Rethinking the Management of Wicked Problems Based on the Covid-19 Public Health Event in China

YuHong Shen

Academy of Arts & Design, Tsinghua University, Beijing, 100050, China

Corresponding athor.Email:shenyh21@mails.tsinghua.edu.cn

Abstract. Public health events are currently being raised to new heights as a global issue, and such problems are often defined as Wicked problems and therefore bear essential research value. This paper takes the research paradigm focused on the Wicked Problem as an entry point. It examines a range of issues arising from Covid-19 in China, focusing on the impact of Covid-19 on human life and the means of intervention. This study, by reflecting on design and re-examining methodologies, finds that the Wicked Problem is difficult to be solved through conventional designing methods. Thus, this paper attempts to construct a new paradigm of thinking and a new design paradigm to address the challenges that the COVID-19 context has as a Wicked Problem. The paper suggests that designers or managers can utilize this design model to solve the distributed Wicked problem first, which means dissolving its complexity by innovating perspectives that allow the problems to be solved.

Keywords: Wicked Problems, Public health events, Covid-19, Design science, Social systems

1 Introduction & Background

In the past three years, the global epidemic of COVID-19 has disrupted society's original order of operation. The economic downturn is becoming more acute, healthcare pressure is increasing, intercultural communication is at a standstill, online lifestyles are becoming mainstream, and many issues are before the public that needs to be rethought and addressed. Of course, the latest liberalization policy also brings many potential problems and uncertainties.

Since the sudden outbreak of the virus, the management of the COVID-19 crisis has shown promising results in some cases, avoiding the spread of the disease to critical levels. Still, the problem can be viewed as wicked due to its complexity. The epidemic in China can be viewed in the abstract as a vast mass of dynamically changing problems. The interests, ethical controversies, and economic dilemmas involved are so intricate that it is almost impossible to give a solution that satisfies everyone[7].

When COVID-19 was defined as a global pandemic by the WHO, the epidemic continued to spread at an accelerated pace, from the first case of COVID-19 diagnosed to 10 million cases worldwide in 202 days to the second 10 million in 43 days and to the

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third 10 million in 38 days. According to WHO statistics, as of December 3, 2021, the number of confirmed COVID-19 cases worldwide has exceeded 2.6286 billion[7].

This shows that COVID-19 is indeed a complex problem that plagues the world. We will take the Wicked problem as the starting point for discussion, take design reflection and design ethics as the foothold, combine the interpretation of artificial things, production relations, cultural expression, market system, aesthetic system, and physical industry, etc., and try to deconstruct the problematic blocks of the "epidemic" and give experimental ideas to solve it. Through the example of the "China Epidemic," we hope to explain our thoughts on "what can and cannot be done with the design."

2 Research and Analysis

2.1 Analysis of the problem based on the new crown epidemic in China

China is characterized by a large population with high foot traffic and holidays that further exacerbate population migration. In the early stages of the beginning of the new coronary pneumonia epidemic, China adopted a SARS-like concept and mindset for epidemic prevention and control, considering the virus to be spread mainly through close contact and droplet transmission, focusing on containing the epidemic, resolutely interrupting transmission, and adopting a robust administrative intervention and population community-wide epidemiological medical treatment. Western European countries, the United States, and others have adopted a similar mindset of collective immunization in response to the pandemic influenza. These countries paid more attention to treating seriously ill patients and focused on slowing the spread and mitigating economic and social harm. Later, some Western countries adopted approaches similar to China's experience3. However, the differences in perceptions, concepts, ideas, and measures are generally apparent. As a sudden international public health event that seriously affects the operation of the world economy and society, this problem is difficult to be described holistically, and no conforming rules and programs exist to cope with and deal with this problem. From the perspective of internal factors of the epidemic, the pathogenicity and transmission of the novel coronavirus will show an indeterminate trend over time due to the possibility of its genetic mutation. Concerning external factors, there are many differences in the prevention and control concepts, policies, measures, and attitudes of officials and the public. The actual prevention and control effects vary significantly from country to country.

2.2 Analysis of the Covid-19 resistant solution problem

In the face of the Wicked problem of "epidemics," the dynamics of the various elements and problem clusters, the interests at stake, the ethical controversies, and the economic dilemmas are so complex that it is almost impossible to provide a path to a solution that is 100% satisfactory to everyone. The management of the coronavirus crisis has shown promising results in some cases, avoiding the spread of the disease to critical levels. The Chinese epidemic can be viewed in the abstract as a large and dynamically changing cluster of issues that can be broken down into sub-clusters of problems such as

economic impact, political governance, social response, ecological impact, the capacity of the public health system, urban system response, international relations, and many others. These sub-level problem clusters can be divided into smaller and more minor problem clusters. From the virus as the starting point or cause, more and more different issues are interconnected, and each individual or group issue cluster is dynamically changing due to policy, material, time, field, drug, economy, commodity, and other elements (each of which is most likely under another issue cluster). Eventually, these smaller problem clusters, split into larger problem clusters, become easier to solve.

Minor problems or clusters are also often referred to as "simple problems," the academic name for which is Tame problem. Tame Problems are problems where the ingredients are familiar. We know the components of the problem and have likely encountered a similar type of problem before. In short, we are familiar with the territory of this type of problem. We know there will probably be a solution, and we work through a standard problem-solving methodology to get there. Tame Problems are problems where the components are familiar. We know the members of the problem and may have encountered similar problems before. In short, we are familiar with the scope of these problems. We know there may be a solution, and we implement it through standard problem-solving methods.

Just like a virus that mutates all the time, no problem is set in stone. As shown in Fig.1, the Tame problem is the source and starting point of all kinds of complex problems, and its problems are clear and easy to analyze and understand. [4 6] From Tame Problem can be composed of a Wicked problem and developed into a Mess problem, where a Mess problem is a stack of various types of tame problems that can still be relatively understood and handled step by step but need to choose the optimal solution because the sub-optimal solution will still bring chain reaction. The Wicked problem is the interconnection of many tame problems, and its complexity has been mentioned many times in the text. And all the problems, if not taken seriously and dealt with, will eventually develop into a Wicked Mess problem, which is a state that no one wants to see and a state that is less likely to occur except in times of war or cholera, with the characteristic that all solutions and means will bring adverse effects. Therefore, let's focus more on Covid-19, which is still in the Wicked problem stage.

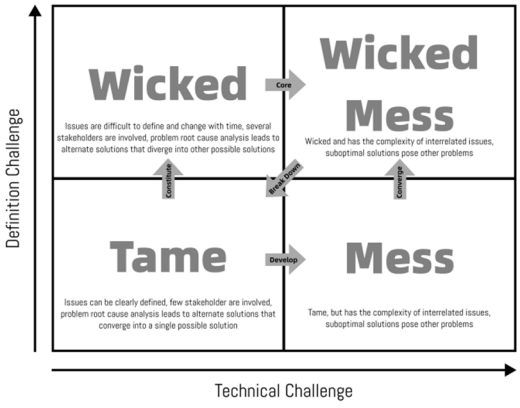

Fig. 1. The development of Tame problems(revision) [6]

2.3 PEST analysis models

To get rid of the traditional design dilemma and build a new thinking model. This paper introduces a macro analysis model highly appreciated in management and sociology - the PEST model - which has been adapted by many sociologists and management scientists to fit the needs of the times better. PEST analysis refers to the analysis of the macro environment. P is politics, E is economy, S is society, and T is technology. When analyzing a company's external environment, these four factors are usually used to analyze the situation faced by the company or society.

The political element refers to the political forces and related laws and regulations that have actual and potential influence on the organization's business activities. When political systems and institutions and governmental attitudes toward business operated by an organization change, and when the government issues laws and regulations binding on business operations, society adjusts accordingly.

Economic elements refer to a country's financial system, structure, industrial layout, resource status, level of economic development, and future economic trends. The key factors constituting the economic environment, in turn, include the direction of changes in GDP, the level of interest rates, the degree and trend of inflation, the unemployment rate, the level of disposable income of the population, the level of exchange rates, the cost of energy supply, the degree of perfection of market mechanisms, the state of market demand, etc.

Social elements. It refers to factors such as ethnic characteristics, cultural traditions, values, religious beliefs, education level, and customs of members of the society where the organization is located. The elements that constitute the social environment include population size, age structure, ethnic structure, income distribution, consumption structure and level, population mobility, etc.; Technological elements.

Technological elements include inventions that cause revolutionary changes and the emergence and development trends of new technologies, processes, materials and application prospects related to enterprise production.

PEST analysis requires a large and sufficient amount of relevant research data and a deep knowledge of the company under examination. Otherwise, it isn't easy to carry out such an investigation. The economic aspects generally include the level of economic development, scale, growth rate, government revenue and expenditure, inflation rate, etc. Political aspects have a political system, government policies, national industrial policies, relevant laws and regulations, etc. Social aspects include population, values, moral level, etc. Technological aspects are high-tech, process technology, and breakthroughs in basic research. Many scholars have expanded this model in recent years, and we believe it can be developed and applied to analyze wicked problems.

2.4 Covid-19 static fragment analysis design model

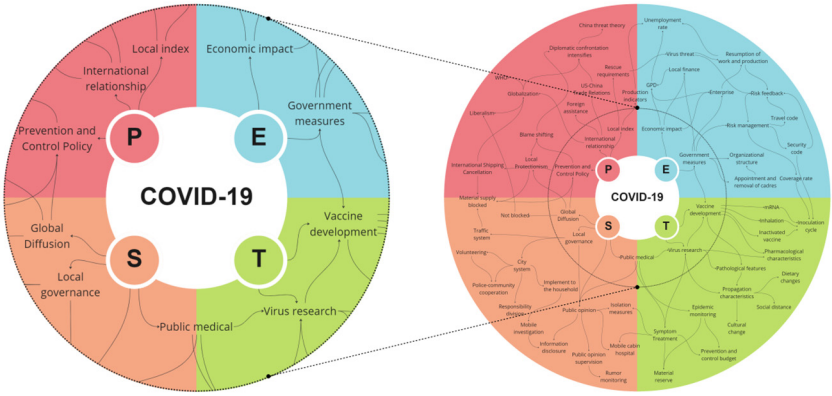

Fig. 2. Covid-19 static fragment analysis design model (Chinese social environment)

Fig.2 illustrates that the circle's inner circle is the core issue or the heart of the Wicked problem "Of Covid-19", around which four small circles are distributed. Namely, political (P), economic (E), technological (T), and social (S). Each of these circles is represented by a different colour for the block or sector where they are located. At the same time, the whole circle is separated by a black dotted line into two major circles, the inner and outer. The inner circle focuses on generalized or huge problems, which are the starting point of subordinate subsets of problems and are the most difficult to solve in the whole problem. For instance, the progress of vaccine development, the way governments make decisions, the speed of virus research, public health care conditions, and the uncontrolled global spread of the virus. These problems are real and cannot be ignored, but they are difficult to solve in the first place. They are not something that a designer or a citizen can change, or they are inherently sudden, contingent, and coercive, such as government measures and vaccine breakthroughs. Mostly, it is impractical to make these problems disappear in a matter of days because something too abstract and macroscopic is challenging to change by individual will or ability and will not disappear entirely the individual or small group efforts.

Although the inner circle of the black dotted line has its specificity, the outer ring of the black dotted line is the place where we should pay attention and make changes and think. Most of the issues in the outer circle are subset issues that are more directly perceptible and closer to our daily lives. For example, in the explicit case, the problems of the urban system come from each metropolitan area, and the issues of the urban area come from each community or each village system. Then we only need to conceptualize and design measures and ideas based on a village first. Then we can prompt the mitigation of the urban system problems.

Another example is the hidden case, such as the public health care conflict, where part of the crisis comes from the social opinion environment, composed of many individual voices. Among the many voices, everyone expects openness and transparency

of information. Then, as a self-publisher or designer, building a better way of information publication and information delivery form will significantly ease the conflict of public health care.

At the same time, it should not be overlooked that sub-level issues are interrelated and have related or opposing interests and that these issues that impact each other and tend to intensify conflicts should not be the first ones we deal with. The problem is exacerbated. It is not that we do not make changes, but we do not try to intensify the contradiction until we have clarified the stakes in the model and conceptualized a reasonable path to solve it. It must be decisively abandoned if the issue is outside the scope of existing social routes or values. There are many examples of this, but most of the time, they are ignored by designers.

In summary, the critical information extracted from this static analysis segment can only express a correlation and condition between the problem and the problem. And the specific ways and means to solve it still need designers to conceive and create, and whether it can be solved or not needs designers to decide. But the whole process of conceptualization and creativity will become more precise and concrete, no longer macro, huge, and detached from the actual content of a society.

2.5 Dynamic analysis design model under the timeline

Analyzing the subsequent static fragments also needs to return to a dynamic design science approach. As shown in Fig. 3, we have strung together each static analysis frame with a timeline to indicate that the Wicked problem (Covid-19) is still in the ongoing process as time changes. In contrast, each problem within it will exist its development and change. Like the little white ball of EXAMPLE in Fig. 3, certain developments and sudden changes will occur at each stage. It is essential to note that the timeline units are changeable; whether it is hours, days, months, or years……, they all apply. So, we still have to judge according to the specific problem. If the problem changes in a relatively slow cycle, people can choose the year as the unit, for example, environmental problems and energy problems. Nevertheless, for Covid-19, the focus of this paper, it would be more appropriate to choose months or weeks as the unit because this problem constantly changes unexpectedly fast.

Our theoretical model can effectively identify which problems are rapidly evolving and which are stabilizing, as in the case of the white ball in the figure, which is the apparent high mutation, fast-evolving type of problem. White ball with new sub-level problem synapses emerging at each stage, from the economic domain to the technological domain. Conversely, if no special-like problem emerges, it is a problem that is starting to stabilize and can easily be problems that are easy to solve. When we understand this point, we can detect the sub-level problems that change at high speed and are prone to cross-area correlation in time so that they can be detected and dealt with early. The evolution of the complexity of the problem can be stopped early.

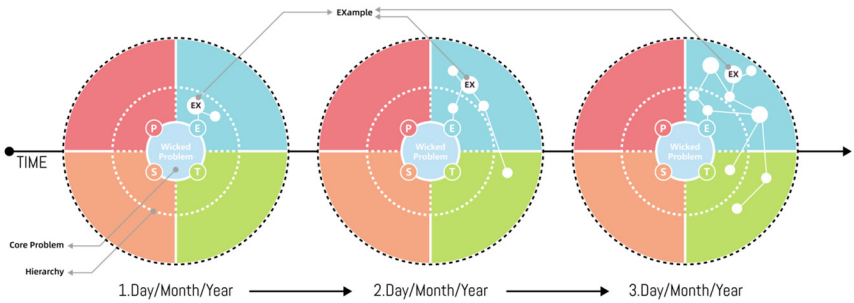

Fig. 3. Dynamic analysis design model combined with fragment analysis

3 Reflections on Design

3.1 Problems with traditional design

Although corresponding solutions are proposed, we still hope that a certain amount of design reflection and criticism awaken more designers to discover the problems and limitations of themselves and their designs so that they can make better and more socially appropriate designs in the post-epidemic era.

As Victor Margolin describes in "The Idea of Design - The Problem of Design": "Behind all this chatter, one realizes that almost all the boundaries of design have been expanded, and that through the display of design, those grand figures must be authenticated for the new freedom of form, and the claims of culture [78]." Our interpretations and expectations of design have become gradually inflated, and we begin to subjectively conceive of the value of existence and self-affirmation of the "final result," we instinctively or unconsciously believe that designers are the exporters of ideologies or value systems, and we cannot accurately interpret policy forms, social conditions, cultural connections and the necessity of existence. We cannot accurately interpret policy forms, social conditions, cultural connections, and the necessity of existence, and often selective blindness is just a self-deception subject to external conditions. There is no limit to any "beautiful dream." However, many people think that designers have always been a group of "dreamers" wearing shackles, but this is not a total rejection of design, but only a reflection and adjustment of the current design situation. As one of the ways to generate new thinking, the design still has an irreplaceable value, but we can not ignore the existence of the disease in traditional design thinking.

3.2 Realistic thinking from a design perspective

From a realistic point of view, the design education we receive from the undergraduate level starts with hands-on skills and then moves on to theoretical learning. It is affirmative, and the skills and theories of the discipline are the foundation and breeding ground for ideas before learning and generating one's ideas, and this is common for the

vast majority of disciplines - skills and theories are interdependent. The building of ideas is based on theoretical learning [9].

However, most of the time, after acquiring skills and theories, we do not recreate and reproduce them but mainly practice them with limited topics, which gives the illusion, the illusion, that the real social problems or the composition of users are so simple and limited. After repeating the process, many people have the illusion that "this is reality, this is society," but this is not the case, as in the case of Covid-19, which is far more complex and specific than the training. Of course, as in mathematics, physics, and philosophy, scholars in this field construct ideal environments for "thinking" because these disciplines have profound problems or conditions that are difficult to reach and exist in reality. For example, absolute freedom from external forces in "uniform linear motion" is almost impossible on earth, so people in the past could only construct the "ideal environment" in their thinking and make reasonable inferences. However, design is supposed to step on the outmoded experience based on the present. But design is supposed to tread on past experiences and solve current and upcoming conflicts and problems based on current technology and production conditions. Art and design is a special social ideology based on the current economic base and fundamentally a superstructure determined by the economic base. It is absolutely impossible to bring design into "idealized thinking" to make inferences and assumptions, such as the one described in "Epidemic The problem of the "epidemic" is idealized as the absence of multiple restrictions and the absence of correlation of interests.

Marx also once proposed from the perspective of dialectical materialism: the origin of the world is matter; matter determines consciousness; matter is the first and consciousness is the second; consciousness depends on matter and is a reflection of objective things [10]. Although art and design are disciplines based on leapfrog thinking, most of the time, our thinking is always outside the conventional logic, so we can adopt a "static fragment model" like the one in the text to analyze the composition of the problem. However, we can still look at our design and thinking from a dialectical materialistic perspective [11]. We cannot impose our design consciousness on the material, a kind of design nihilism, trying to build an ideal design state with absolute justice.

4 Summary and Recommendations

Public health events are an inescapable problem for all humanity. Every public health emergency since ancient times to the present has been distorting the regional or even global social order and organizational structure and thus brought an immeasurable loss of life and economic interests. Its complexity must be examined properly. Complex problems to explore the problem, in general, require systematic analysis that unfolds them into simplified dotted distributed sub-problems. In other words, it is necessary for designers or managers to solve the Wicked Problem by destroying it from innovative perspectives. The innovation in designing paradigm in the COVID-19 context thus provides a new perspective in finding solutions to tackling the public health issues as a classic Wicked Problem so as to help restore order and social ethics to society. Based

on the study of COVID-19 as a social issue, we propose a feasible solution by combining static and dynamic analysis models from the perspective of the wicked problem. Finally, through critical reflections, we will help designers understand the difference between reality and fictional ideas and understand that their design needs to be validated from multiple social perspectives. We hope to bring designers a different perspective on systemic issues. For the follow-up work, we will further follow up on the social changes and changes in the wicked problem under the new policy of epidemic prevention and control in China and gradually follow up to improve the quality of the data collection, as well as the theoretical model proposed in the paper.

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