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Study of the Implementation of Design Management in Traditional Chinese Medicine in the Metaverse Era

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Abstract:
The paper explores how to apply modern design methodology to Traditional Chinese Medicine Industry Innovations. While Design Management is widely accepted in the field of health and wellness, only a few Traditional Chinese Medicine practitioners know about the benefits of modern design. The traditional Chinese Medicine Market scale is predicted to reach 73.5 billion yuan. Also, the industry aims at the updates in standardization, internationalization, and branding, which shall be greatly benefited from the implementation of Design Management. The population of Metaverse also comes up with new challenges and opportunities for the way Traditional Chinese Medical Science interacts with their customers who will spend more than 90% of their time in the virtual world.
The paper mainly employs the secondary research methodology, coped with analysis through knowledge graphs created by Citespace. CNKI, Web of Science are the main databases for secondary research. The influential reports published on the websites or WeChat official accounts and the sales data from e-commercial websites are studied as complemented materials. The research results show that the Traditional Chinese Medicine industry starts its Metaverse style modernization through leveraging basic Design Management methods and receives good outcomes which might trigger broader and deeper design evolution.

Keywords:
Design Management, Traditional Chinese Medicine, Metaverse, Knowledge Graph,Case Study

1. Introduction

1.1 Design Management implementation is needed for Traditional Chinese Medicine's adaption to the new age.

In the context of health care, the use of Design Methods, such as Design practice or Design thinking, is increasingly employed, which makes Design a recognized activity for health care escalation (Partridge, 2017). That Design can add or create value in business is well recognized (Simeone, Secundo, & Schiuma, 2017). More than 85% of the start-ups weigh design decisions and many 500 U.s companies perform a design-centric strategy (Lee, 2016). Design Management is defined as powerful expertise for aligning resources

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(Simeone, Secundo, & Schiuma, 2017). Also, Design Management is concerned with how to apply Design thinking, methods, etc in different stages of entrepreneurship (Goel & Saunoris, 2019). Entrepreneurship refers to recognizing opportunity, developing organizations, and combining resources (Acklin, 2013). Such an entrepreneurship process is what Traditional Chinese Medicine(TCM) industry modernization shall go through in the coming digital Metaverse era. Design Management would fit TCM better into standardized and large-scale business markets, especially the ones abroad.

1.2 Chinese from top to bottom Traditional Chinese Medicine revolution

In China, TCM, which has developed over thousands of years, is practiced together with Western medicine at every level of the healthcare system. In TCM, herbal remedies play a significant role for centuries throughout Asian countries (Hesketh & Zhu, 1997). Acupuncture, moxibustion, acupressure, and massage, Chinese physical and breathing exercises, and Zhuyou(prayer power or supplication therapy) are other typical treatment methods of TCM.

Chinese President Xi has promoted TCM on many occasions and the State Council Information Office issued its first white paper on TCM development in December 2016 (Jianhe Zhang, 2016). TCM has become increasingly popular as an adjuvant treatment for patients with chronic diseases (Tsai et al., 2022). Take diabetic patients for example. Diabetic patients with carcinoma in situ have lower hospitalization and mortality risk with TCM therapy, which may reduce the burden on national medical resources. In the COVID-19 era, TCM also plays an essential role in the clinical treatment strategy for COVID-19 (Tong, Wu, Ni, Shen, & Liu, 2020). Aiming at a shift from serious diseases treatment to comprehensive health management, the Chinese government explores promoting TCM development with government support and multiparty participation. The implementation of TCM in health care services such as TCM health tourism at the community level will be expedited. The TCM service revolution requires Design Management for a better user experience and a win-win business model. The migration of the real world into the virtual world in Metaverse amplified the needs to apply Design Management to the development of TCM.

1.3 Worldwide opportunities and threats brought by Metaverse

The metaverse concept was detonated by the IPO of the sandbox game platform Roblox in March 2021. The Metaverse is characterized as an asynchronous and virtual world duplicating reality (Young, 2010). In the era of the Metaverse, every actual entity will cross the limitation of the screen, enter a real virtual space, and generate one or more twin digital avatars. Humankind will live inside the Metaverse. And the parallel world will continuously sense the human presence, conducts business, or arrange a meet-up with friends (Bolger, 2021). Normal customers would spend more than 90% of their time in the virtual world of Metaverse(Jie, X., Guodong, Z., Yuanchong, X., et al., 2021).

Blockchain, Artificial Intelligence(AI), augmented reality (AR), virtual reality (VR), social media, online gaming, et al. are typical technologies employed to construct Metaverse immersive virtual environment (Learntek, 2021). Especially thanks to blockchain technologies, such as NFT or cryptocurrencies, each regular user is empowered with more decisive rights. The enabled common civilian can be the creator or stakeholder of the virtual world. Considering this User –Generated-Content feature of Metaverse, designers will be key players in Metaverse-related activities. Also, the coronavirus crisis requires physical distance,

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which encourages people to share more range of experiences through the online digital world(Siyaev & Jo, 2021). As Facebook founder Mark Zuckerberg said, “Metaverse is a vision that spreads many companies and even the entire technology industry.” Worldwide opportunities and threats caused by Metaverse for TCM Industries are on the way likewise. Design Management is vital for leveraging the magic of designers, who are influential players in the Metaverse.

2.Research Method

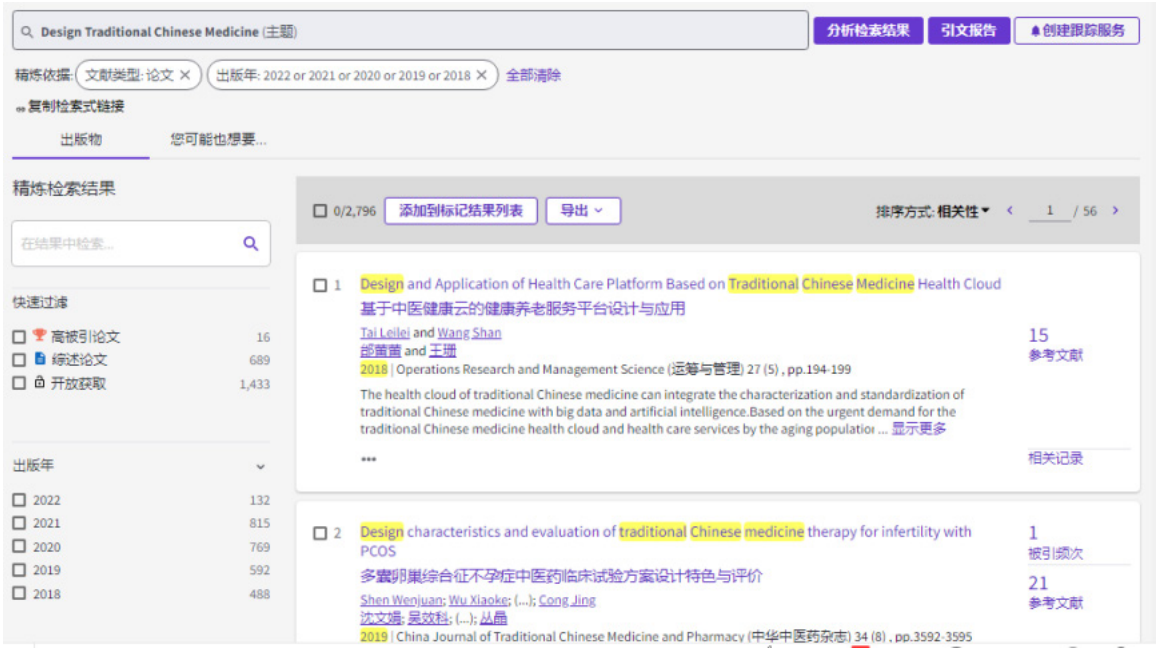


Figure 1 Most articles related to“Design Traditional Chinese Medicine” are Chinese: Web of Science.

2.1 Data Collection

Considering most pieces of literature about “Design and Traditional Chinese Medicine” from the Web of Science are Articles in Chinese. This paper decides to analyze the original Chinese sources and focus on the CNKI literature. When searching with the keywords “Design Management Traditional Chinese Medicine(设计管理 中医) ”, “Metaverse Traditional Chinese Medicine（元宇宙 中医）” or “ Design Management Metaverse(设计管理 元宇宙)”, only five papers are collected. The keywords for the CNKI search are extended to hypernym “Design and Traditional Chinese Medicine (设计 中医)”. Depending on whether the articles employed typical Metaverse technologies mentioned above, 500 articles from 2018 to 2022 were picked as Data for Citespace calculation.

2.2 Data Analysis

(1) The data of the picked 500 articles can be counted, connected, clustered, sorted, and illustrated with Citespace algorithms. And cluster statistics represent different knowledge domains. The clusters’ interaction reflects domains’ correlation (Chen, 2005). The contents of the Citespace study include the following: using the Citespace functions of keyword, authors, and institution co-citation analysis, this paper analyzes the

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literature about design implemented in the TCM industry revolution from 2018 to 2022. Identifying the knowledge evolution pattern based on citation burst detection. Analyzed on the Knowledge base(keywords), domain(author and institution), evolution(timeline), a knowledge graph for the implementation of Design Management in TCM in the Metaverse era is built.

(2) Case studies around the trends from Citespace analysis are articulated in detail, supported by complemented materials such as websites reports, WeChat official accounts push, and the sales data from e-commercial websites.

3. Results of Citation Analysis

3.1 Knowledge Base in the Core Database(Keywords)

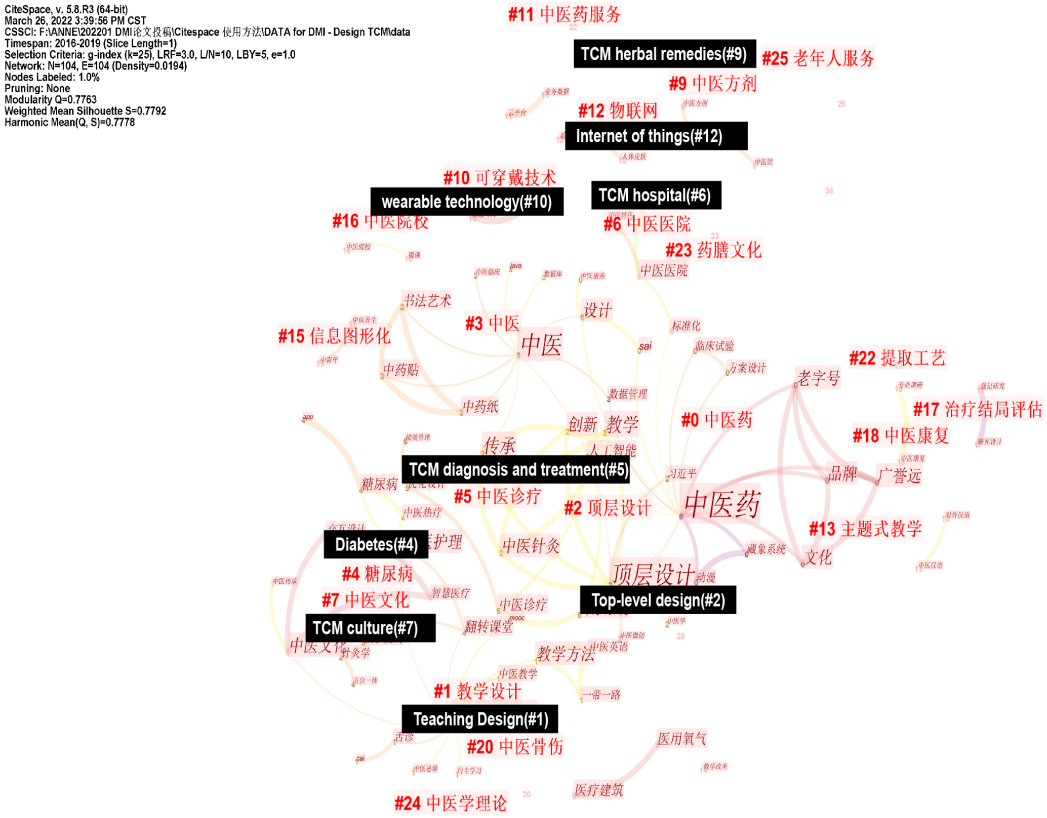


Figure 2 Keywords Citation Analysis by Citespace.

Citespace extracted noun phrases from the title, keywords, and abstract of 500 papers' data. Figure 2 illustrates the clusters generated by Citespace. The bigger the cluster, the smaller the sequence number of the cluster, which starts from zero. The analysis results are exported from the software and eliminate Traditional Chinese Medicine and its synonyms(#0 and #3).Error statistics(#8 fire control) is deleted as well. The top ten keywords are Teaching Design(#1), Top-level design(#2), Diabetes(#4), TCM diagnosis and treatment(#5), TCM hospital(#6), TCM culture(#7), TCM herbal remedies(#9), wearable technology(#10), and Internet of things(#12). From the analysis, Design Management shall start its implementation in the education area(

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Teaching Design) or social design area(top-level design of a country) of TCM. Diabetes, a typical chronic disease, also is a good topic to update TCM health care service with the help of design. Representative TCM methods (diagnosis, treatment, herbal remedies), hospitals, and cultures can get Metaverse updates with the help of wearable technology and the Internet of things.

3.2 Knowledge Domain in the Core Database(Author and Institutions)

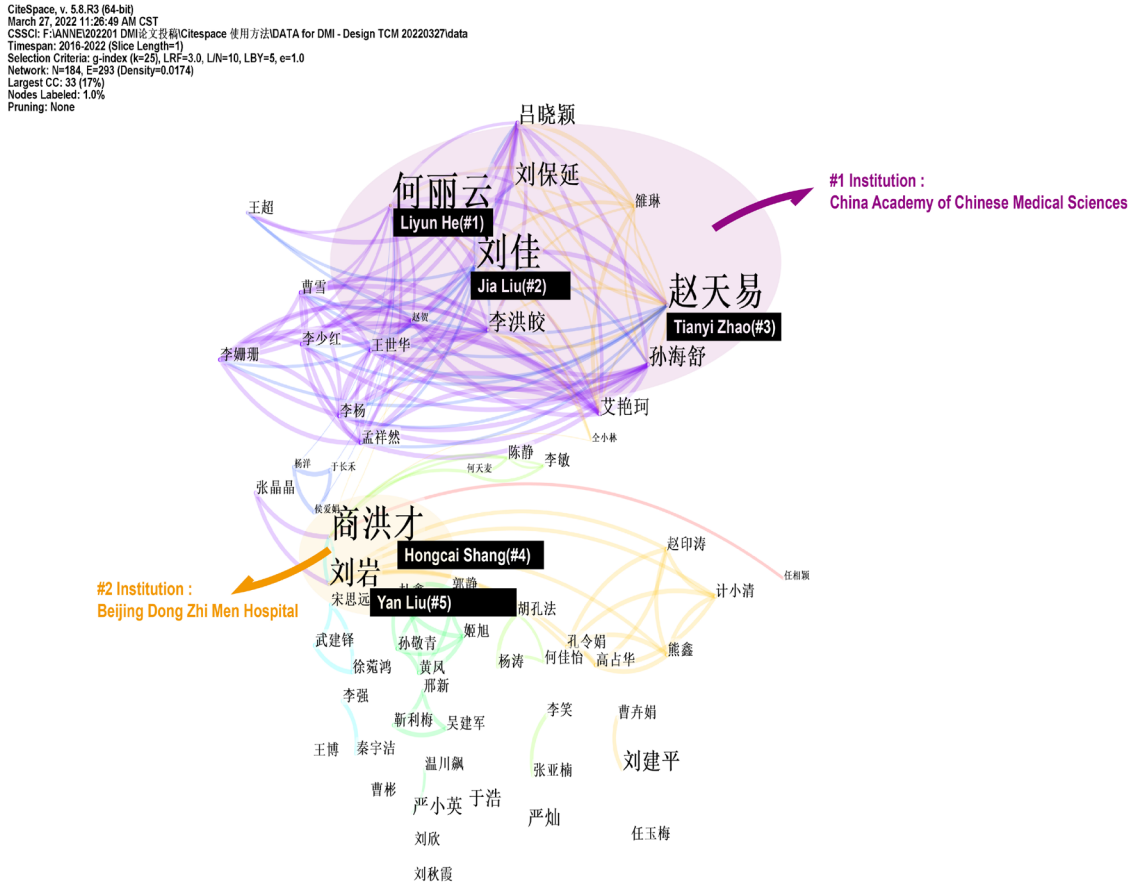


Figure 3 Authors Citation Analysis by Citespace.

Table 1 Most co-cited author by Citespace analysis.

Cluster-ID	Citation Counts	References	Numbers of papers in the 500-paper database
#1	17	Liyun He(何丽云)	5
#2	15	Jia Liu(刘佳)	3
#3	14	Tianyi Zhao(赵天易)	2
#4	13	Hongcai Shang(商洪才)	7
#5	8	Yan Liu(刘岩)	4

Figure 3 illustrates the most co-cited author by Citespace. The details are shown in Table 1. #1Liyun He, #2 Jia Liu, #3 Tianyi Zhao are from the same institution, the Institute of Basic Research in Clinical Medicine, China Academy Of Chinese Medical Sciences. The three co-authored two papers (He, Zhao, Liu, Wang, & Liu, 2022)(Ai, Liu, Zhao, Meng, & Cao, 2022). #4 Hongcai Shang, from Beijing Dong Zhi Men Hospital, also collaborate with #1 Liyun He for one paper(Tong et al., 2021). He is the most high-yield author and

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contributed 7 papers to the research's 500 papers data. And he published 432 papers in total on Traditional Chinese medicine, Traditional Chinese medicine Medical education, and interdisciplinary medicine. #5 Yan Liu is #4 Hongcai Shang's colleague and they co-authored 1 paper (Zhang, Shang, & Liu, 2022). All the influential authors are TCM professionals who are passionate about applying modern technology to the TCM's outcome evaluation. The dominant research topics still focus on serious TCM study and have not moved to comprehensive health management. Let alone in-depth Design Management implementation aiming at upgrade TCM into Metaverse friendly service system.

Table 2 Most co-cited institution by Citespace analysis.

Cluster-ID	Citation Counts	References	Related Most Cited authors
#1	7	China Academy of Chinese Medical Sciences	#1Liyun He, #2 Jia Liu, #3 Tianyi Zhao
#2	7	Beijing Dong Zhi Men Hospital	#4 Hongcai Shang, #5 Yan Liu
#3	7	Beijing University of Chinese Medicine	-
#4	7	Hunan University of Chinese Medicine	-
#5	5	Beijing Tongrentang Commercial Investment Group Co., Ltd	-

Table 2 shows the most co-cited institutions by Citespace. The graph of institutions created by Citespace is abandoned because it's too dispersive. The top 5 most co-cited author mainly comes from the top 2 most cited institutions(Figure 3). The other two University of Chinese Medicine also explores modern efficacy evaluation. Interestingly, the #5 institution, Tongren Tang, a leading TCM store in China, founded in 1669, explores the efficacy evaluation related to IPO, an entrepreneur activity. Although Tongren Tang's serious academic research focuses on academic medical efficacy evaluation with little Design Management sense, the leading TCM company leveraged design methodologies innovatively commercially, which will be discussed deeply in the Case Studies part.

For authors and institutions analysis, the citation counts are pretty low, which leads to no burst items found. This shows the study of the implementation of Design Management in TCM in the Metaverse era is still at an emerging stage.

3.3 Knowledge Evolution in the Core Database(Timeline)

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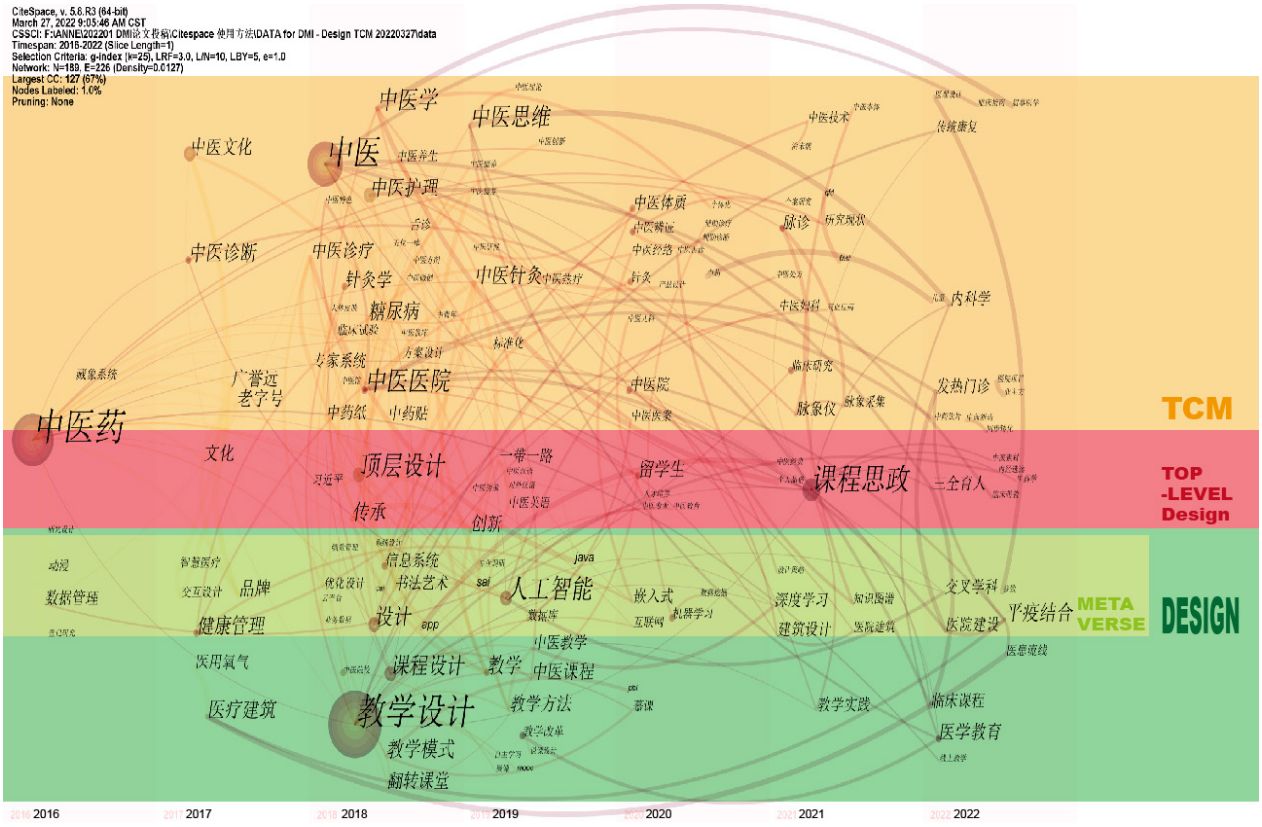


Figure 4 Time Flow Keywords Analysis by Citespace.

Table 3 Top 3 co-cited keywords clustered by Citespace analysis.

Time	2016	2017	2018	2019	2020	2021	2022
TCM	-Systematic Viscera-state	-Culture -Diagnose -Time-honored brand	-Hospital -Diabetes -Nursing	-Thinkings -Acupuncture -Thermal therapy	-Constitution -Hospital -Meridian	-Pulse diagnosis -Pulse device -Pulse collect	-Fever clinic -Internal medicine -Rehabilitation
Toplevel Design	China issued its 1st white paper on TCM	-Culture	-Toplevel design -Inherit -President Xi	-Innovation -Belt and Road Initiative -TCM English	-International Student -Talent Cultivation -TCM education	-Ideological and political education -The classic TCM -Individual character	-Three Holistic Education -TCM materials - The Inner Canon of Huangdi
Metaverse	-Data management -Registration study	- Wisdom medical - Interaction Design	-Business data - Cloud platform - Optimal Design	-AI -Database -Java	-Embedded -Machine learning -data mining	-Deep learning -Knowledge graph	-Parameters
Design	-Comic	-Health Management - Medical Architecture -Branding	-Calligraphy -APP	-SAI	-	-Architecture Design -Design Strategy	-Normal & epidemic combination -interdiscipline -Doctor-patient move line
			Education Design				
			-CAI	-MOOC - Micro class	-PBL -MOOC	- Teaching practice	

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Figure 4 illustrates the analysis of the keywords based on the time flow by Citespace. All the keywords were manually categorized into TCM, Toplevel Design, Metaverse, Design vertically in the figure. For each category, the top 3 keywords were chosen according to the citation number per year, from 2016 to 2022. Details are shown in table 3. From the table, certain trends are shown in the four categories.

The Design category seems to be driven by the Toplevel Design focuses. Before 2017, Design mainly focuses on traditional Visualization Design, Architecture Design, and Software Design. After the country's policy focused on the cultural inheritance supported by President Xi, Design start to focus on education besides the above three classic design topics. The research focus on TCM shows certain stability. Step by step studies on classic TCM concepts, such as Viscera-state and Constitution, is steadily carried out. Concepts of western medicine, such as Diabetes and Rehabilitation, are slowly introduced to stimulate interdisciplinary combination. For the Metaverse category, the implementation of AI and Internet of Things technology is broadly accepted all the time. However, Metaverse and other supporting technologies such as blockchain, AR, VR, etc., are scarcely studied. Affected by the 2020 COVID-19, both the TCM and Design category shows interest in epidemic prevention-related topics. The research results show a two-year delay resulting from the research and publish schedule.

4. Case studies of Citation Analysis

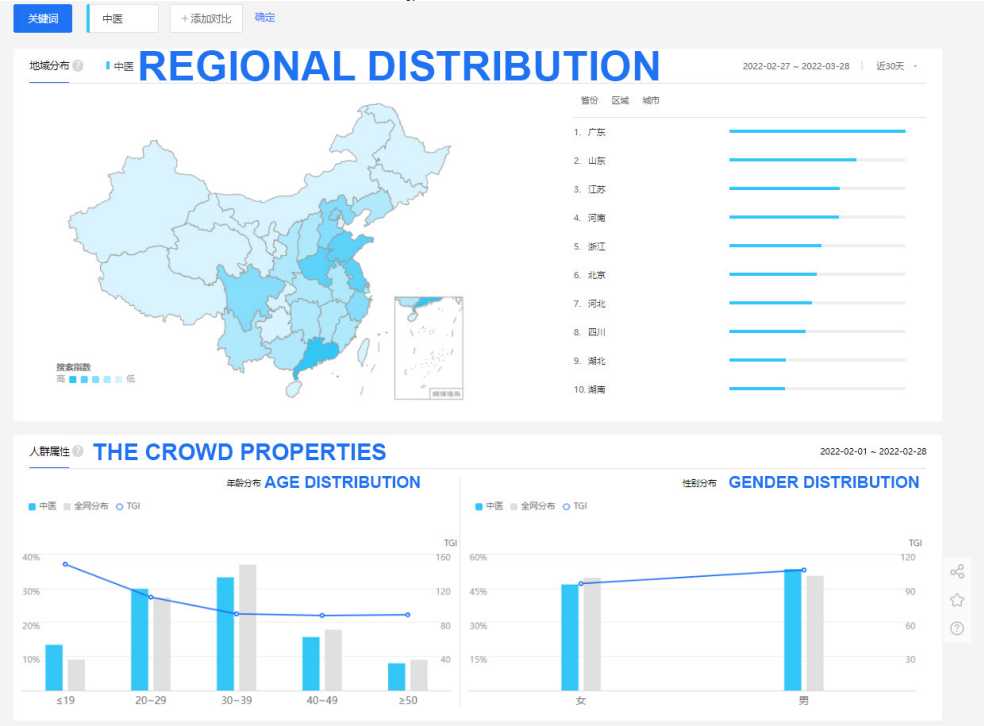


Figure 5 Baidu index of TCM about market location, generation, and gender: Source: https://index.baidu.com/

The above study based on the Journal articles is relatively slower than the real world's development. The sales data from e-commercial websites such as Taobao, Alibaba, JD, etc. are studied as complemented materials as well. Most of the materials studied were published within two years before 2022 March

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except for several classical references and the latest updates. Figure 5 shows the search index of TCM from Baidu(NO.1 search engine in China). The search results show that TCM is especially popular in the Southeastern part of China. Provinces with a profound cultural foundation and good economies, such as Guangdong or Shandong, are especially supportive of TCM. Target Group Index (TGI) is used to reflect the percentage of TCM fans in a certain generation. TGI =((Number of TCM fans)/(Number of a certain generation))*100%. Surprisingly, TCM is especially popular in those younger than 19 years old(TGI=40%) and 20 to 29 years old (TGI=39%). Usually, the elder a person, the more he's into TCM, for suffering more from aging chronic disease. The TGI of the Chinese young generation's TCM fans is going to rise and more market needs for TCM will emerge. For example, the foot bath is a traditional TCM treatment for herb remedies absorption and Meridian dredging. But the traditional style of foot bath is boring and complex for young customers(Figure6). The traditional herb remedies are purified into essential oil and designed into cute bath balls. Such a product design of Design Management fits TCM foot bath into young generations' lifestyle and makes a good profit.

Also from the Baidu Index, it can be told that men are more into TCM compared to women. While TCM products aimed at male customers are undeveloped and offer an opportunity gap. Some medical devices producers such as Xiang Yu Medical and Tian Rui are exploring the collaboration of Chinese theories such as acupuncture or moxibustion with modern rehabilitation techniques through 3D printing orthotics or electrocorticography technologies. Pure medicine companies such as Jingdu Niancian are updating their packaging design and better multi-level Intellectual Property protection. These topics are more male-friendly according to traditional Culture, which might be good niche markets to start.



Figure 6 Popular TCM foot bath ball by Rever from Taobao: Source: Rever shop on the https://www.taobao.



Figure 7 Metaverse style design pioneer, Xiaolu clinic: Source: http://www.xiaoluyy.com/

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The real world's TCM practice, Xiaolu clinic, response to the hospital, management, and APP trends identified through the above Citespace analysis. This service design online offers distant diagnosis and prescription through static images and text information of patients. Offline it offers herb remedies delivery. Through a rough service design of Design Management, TCM doctors, patients, TCM herbs suppliers, logistics companies, and health management platforms are integrated. Such a metaverse style design management implementation offers a brand new experience of TCM distant health service aid by AI. Such an innovation attract 200 million B+investment and was finally purchased by Ali Health from Taobao(Echo, 2018). Some other newly emerging unicorn companies such as Yang Baba, are still booming. They try to explore different TCM online service design implementations. These implementations only try out basic Metaverse technologies such as AI and have numerous opportunity gaps for the latest Metaverse technology. Apply VR technology to the TCM diagnosis procedure and better realize distance watch, listen, ask, and feel diagnose of the patients. Rely on the blockchain technology to offer better medical dispute management with convenient and cheap evidence fixation. And some mature TCM leading brands, such as Wong Lo Ka and Tong Ren Tang are prepared better for the coming Metaverse age.



Figure 8 Zhima Tang health service of Tong Ren Tang : Source: https://www.socialmarketings.com/articldetails/7647

Zhima Tang(Sasame House) is aimed at creating a big healthy ecology for Tong Ren Tang. This huge TCM metaverse started with offline Zhima Tang Cafe and online Zhima Health. Zhima Tang Cafe is designed as a trend-setting product. Young generations who are attracted by Zhima Tang's "healthy" Cafe, will be introduced to try out Tong Ren Tang's health consultancy and TCM treatments. These extra health services are located right above the Zhima Tang Cafe. Also, the new customers will be attracted to try out Zhima Health the online APP to get coupons. Then they will formally enter Tong Ren Tang's Metaverse virtual world. Such a TCM Metaverse called Zhima, integrated Tong Ren Tang stores nationwide, 500,000

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pharmacies, 100,000 traditional Chinese medicine centers, 80,000 medical examination institutions, 460,000 registered traditional Chinese medicine practitioners, and millions of registered dietitians into a virtual becomes real space. With such a Metaverse update, Tongren Tang will realize real-time tracking of users' physical health data, providing personalized optimal solutions to achieve the goal of "accurate health". The brand strategy of Tongren Tang is to become a data company in the field of sub-health and chronic diseases, better leveraging the aging demographic shift of China.

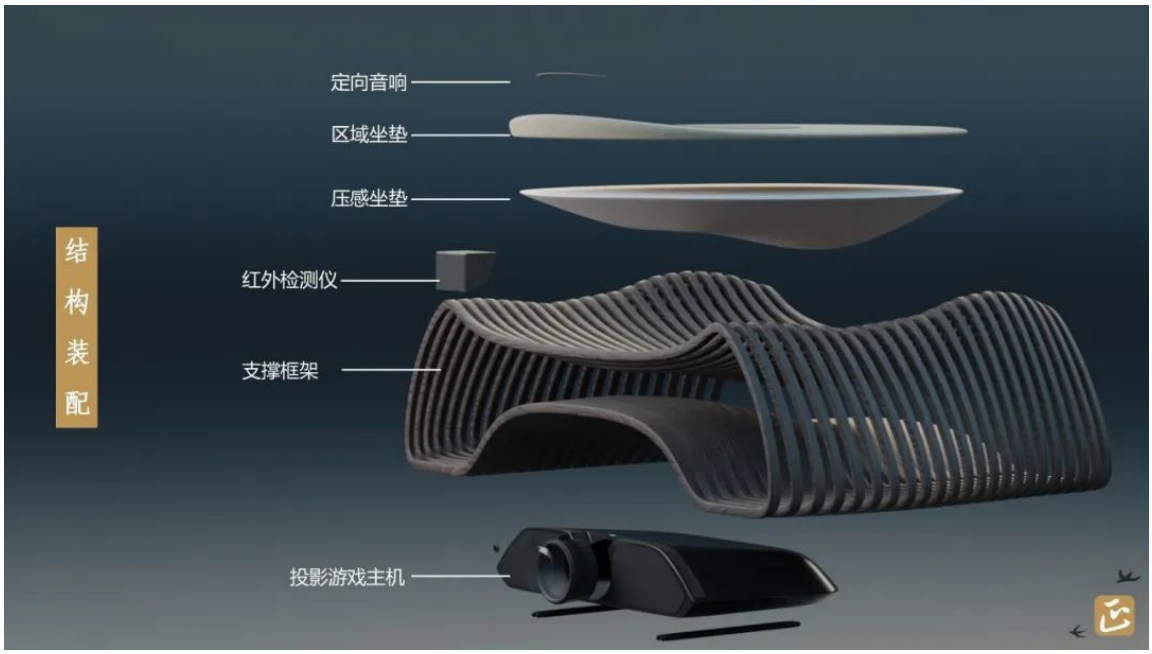


Figure 9 VR game of TCM sit to adjust Qi and get calm, Design guided by Professor Miaosen Gong, Jiangnan University : Source: https://mp.weixin.qq.com/s/euQwdg8W2ZYKvD8BwUyWag

Top-level Chinese design schools such as Miaosen Gong from Jiangnan University are starting a ten-week product design course and reached various TCM designs based on insights from Yellow Emperor's Inner Canon, an ancient Chinese medical doctrinal source(Figure 9). The VR game of TCM sit to adjust Qi and get calm contains not only a cushion but also a cultivation game that encourages the users to record and share their achievements. Through such an online merge offline Metaverse style design, the users will slowly develop a healthier lifestyle and fight against chronic disease. Such a service design implementation from the angle of Design Management is an overturn of traditional passive design commission works. Considering the innumerable digital twins' requirements, interaction designs, and real-world touchpoints' designs, the design will be deeply embedded in the entrepreneur procedure from the concept to the recycling.

5. Conclusions

From the research, trends of hot topics, theories, methodologies, and the latest related studies such as Diabetes, Pulse Collection, AI, or Deep learning related to the implementation of Design in TCM are categorized and analyzed. To effectively present the conclusions, the study comes up with several knowledge graphs related to the implementation of Design Management in TCM. Repetitive and crucial popular themes,

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methodologies, and theories are presented through information graphics and tables.

The research results show that the Traditional Chinese Medical Science industry starts its Metaverse style modernization by leveraging several conservative Design Management methods, such as Visualisation Design, Interaction Design, and Architecture Design. These Design Management try out slightly employed AI, a typical and classic technology for Metaverse. Through the case studies from complementary materials, these innovative trials received good outcomes, especially with young customers. The emerging success might trigger broader and deeper design evolution. The research offers the latest literature reviews for designers who are passionate about practicing Design Management in TCM or the bigger health market. And the entrepreneurs who try to expand their businesses to oriental therapies and medicines and the countries which are eager to find cost-effective aging society health care solutions might get some alien inspirations.

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