

Wicked Problems

Subjects: **Others**

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Wicked problem thinking is regaining interest in different disciplines, mostly because of the complex and interdependent contemporary issues that are particularly challenging for policy makers. This type of problems is difficult, even impossible to tackle by defining optimal solutions because of both deep uncertainty and high complexity. The causes and effects of wicked problems are cross-scale and multi-level; they are extremely difficult to identify due to the system dynamics and non-linear interactions. Thus, most of these problems are symptoms of or related to other problems. Moreover, wicked problems are poorly formulated and boundary-spanning issues where involved stakeholders bring different perspectives to the definitions and potential resolution of the issue. Indeed, the wicked nature stems from biophysical and social complexity, where divergent values related to multi-stakeholders' perceptions and interests influence largely the problem-solving and determining desirable outcomes.

wicked problems

decision-making

social complexity

stakeholders

uncertainty

1. Introduction

The contemporary policy problems are complex and full of uncertainties; they involve interdependent structures, multiple actors, and strong societal implications. From local to global scale, these problems are associated with a resurgence of interest about the “wicked problems” thinking (See, e.g., [\[1\]](#)[\[2\]](#)[\[3\]](#)[\[4\]](#)[\[5\]](#)[\[6\]](#)[\[7\]](#)[\[8\]](#)[\[9\]](#)[\[10\]](#)). The concept of wicked problems stems from the systems theory and planning literature [\[11\]](#)[\[12\]](#); system thinking was developed to help in engaging with the overwhelming complexity of the real world [\[13\]](#)[\[14\]](#). The term of wicked problem was coined by Rittel and Webber in their seminal article “Dilemmas in a general theory of planning” [\[11\]](#). The concept was developed in order to describe the emergence of a set of intractable issues that defy the capacity of policy-makers and governments to address them properly [\[15\]](#). Churchman, defines a wicked problem as a “class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing” [\[12\]](#) (p. 141). At approximately the same time, system theorist R. Ackoff was discussing the notion of messy problems that defy technical solution [\[16\]](#)[\[17\]](#)[\[18\]](#). Another original work on policy problems was brought by Herbert Simon, [\[19\]](#), where he discussed the notion of ‘ill-structured’ problems and the inherent difficulties associated with problem-solving.

Wicked problems generally are ill-defined because their formulation already depends on the viewpoint of those presenting them [\[20\]](#), and each problem may be a symptom of other problems [\[11\]](#). Thereupon, providing a solution to one dimension of the problem may exacerbate situations by generating undesirable consequences. They are described as “wicked problems” to highlight their complexity and the difficulties they ensue [\[21\]](#)[\[22\]](#). Further, the formulation of the wicked problems and their solutions affect a wide range of stakeholders. Indeed, in a wicked

situation, there may be strong disagreement and opposing worldviews between stakeholders about the priorities and desired outcomes [23][24]. Political conflicts are also characterizing wicked problems [1][25].

In the context of global policy, issues such as poverty alleviation, natural resources management, security, have been described as wicked problems. The wicked problem perspective provides new insights concerning why many policies and programs fail to achieve their goals, have unforeseen effects, are difficult to coordinate and generate controversy and inaction [2][3][6][26][27][28]. In this line of thinking, climate change has been described as a 'super wicked problem' [29]. The super wicked problems are characterized by four additional key features: "time is running out; those who cause the problem also seek to provide a solution; the central authority needed to address them is weak or non-existent; and irrational discounting occurs that pushes responses into the future" [30] (p. 124); see also [31].

2. What make problems wicked?

Wicked problems are complex, intractable, non-linear and open-ended; they are boundary-spanning issues. Wicked problems tend to emerge in highly interconnected social systems; they are characterized by interdependence and dispute [26][32][33]. They involve different stakeholders, who differ in their interpretations of the environment and their definition of problems; the strategies developed to solve them are also related to the perceptions they develop upon their life experiences [34]. In fact, the wicked problems perspective emphasizes the role of stakeholder perceptions, values and interests with differing values and perspectives, which leads to divergent framing of the problems [3][28]. As a result, there is no consensus on what exactly the problem is, neither a well-described set of solutions [23]. Therefore, the problem definition tends to change over time [11]. There is no right or definitive solution to wicked problems in complex systems, only trade-offs and responses negotiated between the involved stakeholders [27][35][36].

Rittel and Webber have defined the concept of wicked problems through ten primary characteristics [11] (see Box 1). Further, Alford and Head have described a continuum of problems ranged from taming to wicked problems, their works detailed features of wicked problems based on complexity and the difficulties related to institutions and the stakeholders' perceptions [26], while [32] provided explanations about the constraints that hamper understanding and solving wicked systems.

Box 1. Ten defining attributes of wicked problems, after Rittel and Webber [11]

1. There is no definitive formulation of a wicked problem
2. Wicked problems have no stopping rule
3. Solutions to wicked problems are not true or false, but good or bad

4. There is no immediate and no ultimate test of a solution to a wicked problem
5. Every solution is a “one-shot operation” and may have irreversible effects.
6. There is no established set of potential solutions
7. Every wicked problem is unique
8. Every wicked problem may be considered a symptom of another problem
9. Causes and effects of a wicked problem can be explained in numerous ways
10. In solving wicked problems, the planner has no right to be wrong, i.e., policymakers are liable for the consequences of the solutions, and the public have no tolerance or trust in initiatives that fail.

3. Dealing with wicked problems

[33][34] have pointed “stakeholder divergence, situational complexity and knowledge uncertainty” as key elements reinforcing the wickedness of a situation. Hence, they are extremely difficult to tackle using conventional approaches, such as “command and control” which ignores uncertainties and feedbacks [23][28][35][36]. Tackling the wicked challenges demand collaboration between scientific communities, experts and the society. Accordingly, wicked problems have been largely discussed in a perspective of a post-normal science (see, e.g., [23]). Post-normal science approach focus on issues characterized by irreducible complexity, deep uncertainties, a plurality of legitimate perspectives, value dispute, high stakes, and urgent decisions [37][38][39][40][41].

Moreover, Inter and transdisciplinary approaches are of interest due to the social relevance in facing wicked issues [35][42][43][44]. To create new knowledge, research process invites participants from a diverse of unrelated academic disciplines to transcend boundaries and cooperate with non-academic stakeholders [45][46][47]. Accordingly, [48] argued participatory approaches based on “collective learning, exploration, and experimentation” are appropriate for tackling wicked problems [48] (p. 2). For example, in sustainability issues, scholars have preconized “multi-actor networks and collaborative partnerships” to address wicked problems [49][50][51]. The participation of multiple actors is advocated because considering stakeholders views is thought to contribute to more detailed understanding of the situation and acceptable outcomes [10][42][49][52][53][54]. This could help design and implementation of effective policies by the participants, as [55], outlined, a solution to a wicked problem is up taken durably only if it is developed collectively by the affected parties. Further, in the context of wicked problems, governance approaches also may be mobilized (see, e.g., [6][56][57][58][59][60]).

4. Conclusions

Wicked problems are largely discussed in the recent literature about the policy sciences and environmental issues, the main challenge for decision-making is to recognize such type of problems and therefore, move from conventional rational-technical solutions to develop alternative approaches and thinking. Developing those solutions may be a long process, given the irreducible complexities arising from various forms of uncertainty and social dispute. Interdisciplinary and participatory approaches are advocated to deal with these intractable issues and address the related social conflicts. Further, future research is needed to explore wicked problems-solving using the Agent-Based Modelling (ABMs). ABMs [61] have been mobilized to help decision-making in situations of complex social stubborn problems, in medicine and public health (see, e.g., [62][63]).

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