

A Case Study of Glass Art Marketization Under the Background of Creative Industry

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ABSTRACT

Through the interpretation of the marketization of glass art in some cases and the construction and analysis of the creative industry, this paper puts forward some thoughts on the marketization of glass art from the perspective of creative industry. There are mainly two tasks: the first one is to clarify the context of glass art industrialization as well as the focus of controversy appearing in the international glass studio movement; the second one is to try to construct a new research paradigm of glass art marketization and take it as the creative source of art and artists.

Keywords: creative industry, glass art, case study, knowledge economy, cultural enterprise

1. INTRODUCTION

The concept of creative industry firstly emerged in the end of the 1990s, which was proposed to promote urban development and establish a new pattern of economic growth. The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines the creative industry as “the cultural industry includes publishing, music, film, crafts and design”.^[1] So, it is obvious that the core of the creative industry is the cultural industry, which is also known as the cultural and creative industry. According to the UK Creative Industry Path Documents issued by the UK government in 1998 and 2001, respectively, creative industries refer to “some activities that derive from individual creativity, skills and wisdom, and they can create potential wealth and employment opportunities through the development and use of intellectual property rights”.^[2] More specifically, it includes 13 industries: advertising, architecture, art and antique trade market, handicrafts, design, fashion design, film and video, interactive casual game software, music, performing arts, publishing, software and computer services, television and radio.^[3] In order to promote communication between practitioners in different creative industries, there is no clear boundary among these 13 industries. It is reported that the creative industry contributed £21 billion to the London economy in 2007, which is second only to the financial sector. Nowadays, the creative industry around the world is generating more than \$22 billion a day and it is growing at a rate of around 5%. The creative industry has become the fastest growing

pillar industry in UK now, with about 130,000 different kinds of companies work in creative industry. What's more, the number of employees in this field is nearly 2 million people, ranking first among all industries.^[4] The direct impact of cultural and creative industry as a mode of economic growth has changed the current economic growth structure in urban area, thus making a transformation from an industrial society that attaches importance to hierarchical system to a creative society with participation, communication and sharing.^[5]

When analyzing it from the etymology, creative industry is the combination of “creativity” and “industry”. “Creativity” emphasizes the creative aspects with imagination of an individual or organization. Creativity is conceptually defined as “the ability to produce something new”, which means the occurrence of original invention achieved by one person or more people. People with creative ideas are called “creators”. They make use of the production of knowledge, the invention of creativity and technology, as well as the dissemination of intellectual property rights as ways of innovative industries, with the aim of producing economic benefits guided by the demands of market and industry. “Industry” excludes most of human creativity. However, human beings work in an industrial environment, so the investment of imagination, creativity, wisdom and experience of people support the creative industry.

In 1972, the concept of “technology is cheap” put forward in The 7th Lawrence National Sculpture Symposium immediately triggered the heated discussion,

which focuses on “technology and thinking, which one is more important?” in the glass art. It’s hard to define which side to prefer, because technological innovation brings disruption of productivity, and thinking innovation brings disruption of creativity. Whatever the outcome concluded from the final discussion, the concept of creative industry seems to suggest a compromise and neutral “boundary concept” for this issue: if technology is used by people full of innovative thinking, it seems to be a new level of thinking.

According to the Comparative Analysis of British Creative Industries issued in 2006, creative industries were classified into three industrial clusters: productive industry, service industry, art and craft industry. [6] Glass art is included in the classification. From the division of disciplines, glass belongs to the category of arts and crafts. In fact, glass across a wide field: “The world of glass expand the human vision, which greatly promotes the traditional disease researches in optics, astronomy, navigation, hematology, bacteriology and the development of painting art in the Renaissance Period...” [7]. It can be seen that the field of glass is a highly practical and specialized field. As a tool for exploring the objective practice, glass serves the real life. Microscopes, telescopes, glass wares, window glass, architectural glass and other practical designs bring infinite convenience to people’s daily life. Now, glass is not only an artistic phenomenon, but involving materials, technology, sales and other complex phenomena. Furthermore, it is also affected by many other aspects such as social factors, scientific development, technical barriers breakthrough and so on, artistic performance is only a small part of it.

As a technology of thought, glass is perhaps the most appropriate metaphor for modernity, because its transparency in material property perfectly fits with the opening dimension of modernity. [8] In 1997, British government adopted the suggestion put forward by the famous scholar John A. Howkins to take the lead in transforming the British national economic growth from industrial manufacturing to creative economy. In the book *The Creative Economy: How People Make Money from Ideas*, Howkins mentioned that “the most valuable currency is not the stereotyped production, but the creation of individuals.” Obviously, creativity itself is a kind of creative power. In order to create and synthesize, artists need to combine ideas in unfamiliar ways gradually and to overcome the phenomenon that technological innovation is only applied to one-sided fields, so as to let “creative destroyers” with innovative ability gain market recognition with a combination of new economic possibility. The ultimate practice of glass art in the creative industry is that art and cultural production will not be divorced from commercial reality. Sponsorship, subsidies, and production are all means of providing financial support for art work. It can be said that the creative industry is a redefinition of the traditional glass industry.

The phenomenon formed by the interweaving of many credible knowledge is the result of seemingly unrelated things but intertwined in one net. Creative industry has built a systematic knowledge network with the people as the center and the knowledge innovation as the purpose. We study and analyze the cases of glass art marketization under the creative industry, at the same time, sorting out the achievements of industrialization in glass creation based on personal ideas, talents, experiences and work, so as to promote sustainable economic growth. Maybe creative ideas are neither in the box nor out the box, but on the edge of the box.

2.THE VALUE OF GLASS AS A CREATIVE MEDIUM

The unique nature of glass materials can make artists create open art works, and it is the ambiguous binary relationship between glass materials and light that gives this kind of artistic and mysterious aesthetic beauty- glass can be passed through by the light and it also can reflect the light. After processing the thickness, color and molding method of glass, it can shape into various forms of manifestations. The invention of a new glass technology will also trigger new manifestations of glass art, which is more likely to transform the culture in some aspects beyond its field, so that leading to a large number of new things in other fields. The study of glass media noumenon brings infinite changes and imagination to creators The study of glass media ontology brings infinite changes and imagination to the creators.

Glass in history has completed the evolution from daily necessities to culture. Glass intervenes in the memory of every period of history, which records the traces of every moment in the past. In fact, we have entered the world of glass. Nowadays, the biological system and human-computer interaction system that combines glass with artificial intelligence and science have become a reality. Glass integrates with various new materials to promote communication, collaboration and links in the future. Promoting scientific progress with the development of technology, thus serving the real life. Glass is changing the style of people’s daily life.

In the book *The System of Objects* written by Jean Baudrillard, he holds that “glass promotes trafficking, it is functional, but it needs to be consumed as an object and the pace of its consumption is very fast. The psychological function of glass (its transparency, its purity) is completely absorbed and submerged by its economic function. Sublime plays the role of shopping motivation here.” Baudrillard calls glass the “model material” and the “future material”, so glass is “both material and the goal for pursuing, both means and purpose, which is the ideal modern container” [9]. Indeed, before the Industrial Revolution, glass was mainly used to produce practical vessels, so the demands for those items could be met by high-yield mechanized production.

The origin of the modernist movement made the glass not designed around the actual needs of products for the first time, but designed for the concept of art or architecture Academy. Even though the price of glass products has fallen faster than at any time in history, partly due to industrial technology and market competition, perhaps more importantly, designers want to provide good designs at low prices. The result of many emerging designers' combination of imagination and superb technology is that the functionality of glass is weakened, but it becomes thicker and more attractive in art aesthetic, which makes glass enter the stage of history as an independent form of artistic expression.

Glass became one of the main participating materials of the handicraft movement in 20th century, so artists could create unique decorations and sculptures through using it. For nearly 150 years, all kinds of methods and types for producing glass have greatly exceeded the amount at any time in the past four thousand years of history. The craft industry is now seen as an important industry in the UK's small business economy. According to the survey "craftsmanship industry in the 1990s" made by the Crafts Committee in 1993, the overall estimated turnover of the crafts industry was about £4 billion. Since then, this figure is likely to have increased significantly, which provides new opportunities for academic and commercial cooperation in glass design and development.^[10] The condition shows that the glass art industry is now growing in product quantity so rapidly that it has become a mainstream economic growth mode in the producing countries, and it presents a constantly expanding trend. Glass has found its own market position and appear as non-expensive crafts as well as vessels with rigid demand. Moreover, it also appears as a kind of unique artwork in the sculpture market. The data that relate to the studio glass are growing every year, which includes documented increases in artist income, market share in the number of works, product diversity and economic returns. The phenomenon of glass art marketization has become the most influential trend in glass art in the late 20th century.

In 2012, Professor Zhuang Xiaowei, director of the Glass Office of the Academy of Fine Arts of Shanghai University, served as the curator of the New Glass Art Exhibition. Professor Zhuang had planned the Shanghai Spring Art Salon from 2012 to 2014, and he also planned the Shanghai International New Glass Art Exhibition for three consecutive years. Among which, the 2012 Shanghai International Art Expo was the first time for China to sell glass art works at an auction, with 68 glass works sold out with the price of 40% above the starting price. The value of glass as a creative medium is reflected in the user consumption and economic activities of artistic works. The cost, pricing, packaging, transportation, media promotion, and sales of artworks all need to be considered comprehensively in an event. In addition, the ancillary expenses of art trade in an auction include: professional expenses, entertainment expenses

and travel expenses, information technology, site costs, insurance premiums, advertising and marketing expenses, etc. All of them are contributions of creative economy. Holding the glass art expo also has an indirect contribution to the creative economy, which is reflected in bringing huge economic benefits to the local cities. The people attracted in a few days are those with relatively strong consumption ability. The places of consumption include top hotels, restaurants and other goods as well as services, which will drive the consumption growth of related industries in surrounding areas. For example, Annual Meeting of Glass Art in St. Petersburg, Florida, USA, Glass Art Society Conference and so on attracted tourists from all over the world, so that boosting the quarterly economic growth of local cities. The art market contributes to consumption by attracting users with strong purchasing power who are interested in culture. The World Tourism Organization claims that cultural tourism is one of the largest and fastest-growing global tourism markets. It accounts for 35% to 40% of all global tourism and grows at a rate of 15% every year, which is three times the growth rate of general tourism. Job opportunities offered by travel and tourism are expected to benefit 3 million people by 2023. Cultural tourists travel more frequently with longer time, and they also spend significantly more money than ordinary tourists.

In the creative industry, the total amount of tax revenue generated by the art market pays taxes and fees directly to the financial sector, which makes a significant contribution to the economy. It mainly includes auction houses, galleries, dealers, people who engaged in artistic activities, auxiliary businesses of trade, and so on. This condition undoubtedly increases the financial contribution of art market to a large extent. In the art market, holding a medium and large art trade needs a series of supporting services and auxiliary businesses, such as hiring a lot of professional commentators, buying insurances for art works, employing exhibition personnel, etc., all of which requires a lot of money from auction houses and dealers. At the same time, it also brings many job opportunities. In 2013, there were over 7,850 enterprises in the UK art market provided about 41,420 high-value job opportunities directly. This number includes only galleries, dealers and auction houses that are specializing in art and antiques, but excluding many other businesses that are related to the art trade, such as expositions and other activities. Workers in culture field tend to be more educated than other workforce in a broader range, with 48% of them achieving a third-level or university education (versus 40% of the workforce in UK, 31% in the EU workforce and 42% in the United States). Over the years, knowledge, skills and creativity have been considered to be the basic elements that give the British competitive advantage, while the cultural industry continues to play a leading role in the process of moving towards the knowledge-based economy. A strong art infrastructure can attract skilled workers into the

economy, resulting in an effect of “brain gain”, so as to make regions more attractive to enterprises and generate the positive multiplier effect across the entire economy field. Some studies show that the art and cultural industries promote innovation and growth in business creative industries, furthermore, it supports the productivity of the entire workforce.

3.CASES ABOUT ARTISTS’ INNOVATION STRATEGY: CREATIVE IDENTITY

After the Industrial Revolution in the middle of the 18th century, the glass manufacturing industry began to develop into two paths. First, stepping from artificial production to mechanized production, which mainly focused on the flat glass, bottle glass and jar glass. Second, extending the handicraft production methods to produce glass products, which was mainly led by the opposition of some artists and designers to stylized industrial products. Under that condition, they began to explore glass products for the purpose of concept and practicality. The products made and designed by artists for emphasizing the design characteristics of handicrafts. Such as: the glass window designed by William Morris, who is the representative artist in Arts and Crafts Movement, a series of furniture with mosaic glass designed by Louis Tiffany, who is the representative glass artist in Art Nouveau Movement, the glass vase with reliefs designed by Emile Galle, the perfume bottle series designed by Rene Lalique in Art Deco Movement, the “anti-design” glass furniture advocated by Ettore Sottsass, who is the representative glass artist in Memphis designer group, etc. The common feature of these glass artists lies in that they put their thoughts and personal expression in the first place, in order to produce intellectual property rights with mental works, thus realizing the commercial application of glass through the way of developing intellectual property rights and patents. At this point, the glass art is an enterprise with new ideas in various fields such as art, scientific invention, new mode of economic growth, social policy and so on. At the same time, these artists are also cultural entrepreneurs with new ideas, with unique management style and entrepreneurial spirits.

The definition of identity in Chinese refers to people’s origin and social status, and workshop refers to the factory for handicraft manufacturing or processing. The concept of “identity workshop” comes from the writer Kevin Kelly in the book *Out of Control: The New Biology of Machines, Social Systems, and the Economic World* when it refers to the concept of ecosystem, indicating that everyone is an individual in the system and they have their own identities in it. What’s more, these identities are accidental, uncertain, multiple inclusive and variable. At the same time, identity is a closely connected system for the whole. In order for evolution to have an effect, the diversity included in the identity carried by individuals is very important. We understand the identity workshop as:

the identity of species, that is, the characteristics that are different from other species. It is not deliberately or predictably created, but emerges naturally through “Rehearsal and other species optimize each other, trying to practice different roles for evolution. Therefore, it is aimless, workshop-style and broken.”^[1] From the description about the evolution process of biological system, it seems possible for us to find out that the forming processes of “identity-identity workshop-ecosystem” and “artist-cultural entrepreneur-creative industry” may have some links that are worthy of discussing. The richness and inclusiveness of creative industry corresponds to the diversity and complexity of the biological system. When using the “bottom-up” case analysis method in the process of biological system evolution to discuss “how personal creativity plays a role in the glass art market”, and then combining some points into a line to consider the problems of art organizations, art groups and centralized art industries. Studying the relationship between individuals and society to form into a social network, which is similar to the problem analysis method in genealogy: “Investigating how the subjects who regard the biologically individual as labor who can speak and learn knowledge is created in power and knowledge.” We “fabricate” and “make up” a possibility to disrupt some certain orders and then explore the problems of established things from another perspective.

In the knowledge-driven economy, enterprises rely on disruptive technologies to improve products and create new products, so the innovation has become the core element of creative economic growth. Once this idea needs to be realized, it needs to integrate relevant resources, including mature technology, appropriate policies, personnel skills, etc. Cultural entrepreneurs as leaders will lead their teams to turn these ideas into reality, thus making careful planning and conditions that are suitable for creative industries. To study the creative industry and the marketization of glass, as well as the practical problems faced by creators, the focus is how to explore the unknown from the known. The following part will sort out some cases about artists to analyze how they make use their entrepreneurial identity to lead the team to realize the economic transformation process of creative ideas in the consumer economy at the individual level.

Dominick Labino is one of the representatives of the International Glass Studio Movement, and he is also one of the most innovative technicians in the glass field. As a successful corporate manager in the creative glass industry, Labino has invented more than 60 glass patents in the United States, and with another hundreds of foreign patents, covering the research and development of glass composition, processes and machines, fiberglass, cellophane and furnace design. Among them, three pure silica glass fibers (Figure 2) developed by him can adapt to extreme temperature and its thermal insulation property is terrific, so they are widely used in space fields, such as the insulating materials used in Apollo and

Gemini spacecrafts. When he works as the president at the Research and Development Department of Johns-Manville (formerly Libbey-Owens-Ford Glass Fibers), he invented a small portable kiln that can melt glass at low temperature, which is very important for the development of studio glass movement. Owing to this invention, artists can easily melt glass in their own studios rather than relying on factories. The 475 fiberglass marbles that were also invented by him were sold to factory and university programs. These inventions were presented at the World Industrial Symposium held at Columbia University in 1964, and then these inventions, equipment, and raw materials were subsequently used by many universities as well as factories for practical creation and production, so that realizing technological and artistic innovation. Realizing the process innovation of new ideas in both the industrial production of glass and the expression of handicraft art, so as to push glass and glass art to the new level.



Figure 1 Sample of fiberglass invented by Dominick Labino, 1952, the figure is taken from the American Corning Museum of Glass

The construction of art forms reflects science or the culture of times. The openness and poetic characteristics of works are comprehensively creative embodiment of both artists' personal concepts and experience visions. The art practice of Louis Comfort Tiffany can be regarded as a typical case of using glass media to achieve creative industry. Although every one of his artistic glass work seems to take almost extravagant time to design and polish, so many amounts of "Tiffany" artistic glass were created. The reason is that many of works named after Tiffany are made by company's craftsmen (Figure 2). Tiffany set up his own glass factory in Corona, Queens, New York city (Figure 3) to produce creative glass wares for achieving breakthroughs and innovations at technological level. He supervises the decision-making instead of making them all by himself. These working patterns and Tiffany's creative ideas directly influenced the glass making in factory. The pursuit of craftsman's spirit and extreme craftsmanship is not only the purpose of Tiffany's creative products. The peak of his creativity is to combine his artistic ambition with his unique marketing ability. Tiffany's products were brilliant at the World Expo at the end of the 19th century. At the beginning of the 20th century, with the rising of

decorative movement and the diffusion of new decorative styles in the art world, Tiffany's attitude of real creativity has been realized in many media such as watercolor, enamel and glass. He applied for a technical patent-"Favrile glass", which makes the colored glass full of metallic luster, that is, a thin film of metal or metal oxide is formed on the glass to realize the rainbow color of the glass surface. As the direction of visual light moves and the brightness of the light falling on the glass turns different, it will produce a artificial rainbow effect visually. In addition, the glass processing creativity patents of Tiffany also include Opalescent, Ripple, etc. Some brands that use Tiffany technologies include the Kokomo Glass Company in Indiana, America and the American Fenton Art Glass Company. Tiffany's glass products are used on lamps, windows, glass domes and mosaic tiles, which appear in libraries, office lobbies, banks, hospitals, university gymnasiums, art galleries, restaurants, department stores, hotels, lecture rooms and waiting rooms. Nowadays, we will say that Tiffany is a typical example of creative branding as he has established a enterprise image for the glass creative industry to meet the actual market demands with creative capital.



Figure 2 Corona factory of Tiffany that is located in Queens, New York, 1913, the figure is provided by Tiffany Studio



Figure 3 Craftsmen were assembling lamps' lead glass lampshade at Tiffany factory, World Journal, January 1899

René Lalique is also such a designer who runs his own creative industry. He produces glass products in bulk through high-quality design and technical standards, thus establishing harmonious cooperative management between the creative identity of designers and factory manufacturing. In 1992, Lalique established a modern glass factory (figure 4) near the Wingen-sur-moder. The area has a long traditional history of glass manufacturing, and the factory was equipped with all the latest designs for glass experiments: hot metal mould, thermal compression and complex decorative technology tools. Lalique's company has developed thousands of glass designs, which covers the range from tiny jewelry elements for decoration to huge building panels and large casting elements for church and outdoor spaces, and all of them are in Lalique's creative style. The art glass industry career of Lalique started from 1907 when he designed perfume bottle (figure 5) for the world's largest perfume company Francois Coty in France. His creativity combined the manufacturing products of glass and perfume manufacturers to provide a considerable number of products with the Lalique style, so that opening his golden age of creativity. In addition, he applied creativity directly to the real design and production.



Figure 4 Glass factory founded by Lalique in Alsace in 1922



Figure 5 Left figure: portrait of René Lalique. Right figure: Lalique's first design of perfume bottle in Francois Coty

Dale Chihuly promoted creative glass to all over the world for fixed-point exhibitions with large scale to gain

artistic influence, at the same time, he obtained the economic benefits of more than ten million dollars. He established the company with businesses of blowing glass team group, artwork installation and movement, negotiation with museums and other institutions, commercial market expansion, advertising publications and other media communication, etc. The "Chihuly Garden" named after the artist is built in the center of Seattle, which has quickly become one of the popular attractions in Seattle since it is a glass garden that is entirely made with blowing technology. What's more, it becomes the city's landmark memory that is shaped through glass creativity. Many glass projects that are related to creativity have brought about the growth of the number of tourists, but also promoting the increase of local government income. Moreover, they even increase the professional skill training for personnel engaged in glass art industry and solve the employment problem of many people. Instead of using the blowing glass like the conventional indoor sculptural display, Chihuly introduced creative glass art to the commercial market, which made handicrafts become one of the new paradigms in driving economic growth.

Handicraft glass products is a typical small manufacturing industry, these artists use the creative identity of cultural entrepreneurs to take the mental labor as the leading role in glass art, and then converting the intellectual property rights into economic achievements, so as to promote the economic growth of handicrafts with the help of the most advanced technological concepts and means in the art market in order to industrialize glass art. Artists in the creative industry expand the boundaries of the art market and build creative enterprise brands through constructing creative identity. The developing degree of brand reacts on the artist's re-innovation again.

Cultural entrepreneurs establish their own creative identities in the process as they adopt interactive adjustment methods in media such as games, entertainment, products and the Internet to combine personal identity, public identity and consumption, at the same time, linking the social, cultural and value creation concepts with certain groups. These groups may be citizens in the virtual world, not necessarily citizens of the real world, but they also share the areas with same cultural relation. There is a real and imaginary relationship between people in the virtual world and real life. They are creating identity, expressing themselves more and more professionally and consciously. Furthermore, they are subverting their identities in the process of interaction. The entrepreneurship of these glass art creators aims to perceive opportunities and bring them to reality. On the other hand, it aims to capture the added value created from the original value. At the same time, the glass art creators are good at working with practitioners in knowledge-intensive industries such as high-tech, financial, legal, medical, business management and academic researchers. The unique art

products developed by the creative team automatically have the attribute of crossing boundary. Science and technology provides a breakthrough exploration for the industrialized production brought about by the artistic innovation. Glass production is expected to meet the preferences of the audiences, and the creative team itself has become a cultural enterprise group.

4.FUTURE CREATIVE PATH: DECISION-MAKING OF ALGORITHM

Creativity comes from the process of starting a new idea, from the conscientiousness of artists or agents to the potential economic value, it creates opportunities to enter the market in new ways. In 1919, Ludwig Mies van der Rohe, the founder of the curtain wall glass, proposed the precedent idea of using glass as the exterior material for building wall to shape the tall buildings. In 1952, he built the first 38-floor building with curtain wall glass around the world by replacing colored glass with stained glass, that is, the Seagram Building, New York, America. Since then, glass as an independent exterior wall material has opened a new road in architectural art, for example, forming the landmark building of a city and the synonymous with “skyscraper” for economic development. In 1985, the curtain wall glass materials produced by European Community countries accounted for more than two-thirds of all building glass, of which the products of curtain wall glass in the United States had exceeded 50 million square meters, thus occurring the “curtain glass heat”.^[12] In addition, all kinds of materials of curtain wall glass emerged at that time continuously, which led to the condition that curtain wall glass entered the building market as a new creative idea and replaced the futuristic feeling of shaping building with other ideas. This process brought about some changes in relative prices, restrictions and opportunities of glass art in the building market. Moreover, the construction and innovation track links the symbiotic relationship between construction industry and glass art in the creative industry.

In 1982, the concept of knowledge economy was put forward by John Naisbitt in his book *Mastering Megatrends*. It is also known as the information economy, as it is an economy taking knowledge as the basis and mental work as the main body for increasing revenues. Its main symbol is the rise of software knowledge industry represented by Bill Gates. At present, the output value of Microsoft has exceeded the total output of the three major automobile companies in the United States. The rise of digital technology and the global Internet has brought new demands to the creative industry. The software knowledge industry is characterized by easily dispersing production activities to a wider region, lowering costs and easily grasping new markets. At the same time, through software encryption and other measures to centrally control intellectual property rights, so as to maximize profits to the greatest degree.

The innovation process itself can be programmed just like the purpose of research and development department in the company: trying to develop novel path with innovative technology. The software named “D.M. artificial intelligence 3D modelling system” developed by crop team from Shanghai Lenai Technology software is such a case. Ordinary people can completed design and development of 3D product in 5 minutes with it, and the operation interface conforms to the habit of people when using smart phones . Users can easily create 3D modelling, make parametric editing and calculate the size in real time, which is accurate and intuitive. Let’s take the design of a glass kettle as an example, users can change the shape of their design, adjust the angle of water outlet in the most suitable position, and the thickness of cup’s bottom as well as the wall of the vessel can be designed through the software. Furthermore, the software can be placed in user’s customized photos to generate photo texture and material with one click, thus intelligent seam is rendered on the glassware and automatically generating scenes. Artificial intelligence can automatically generate Nurbs surface model in this creative software system, and the Raytrace algorithm in it can project the refraction and reflection of light on the glass into the material of model. After the modeling is completed, the industrial printing software, printing equipment and printing mould that are suitable for all kinds of high precision can be exported, so the industrialization of factory can be formed (Figure 6). For people who lack the knowledge background of advanced mathematics, modeling is a tedious process. The innovative significance of this software is to completely liberate the tedious modeling process. The D.M. brand has now obtained the license issued by the United States Patent and Trademark Office, and it has designed a variety of glass wares like drinking glass, vase, wine vessel and so on for putting into the industrial production. In the process of “designing and manufacturing innovative products with high technology”, there are many unknown possibilities that are worthy of further discussion. Creative industry undoubtedly affects the developing direction of glass art. Knowledge economy makes the production of glass show an intelligent trend, which may continue to improve in the future.



Figure 6 Wine decanter designed by “D.M artificial intelligence 3D modeling system”, the figure is from the crop team

Glass itself is constantly developing and updating to serve the new era. In the late 20th century, with the emergence and application of disruptive technologies in the glass field, we actually have changed the way in communicating with art. The ambiguities of material examines the ontology, the order and our direct sensory experience of the world. The avant-garde artists strongly express the trend of art through glass media, and they create new contemporary glass art through performance, installation, sound and digital art. The creative friction caused by inter-discipline permeates the thinking of creative industry in artist's design experience. With the help of creative industries, the new virtual world of glass will be discovered.

5.CONCLUSION

Innovation means the real discovery of new things. In the complex and diverse system composition of the creative industry, we can not predict the probability of the occurrence of glass art, but these uncertainties just lead to the emergence of more possibilities of glass art, so we look forward to the new glass. What needs to be mentioned is the direction of actively predicting the trend of glass revolution, and there are often “variant thinking” and “subversive destructive innovative thinking”, which provide rich materials for the evolution of glass science and technology. The evolutionary analysis of completing glass research is different from the creative source and motivation of the cases in using glass media to realize industry and marketization. Therefore, combing the differences existing between diversity and creative potential of these cases in the whole creative industry system is possible to produce a new creative path of glass

art. Consequently, for the future development of glass art industry, a series of innovations can be made in the following aspects to explore new growth potential: first of all, paying attention to the “creative research” of glass art production, especially from the aspects of patent and copyright, including software, interactive media and other industries that can produce new glass economy; secondly, predicting and finding out more innovative possibilities, considering the impact generated from digitalization on the glass creative industry, thus breaking through the bottleneck of former technology. Finally, we need to think about some possible problems in the future. Perhaps the practical achievements of glass art industrialization from the perspective of creative industry will be applied to some fields that are traditionally considered as non-creative industries, so as to create value in other fields of life, which is worthy of further research.

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