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The Effect of Digital Literacy and External Information on Market Competition Fear: An Empirical Study on Fresh Food Consumption in China

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ABSTRACT

The emergence of market competition fear is a new social phenomenon due to technological innovations and is worth studying. This paper explored the causes of market competition fear as well as the effect of digital literacy and external information channels on it. Data was collected from China by offline survey, and empirical analysis was used for hypotheses testing. The result shows that some specific competences of digital literacy have a negative impact on market competition fear. On the other hand, diverse external information channels have a positive impact on market competition fear, while the information from official news media can weaken fear. These findings confirmed that market competition fear exists in digital transformation. This paper can help to understand market competition fear and have positive practical significance for the government.

Keywords: Market competition fear, digital literacy, external information channels.

INTRODUCTION

The outbreak of COVID-19 created an unpredictable external environment and led to the need to accelerate digital transformation. During the pandemic, digital technology has been widely applied to schools and companies. Organizations with higher levels of digital maturity are generally more flexible (Fletcher & Griffiths, 2020). Furthermore, digital technology has played a key role in the prevention and control of the epidemic. However, everything has two sides. People differ in their attitude toward digital transformation (Kharlamov *et al.*, 2021), and the application of digital technology has also caused a series of social problems. At the beginning of 2021, some Internet giants with enormous assets and advanced technology entered the community group buying market of fresh agricultural products. This affair attracted social buzz, and the hot discussion reflected the market participants' rejection and fear of these Internet companies entering the fresh food industry.

In fact, although the Internet giants have already entered several industries during the past few years, it was the first time that people expressed their fear before the emergence of a disorderly market. Up to now, the fear of society still exists, though the Internet giants do not corner the market, and offline food markets are operating orderly. The reasons are as follows. First, the digital economy has potential technical monopoly risk. Food demand is a rigid problem, which is closely related to people's life. Once the fresh market is monopolized by some companies, it will cause well-being problems. Second, there are many serious social problems that remained unsolved after the price war among the Internet giants, such as shared-bike cemetery, 996 schedules (work from 9 am to 9 pm, six days a week), and much unfair competition acts. Third, the participants in the traditional fresh market are more likely to believe that they may lose their jobs due to digital technology (Kharlamov *et al.*, 2021), especially when the employment environment is unstable during the pandemic. The reasons listed above help people to anticipate the detriments of competition in advance and make them have a sense of fear. It is a new social phenomenon and needs to be studied urgently.

Nowadays, building a digital society has become an irreversible trend. However, the appearance of fear will hinder the healthy development of the industry. In the future, digital technology will continue to apply to different life scenes. How to prevent market fear from appearing again? How to guide digital technology to effectively support the economy and society? These are important issues in the context of innovation-driven strategy. The attempt of this study can not only find out the causes of the market competition fear but can also provide the solutions to it.

Present studies on group fear at home and abroad are mainly based on public health emergencies. Public health emergency has the characteristics of unpredictability, destructiveness, and uncertainty of evolution. Therefore, people do not have plenty of time to make a reasonable decision but can only act on their emotions (Ni *et al.*, 2020). Sometimes, group fear is accompanied by a series of irrational behaviors such as scrambling for aid and panic buying (Fu *et al.*, 2021). Researches on group fear mainly began with the SARS incident in 2003. After a large-scale outbreak of COVID-19 in 2020, more scholars focused on the group's fear during the epidemic. As for technophobia, the fear caused by new technology, most studies focus on a specific technology and pay more attention to the resistance of fear to technological application. New technologies tend to break the people's original

technical environment and traditional habits, forming group fears, which have the strong interpersonal infection and social diffusion. In the 1990s, technophobia usually referred to serious anxiety caused by computers and other technologies, which directly led to the serious consequences of avoiding and reducing the use of a computer (Brosnan, 1998). Nowadays, technophobia also refers to the fear caused by various new technology like AI and the worry about unemployment caused by high-intelligence technology (Liang & Lee, 2017). Nevertheless, they fail to discuss the impact of technophobia on the market and rarely pay attention to the negative socio-emotion brought by the integration of new technology.

The Internet giants' entry into the community group buying market has triggered market competition fear, which provides an opportunity for this study to explore the market fear phenomenon. Thus, this paper carries out empirical research to expand the theories related to digital literacy and fear. In addition, the conclusions of this paper can contribute to the upgrading and optimization of the Chinese digital economy and better help society integrate with new technology.

LITERATURE AND HYPOTHESES

Market Competition Fear

As a kind of emotion, the research on fear is mostly concentrated in the field of psychology and medicine. In psychology, fear is a state of biological, mental activity, which refers to a strong depressive emotion produced by an individual when facing a dangerous situation. In medicine, fear is a self-defense response to a current, identifiable threat and is typically accompanied by a fight or flight response (Barlow, 2000). In terms of the effect on behaviors, fear often reminds people of the perception of risk or negative information and makes negative behaviors (Watson & Tellegen, 1985). From the perspective of emotional motivation, fear is a defensive emotion that prompts individuals to avoid risk (Ark & S., 2006). Nevertheless, individual panic behavior during an emergency is contagious, leading to collective panic behavior (Chen *et al.*, 2015), which is group fear.

In economics, the market is not only a physical place where goods are exchanged but also the sum of supply and demand between buyers and sellers. Participants in the market transaction include producers, consumers, resellers, and so on. The cause of the market competition fears this time was the emergence of new technology, which aroused the fear of job losses (Kharlamov *et al.*, 2021). Therefore, the market competition fears discussed in this paper refer to a strong negative group emotion that generates when the original market participants are unable to control the competitive threat caused by new technology. Besides, according to the group fear we discussed above, market competition fears also include the fear of unemployment, which consists of job insecurity and risk of job loss (Vuorikari *et al.*, 2016). From the perspective of the supply-side, if there is a monopoly in the market, it means market competition is disturbed. Competition failure leads to the continuous misallocation of resources to the monopoly enterprises. The existing competitors have no choice but to gradually withdraw from the market due to the lack of resources.

Existing competitors (greengrocers) in the fresh market are self-employed, mainly aged between 40 and 60. Most of them are undereducated with limited income. As far as they are concerned, the technological application breaks consumers' habit that they have to go to physical stores to buy fresh food. Besides, the involvement of the Internet giant breaks the competitive order. These two factors indirectly lead to fewer consumers and lower-income, which causes uncertainty about the future. While people who are intolerant of uncertainty are more likely to interpret all ambiguous information as threatening, leading to inaction and avoidance of ambiguous situations (Dugas *et al.*, 1997; Dugas *et al.*, 2001). Therefore, this paper argues that existing competitors in the market are fear of being squeezed out of the market, which includes uncertainty and unemployment fear. Thus, the following hypothesis is posited:

H1: Internet giants entering the community group buying market has caused the market competition fear.

Digital Literacy

As the core of the fear that happened this time lies in technology, this paper believes that we should prevent and solve the fear from a perspective of technology, that is, to help in accepting new digital technology. And among all methods, the most critical way is to improve the digital literacy of existing competitors.

The concept of digital literacy was first formally defined in 1997, which is the ability to understand and use various digital resources and information displayed by a computer (Pool & Gilster, 1997). In the 21st century, the term digital literacy is used to describe the knowledge, skills, and dispositions necessary for successful participation (Greene *et al.*, 2014). After that, the DigEuLit (Digital European Literacy) project of the European Union defines digital literacy as awareness, attitude, and ability of individuals to properly identify, acquire, manage, integrate, evaluate, analyze and synthesize digital resources by using digital tools or digital facilities in specific life situations, so as to construct new knowledge, create media expression and communicate with others (Martin & Grudziecki, 2006). As digital technology has been integrated into all aspects of daily life, many basic necessities of life rely on digital devices. Digital literacy has become the core literacy of citizens in the digital society and is one of the necessary abilities for individuals to cope with life and work. It emphasizes more on critical thinking, which has an important impact on individuals' understanding, processing, and judgment of information (Pool & Gilster, 1997). There are a few kinds of research about the impact of digital literacy on behavior. Some studies suggest that individual digital literacy has a positive effect on users' performance and effort expectations which can facilitate the use of e-learning (Mohammadyari & Singh, 2015). In addition, the improvements in digital literacy can enable individuals to strengthen their control over personal information. Higher digital literacy is reflected in higher technical familiarity, higher awareness of institutional supervision, and

a greater understanding of privacy policies (Ball & Webster, 2020). Furthermore, the development of digital literacy can promote digital creativity (Chung *et al.*, 2015). Thus, we assumed that people with high digital literacy could dialectically and effectively use the acquired information and objectively understand digital technology.

Combined with the above considerations, we believe that improving the level of digital literacy can reduce the fear of external information on individual perception. In addition, it can make existing competitors more competitive, ensure job stability, and relieve their pressure of re-employment, so as to reduce the fear of unemployment. Therefore, whether digital literacy, as an individual characteristic factor, can alleviate the fear of market competition caused by technological progress? Thus, we suppose that:

H2: Digital literacy has a significant impact on market competition fear.

At present, there are many digital literacy frameworks that work to address the needs of different specific contexts. Most frameworks are used to measure the digital literacy of citizens (Neumann *et al.*, 2016; Vuorikari *et al.*, 2016). In DigComp2.1, digital literacy is divided into five competence areas: Information and data literacy; Communication and collaboration; Digital content creation; Security; Problem-solving (Carretero *et al.*, 2017). European Union also developed the framework for consumers (Brecko & Ferrari, 2016). Besides, some researches focused on measuring the digital literacy of educators and librarians in school (Guitert *et al.*, 2020; Hall *et al.*, 2014; Johnston, 2020). In digital transformation, digital technology is increasingly integrating into all walks of life, and more attention is paid to digital capabilities in various industries. At the same time, few papers have developed the framework to measure other occupations. This study will develop the digital literacy framework of operators based on prior researches.

The measurement dimensions of digital literacy used in this paper are based on DigComp2.1. Taking the features of the community group buying market into consideration, we selected four competence areas, which are information and data literacy, communication and collaboration, digital content creation, and problem-solving. These four dimensions are defined according to the characteristics of the trading scenario. That is fundamental to digital ability, digital social Ability, the ability to create digital content to acquire resources, and the ability to operate with digital technology. "Fundamental of digital ability" means the operator's knowledge and ability to use digital equipment and digital software; "Digital social ability" refers to an operator's ability and willingness to socialize with customers and suppliers through digital channels; "Ability to create digital content to acquire resources" refers to the ability that operators attract consumers and suppliers by creating business-related content on different social platforms; "Ability to operate with digital technology" refers to the operator's ability to manage transaction and operation by digital devices. Thus, on the basis of hypothesis 2, we propose the following hypothesis:

H2a: Fundamental digital ability has a significant impact on market competition fear.

H2b: Digital social ability has a significant impact on market competition fear.

H2c: The ability to create digital content to acquire resources has a significant impact on market competition fear.

H2d: The ability to operate with digital technology has a significant impact on market competition fear.

External information channel

In the highly developed information age, the media and social networks played a significant role in informing civilians about various news. With a large number of users, it is easy to spread negative information among users and create a chain risk. Stimulated by such information, the feeling of fear forms among social networks and diffuses to other groups through media. Owing to the infectivity and transmissibility of fear, it not only affects the user group of digital technology but also affects the non-user group, forming a group effect. In the vast majority of cases, rumors and panic tend to go hand in hand (Ding *et al.*, 2021). Rampant information in various media channels is interspersed with a large number of rumors, promoting the breeding of negative emotions. Some studies have already explored the sources of fear-based on public emergencies such as COVID-19. In their research, internet information, fears and rumors from people around, and official news media (Hou *et al.*, 2020) are regarded as three of the sources of fear. When in the fresh market, greengrocers are close to each other and communicate frequently. This gives them more opportunities to contact people around them, so the information and rumors from people around them are more likely to affect them, which increases their job insecurity and exacerbates their fear. On the other hand, some studies found that official guidance instructions can effectively control the spread of panic if emergencies happen (Li *et al.*, 2019). Thus, the following hypotheses are posited:

H3: External information has a significant impact on market competition fear.

H3a: Internet information has a significant impact on market competition fear.

H3b: Information and rumors from people around have a significant impact on market competition fear.

H3c: Information from official news media has a significant impact on market competition fear.

Based on the above hypotheses, our research model is shown in Figure 1.

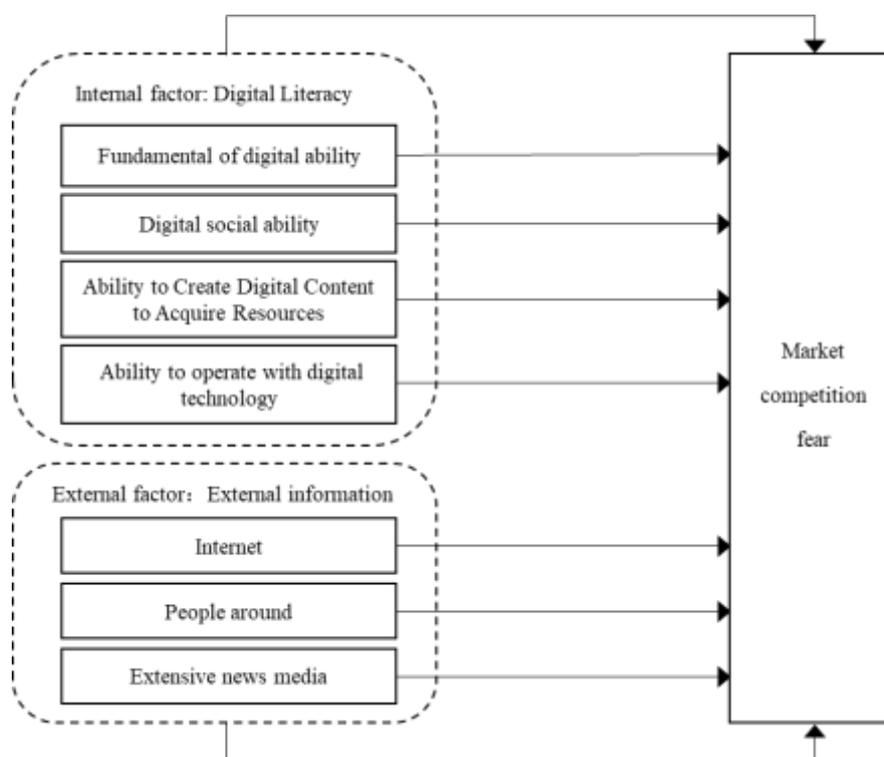


Figure 1: Theoretical model.

MEASUREMENT

Data collection

Participants.

Data were collected from 248 greengrocers from different fresh markets in China through a face-to-face survey. There are 239 participants who provided usable information, representing a response rate of 96.4%. Among these remaining 239 participants, 93 are males, and 146 are females. Only 7.1% are undergraduates, and the degree of the remaining people is lower than the bachelor's degree. In terms of city distribution, these participants come from different regions of China, including Shanghai, Jiangsu, Zhejiang, Sichuan, and other cities in China.

Procedure and materials.

Considering that greengrocers are busy greeting consumers during work time and most of them are undereducated, we conduct an interview to help them understand the questions. Before it, each participant was told the news about Internet giants entering the community group buying market. The formal survey was divided into two parts. The first part was about the demographic variables of greengrocers. The second part measured the digital literacy of participants, the degree of market competition, and the effect of separate media channels.

Measures

Digital Literacy.

We considered the digital literacy of greengrocers was made up of 4 dimensions. That is fundamental to digital ability, digital social ability, the ability to create digital content to acquire resources, and the ability to operate with digital technology. The whole scale was designed on the basis of DigComp2.1 (Carretero *et al.*, 2017). The scale contains 15 items, and all the items were rated on a three-point Likert scale (1: strongly disagree, 3: strongly agree). A sample item from Digital Literacy was "I know the current popular social media platforms." The Cronbach's alpha was 0.899.

Market Competition Fear.

We used the uncertainty concern and fear of unemployment to measure the market competition fear of greengrocers. The scale contains 11 items. All measures were answered on a five-point Likert scale (1: Strongly disagree to 5: Strongly agree). The measurement of uncertainty concern refers to the uncertainty scale developed by Yao (Yao *et al.*, 2021). A sample item from Uncertainty Concern was "I am worried because I am not entirely sure what will happen in the future." The measurement of Fear of Unemployment refers to the Chinese General Social Survey (2015). A sample item from fear of unemployment was "I fear I may lose my main source of income." The Cronbach's alpha was 0.910.

External Information Channels.

We used the External Information Channels to measure the effect of different information channels on fear. The three-item scale was developed by Hou (Hou *et al.*, 2020), which was Internet information, people around, extensive news media. All the items were rated on a five-point Likert scale (1: Strongly disagree to 5: Strongly agree). The Cronbach's alpha was 0.875.

All the details of the scale can be checked in Table 1.

Table 1: Variables and their measures.

Variables		Measures
Digital literacy	Fundamental of digital ability	I know and use the instant messaging app.
		I know and use search engines.
		I know and use some popular social media platforms.
		I know and use the commonly used online shopping platforms.
		I know and use Alipay and WeChat Pay.
	Digital social ability	I use instant messenger to keep in contact with customers.
		I use instant messenger to keep in contact with my counterparts.
		I use instant messenger to keep in contact with suppliers.
	Ability to create digital content to acquire resources	I release copywriting and pictures on social media to promote products.
		I attract potential customers through short videos on social media.
		I attract potential customers through live streaming.
		I can get competitive suppliers through the Internet.
	Ability to operate with digital technology	I collect money from Alipay, WeChat Pay, or other third-party payment companies.
I use digital technology to manage the financial situation of the operation.		
I use digital technology to keep track of the stock.		
Market competition fear	Uncertainty concern	I feel uncomfortable if the changes in the industry are unpredictable.
		I felt nervous and anxious in the face of a steady diet of price-off promotions.
		I feel nervous about the Internet giants using price war to seize the market.
		I feel worried if I am not entirely sure what will happen in the future.
		I feel worried if the government does not have a clear regulatory policy.
		It is hard for me to adapt if the market mode is constantly adjusted due to changes.
	If possible, I would like to avoid being in such an uncertain situation.	
	Fear of unemployment	I'm worried about losing my job.
		I'm worried about losing my main source of income.
I think it will be difficult to find another job that is as good or better than my present one.		
External information channels	the Internet	The information from the Internet can trigger my fears.
	People around	Rumors and information from people around me can trigger my fears.
	News media	The information from the news media can trigger my fears.

RESULTS

Descriptive statistic

Table 2 lists the means, standard deviations, minimum and maximum among variables in the experiment. Significantly, the mean of digital literacy is just above 60, and the standard deviation of digital literacy is high as for the four dimensions, the mean of "Ability to Create Digital Content to Acquire Resources" is much lower than other dimensions, while the standard deviation of "Digital Social Ability" is much higher compared with the others. Also, we found that the mean of "Market Competition Fear" is above 3, which means the market competition fear did exist. Thus, H1 was supported.

Table 2: Means, standard deviations, minimums, and maximums.

Variables	M	SD	Min	Max
Digital Literacy	61.23	16.75	20	98
DL ₁	20.32	5.14	5	25
DL ₂	16.63	7.12	5	25
DL ₃	9.65	5.43	5	25
DL ₄	14.63	4.71	5	25
Market Competition Fear	3.33	1.07	1	5
Internet Information	2.67	1.19	1	5
People around	2.97	1.16	1	5
News media	2.96	1.22	1	5

Note: DL₁= "Fundamental of Digital Ability." DL₂= "Digital Social Ability." DL₃= "Ability to Create Digital Content to Acquire Resources." DL₄= "Ability to Operate with Digital Technology."

Regression Analysis

Internal factors on market competition fear.

First, we took market competition fear as the dependent variable. Then, digital literacy and its dimensions were respectively

introduced into the regression equation as independent variables. According to Model₁ in table 3, Digital Literacy ($\beta=-0.475$, $p<0.001$) has a significant negative effect on market competition fear. So that the H2 was supported. As for the other four dimensions, it is clear to see in Model₂ that digital social ability (DL₂, $\beta=-0.157$, $p <0.1$) and ability to create digital content to acquire resources (DL₃, $\beta=-0.306$, $p<0.001$) both have a significant negative effect on market competition fear. Thus, H1b and H1c were supported. This suggests that if individuals can constantly obtain resources and keep well in contact with customers, counterparts, and suppliers, their job security can be enhanced, which may reduce individuals' market competition fear.

However, according to the regression result, the effect of fundamental digital ability (DL₁) on market competition fear was not significant, so was the ability to operate with digital technology (DL₄). The result shows that whether individuals have the ability to use digital devices and apps cannot contribute to the operation. That's mainly because this ability is basic in the digital era, which is not a part of the core competitiveness of operators. On the other hand, due to the small scale, the use of digital technology for inventory and financial management makes little sense. There are few demands for the operators to keep accounts electronically. Meanwhile, almost all the greengrocers collected money through Alipay and WeChat Pay, which means the differences of operation among greengrocers are small, and the ability can hardly improve their competitiveness.

External factors on market competition fear.

In Hypotheses 3, we argued that information from different external channels could affect market competition fear. In Model₂, the information from people around ($\beta=0.300$, $p <0.001$) has a significant positive impact on market competition fear. Thus, H3b was supported. However, news media ($\beta=-0.272$, $p <0.05$) has a significant negative impact on market competition fear, which means the information from news media reduces the fear of market competition. We argued that news media acts as a bridge between the government and the public and has strong credibility, which is fair and objective. Thus, news media can effectively reduce the fear of competition fear and ensure the stability of social order.

However, the result shows that Internet information does not have a significant effect on market competition fear. Thus, hypothesis 2a was rejected. We believed that most greengrocers use the Internet for entertainment instead of searching for information, and they obtained little information about the community group buying market from the Internet. So, the information from the Internet cannot influence their feelings of fear.

Table 3: Results of regression analysis of variables

Dependent Variable	Market Competition Fear	
	Model ₁	Model ₂
Model		
Independent Variable		
Digital Literacy	-0.475***	-
DL ₁	-	0.028
DL ₂	-	-0.157*
DL ₃	-	-0.306***
DL ₄	-	-0.080
Internet Information	0.060	0.039
People Around	0.275***	0.3***
News Media	-0.233**	-0.272**
Model Statistics		
Adjusted R ²	28.50%	27.10%
F	20.16	11.18

Note: * $p < .1$; ** $p < .05$; *** $p < .01$.

DL₁= "Fundamental of Digital Ability." DL₂= "Digital Social Ability." DL₃= "Ability to Create Digital Content to Acquire Resources." DL₄= "Ability to Operate with Digital Technology."

CONCLUSION

This paper focused on the market competition fear caused by technological innovations in the digital transformation. Based on the Internet giants' entry into the community group buying market of fresh food products, we explored the objective existence of market competition fear in the digital transformation. Firstly, the levels of digital literacy influence the market competition fear. The higher level of digital literacy leads to lower market competition fear. For internal factors, digital literacy plays an important role in overcoming the market competition fear caused by digital transformation. However, not all the abilities related to digital literacy have a significant effect. The basic digital knowledge and ability cannot help market participants to resist the fear, but the digital social ability and the ability to create digital content to obtain resources can effectively reduce the fear. This means that operators who use social networks wisely can be more competitive. What's more, for the external factors, individuals can easily be influenced by the information and rumors from people around and intensify the feeling of fear. Although the information from the Internet can barely influence the operators in the food market, the news media, as a reliable source of information, spreading information can help reduce fear. Hence, we concluded that digital transformation induces the market competition fear. Meanwhile, digital literacy and external information channels have a positive influence on the market competition fear.

Theoretical Implication

This paper explored the effect of digital literacy and external information channels on market competition fear. Firstly, the result confirmed that digital transformation induces the fear of job losses and the worry about finding a new job (Kharlamov *et al.*, 2021). People have difficulties in adopting technological innovations in terms of accelerating digital transformation. Meanwhile, we coined the term market competition fear based on prior researches, which refers to the fear in the market caused by technical competition in digital transformation.

Secondly, the study also expanded the effect of digital literacy on individuals. Prior researches have focused on exploring the influence mechanism of digital literacy on behaviors (Ball & Webster, 2020; Chung *et al.*, 2015). However, this paper considered digital literacy as an internal factor and discussed the impact of digital literacy on negative emotions caused by technological innovations, which filled the research gap about digital literacy of operators.

Managerial Implication

Nowadays, many companies have been trying to apply digital technology to strengthen the resilience of enterprises in the post-epidemic era. The results of this paper also have positive implications for preventing and resolving market competition fear caused by digital transformation. Firstly, the integration of new technologies and traditional industries may cause overall and chain risks in society, such as market fear caused by fears of large-scale unemployment and resource misallocation. More attention should be paid to such issues, and the expansion of capital scale should be limited in order to prevent monopolies, which can better level the playing field for market participants.

Secondly, the digital abilities of operators need to be improved according to the characteristics of a business. It is obvious that different types of the job require different abilities. Only cultivating the abilities related to the operation can truly help the operators gain the confidence to confront the challenges of their jobs. Take the food market as an example. It is hard for self-employed operators to defeat the Internet giants if they only improve some basic digital abilities, such as using smartphones and apps. Only by cultivating digital abilities related to operation can it make the operators more competitive. Thus, a vocational digital competency training program should be established to help practitioners improve their digital competitiveness, which must be led by the government, including how to obtain customers and sources of goods through digital channels and how to use social platforms to maintain customer relationships.

Thirdly, the lack of understanding of new technologies can easily turn into misunderstandings, and misinformation will be spread through various channels, triggering fear. When facing rumors about new technologies, it is necessary to use the official news media to stop the rumors from spreading further. Although there are many information channels like social platforms these days, official media still occupies an important place. The official news media must dispel rumors and transmit correct information in time, shape public opinions, and play a role in maintaining the stability of society. In addition, the mainstream news media are responsible for helping market participants understand the impact of technological progress on the market and to help innovation-driven development.

Limitation and Further Research

Although this study confirmed that digital literacy and different information channels could affect market competition fear, we believe that this study has some limitations. First, there are a few types of research focused on the digital literacy of operators and market competition fear. As a result, it is difficult to develop the scales of operators' digital literacy and market competition fear in this paper based on mature scale, and the validity of the scale needs to be strengthened. Therefore, we will keep up to date with the latest researches about digital literacy and market competition fear in the future and perfect the measurement frameworks of operators' digital literacy and market competition fear. On the other hand, we think the amount of data in this paper can be expanded. This study believed that Internet information would negatively affect the market competition fear. The more frequently people are exposed to the Internet, the easier it is to induce fear. But this research did not get significant data results. It may be because the operators in the food market seldom keep up with the news through the Internet. We believe that more participants can be invited to participate in our experiment in the future. At the same time, we can add moderator and mediator to further test the influence of variables on the model, such as the operator's revenue and operating years.

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