appear on more users' homepages with less money investment. When Wangge talked about the rules of the Douyin algorithm, he mentioned 'decentralization' more than once. He said:

> *"Douyin is decentralized. It doesn't have a clear hierarchy like Taobao or Tmall. It treats every channel fairly and gives you traffic depending on the quality of your content'. 'Douyin is decentralized. It will not let your product get high traffic for a very long time. It won't always push traffic to you."*

Not only Wangge but also many interviewees used the term 'decentralized' to describe Douyin's algorithm. Decentralization, as opposed to centralization, is seen as a distinctive feature of the internet era, where different players are equal in a web-like rather than hierarchical structure (Schneider 2019). But there are studies holding the opposite opinion. For instance, Qian and Chen (2023) found that digital technologies have created

equal opportunities as well as new trade barriers for consumers in e-commerce platform. For entrepreneurs on live e-commerce platforms, "decentralization" as opposed to "monopoly" means that a platform provides a fairer traffic distribution system. For creators, Douyin's "decentralization" has two implications. First, they believe that the algorithm is fair and will treat everyone on the platform equally because the data generated from the quality of the content are the only criteria. Second, the algorithm will actively balance the distribution of traffic and try to avoid the concentration of traffic in the platform. The interviewees mentioned the "Newcomer Support Plan", "DOU Art Plan" and "New Farmer Plan" initiated by Douyin, in which the algorithm will allocate traffic to newcomers or specific projects.

This shows that entrepreneurs have a high level of trust in the Douyin platform and its algorithm. They have expectations for the business environment provided by the platform, which explains the constant influx of newcomers into Douyin startups. The grassroots entrepreneurs imagine the platform's algorithm as a fair "judge"—an algorithm that uses data as the standard for traffic distribution and is not biased. When traffic on the platform is too concentrated on one channel or one product, the entrepreneurs believe that the algorithm will automatically adjust to ensure the balance of the platform's ecology.

However, the platform's decentralization in reality supports further centralization. At the early stages of platformization, the platform opened up equal opportunities for most content creators to attract more audience, which led to an extraordinary concentration of economic power held by the platform and top celebrities (Poell et al. 2022: 50). To better manage creators, the platform has a hierarchy system that ensures that high-status creators have more recommendation opportunities through the automated recommendation algorithm. While concerning the quality of the content, the platform also considers the payment offered by the creators for distribution. We can see that the entrepreneurs' understanding of the platform is idealistic to some extent.

**"Algorithm is a money-making tool for the platform"**

This study also found that entrepreneurs' knowledge of platform rules and algorithms affects the traffic of their channels and the sales of goods. As the platform expands, the traffic rules become more complex. Efficiently obtaining the most traffic is a constant task for every entrepreneur.

The algorithm allocates traffic based on the data of the entrepreneur's live-streaming. As a result, data analysis of one's own streaming channel has become an algorithmic skill that entrepreneurs need to master. In April 2022, Douyin launched the official *Guide to Operating with Merchant Competence*, which clearly states the importance of "improving data competence" for short video and live-streaming businesses. The guide states that videos with higher play counts, more interactions, and more active followers will receive more traffic. The more people are present, the longer they stay, and the higher the turnover, the more traffic they will receive. Therefore, entrepreneurs realize that they should review the data of their channel after each broadcast, such as which time periods have the most traffic, what kind of speechcraft attracts more people, and what kind of products are more popular. Based on this information, entrepreneurs can improve their business operations.

To fully understand the platform's algorithms, a number of entrepreneurs have signed up for courses introducing the service of "buying traffic". The main content of these courses is an introduction to the traffic placement tools on Douyin, such as "Ocean Engine Shopping Ads" for buying live streaming traffic, "DOU+" for buying short video traffic, and "Small Shop With Push" for buying traffic for specific goods. The streamer Youge said, "In the past, we just make quality content and the traffic would come naturally. Now the rules are getting more complicated and to get more traffic, these are things to learn."

In this sense, the entrepreneurs see algorithms as a money-making tool for the platform. Both free traffic and paid traffic are designed to maximize the platform's benefits. Only when entrepreneurs meet the platform's interest needs will the platform provide the corresponding traffic support. Wangge, in his analysis of Douyin's flow-pushing mechanism, said:

> *"If [users] buy more on your channel, the more traffic will be pushed into your channel by the system. If Douyin finds that no one buys your goods, it won't push traffic to you anymore. It's its traffic, and it needs to make money. So why provide traffic for no results?"*

As a result, entrepreneurs see the platform's charging for technical services, advertising and traffic as reasonable, and they see the purchase of paid traffic as an "entry ticket" to a larger pool of traffic.

Unlike users, platform entrepreneurs have an algorithmic imaginary that is based on the idea of profitability for the platform. The platform, as the party with absolute power, continues to incentivize entrepreneurs to produce more and better work, internalizing the ideology of the platform and simultaneously developing paid traffic products to increase their own profits. "Win–win" has become the ideal relationship that entrepreneurs seek with the platform. Mastery of the platform's paid traffic methods is seen by entrepreneurs as "high level" algorithmic literacy. However, while entrepreneurs have been able to understand the rules of platforms through various methods, they are still subject to a high degree of uncertainty and vulnerability, as they do not have a say in the process.

### "Algorithm is like a gust of wind", and algorithmic precarity

As one interviewee has put it, "The algorithm is like a gust of wind at times, there is no telling where it will blow or where it will take the entrepreneur." Despite entrepreneurs' great efforts to make videos, learn the platform rules and try to buy traffic, they face fluctuations in traffic and then feel the uncertainty in their careers. The instability of traffic is manifested in two main ways: (1) *the traffic arrives late*, and (2) *the traffic fluctuates greatly*.

For entrepreneurs who have just started a channel, a "long wait" in a live broadcast is normal. Live-streamer Yanjie has been on air for 3 months, starting at approximately 5 a.m. every day, selling household goods; they noted, "I mainly broadcast in early morning, and when I start, there are very few people in my channel." The entrepreneurs were attracted by the "Gold Rush Dream" in streaming. Although there is no one in the channel and no revenue day after day, the entrepreneurs still have hope.

For streamers who have been on air for a while they are able to strategically gain a certain amount of traffic in each broadcast but are also constantly at risk of losing traffic. Interviewee Xiaokui told the author that although he has built up a certain fan base, the traffic is still unstable. Once the channel has prohibited content, it risks being banned, and all the work previously done will be lost. He said:

> *"If you have prohibited content, it [Douyin] will prompt you which word causes trouble and give you a pop-up. It could be that you have 100 people (in your channel) and (the algorithm) immediately stops pushing people to you. (The number of people) may immediately go from 80, 50, 30, 20, 10 to 5. In this situation, you will have to go off air immediately and pause for 2 or 3 days. Then, you start doing it all over again. It's a lot of hassle."*

To the entrepreneurs, when the traffic will come back is something that the platform cannot explain clearly. Streamer Xiaofan, talking about how to get more traffic to ensure the stability of the business, repeatedly emphasized the elusiveness of the traffic, "It [the algorithm] probably has the same logic, which everyone knows, but its calculation logic is unknown to anyone... The platform can't control itself and can't explain everything"... "The official saying is that you need to make quality content, and you must insist. Anything else has been said to you?".

Duffy et al. (2021) summarize the precarities of the visibility of creative labor in three ways: (1) market precarity, i.e., the taste of audiences and advertisers change; (2) industry precarity, with too many competitors in the platform; and (3) platform precarity, or the changes enacted by individual platform companies in the form of updates to their features and algorithms. In another study, Duffy calls researchers' attention to algorithmic precarity, arguing that this opens up a space to ground cultural producers' experiences with algorithms without losing sight of the role of these systems in driving the curated, data-driven worlds of platformized content (Duffy 2020).

In China, where traffic fluctuations are common in platforms, algorithmic precarity is an applicable concept for analysis. However, Duffy's above two studies did not take into account the implications of state, which is equally important in the context of Chinese live e-commerce. Although the state does not directly inform the individual creator what to do or not to do, the creators are able to capture this through algorithm adjustments by the platform company when the state introduces new policies. The platform company is profit-orientated while the state has changing policies for governance.

Youge's Douyin account primarily shares humorous videos in Chinese villages. He mentioned in the interview that one should keep a close eye on social events and internet governance policy because the platform's streaming rules always change accordingly. He noted:

> *"A few days before the national day, Douyin definitely restricted the (entertainment accounts') traffic. Previously, we could get hundreds of thousands of views every day, but it suddenly dropped to just thousands." Moreover, "When the government claimed to protect the teenagers' security on the internet, one should be very cautious and try to avoid any teenager's shots that might be deemed (in violation of the rules)."*

As a result, even if entrepreneurs are already familiar with the previous rules and have built a large number of followers, they still face the risk of fluctuating traffic, suspension or banning from broadcasting. In fact, every week, the platform publishes rule changes on the official learning webpage. However, for entrepreneurs, remembering all the rules is simply impossible. In response, entrepreneurs often register several accounts, and when one account is banned, they rush to divert followers from the original channel to a different new one in an attempt to minimize the damage of the rule changes. Unlike users who try to resist the platform's algorithms, entrepreneurs usually internalize the logic of platform governance. The acceptance of algorithmic precarity may be shaped by the platform and training institutions but also leads to entrepreneurs' self-reflection. They will further optimize the live streaming strategies.

## Facing algorithmic precarity: understanding, harnessing and going beyond algorithms

The greatest challenge for entrepreneurs in the platform economy is traffic uncertainty, according to Douyin users. Thus, entrepreneurs are trying different approaches to seek traffic stability. For entrepreneurs, the live streaming business is something that requires what is known in Chinese idioms as "favorable timing, geographical and human conditions" (*Tianshi Dili Renhe*, 天时地利人和). This idiom means that, on the road to success, favorable climatic conditions are not as favorable as favorable geographical conditions, and favorable geographical conditions are not as favorable as the concerted efforts of men. However, in the understanding of the entrepreneurs, in the context of live streaming, "timing" refers to the timing of the live broadcast, "geographical condition" refers to the setup of the live chatroom in the channel, and "human condition" refers to how well the team fits with each other. Live streaming is full of unpredictable elements, but they still try to do the best they can to do what needs to be done.

### Understanding algorithm: learning the rules of traffic online and offline

A comprehensive understanding of algorithm rules will reduce traffic uncertainty. Unlike platform users, entrepreneurs, as content producers, must fully master the platform rules. In the early stages of entrepreneurship, taking classes is the most effective way to understand the platform's algorithm for grassroots entrepreneurs who do not have enough technical knowledge and skills. Entrepreneurs learn the platform's rules for pushing traffic through official courses, training institutes, and peer-to-peer exchanges. In the process of continuous learning, they internalize their knowledge of the algorithm into new professional skills to gain relative stability in the platform.

The official courses and learning documents released by Douyin are considered the "algorithmic bible", which deeply shapes the algorithmic awareness of entrepreneurs. Douyin has established the course website "Douyin E-Commerce Learning Centre", which covers 14 sections, including an introduction for newbies, rule interpretation, traffic acquisition, live stream operation, short video operation, goods operation, etc. These contents provide a certain reference for entrepreneurs to learn to sell goods live.

The courses offered by the third-party training institutions are mostly integrated, simplified or hands-on versions of the official courses, providing "hands-on" learning opportunities for streamers with relatively low digital literacy. Xiangjie, an entrepreneur from

Anhui Province whom the author met at the training institute, is in her fifties. She used to be in the wholesale food business. Xiangjie came to Yiwu alone from her hometown and rented a place to stay a kilometer away from the training institution. She comes to the training institution every day at 6 a.m. in the morning to study with the teacher, and usually goes home at 10 p.m. in the evening, and later when the task is not done. She said:

> *"We go to the nearby park at 6 a.m. to learn from the tutor and practice our speech-craft. We speak aloud in the park. In the afternoon session, we practice photograph-ing. In the evening session, we practice live streaming... The tutors are all very nice. Whatever you ask, he will teach you by hand."*

Xiangjie paid close to 10,000 RMB yuan in tuition fees to learn how to shoot and oper-ate live broadcast. She said that although many people say that training institutions are "fleecing the sheep" and that they don't teach anything useful, for her, the training insti-tution is the only place that could teach her how to make videos.

However, platform rules change quickly, and entrepreneurs need to constantly update their algorithm knowledge in practice, which requires considerable effort. Operator Wangge told the author:

> *"Douyin's algorithm changes often, and it changed completely in September and October. I had to re-break my perceptions and turn around quickly. You see whether a person is great or not, it depends on how he goes and finds this thing first when the platform changes and can adjust to solve the problem, that's his ability."*

In addition to self-practice, exchanging information with peers also helps entrepre-neurs understand the trend of rule changes. Chaoge learned his operating knowledge from his friend. In his opinion, compared with training institutions, daily communi-cation with friends can bring him more practical experience. He told us, "I signed up for training courses long before, but then I quit. My friend downstairs is very intelli-gent, and I learned a lot from him...We will talk about experience on the table or in the Group Chat". However, not every entrepreneur can meet friends who are willing to share knowledge with each other. Algorithm rules are also part of entrepreneurs' "commercial secrets'".

### Harnessing algorithm: channel mimicry and algorithm testing

According to sociologist Brighenti (2007), visibility is a metaphor for knowledge, but it is not simply an image: it is a real social process in itself. Being seen is the marker of successful content. Therefore, how content on platforms is chosen by the algorithm, selected, elevated and given voice and legitimacy, could be regarded as "algorithmic vis-ibility" (O'Meara 2019; Petre et al. 2019). Thus, like content creators on YouTube, Ins-tagram and Facebook, entrepreneurs are highly dependent on the platform for their revenue, and increased visibility is the biggest demand of entrepreneurs (Bishop 2019; Petre et al. 2019). While traffic on the platform is fraught with instability, once entre-preneurs understand the traffic rules of the platform, they focus on the data that serve as a criterion for the algorithm to judge, determine and grasp the algorithm in real-time interactions.

Two strategies emerge as entrepreneurs try to harness the algorithm: (1) *picking the benchmark channel to imitate* and (2) *taking the initiatives to test the algorithm*. Most entrepreneurs usually spend a vast amount of time watching the broadcasts recommended by the platform, believing that this content receives the algorithm's favor and therefore is worth imitating. This is true for individual content, and the same strategy is used to even start a new channel/account. The "benchmark channel" is a target account that entrepreneurs can learn from and imitate. The mimicry of the "benchmark channel" helps entrepreneurs establish their personas, select goods they want to sell and perfect their account profile so that the algorithm will recommend their channels to the target audience. Xiaoji, a tutor at a training institution, introduced the specific method of choosing a 'benchmark channel' when he gave a lesson to the students:

> *"You decide the keywords of your merchandises, then go and search for the channels selling the similar categories with no more than 200,000 followers.[5] Then you choose one as your benchmark, and fill in the information to complete your account profile by imitating it."*

Fangfang, another tutor at a training institution in Yiwu, also tells her students, "Before you do Douyin, you need to determine how to build your persona and identity, what your benchmark channels are, which direction you want to go, and then position yourself, make videos, tag, and sell goods." In addition to completing basic information such as avatars, nicknames, profiles and background images, entrepreneurs will also "nurse the account" by posting short videos, click farming, and providing benefits to users who have come to the channel. When Hongjie shared his production experience, he mentioned, "In fact, we make [short videos] very quickly. We find a benchmark channel first. If we think the content is good and educational, we adapt it and remake it."

In the creator's view, the algorithm has a certain memory for channels with fixed content and style, and once it gets to know the content and understand the style of goods, it can more accurately recommend the channel to interested users. The "testing" algorithm is also a common strategy used by entrepreneurs. The entrepreneurs believe that every Douyin account is similar to a newborn baby, with its own genetic traits. Different accounts have different attributes, so the algorithm needs to be tested in different contexts to find the best time to perform live streaming. When a new product is added to the shelf, the time of live streaming is changed, or the speechcraft is adjusted, the entrepreneur needs to test it.

Xiaopen is the operator of a channel selling accessories. He develops a strict testing plan to select the best time slot for live streaming:

> *"When we measure the time slot, we will spend several days testing. We stream in different time slots every day, so we can find out which time slot has more traffic. Each day we go live for 6 h. Each time slot is tested on 4 different days. And we try to cover 24 h... If I want to test the new product, I will intersperse the new product with the normal streaming to see how it works. A good product is able to pull the consumers and sales well."*

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[5] The reason why the tutor suggests the entrepreneur to choose accounts with less than 200,000 followers to imitate is because these accounts are much less difficult to imitate and still good at selling goods.

Testing algorithms by entrepreneurs is somewhat like real-time market research. An entrepreneur's harnessing of the algorithm is a long-term process, requiring both finding their niche in the market and finding their position in the algorithm system.

### Intercepting and retaining traffic: division of streaming labor and traffic operations

The job division of a live-streaming e-commerce team could be quite flexible and change over time. In the early stage of a business, the team often consists of only 1–2 people, the live-streamer and the operator. As the business expands, the size of the team increases. There are more divisions of labor in live-streaming e-commerce, such as assistant live-streamers, shop operators, traffic monitors, and traffic marketing manager, to manage the live broadcast process more precisely. The real-time interactive nature of live streaming requires each worker to have a strong awareness of traffic.

The live-streamer is the "face" of the live broadcast. Through enthusiasm and speech-craft, streamers skillfully attract newcomers, prolong their stay in the channel, introduce products and guide users to place orders. The operation manager is the closest to the algorithm and the one who knows it best. The operation manager plans the interactions between the live-streamer and the audience during the live broadcast, monitors the backstage traffic in real time during the broadcast, responds to the appeals of the audience in the channel and adopts different traffic placement strategies at different points in time.

Zege is an operator of a women's clothing channel and has been in this position for more than a year. He told the author that to do operation, you need to have keen observation and keep the sense of rhythm. One needs to constantly practice to make accurate judgments in a relatively short period of time. He said, "In the early stage, you need to pull in the traffic and get popular bit by bit. As soon as you get the traffic, you should be quick to react. Catch the wind of the flow so that you can sell out the goods in time."

The manipulation of traffic does not occur only during live-streaming. Operators also conduct a review after the broadcast to examine the fluctuations in traffic more systematically and carefully. Wangge said, "You need to review the day's work every night. And when you do the review, you need to look at the traffic trend graph." The platform rules are extremely complex, but the traffic trend graph reveals and visualizes the process of traffic fluctuations. By analyzing the graph, the operators reflect on their practice and in turn reformulate their next live streaming strategy.

The operators who were interviewed developed similar strategies. When the trend of traffic is up, which means more audiences enter the channel, the operators ask the live-streamers to introduce profitable products to obtain large sales and revenues. When the trend is down, which means the channel is losing audiences, the operators immediately release the product that gives the consumers the most benefits, hands out coupons, or sells more goods at cheaper prices to retain the audience.

To intercept and retain traffic, operators divide goods into three categories: push-traffic goods, goods with benefits and profitable goods. Push-traffic goods are released at the beginning of the live broadcast to attract traffic, profitable goods are released to make money, and goods with benefits are used to increase interaction and retain traffic. This unique strategy is completely different from offline commerce and fully illustrates the influence of algorithms in the platform economy.

Another common strategy used by entrepreneurs is "cyber bawling". Entrepreneurs compare the platform to a square and see the live-streaming channel as a mobile booth in the offline world. This strategy is usually utilized when a channel is just starting the business, when the traffic is not good, or when festivals such as "Double Eleven" shopping festival or Chinese New Year are approaching. For example, Tangtang, a live-streamer, and his team members decided to use this strategy before the festival arrived. He said:

> "It's like you set up a booth in the square. You prepare your sound equipment, you prepare your lines, you set your goods shelf nicely, and then you get to the square and bawl. You shout aloud to attract people."

Usually, entrepreneurs will make their channels very attractive, featuring seasonal characteristics, and provide more streamers and assistants. The main thing is to provide many more benefits; for example, if one usually gives out 10 coupons, they will give out 100. Or they will just give more discounts on the goods. This strategy is reminiscent of offline promotion and sale.

As live-streamers gain a deeper understanding of the algorithms, they develop more refined strategies. For example, from the interviewers' experiences, we know that creators will adjust the background music, keywords and tags of their content to get more traffic by "clout-chasing". Xiaoji, born in 1997, is a tutor at a training institute who teaches filming and editing techniques. He said, "You'd better use the music owned or promoted by the platform. If you use this kind of music, the platform will recognize it and definitely give priority to promoting your content with that music."

### Going beyond algorithm: focusing on value and following fate

Courses, peer-to-peer exchanges, and platform practice all provide entrepreneurs with strategies for interacting with algorithms, but they sometimes feel powerless in the face of vague algorithmic rules and unstable traffic. Some of them return to the traditional value system of "doing business", while others decide to believe in the Chinese philosophy of "this is fate". They incorporate life experiences into the understanding of algorithms and develop their own interpretations of doing business in the platform.

In Wangge's view, speechcraft represents an anchor's language reserve, but it is crucial to build trust between the live-streamer and the audience. The level of trust between the two is behind the trading figures. "Smiles and affinities", he says, "solve everything. In every deal, especially when a stranger gets into your channel, gets interested in your product, whether he will make the deal or not, depends on the level of trust."

Wangge takes the building of trust between buyers and sellers as the basic working strategy, trying to go beyond algorithmic standards and instead seek the social value of his own labor. The interviewees commonly believe that the personal ethos of the live-streamer, the trust between the live-streamer and the audience, and the quality of the goods themselves are the most important. This is both an excavation of the deeper value hidden by the data and a revolt against the data-based and standardized system brought about by multiple algorithms.

Xiaokui sells a special local product, Yunnan Pu'er tea, in his live room. Being based in a tea factory has brought him a sales advantage. When the audience notices that the

background of his live streaming is the tea planting base, it is easier for them to trust the quality of the tea. Xiaokui does not spend too much money buying traffic; he regards the audience who comes to the live-streaming room as friends and treats the audience with enthusiasm, sincerity and friendliness. He told us, "When they come to my live channel, whether they buy or not, I am willing to introduce knowledge related to tea culture. In my view, they are all friends recommend by the system". When they send out the product to buyers, they will give a little more so that they earn customers' favorability.

Faced with significant fluctuations and instability in platform traffic, many entrepreneurs explain the phenomenon by the Chinese life philosophy of "the world is unpredictable" (*Shishi Wuchang*, 世事无常), and "accepting your fate" (*Jieshou Mingyun*, 接受命运). Hongjie, who is in her fifties, was originally in the restaurant business. The pandemic left her restaurants shut down one after another and left her with considerable debt. In early 2021, when she learned of the opportunity to make money by live-streaming, she began to experiment with short videos. Hongjie's first video posted in Douyin received over three million views, which she regards as a blessing of fate. She said, "I think everyone is able to find their place in Douyin. All people have to do is to try. Whether you can make it or not depends on whether you have the fate or not." She believes that the traffic is unpredictable. The first video she posted was quite a success, but the same thing posted again was nothing.

For grassroots entrepreneurs facing unmanageable traffic, "whether you have the fate to make money" becomes the framework for their explanation. When they get more traffic, they see it as a favor from the algorithm; when they face fluctuations or delays in traffic, they choose to withdraw from the industry as "I don't have the fate to make money".

To go beyond the algorithm is not to say that one does not care about the algorithm at all; instead, they choose to step outside the framework of the algorithm and the limitations imposed by excessive data and return to the essence of doing business, to go with the flow, to believe in the destiny of the fate and wait for a comeback, or to convince themselves to withdraw from the industry, which can also be interpreted as a kind of obedience to the algorithm. This coping strategy shows that entrepreneurs' algorithmic imaginary comes from the technical knowledge of the platform and training institutions on the one hand and is also influenced by the previous business ethics and life experiences on the other, being an extension of the individuals' life aspirations and values.

## Conclusion

In the field of the platform economy, algorithms as technical rules are directly applied to the process of production, distribution, and consumption, affecting economic activities and the distribution of interests of stakeholders (Willson 2017). Much of the current research on the algorithmic imaginary examines consumers of content, i.e., the common users in the platform. Compared with platform users, entrepreneurs have to face great uncertainty in live traffic, which affects their perception and knowledge of algorithms embodied in platform. This study explores how entrepreneurs become "algorithm experts" by describing their movements to learn about, understand and interact with fluctuant algorithms in the context of e-commerce. Therefore, this research contributes to the study of platform economy and precarious labor from the perspective of technology imaginary.

This study enriches the approach of STS (science, technology and society) by discussing the impact of technology on individual actions in the context of the platform economy. In the field of STS, there are two main lines of research on technology: (1) from an ontological perspective, focusing on discussions about the philosophy of technology; (2) from the perspective of the interaction between technology and society, focusing on the impact of technology on social structures, social relations, and social actions (Law 2008; Zhao 2022). Early research dimension on STS focused on the design and production of technology, and with the development of media technology, an increasing number of STS studies have focused on the relationship between users and technology (Wajcman and Jones 2012). This study discusses, in the context of the platform economy, the actions that individuals take to respond to and explain the changes brought about by technology when economic activities are mediated by technology and when the logic of technology affects the previous criteria for the distribution of benefits. Entrepreneurs' learning of new technological knowledge is not a passive process. Their understanding of algorithms is embedded within preexisting life/industry logics. Unlike the free labor of content creators on YouTube, Facebook and Instagram, the primary purpose of live e-commerce on Douyin is to sell goods in real-time interaction with audiences, and thus, their understanding of algorithms is influenced not only by technical logic but also by "business" logic. (1) They do not consider themselves free laboring for the platform but rather that the platform offers them the opportunity to start a business with a very low threshold and therefore have a positive attitude toward the platform. (2) The entrepreneurs consider the algorithm to be a tool for the platform's profitability and believe they can only obtain more traffic if they satisfy the logic of a win–win situation for themselves and the platform. They recognize this logic of the platform, including Douyin taking a percentage of their sales, asking them to buy traffic and pay promotion fees, etc. However, entrepreneurs sometimes feel helpless when they have difficulty understanding and predicting algorithmic patterns. Some of them return to the traditional value system of "doing business", i.e., focusing on the quality of the product, building trust with the consumer and finding an approachable streamer, while others decide to believe in the Chinese philosophy of "this is fate".

Precarious labor has been an important topic in platform economy research, and this study elucidates the issue of the precarious labor of platform e-commerce entrepreneurs and their internalization of the platform's algorithmic logic. The algorithm that distributes traffic on the Douyin platform is still a black box. Neither the programmers at Douyin, the live-streaming entrepreneurs, nor the viewers and consumers on Douyin can truly and completely explain all the rules of the algorithm and traffic. Everyone must rely on the mediation of the "algorithmic imaginary" to interact with the technology. The "algorithmic imaginary" also becomes a prerequisite for the acceptance of precarious labor. The average user in the platform imagines algorithms mostly from everyday use experiences, and algorithmic awareness is mostly seen as the user's ability to critically accept content recommendations and acquire the knowledge they need (DeVito et al. 2018; Zarouali et al. 2021).

In contrast, entrepreneurs take a more positive attitude toward algorithms, viewing them as an essential professional skill to survive in the platform society. Because entrepreneurs' financial gains in the platform are directly related to the amount of

traffic they get, they spend considerable energy and time learning about algorithms and traffic. Research shows that entrepreneurs see algorithms as fair judges, rules of platform traffic distribution and tools for their own money-making business. This knowledge comes partly from training courses on the platform and third party training institutions and partly from daily, real-time, interactive practice on the platform. Actually they need to make a living in algorithmic precarity, so they often describe algorithms using words such as "like a wind". In attempting to harness unpredictable and unstable traffic, entrepreneurs have developed strategies, such as channel mimicry, testing algorithms, and traffic management through a fine division of labor, in an attempt to attract, intercept and retain traffic for live e-commerce. These unique online e-commerce strategies differ from those of offline commerce, highlighting the significant influence of traffic logic on online business.,

Despite the official instructions and manuals provided by Douyin and the fact that entrepreneurs pay to attend formal and informal training sessions, there is no guarantee that following these methods will lead to success. When entrepreneurs' channels start to become unpopular and when viewers are unwilling to spend money, entrepreneurs are not sure that this is a penalty from the algorithm. What exactly do entrepreneurs buy with the fees they are charged by the platform for technical services, advertising and traffic? What exactly should they buy? It is actually difficult to measure. The algorithmic imaginary therefore eliminates entrepreneurs' ability to bargain with the platform.

The coping strategies acquired by entrepreneurs in the process of interaction, symbiosis, and competition with algorithms have the potential to help e-commerce entrepreneurs differentiate themselves from peer competition on the one hand and eliminate the need for reflection, critique, and confrontation with technology on the other. In a platform society that relies on algorithmic imaginary, there is still a long way to go to effectively encourage innovation among entrepreneurs.

**Abbreviations**
MCN     Multichannel Network
STS      Science, technology and society

## Declarations

**Competing interests**
The authors declare they have no competing interests.

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