Article

Research on the Motivation behind the Rise of China's Maker Movement and the Maker Class in an Era of Great Transformation

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Abstract: *Background:* This study aims to explore the rise of the maker movement and the Maker Class in the context of an era of great transformation. By examining the maker movement that has emerged from the West to the East over the past two decades, the study seeks to uncover the motivations behind the rise of the Maker Class. *Objective:* To uncover and explain the reasons, driving forces, and influencing factors behind the rise of the maker movement and the Maker Class in China, and to provide valuable insights for research, decision-making, and practical applications in related fields. *Methods:* The research employs a literature review methodology , combining an analysis of the development trends of the maker movement with the backdrop of social transformation. *Results:* The maker movement has benefited from the rapid development and widespread adoption of information technology, the rise of open innovation and the sharing economy, and the changes in social structure and values. These factors collectively drive the rise of the Maker Class in China, making it a significant force in the era of transformation. *Conclusions*: In the information age, the Maker Class embodies creativity, innovation, and autonomy, aligning with the aspirations of contemporary society. As a result, it has gained widespread recognition and support. The rise of the Maker Class has a profound impact on social structure, promoting a surge in innovation, entrepreneurship, and creativity, and furthering the development and transformation of society.

Keywords: Era of Transformation; the Maker Movement; the Maker Class, Social transformation

1. Introduction

In the past 20 years, a technological wave triggered by IT advancements in Silicon Valley, USA, has been sweeping through industrial facilities, industrial technologies, and industrial ecosystems. It is giving rise to new facilities, elements, structures, and ecosystems of the information age. Whether domestically or internationally, almost everyone has personally experienced and witnessed the extraordinary changes brought about by the rapid development of the Internet in the social life. In particular, the proliferation and application of smartphones have made information exchange instantaneous, ubiquitous, and transcending national borders. Smartphones can be seen as a revolution in Information Communication Technology(ICT), as they integrate information, communication, and technology, driving profound changes in people's lifestyles, work styles, organizational methods, and social forms(Song, 2005). At the same time, it is also driving the formation of a knowledge society and the transformation of innovation models(Song et al., 2008). The pervasive ubiquity of WIFI has woven knowledge and information transmission and sharing into an ever-flowing river of information, while the exponential growth of information and data has transformed this intricate river into an increasingly complex fluid world. The cleaning, routing, processing, and utilization of data have transformed society into a new form of data

aggregation, blurring the boundaries between work, life, and entertainment. The world of invention, innovation, and creation, which was once accessible only to a few, is now within reach of ordinary people. Anyone can be a maker as long as they possess the qualities required(Jiang et al., 2022). The term 'maker(s)', chuang ke in Chinese mandain, originates from the English world which refers to individuals who are willing to turn their ideas into reality without a profit-driven motive. In Chinese mandarin, 'chuang'"(literally 'make')" itself signifies creation, while 'ke' (morphologically as English suffix '-er') refers to a person engaged in a certain activity. Tracing back the origins of this term, it can be linked to the experimental classes at the Microassembly Laboratory of the Massachusetts Institute of Technology. These classes centered around innovation and customer-centricity, as well as focused on individual design and manufacturing as the core content, and further explored   the realization of creative design problems. The students participating in these experimental classes came to be known as "Makers"(Song et al., 2008). Furthermore, the term "Maker" has also been extended to refer to individuals with innovative ideas and a spirit of entrepreneurialism. The creative class discussed in this article represents this group of individuals who possess creative thinking and strive to transform ideas into reality as "Makers".

2. Definition of the Maker Class and Personality Survey

2.1 Definition of the Maker Class

The definition of the Maker Class is not yet clearly established. Currently, one of the most explicit definitions of the Maker Class is provided by Professor Richard Florida in the United States. Florida(2002) defines creative talents as a group of professionals whose work involves a significant creative component, such as scientists, engineers, architects, artists, and entertainment workers. Traditional white-collar professions such as accountants, teachers, doctors, and lawyers also fall under the category of the creative class, as their work requires creative application of complex symbolic systems. Florida's elaboration(2002) is based on the emergence of the creative industries and the differentiation of traditional service industries in the past 20 years. According to his perspective, creativity is not exclusive to highly educated individuals, and anyone can possess a certain level of creativity. Even hairstylists can demonstrate innate creative talents.

However, whether a city can truly possess and attract the Maker Class depends on its ability to provide a welcoming and inclusive environment and whether the government has supportive policies and measures in the place. The author believes that the creative class is a distinct group from the general population. They not only seek survival but also embrace a new value system of "self-expression." They represent individuals who have reached higher levels of Maslow's(1943) "self-actualization" theory, pursuing their own personal fulfillment.

2.2 The Maker Class Personality Survey

This article first examines the statistical data from Richard Florida's(2002) survey on IT professionals with in the Maker Class, and then compares it with the personality survey conducted for this research project in China. In Florida's study on "Money and the Love of Work," he concluded that the work for makers is not solely driven by monetary incentives. In the era of the creative economy, the most exceptional talents cannot be motivated by money alone. Money is merely an additional factor, and the driving force for exceptional talents in any field stems from their passion. Thus, even in developed capitalist societies, creative intellectual labor is propelled by the inherent human desire for creativity.

Furthermore, the research findings shed light on the significance of individual characteristics within the creative class in response to the question, "Which aspect of work is most important to you?" Survey respondents were allowed to select one or more

answers. Table 1 demonstrates that only 38.5% of respondents considered "basic salary" as the most crucial factor, while the number of respondents selecting "challenging work and responsibilities" was nearly double that of those choosing basic income, reaching 67.0%. Surprisingly, selecting "stock options to share company profits" did not make it into the top 20, accounting for only 10% of the total respondents. Other factors such as respect, technical aspects, work location, company positioning, organizational culture, career prospects, and benefits ranked lower on the list.
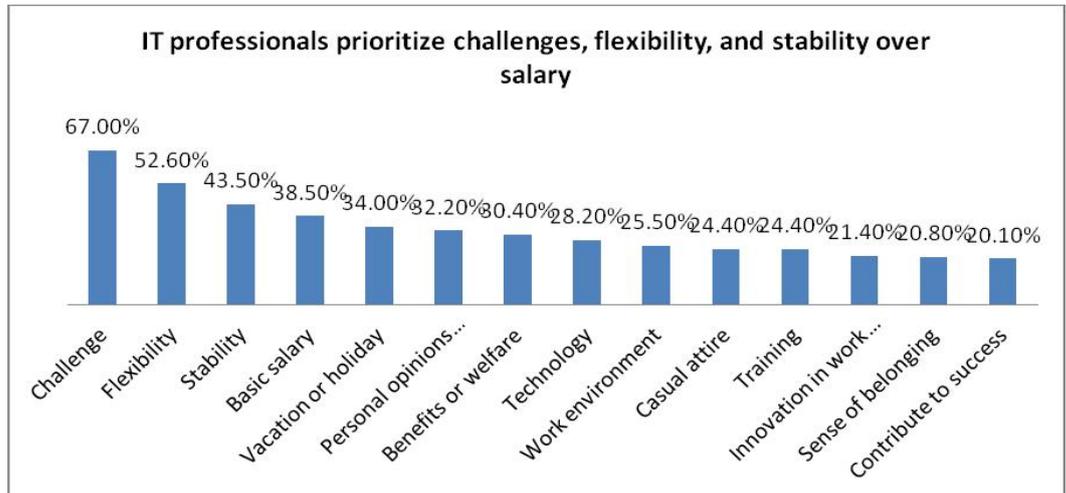

Table 1: Adapted from Richard Florida's "The Rise of the Creative Class," p103.

It can be concluded that, compared to income, the Maker population in Western countries places greater emphasis on intrinsic challenges and development. This is especially evident after experiencing multiple instances of stock market bubbles and fluctuations in the Western economies, as the rise and fall of stocks or technological volatility cannot alter the values and aspirations cherished by creators.

In order to conduct this study, the researcher distributed a questionnaire to 50 creative professionals in cosmopolis   such as Shanghai, Shenzhen, Beijing, and Hong Kong in March. A total of 47 responses were collected, with 45 being valid, resulting in a response rate of 94% and an effective rate of 90%. In the analysis of self-perception among creative individuals, the questionnaire included the question "Which factors directly influence the success of creativity?"(see Table 2). The results showed that "passion" was considered the most important factor, accounting for 42% of the total respondents. "Creative ideas" were considered the most important by 24% of the respondents, while "perseverance" was deemed more important by 18%, and "responsibility" by 16%. Regarding the question about what creative professionals value more among "salary, status, and honor"(see Table 3), over 32 individuals believed that "achievement" was the most important, representing 71% of the total respondents. Only 1% considered "honor" important, while 7% considered "salary" relatively important. Welfare, salary raises, and promotions were ranked lower in importance.
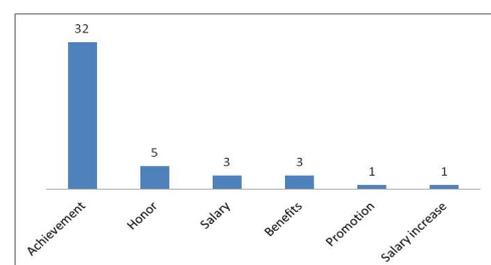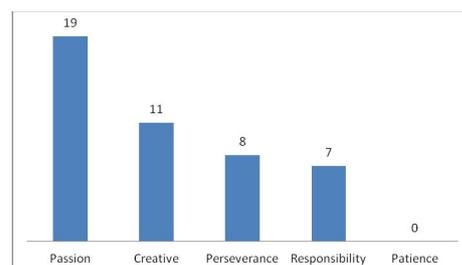

Table 2: Factors influencing the success of creativity   Table 3: Values emphasized by the creative professionals

The research above indicates that the common characteristics shared by creative individuals or the maker community in both the United States and China are the pursuit of self-realization and the development of personal interests. They highly value relaxed environments, flexible mechanisms, a conducive work atmosphere, and challenging business opportunities.

3. The rise of the maker movement and the phenomenon of community clustering

The rise of the maker movement has been propelled by the internet wave of the 21st century. In the future, it will be possible to leverage the intelligence of the internet in the real world by establishing virtual network companies and integrating them into the deeply rooted industrial world. The "maker movement" acts as a catalyst for a groundbreaking revolution, enabling individuals to enhance themselves, develop their skills, and showcase their talents through a digital DIY revolution.

3.1 The rise of the maker movement

In the United States, the maker movement has become a new trend. It originated from the MIT Media Lab's Bit and Atoms research, and later, the maker movement flourished globally. Initially referring to a group of individuals with digital technology skills, creative talent, or hobbies who were adept at designing original products, the definition of makers gradually expanded to include all creative individuals passionate about hands-on practices and sharing cutting-edge technologies and new ideas. Center for Bits and Atoms was one of the earliest initiators of Fab Lab spaces and advocated for the concept and model of involving ordinary people in "personal manufacturing." Within a few years, it garnered a global response from makers. Subsequently, countries such as Norway, India, Ghana, South Africa, Kenya, Iceland, Spain, and the Netherlands, among others, started establishing Fab Lab spaces, initiating practices that encompassed personal creativity, design, and manufacturing.

Since 2006, the maker movement has begun to influence China. In 2010, the first maker space in China, Xinchejian, was established in Shanghai. Following that, makers and the maker movement grew and developed across China, with maker culture rapidly spreading on the Internet. When Premier Li Keqiang visited "Chaihuo Space" in Shenzhen, the Chinese government initiated a nationwide movement to promote innovation and entrepreneurship on a larger scale. The Chinese government has made efforts to promote the Application Innovation Park (AIP) (Song & Zhang, 2009) project, which represents a new exploration of user-centered and demand-driven technological innovation system design under the conditions of the information society. It is also a manifestation of the maker carnival movement in China.

3.2 The phenomenon of maker clustering

The development of the maker movement relies on the contributions of various creative talents, such as IT enthusiasts, artistic makers, online freelancers, literary podcasters, and robotics engineers(Yu & Weng, 2009) The common characteristics among makers are innovation, hands-on practice, and sharing. It is their shared interests and hobbies that bring them together, allowing them to coordinate and leverage their individual strengths. The collision of ideas among them generates endless innovative vitality. However, the full potential of their individual qualities may not be fully realized without a conducive environment for growth. On the one hand, the survival environment of makers depends on the formation and consolidation of the overall maker community. The clustering of the maker community is driven by the pursuit of opportunities and avoidance of risks. On the other hand, it also requires certain driving factors, such as a well-developed industrial eco-system within cities or regions, mechanisms that facilitate coordination among industries, and a stimulating

environment characterized by inclusiveness, openness, citizenry, and urban surroundings. Richard Florida   a researcher on the creative class, has used the Gay Index as an indicator of urban openness to explain the relationship between urban inclusiveness and the creative index. Therefore, it is important to understand the concentration of makers in cities in the United States, such as San Francisco, Los Angeles, New York, Chicago, Seattle, Dallas, Washington D.C., Boston, Houston, Denver, and others. Similarly, in China, the phenomenon of maker clustering is primarily observed in cities with well-established infrastructure and vibrant creative thinking, such as Beijing, Shanghai, Shenzhen, Guangzhou, and provincial capital cities.

4. Formation and Development of Maker Culture

The formation and development of maker culture are inseparable from the rise of the maker movement, which in turn owes its emergence to several key figures and events. It is these key individuals and events that have influenced and propelled the global maker movement's development wave. New ideas, new theories, and the openness of the Arduino open-source platform have all contributed to the dissemination of creative thinking and the realization of personal creations. The exponential growth of big data, the Internet, and smart mobile devices, has become the engine driving the formation and development of creative culture. A flattened world and the transformative culture of knowledge innovation 2.0 will lead the future world's development.

4.1 Maker's Creative Culture

Maker's DIY Culture. DIY stands for "do-it-yourself," which means creating and making things by oneself. It is an excellent method for developing individuality, hands-on skills, and thinking abilities. At its core, DIY combines experiential learning and personalized design to integrate experience and creation, aiming for self-satisfaction, self-realization, and self-affirmation. Philosophers such as Hegel, Jung, and Maslow have all reached the same conclusion in studying human behavior: creative behavior is fundamental to human existence. DIY has initiated the first steps towards autonomous labor and creation, leading to the emergence of countless makers who have industrialized the spirit of DIY.

DIY Experience Culture. DIY experience culture refers to the special pleasure and enjoyment that makers experience during the process of DIY innovation, design, and hands-on work, utilizing open-source software and hardware sharing platforms. Each individual may have a unique understanding and perception of the DIY creative process, resulting in diverse experiences. However, when completing a DIY project, it may provide an unprecedented psychological experience. The DIY creation may transcend its status as a mere product and become a manifestation of significant experiences and memories. It could potentially become one of the most important mementos in one's life. Although it may seem like a small process, it encompasses a profound experience that goes beyond the enjoyment of the production process. This experience may carry the weight of beautiful memories and become one of the most precious treasures in one's life.

4.2 Maker's Sharing Culture

Sharing Culture. Sharing culture is a culture of generosity, cultivating the most selfless, noble, and beautiful aspects of one's character through sharing with others. Just like the renowned scientist Madame Curie, when she shared her research and discoveries with the world, she gained the respect and admiration of people worldwide, shining with the brilliance of her humanity. Makers belong to a group of people who are creative and willing to share. Of course, we cannot assert that every maker possesses these qualities, but we can still believe that a large number of people do process these

qualities.. The most satisfying aspect of sharing creation may be the joy obtained when presenting one's work, which represents their ideas, efforts, and dedication, to loved ones or friends. When family members and close friends receive the handmade creative gifts from makers, their value is cherished and bring happiness to the makers.

Culture of Emotional Investment. The culture of emotional investment primarily refers to makers dedicating a significant amount of time, energy, and thoughts to DIY design and their creations. By infusing ideas and emotions into innovative designs and creations, the works possess unique thoughts, vitality, and infectiousness. As makers devote substantial time to the DIY creative process, sacrificing time that could be spent with family and friends, their dedicated efforts become integral to their creative freedom, selfless attitude, and cultural belief in the power of creation. The author believes that the contrasting culture of current fashion and fast-paced consumption culture with the culture of emotional investment by creators is something worth treasuring and reflecting upon.

4.3 Maker's Learning Culture

Embracing the Culture of Joyful Learning. The culture of joyful learning is a personalized DIY creative activity filled with happiness and childlike wonder. It encourages makers to continuously seek the most effective ways to solve problems, approaching exploration with a playful mindset. By expanding various problems to their limits and exploring their essence through fun and joy, creators experience a sense of pride in surprises, excitement, and discoveries. These experiences often leave a deep impression in their memories and stimulate active thinking, fostering brain development. The culture of joyful learning is an authentic culture that many makers possess, blurring the line between play and work in their creative pursuits. Therefore, if the culture of joyful learning is embraced by more people, their lives will become more fascinating and enriched.

Embracing the Culture of In-depth Research. The culture of in-depth research is an elevated form of the culture of joyful learning, emphasizing exploration, analysis, and problem-solving in personalized creativity. Around the world, there are 1000 "maker spaces" where production equipment can be shared, all of which advocate for the culture of in-depth research. The number of such spaces is growing exponentially, with over 100 established in Shanghai alone in the past two years. These spaces incorporate digital manufacturing and focus on personalized system design by makers, innovative production exploration, and the development of a culture of in-depth research. It can be said that the culture of in-depth research is synonymous with maker culture, as the former's essence has always been intertwined with this community, driving progress and development in the world with remarkable demonstration effects.

4.4 Maker's Tool Culture

Culture of Utilizing Innovative Tools. The rise of the maker movement is rooted in the transformation of using new tools in this era. Firstly, makers use digital desktop tools to design new products and create digital DIY models. Secondly, sharing design achievements and engaging in collaborations within open-source communities has become a cultural paradigm. Thirdly, anyone, if willing, can transmit their designs to commercial manufacturing service providers through universal design file standards, enabling the production of designed products in any quantity and scale. They can also use desktop tools for personal manufacturing. Compared to traditional large factories, spaces, mass production, and standardized products, the use of innovative tools by makers has become easier, more accessible, and user-friendly in the modern "maker movement." The created space, venue, scale, production volume, etc., tend towards miniaturization, precision, personalization, innovation, and global sharing anytime and anywhere. It can be considered a new tool utilization movement that starts from small

aspects while considering the bigger picture. Moreover, the various tools required for makers to create their works have become increasingly simple to use, with more powerful functionalities, lower prices than ever before, easier accessibility to materials, and more refined tools.

Culture of Enhancing Craftsmanship Skills. DIY digital personalized design and manufacturing are processes completed in the digital realm, seemingly not involving craftsmanship skills on the surface. However, in practice, these craftsmanship skills have transitioned into personalized designs by makers from the real world. Moreover, their craftsmanship skills and techniques have been replaced by computer languages like MakerBot, achieving the transformation between the physical and virtual. In traditional industrial manufacturing, the production process of a product embodies the manual labor, skills, and craftsmanship of workers. In today's society, manual labor and craftsmanship have been replaced by 3D or 4D technology, or more advanced digital technology and machines. The craftsmanship skills of makers have been completely transformed by using lightweight assets and computers. Creativity has become an unlimited stage for makers, and their skills reside in the minds of the wise, while craftsmanship manifests in the ten fingers constantly using keyboards and mice. In this new era, our fingers have become revolutionary fingertip weapons.

5. The Driving Forces behind the Rise of the Maker Class

The rise of the maker movement, and the formation and development of maker culture have facilitated the gathering of a large number of makers, leading to the rapid emergence of an overall class. The social structure is undergoing significant internal changes and adjustments, representing a reshuffling of social classes internalized within the context of the information technology revolution and knowledge innovation 2.0. The Maker Class in society is poised to become the primary driving force in the era of major transformations. This article attempts to uncover the reasons behind the rise of the Maker Class through research on the maker movement that has swept from the West to the East in the past two decades. The most important reason can be attributed to the elevation of "creativity" as a major characteristic of contemporary life, and the emerging population represents the driving force behind significant societal changes. New technologies, new concepts, new wealth, and all intellectual and economic achievements stem from the creative ideas or the transformation of theoretical thinking by makers. Over the past century, there has been a noticeable increase in the number of individuals engaged in creative work, particularly in the fields of technology, culture, and art. The growth of creative industries such as technology, cultural innovation, and art has laid the foundation for the rise of the Maker Class.

5.1 The Intrinsic Driving Forces behind the Rise of the Maker Class

5.1.1 The rise of individual makers, small teams, and micro-enterprises.

As for makers, their existence dates back to ancient times, as early human civilizations began inventing and manufacturing tools. There have been countless renowned inventors both domestically and internationally. In the past, becoming a successful maker required harsh conditions — either having excellent material resources, unwavering determination, or exceptionally sharp intellect. Even until the 1990s, this situation remained largely unchanged. However, with the advent of the Arduino open-source electronics platform and 3D printers in the 21st century, not only has the barrier for ordinary people to engage in creativity been lowered, but it has also made it possible for artist makers to create original products. The number of makers has been increasing day by day, especially in the DIY personal maker and small team maker manufacturing sectors in the United States. Emerging micro-enterprises and makers have become a new trend.

The progression from individual makers to forming teams is a natural process, with shared interests as their bond. Places such as the Silicon Valley, Soho, Broadway, and Fab Labs in the United States, as well as London, Edinburgh, and Manchester in the United Kingdom, have become hubs for creative individuals in industries such as technology and innovation. Similarly, cities like Beijing, Shanghai, Guangzhou, and Shenzhen in China have also become favorable environments for the strong growth of emerging industries. It is due to this phenomenon that high-tech micro-enterprises, gaming companies, animation studios, digital music effects, new digital media, film and television, and technology software development enterprises have flourished in the age of digitization.

5.1.2 The release of self-needs and creativity.

With the improvement in all aspects, people are no longer merely satisfied with basic material needs, and spiritual needs have become the pursuit of daily life. Looking at the twists and turns of the creative industry in Western countries over the past twenty or thirty years, from the rejection of emerging creative industries to acceptance and support, those declining industrial areas, abandoned factories, and streets have been transformed by a group of postmodern creatives into emerging economic forces and engines of urban development. For example, Bilbao in Spain has transformed from an industrial town into a city of creativity, Lille in France has transitioned from a declining textile industry to a cultural hub, and Zurich has evolved from a conservative banking hub to a city of fashion and creativity. The transformations of these cities all embody the release of self-innovation by creative individuals. Currently, China has also entered the era of "mass innovation and entrepreneurship," with the government providing maximum support for makerspaces in terms of policies. The innovation and entrepreneurship environment are relatively relaxed, greatly unleashing the potential creativity and enthusiasm of Chinese makers. This has led to an increasing number of maker communities to seek their true value(Xia, 2013).

5.1.3 The diversification and involvement of leisure activities.

Leisure activities are originally a part of relieving work-related stress and cultivating one's sentiments. With the emergence of various groups, salons, parties, clubs, markets, exhibitions, and other activities in society, leisure activities have become more diverse, and people participate in them and experience the joy of involvement. As more and more people engage in activities and collaborations, it sparks a passion for creativity, leading to a growing number of like-minded individuals who are dissatisfied with the status quo choosing maker spaces. From participants to active contributors in personal creative spaces, they ultimately become the driving force behind the rise of the maker community.

5.2 The External Environment for the Rise of the Maker Community

In addition to the above-mentioned internal factors that contribute to the rise of the maker community, external conditions and a supportive environment are also crucial factors. The conditions that foster the rise of the maker community can be summarized into three main aspects:

The first is the technological accelerator. From the development of maker movements worldwide, science, technology, big data, and smart mobile devices have evolved into technological accelerators for the development of the maker community. In just 20 years, nearly half of the global population has entered the digital world, and the widespread use of the Internet has transformed Web 2.0 into an era of "networking for all" and "grassroots innovation" in the maker age. In particular, the introduction of tools such as 3D printers and laser cutters into Fab Labs, along with the increasing number of people using simple design software or desktop workstations, has contributed to the continuous growth of technical skills. Furthermore, the emergence of big data,

networking, and cloud technologies has lowered the barriers to entry for digital storage, data collection, and communication technology startups. As a result, it has propelled the advent of a global-scale personal manufacturing industry innovation.

The second is the shift towards online crowdfunding for makers. Starting with the rise of the open-source crowdfunding platform Kickstarter in the United States, similar websites have become popular funding channels for inventors worldwide, with Internet-based crowdfunding gaining popularity in other countries as well. In China, Angel Investment Funds also seek out maker projects for investments, both online and offline. This demonstrates that online crowdfunding platforms and open-source funding channels have become important means of financing for the development of the maker movement.

The third aspect is the convenience of accessing information and government support. Various types of information, such as national data, social network data, publicly available utility data, and online paid data, along with the ease of communication anytime and anywhere, provide makers with open, free, and abundant database resources. Furthermore, the Chinese government encourages and supports makers, maker projects, and maker spaces through favorable policies, preferential loan policies offered by banks, and a growing tolerance and understanding from society, the government, and the public towards innovation and entrepreneurial failures. All of these factors contribute to a favorable external environment for the rise of the maker community.

6. Conclusion

This study examines the rise of the maker movement and the emergence of the Maker Class in the past 20 years, driven by the penetration of the Internet, big data, and smart mobile devices in the global digital world. The open-source Arduino platform has provided aspiring makers with endless creative possibilities, leading to the proliferation of maker spaces worldwide as venues for mutual exchange among makers. Increasingly, more makers are drawn to this inclusive "creative" culture, gathering, mobilizing, and gradually becoming coordinates that influence regional economic development. Empowered by the core cultural influence of "creativity," the Maker Class has emerged as a dominant force driving innovation and the development of knowledge-based economies. This article delves into four dimensions: defining and surveying the characteristics of the Maker Class, the rise of the maker movement and the phenomenon of community clustering, the formation and development of maker culture, and the internal and external driving forces behind the rise of the Maker Class.

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