Discussion on the practical dilemma and legal regulation path of 3D printing contraband in the era of big data

Zhebin Wang[a,*], Qijie Lian, Silu Ding, Xuanrui Zhang

Department of Law, Zhejiang Police College, 555 Binwen Road, Binjiang District, Hangzhou, Zhejiang Province, China

[a]3550926537@qq.com

*Corresponding author

Keywords: 3D printing; security risks; Regulatory system; administrative regulation; Self-regulation

Abstract: In view of the huge social security risks faced by 3D printers, China's current government policies and administrative departments have the problems of poor results and backward regulations. By studying the phenomenon of government legal regulation, comparing different government legal regulation models around the world, in-depth study of the logical foundation and legal roots behind the models such as judicial regulations, the overall behavior of government legal regulation has been standardized and improved, on the basis of studying the departmental regulation system, combined with the government's self-regulation ability of legal regulation, the three regulatory models are used in parallel, thus forming a more diversified method of 3D printing regulation and forming an orderly and efficient regulatory space.

1. Introduction

In recent years, there have been an endless number of cases of printing contraband using 3D printing technology in foreign countries, which has sounded the alarm for building a safe China.

China strictly controls firearms.If the 3D printed gun fails to meet the identification standards for real guns, it will be identified as a simulation gun as long as it meets one of the three conditions of the Identification Standards for Simulation Guns, and the seized simulation guns will be confiscated by the public security organs. Although there are some provisions in Chinese laws and regulations, such as Criminal Law, Network Security Law and Regulations on the Administration of Information Release of Dangerous Substances on the Internet to regulate 3D printing contraband, in general, the current laws can only regulate the possible future 3D printing contraband events in general, but lack pertinence and operation possibility. This will cause difficulties in dealing with specific cases in judicial practice, and will also produce related loopholes in the management of contraband, so that offenders can take advantage of it.

At the same time, in view of the convenience, concealment and popularity of 3D printing gun technology, it is impossible to fundamentally curb the private manufacturing and trading of 3D printing guns by only relying on the confiscation and punishment measures after the event.

Therefore, in order to control the use of 3D printing technology for printing guns and other contraband from the source, it is urgent to explore, regulate, prevent and control 3D printing contraband through legal paths in the face of technology development, cost reduction, regulatory loss, lag of laws and regulations and other problems.

2. The current situation of China's regulation of 3D printing contraband in the Criminal Law

From the perspective of the working principle of 3D printer, it is a revolutionary, digital additive production process that uses substances to be added layer by layer to produce three-dimensional items, and cross-combines and penetrates data, materials, biology, control and technology, which will bring great impact to the future production mode and people's daily life mode. "For

　　　　1

sophisticated tools, criminals like us, aim for possession. Many crimes are committed with the help of criminal tools, and the more complex the crime, the more damaging it is to society and the stronger the dependence on the means of crime. China's criminal law should consider studying 3D printed crime tools known as "practical manufacturing machinery" to effectively manage and avoid and regulate the criminal risks brought about by technological progress.

Since 3D printing is still a new thing, the popularity of the public is not high, so the legal regulation path for 3D printing contraband is still relatively single. Through searching for relevant legal provisions, the author currently mainly regulates 3D printing contraband through Article 125 of the Criminal Law.

3D printing can indeed provide scientific and technological tools for crime, but criminal tools are selective elements of crime composition and do not affect the establishment of crime. Seemingly novel crimes caused by 3D printing can be effectively controlled by relying on the existing crimes of the criminal law. That is, China's criminal law can effectively respond to all kinds of 3D printed criminal tools that are generally concerned by the public[4].

In terms of crime methods and danger, we believe that the safety hazards of 3D printing technology include the production of special materials and the production of dangerous goods, and the application of 3D printing technology in the criminal path has been proved in theory and practice.

2.1. Reproduction of special items

"Special" here refers to something that is related to a special area, or is associated with a specific area with a specific security threat, and has potential social hazards. Once scanned by a 3D scanner, these objects can be replicated using 3D modeling techniques[3].

2.2. Manufacture of dangerous goods

The difference between dangerous substances and special items is that special substances are more used in economic crimes and have a lower risk of side effects on the human body, but harmful substances can be directly used to harm the bodies of others, or once produced, they directly endanger their lives, and the potential social harm in society is great. 3D printing technology is used in the production of dangerous goods, the most typical is the production of weapons, ammunition, controlled equipment, etc. However, the author believes that while deeply affected by personalized customization, 3D printing technology will become more mature, advanced and stable, so the potential dangers of social governance will become more and more prominent. The main reason is the use of 3D printing technology to produce dangerous goods. Different from the traditional manufacturing or high-imitation technology, it will pose a more serious threat to the order of social security management.

3. Analysis of existing problems in regulation of 3D printing contraband

3.1. The status quo of 3D printing contraband control in our country

At present, China implements regulations on design, production, circulation and other links respectively, which is easy to appear the incompatibility of standards and rules, and may cause the overlap of law enforcement, vacuum zone between links and" black under the light "situation. Therefore, there is no sound set of national legislative regulations to strictly control the whole process of 3D printing technology from manufacturing to selling, but only the whole process of research and development, manufacturing, processing, selling, etc., which is easy to produce incompatibility between the norms of each link and the national laws and regulations, and lead to the overlap of law enforcement. In addition, in the link of networked production, safety regulations are faced with the problems of information asymmetry and the difference of production behavior objectives. Under the background of mass creation and demand for 3D printed drawings and 3D printed products, information related to safety production is easy to be hidden. When 3D printing technology is applied to the production of contraband, due to the convenient production procedure

of 3D printing technology and the high concealment of printing materials, producers only need to print drawings or molds to have the "skills" to complete the production of the product, even including guns, ammunition, controlled knives, drugs and a series of contraband, to devise more effective and discreet methods for criminals to craft tools of wrongdoing.

3.2. Hysteresis analysis of the regulation problem of 3D printing contraband by our laws

At present, 3D printing contraband regulation is weak in our country, the government loses its position, laws and regulations lag, and binding force of legal regulation 3D printing needs to be strengthened.

China has not issued a unified law on the control of dangerous goods, and has not made a unified description of dangerous goods. The legislative limits of the types of goods printed by 3D printers are not clear enough, and there is a lack of policy guidance and supervision for the 3D printing industry[3]. Although we have laws and regulations.China has been taking strict measures to control dangerous goods or contraband, and has clear prohibitions. However, China still does not have a unified law on the control of dangerous goods, and the current law on the management of dangerous goods.It is also distributed in various articles, and there are some problems such as vague legal expression and no scientific definition of the scope of application. Vague coverage of the scope will inevitably have a negative impact on the performance of the supervision function of the public security organs.China has not yet issued a judicial interpretation on what is the nature of 3D printing contraband, at the same time, has not yet given a judicial interpretation on the jurisdiction of 3D printing illegal acts, nor has it established a joint mechanism of multi-departments to crack down on 3D printing product-related crimes. This makes it possible for crimes related to 3D printing to infringe on different legal interests protected by different department laws.

Our country has not issued a judicial interpretation of what is the nature of 3D printing contraband, at the same time has not made a judicial interpretation of the jurisdiction of 3D printing illegal activities, and has not established a joint mechanism of multi-departments to fight 3D printing products related crimes. This makes it possible for crimes related to 3D printing to infringe on different legal interests protected by different department laws.

From the perspective of lawmakers, we urgently need to include 3D printing technology into the scope of special industry management, and clarify the responsibilities, rights and obligations of each subject in 3D printing production, transportation, circulation, management and other links through legislation. The development of 3D printing technology is not only a revolution in manufacturing technology and production mode, but also a revolution in public safety and management mode. The rapid development of science and technology has brought great challenges to the public security management order, which has gone beyond the general scope of the current public security management means. The government should timely incorporate 3D printing technology into the special industry supervision scope, establish rules and regulations, and strictly regulate and control the quantity, standard, scope of use, whereabouts, manufacturing, sales, procurement, application and maintenance of printing equipment.

4. Legal regulation path suggestion

4.1. Judicial regulation

4.1.1. It will be included in the category of special industry management

Following the management methods of special industries, the concept of big data is introduced to collect real-time business information of 3D printer manufacturing, sales, storage, use and maintenance of high-risk business units that may illegally manufacture firearms, weapons and other contraband, conduct big data analysis after comprehensively mastering the basic situation, timely warn suspicious persons and suspicious objects, and provide support to prevent and combat crimes to establish security risks Grade analysis mechanism, which may illegally manufacture guns and weapons and other contraband key units, key links, key personnel, from the internal security prevention, professional safety system training and other aspects of key management. In light of the

current state of industry development, it is essential to closely monitor legal research and encourage government legal departments to promptly issue specialized regulations pertaining to the 3D printing industry.This initiative aims to clearly delineate the management responsibilities of various government departments and establish the safety obligations for businesses and practitioners. By doing so, we can ensure legal safeguards for the public safety management within the industry[1].

4.1.2. From the perspective of civil law and criminal law, the "high-precision data model drawing" of 3D printing industry is regulated

Because the high-precision data model of guns, ammunition and other dangerous goods can be obtained by simple online download, physical scan, offline purchase and other means, it is easy to provide convenient conditions for 3D printing technology to manufacture illegal and criminal tools. Therefore, it is urgent to strengthen the online and offline supervision of high-precision data models for dangerous goods such as guns. From the civil liability side, the judicial regulation on the safety of 3D printing should be carried out[2], and the damage liability for the infringement of public legal interests caused by their behavior should include the manufacturers and sellers who manufacture and sell 3D printing products (dangerous goods), as well as the providers of 3D printing CAD models.

"Law of the People's Republic of China on the Control of Firearms" Article 3, and Article 22 have provisions. Accordingly, the Chinese criminal law also provides for the purchase and sale of guns and other provisions.Therefore, when the guns made by 3D printing technology have certain "launch and harmfulness" and meet the identification standard in the law, it will certainly violate the laws of our country.Therefore, the author believes that the ban on 3D printing contraband is based on the prohibition of illegal possession of digital drawing model files of guns or gun parts, not on the punishment for crimes once the guns are manufactured.

4.2. Administrative regulation

4.2.1. Through the role of big data platform, a public platform of 3D printing technology is established

4.2.1.1. Standardize the rules and regulations of the 3D printing industry and escort the healthy development of the 3D printing industry

The construction of a 3D printing technology public service platform can provide more specialized and personalized technical services for 3D printing related industries. At the same time, it provides professional technical support and product innovation services for 3D printing enterprises, which is conducive to the standardization of 3D printing industry technology. Through the platform, online supervision is implemented, a comprehensive service platform combining online and offline organically is constructed, and a healthy industry chain of 3D printing technology is constructed in combination with market supervision, thus escorting the healthy development of 3D printing industry.

4.2.1.2. Build a safety net of 3D printing technology and a safe, standardized and reasonable public platform

3D printing data is transmitted on the network platform to update and share data in real time, which has the characteristics of strong communication, uncontrollable and explosive. Due to the numerous resources of the contemporary Internet, and the characteristics of high degree of communication, sharing and rapid communication among networks, 3D printing models are easy to be captured by users in the network. In addition, because the 3D data defining 3D printing dangerous goods needs to face the massive information in the Internet, and also requires the network platform regulators to have a high level of technology, it is difficult to distinguish the normal information or restricted information. Due to the rapid dissemination of the Internet, as long as the model information is uploaded and shared by users, it is impossible to completely cut off all transmission channels and completely eliminate the model information. This uncontrollability is difficult to control. Therefore, our public security organs must build a safety net of 3D printing

technology and conduct real-time analysis of 3D data of 3D-printed dangerous goods and utilize a big data platform to screen and extract sensitive information from 3D-printed contraband.

4.2.1.3. Strengthen offline supervision of 3D printing enterprises

At present, there are no perfect laws and regulations for the management of 3D printing technology in the world, so it is urgent to regulate 3D printing contraband through legal approaches. Taking 3D printed guns as an example, in view of the convenience, concealment and future popularity of 3D printed guns technology, it is impossible to fundamentally curb the private manufacturing and trading of 3D printed guns by only relying on the confiscation and punishment measures after the event[1]. Therefore, in order to control the 3D printing technology used to print guns and other contraband from the source, our country should control the 3D printing contraband laws and regulations at the legislative and judicial levels.

4.2.1.4. The online public platform of 3D printing technology is used to escort the safe and orderly development of 3D printing industry, and six basic security systems for platforms are established

Through interviews and surveys, the author searched relevant materials and reports at home and abroad to learn that with the development of 3D printing technology, the performance of 3D printing equipment is constantly improving, the price of printing equipment and consumables is constantly declining, and the research on multi-material printing has made great progress. The future of 3D printing lies in its evolving technology, characterized by intelligence, convenience, precision, and socialization. Undoubtedly, these features pose challenges for law enforcement in regulating the 3D printing industry, introducing new complexities to the long-term stability of society. Therefore, it is necessary to establish a public platform of 3D printing technology by giving full play to the role of big data platform, and conduct offline inspection and supervision of enterprises.

4.2.2. Establish a prevention system to deal with the security risks of 3D printing technology

By consulting relevant materials, the author learned that in the 3D printing industry, the four main elements of practitioners, machines and equipment, data models and raw materials may cause safety problems: first, practitioners use the opportunity to contact 3D printing machines and equipment to manufacture guns and other dangerous goods without permission; Second, criminals or criminal organizations are premeditated and organized to manufacture and trade guns, carry out violent criminal activities involving guns, steal and purchase 3D printing equipment to manufacture guns on a large-scale; Third, high-precision data models of guns and other dangerous goods are disseminated online and offline. They can be obtained through online downloading, physical scanning, purchasing, etc., which is easy to provide convenient conditions for 3D printing technology to manufacture illegal and criminal tools. Fourth, ABS, PLA engineering plastics, metal materials and other 3D printing raw materials are lost in manufacturing, sales, storage and use, which is easy to be used to make dangerous goods.

In order to better cope with the security risks of 3D printing technology and minimize its possible negative impact, the following prevention systems should be established in the construction of a public platform of 3D printing technology in the era of big data: In terms of management concept, the work idea of "releasing control and service" should be implemented, the healthy development of 3D printing technology enterprises should be promoted in the first place, and the targeted management and supervision should be strengthened at the same time Witness its healthy development and full of vitality. In terms of management subjects, the degree of diversification should be enhanced, and organizations such as relevant government departments, industry associations, scientific research colleges and enterprises should be actively mobilized to fulfill the main responsibilities of social management, so as to form a "horizontal to the side, vertical to the side" management system.

4.2.2.1. Build platform security risk assessment system

Enterprise regulatory authorities, industry associations and research institutions should establish a safety risk assessment mechanism, form a multi-level safety prevention and control expert group, actively promote the formulation of industry standards and regulations, continuously carry out research on the development of 3D printing technology, and pay close attention to its progress and application in relevant industries, timely evaluate the real public safety hazards that 3D printing technology may pose, formulate opinions according to the actual public safety threats, and improve the level of safety management. Experts and technicians and artificial intelligence are used to conduct real-time monitoring and security risk assessment on machines, materials, data model raw materials and other elements of the 3D printing industry, and establish a security risk assessment mechanism.

4.2.2.2. Formulate a registration system for the flow of platform elements

A real-name registration system shall be established for the sales, use, maintenance and processing of machinery, equipment, raw materials and data models involved in the manufacture of civilian firearms and other special industry articles, and a detailed record shall be made of the business units, specific personnel and product flow directions involved in each link, so as to master the whole process of element circulation.

4.2.2.3. Improve the system of contraband they work

If 3D printing enterprises want to print a certain product in large quantities, they must upload drawings on the 3D printing technology public platform, and printing can only be carried out after the approval of relevant national departments. In the public platform of 3D printing technology, a list of prohibited printing should also be established, including the imitation of guns and their parts, simulation guns, controlled knives, grenades, bullets, mines, artillery shells and other items specially permitted or prohibited by the state into the scope of prohibited printing, and focus on the management of 3D data model production and product production.

4.2.2.4. Establish a system for reporting suspicious cases

In the 3D printing industry, various stages include manufacturing, sales, storage, usage, and maintenance.The focus is on advanced identifying 3D data models and post-identifying printed products.The platform will automatically report to the public security organs for disposal once it finds the suspicious person or suspicious behavior of manufacturing contraband or committing other illegal crimes.

4.2.2.5. Establish a safety training system for employees

Every 3D printing enterprise shall input the personal information of its employees on the 3D printing technology public platform. For the employees in the 3D printing industry, especially those engaged in 3D product printing and 3D data model manufacturing, background examination mechanism shall be established, and basic information shall be reported to the public security organs. The public security organs shall also send the police in the area of the enterprise to give regular legal education to the employees of the enterprise Education and training.

4.2.2.6. Improve the internal security system

Physical and technological defenses can be implemented to control the storage location of machine equipment and manage personnel. Related administration section should strengthen supervision of machinery, materials and data models that can be used in the illicit production of firearms, weapons and other contraband. This is to prevent unauthorized individuals from stealing and utilizing these resources for illicit purposes.

4.2.3. Real-name registration system

With the development of economy and society and the application of information technology,3D printing is more and more closely related to People's Daily life. These industries provide people

with more and more diversified and convenient services. At the same time, there are risks of being used by terrorists and criminal suspects to print contraband, organize, plan and carry out terrorist activities, carry out terrorist financing, money laundering, hide, evade detection and other illegal and criminal activities. Taking the Internet as an example. With the popularization of information technology, some terrorist organizations and criminals are increasingly using the information network to spread and print 3D contraband and incite criminal activities.

According to the current situation of continuous economic and social development and the broad demand of the actual market of 3D printing, there are several key industries that really need to manage the real-name system. The standard of real-name system is to lay a solid foundation of real-name system management in practice.

4.2.3.1. Advantages of real-name management in telecommunications and Internet

Real-name management has a lot of benefits for consolidating the transmission and management of communication and information, and can also better avoid the behavior of criminal suspects smuggling 3D printing and buying contraband through information networks such as telecommunications and the Internet. To oversee the entire online shopping industry chain, emphasis should be placed on entities conducting real-name verification, registration, and monitoring within specific sectors. This includes those engaged in the production, transportation, and sale of prohibited 3D printed items.

4.2.3.2. Entrepreneurs and service providers associated with 3D printing will verify the identity of 3D printing customers

Identity identification refers to checking and examining the ID card or passport of 3D printing customers, or verifying other documents used for identification according to law, and recording or recording the identity information according to the situation and relevant laws and regulations for judicial investigation. Customers who are not identified or whose identification has been denied may have received a certificate but cannot verify their identity because they do not meet any requirements or requirements. If the ID card is damaged or disfigured, important information is lost and identity verification may not be possible. If the 3D printing industry, economic operators and service providers find out that they are suspected of illegal 3D printing smuggling in the process of verifying the identity of their clients, they shall, in addition to refusing to provide services to them, immediately notify the relevant public security organs or service institutions.

4.3. Self-regulation

4.3.1. Establishing private standards to regulate the diversification of 3D printing scenarios.

Our country still formulates the industry standard and technical standard mainly by government departments at present. However, the government's standard formulation procedure is too long. Under the background of the personalized development of the 3D printing industry, it is very necessary to play the role of private subjects in the standard formulation. Private enterprises, organizations and other subjects can establish a special review committee, or the authority within the industry to spontaneously set up a standard organization, according to the industry rules and standards, quality supervision and certification of member enterprises, organizations and individuals with 3D printing needs to supervise[2]. In this case, in order to avoid the government's stricter regulation outside the industry and supervision within the industry, such as the review committee, private organizations usually set their own standards of conduct, which can not only pursue private interests in the best interests, but also better realize the self-regulation of 3D printing to meet the needs of public interests.

4.3.2. Establishing private penalty standards to regulate the diversification of 3D printing scenarios.

Considering the cost of industry regulation, it is feasible that part of regulation enforcement power (including penalty power) can be entrusted by the government to qualified private

organizations in the context of accelerating the construction of industry security risk prevention system. According to China's Cyber Security Law, when 3D printing network platforms find that the 3D printing CAD model is banned or controlled, they can take enforcement measures such as stopping the service, deleting, blocking and disconnecting the link, and impose sanctions such as warning, suspending the service and abolishing the registration number on the uploader. This punishment power is delegated to the industry's own expert association to investigate, negotiate, deter and punish the illegal behaviors of 3D printing that endanger safety according to the provisions of laws and regulations or authorized, and then to supervise and manage the government personnel afterwards, which greatly improves the lag of supervision by government departments.

5. Conclusion

Currently, our country's criminal law still contains relevant provisions regarding the hazardous use of 3D printing technology. However, with the advancement of time and technology, the development of 3D printing is bound to exhibit characteristics of greater precision, speed, and danger. This passive weakening of the role of legal regulation is worthy of our vigilance and contemplation. Looking at the long-term development of regulating the safe use of 3D printing technology, targeted legal regulations should be prioritized. This will translate into concrete measures to protect national security, social security, and the personal safety of citizens.

References

[1] Jinju Zhang. The challenges and countermeasures brought by 3D printing technology to our gun control. People's Public Security University of China (Social Science Edition).2016,(01):138-143

[2] Guangxi Wei. On the safety regulation of 3D printing. Wuhan University of Technology (Social Science Edition).2021,(04)4

[3] Lantao Qi. Safety risk and legal regulation of 3D printing technology. Hunan Police Academy. 2021,(03)103-109

[4] Jin Gao. Research on 3D printing crime tools. Technology and law.2015,(06)1116-1132