

The value and impact of stakeholder networks in exploring the complexity of government public services: a case study of stray dog population management

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The social issue of stray dogs in Taiwan has been increasingly severe. Despite the substantial annual investments in funding and resources by the government, little progress has been made in resolving this problem. The difficulty stems from the dynamic complexity of the issues among stakeholders in the service system. The research problem is: How can complex social problems be analyzed through stakeholders? The research method is a case study of the "*Stray Dog Population Management*," and system dynamics is employed to demonstrate the complex problems. The research objectives are: (1) to construct a service ecosystem using the data of a case study; (2) to employ system dynamics methods to analyze the interactions among stakeholders; and (3) to reflect on how service designers resolved conflicts among stakeholders. Based on practical cases, this study provides a new perspective for analyzing the complexity of social issues. The research results can serve as a reference for practitioners in public service design.

Keywords: *public service; systems thinking; complexity; stakeholders*

1 Introduction

The problem of stray dogs in Taiwan has received considerable attention from society. In recent years, the continuous increase in their population has led to various social issues, including conflicts between people and dogs, environmental hygiene, disease prevention, and wildlife conservation. The government and animal welfare organizations have attempted to solve this troublesome issue through various policies and plans. Zero-euthanasia policy implemented in 2017, which prohibits animal shelters from euthanizing healthy animals to reduce the pressure of overcrowding, was once seen as a milestone in animal welfare progress. While the policy seemed to protect the right to life of sheltered animals in the short term, many fundamental problems remain unresolved due to the lack of effective control of the source of stray animals, inadequate implementation of sterilization programs, the failure of pet owners to take responsibility, and the diverse religiousness of dog feeders. It has resulted in a continued high number of stray dogs and exacerbates the problem of shelters being



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in a state of constant overload (Tseng, 2018). In the long term, this has led to a decline in the quality of life for shelter animals, with many dogs dying due to overcrowding, fighting, and disease transmission. The decrease in the "Animal euthanasia rate" is the actual cause of the increase in the "Natural mortality rate" (Chang, 2017), indicating that animal welfare has not genuinely improved. Moreover, with no designated places for the increasing number of stray dogs and their continuous breeding, the problem has become increasingly severe and gradually developed into an intractable vicious cycle. As a result, it leaves the government in a difficult situation of investing substantial resources each year with little visible effect.

As can be seen, the stray dog social problem is the dynamic complexity of issues, where the interrelated causal relationships result in dramatically different outcomes in the long and short term of policies. The same action can cause vastly different effects in diverse parts of the service system, reflecting the multi-level complexity of social problems. Traditional prediction, planning, and analysis methods cannot adequately address structural issues (Senge, 1994/2018). The government may narrowly focus on solving current problems while neglecting the bigger picture, which can lead to ineffective utilization of resources and even exacerbate the social issue of stray dogs. Therefore, clarifying the structural and operational issues of the service system, and taking stock of design limitations and crucial resources, are significant issues in overcoming its complexity.

Public service is a complex system that comprises a series of interactions between stakeholders, organizations, technological elements, and service processes (Radnor et al., 2014). The service system is a value co-creation system composed of stakeholders, including service providers, service demanders, and service recipients (Service Science Society of Taiwan, 2015). The issue of stray dogs in society is a monumental and complex ecosystem involving many stakeholders, including central and local government agencies, animal welfare groups, related non-profit organizations, and people with different values. Multiple stakeholders with diverse goals, needs, and beliefs will inevitably generate strong or weak conflicts and tensions during interactions. It is evident that the complexity of these relationships poses challenges to their management, and potential interactions are unpredictable. The practice and quality of public services depend on the collaboration of multiple stakeholders. However, from the current situation of stray dog issues, many problems arise from the knowledge gap or differences in positions between diverse interest groups, resulting in communication and cooperation obstacles. Therefore, it is evident that a critical barrier to the execution and expansion of stray dog public policies and services lies in the "person-to-person" conflicts and opposition during their interactions.

This study presents the "Stray Dog Population Management Planning Guideline" as a case study. Firstly, through literature review and case data analysis, an ecosystem centered on the stray dog population management (SDPM) is constructed, and essential stakeholders and core activities in the service system are identified. Secondly, using a system dynamics perspective and method to analyze the interactions between stakeholders, clarify the behavior context behind the event, identify leverage points, and ultimately examine the process and approaches of service strategy proposed in the case. The aim is to approach the complexity and design challenges of the public service system from the perspective of "stakeholders." Furthermore, drawing on practical experience from the case, this study analyzes how service design thinking and methods can be employed to resolve conflicts among diverse stakeholders and overcome complexity in the design process.

2 The complex of government public services

Government public service is a complex system that operates as a service ecosystem. Within this ecosystem, multiple stakeholders collaboratively generate value. Moreover, through the application of systems thinking, complex problems can be effectively deconstructed, offering a more holistic perspective. In addition, service design thinking and Stakeholder Networks analysis play a crucial role in enhancing public services. The forthcoming sections will delve into the intricacies of public service, elucidate how systems thinking and service design thinking contribute to its improvement, and explore their interconnectedness with knowledge.

2.1 The complexity and value co-creation of public services

With the increasing complexity of service environments, research on service design has shifted from the traditional dyadic relationship between companies and customers (Tronvoll et al., 2011) to encompass a diverse range of service participants. Many studies advocate for the perspective of value networks to consider service improvement (Edvardsson et al., 2014). People no longer view services as just a singular process. Instead, they see services as interactions within service ecosystems, where value is co-created through participation, collaboration, and resource integration of relevant stakeholders. Driven by the Service-Dominant Logic (S-D Logic) proposed by Vargo and Lusch (2004), many scholars argue that the focus of service design research ought to be on the overall environment of a complex world, with a particular emphasis on analyzing the relationships between multiple stakeholders to help research concentrate on the entire service ecosystem (Gummesson, 2007). By adopting the S-D Logic approach, the service users and the general public are considered stakeholders in the provision of public services. Throughout the process of delivering public services, the participation and interaction of all stakeholders co-create value for all parties involved.

2.2 The characteristics and applications of systems thinking

In the face of complex social issues, a more comprehensive systems-thinking approach is required (Wymer, 2021). Senge (2018) argues that the construction of a system has a hierarchical structure, and the crux of a problem is the result of layer-by-layer deduction. Therefore, adopting a systems-thinking framework is effective in constructing processes, examining individual events in a holistic view, and gaining insights into the operating context of the system through pattern analysis. This approach can break through linear thinking and the narrow focus on individual events, broaden the scope of exploration, and examine the core of the problem. Explaining complex situations from a systemic perspective can be divided into three levels: systemic structure, behavioral patterns, and events. Among them, the most beneficial insight comes from the structure level. To achieve a more profound understanding of intricate human issues, "system archetypes" can be used as fundamental modules of a system to help illuminate behavioral patterns, which serve as successful tools for reflecting the underlying structure of systems (Braun, 2002). The purpose of archetypes is to re-adjust our cognition, help us see how the construction of a system operates, and identify the leverage points within the system. Their implementation in various management and strategic issues can reveal the impact and changes that arise in the system through event interactions.

2.3 Service design characteristics and stakeholder networks

Service design can serve as a means to address social or economic issues (Meroni & Sangiorgi, 2011) and potentially improve the quality of public services. In the service design process, it is necessary to

focus on the core stakeholders of the service and thoroughly explore the underlying meta-problems of their needs (Sung, 2020). By putting the stakeholders at the center of the design process, designers can find the appropriate remedy to address the underlying issues. Lee and Tang (2022) summarize the five following features of service design: emphasizing stakeholders, sequence, holistic view, realism, and evidence, which underscores the importance of stakeholder involvement in the service design process. Furthermore, Hsieh (2022) noted that effective service design not only meets the needs of stakeholders but also has the potential to facilitate relationship transformation among multiple parties and achieve a collaborative and mutually beneficial outcome.

To conclude, this study aims to use systems thinking methods to explore the dynamic complexity of social problems.

3 Research method

This study adopted a case study approach, selecting the "Stray Dog Population Management Plan" as the case to understand its service operation by combining literature review and case data collection. Firstly, observation and recording were carried out during the actual process of the case to obtain comprehensive first-hand data. Then, the study employed a systems-thinking perspective and Causal Feedback Loop Diagram (CLD) for analysis and interpretation to deconstruct the complex stakeholder interactions context and identify the difficulty factors that require addressing in the service system.

4 Results

Two sections present the service as an ecosystem and reveal the conflicts. Firstly, constructing a service ecosystem centered on Stray Dog Population Management (SDPM). Then, analyzing the interactive conflicts among stakeholders and clarifying the system dynamics structure and critical factors.

4.1 Constructing a service ecosystem centered on Stray Dog Population Management (SDPM)

This study reveals that the complexity of the stray dog social problem arises from the interactive network of multiple stakeholders. Firstly, the service ecosystem centered on the SDPM is unfolded through case data, clarifying the relationships and significant levels among diverse stakeholder organizations. The positioning of stakeholders in the service ecosystem, from the center to the periphery, is determined by their degree of impact on population management. Furthermore, the service ecosystem categorizes internal and external stakeholders according to their roles. Back-end support and publicly visible responsibilities are internal to the organization, while public and private sector entities which serve as external collaboration roles are external to the organization. Figure 1 illustrates how the delineation of critical interaction events accompanies the definition of system boundaries and objectives.

Due to the wide-ranging scope of involvement of numerous government agencies and non-profit organizations in Taiwan's SDPM, this study selected central and local animal protection agencies and benchmarking animal welfare groups that have direct contact with the case as representatives. By combining data collected through field observations and interviews conducted by the researchers during the case process, this study gained a comprehensive understanding of the issue's background

knowledge from the perspectives of sterilization units in both public and private sectors and sterilization practitioners with varying levels of expertise. Additionally, diverse content from organizations, such as independent media reports from WuoWuo, the Council of Agriculture, and relevant academic institutions, were obtained to construct the entire service ecosystem based on multiple data sources, including the previously mentioned field observations and interview data.

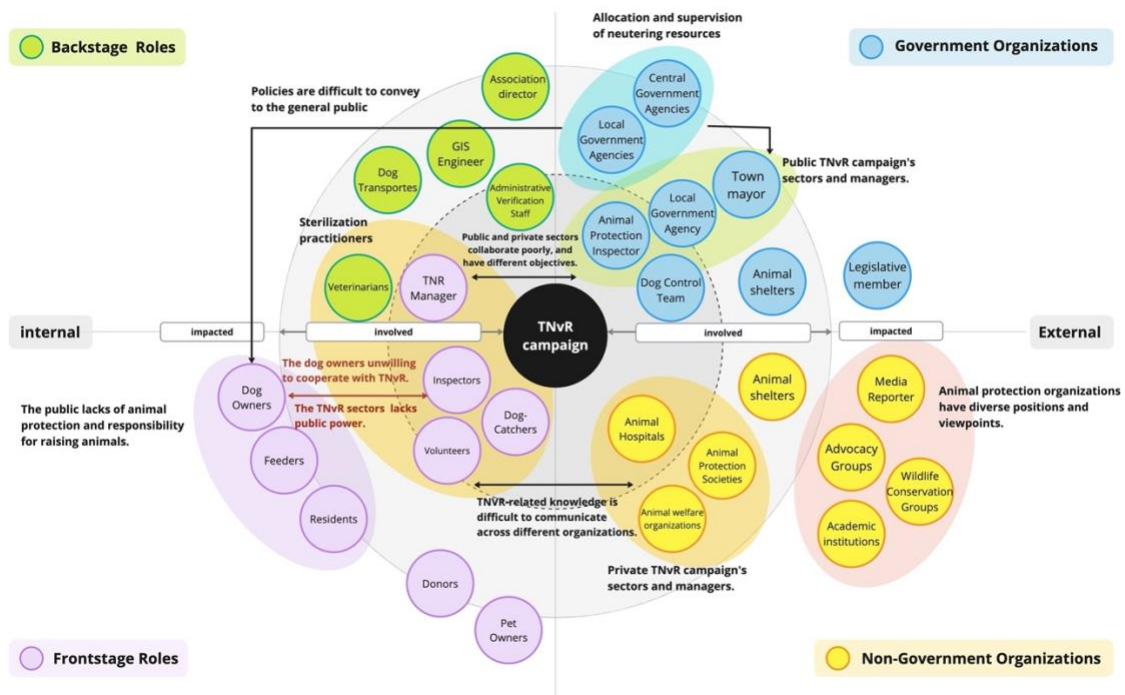


Figure 1. Mapping the stakeholders in the service ecosystem centered on the TNvR campaign

As depicted in Figure 1, the stakeholder landscape of the SDPM is highly complex, which includes a range of service supervisors from animal protection agencies at both the central and local levels. Service providers are equally diverse, encompassing public agencies, private organizations, and individuals with varied professional backgrounds, perspectives, and animal welfare interests. The service recipients are also a heterogeneous group with different values, meaning that managing diverse owners, feeders, or residents with varying attitudes toward pet ownership requires tailored responses. Moreover, Taiwan's unique geographic milieu and multiracial society inevitably engender an environment where conflicts and friction among stakeholders become unavoidable. The intricate web of multiple stakeholders and individuals forms a critical factor that poses a significant challenge in straightforwardly resolving the social issue of stray dogs and helps us understand why it is demanding to tackle.

4.2 Analyzing the interactive conflicts among stakeholders and clarifying the system dynamics structure and critical factors

This study constructs a system model of the service ecosystem based on the SDPM, consisting of four major subsystems and their corresponding key factors: (1) public participation in Trap-Neuter-vaccinate-Return (TNvR) activities, (2) implementation of regional TNvR campaign, (3) development of large-scale TNvR project, and (4) allocation and supervision of neutering resources. The subsystems are employed to explicate the intricate interrelationships among one or more organizations and the

multiple critical factors involved in their interaction processes. Among them, subsystem 2, "implementation of regional TNvR campaign," can represent the most complex concept, revealing the interactive relationship and key events among animal welfare groups, local government agencies, and the public. The researchers synthesized multiple perspectives to summarize the current service situation, pain points, and potential interventions among various stakeholder organizations, revealing the development network and operational difficulties of implementing the regional TNvR campaign in Taiwan, as shown in Figure 2.

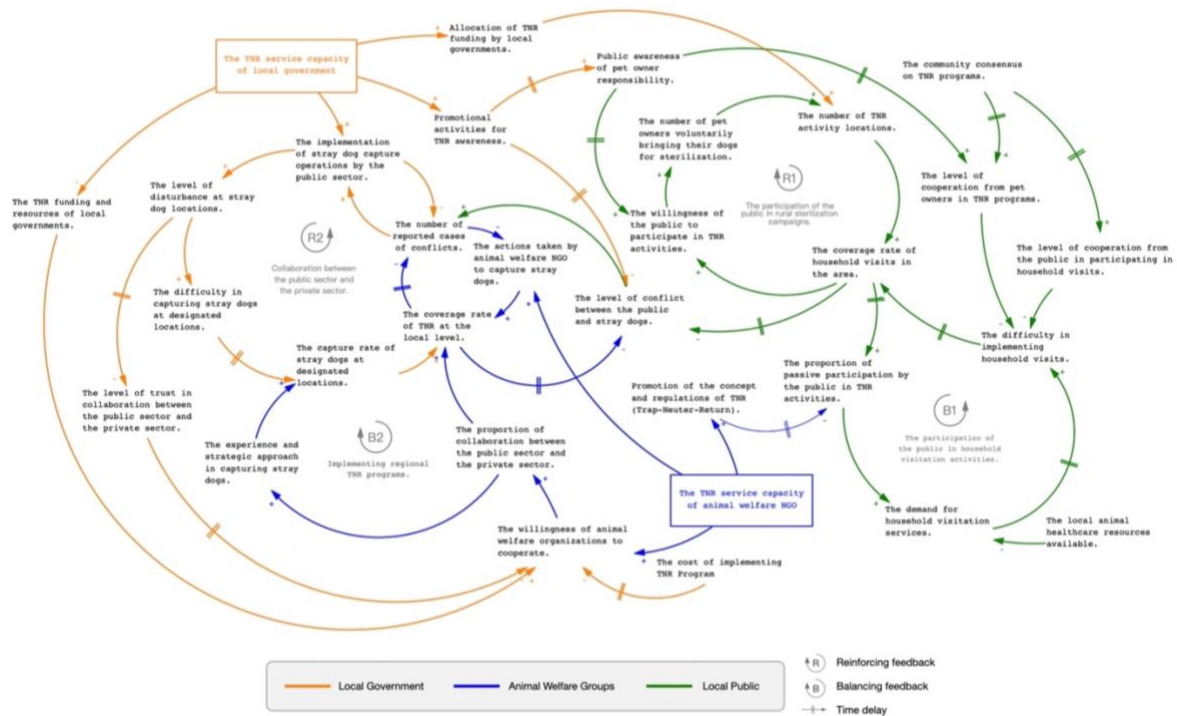


Figure 2. Causal loop diagrams of the regional TNvR campaign in Taiwan

The systems-thinking approach provides a macroscopic perspective to examine the development status of SDPM, along with various interactive issues among the participants and stakeholders involved in the program. This approach facilitates researchers in gaining a deep understanding of the complex and dynamic pivotal issues within the service. It enables them to analyze the interrelated subsystems, their constituent critical factors, and root problems within subsystems. This approach, in turn, helps overcome the limitations of linear thinking patterns or tool-based constraints adopted in traditional service design.

5 Conclusion

5.1 Systems thinking for analyzing complex social issues and decomposing them into manageable and executable service strategies

This study employs the systems thinking approach to examine intricate social issues. The government confronts the dynamic complexity of issues in a dynamic and evolving environment. These issues exhibit characteristics such as time delays, multiple causal relationships, and nonlinear interdependencies among events. The limited scope of perspectives often hampers the ability to make

well-informed decisions. Thus, this study utilizes systems thinking to analyze the intricate network of stakeholder interactions and deconstructs the dynamic complexity of issues into manageable and solvable design problems. The aim is to discern causal relationships with inherent order and prioritize problem-solving based on significance and urgency, thus facilitating informed decision-making and enabling strategic planning to be conducted with greater precision and foresight.

5.2 Integrating a systemic perspective into service design facilitates a shift from addressing surface-level pain points to enhancing root causes

By integrating systems thinking into service design, the objective is to offer a holistic and comprehensive vantage point that facilitates the resolution of conflicting interests among diverse stakeholders driven by self-interest. Simultaneously, identifying the operational structures behind behaviors unveils fundamental problems and avoids the fallacy of addressing superficial pain points. Through improving the interaction structures among stakeholders, the emphasis transitions from individual goals to collective consensus, thus thereby empowering stakeholders to evolve from passive responders to active problem-solving participants. This approach assists in constructing more effective policy planning and service layouts.

References

- Braun, W. (2002). The system archetypes. Retrieved from: https://www.albany.edu/faculty/gpr/PAD724/724WebArticles/sys_archetypes.pdf
- Chang, Y. J. (2017). Zero-euthanasia policy Topic#4 Zero euthanasia is not equal to zero culling: Talking about the quality of life of dogs and cats in shelters. Retrieved from: <https://wuo-wuo.com/topics/stray-animals/92-zero-culling-policy/864-zeczec-2648>
- Edvardsson, B., Gustafsson, A., Pinho, N., Beirão, G., Patrício, L., & Fisk, R. P. (2014). Understanding value co-creation in complex services with many actors. *Journal of Service Management*. <https://doi.org/10.1108/JOSM-02-2014-0055>
- Gummesson, E. (2007). Exit services marketing-enter service marketing. *Journal of customer behaviour*, 6(2), 113-141. <https://doi.org/10.1362/147539207X223357>
- Hsieh, W. A., & Tang, H. H. (2021). Design for People, Design with People: The Complexities and Breakouts of Public Service Design in Practice. In *HCI International 2021-Posters: 23rd HCI International Conference, HCII 2021, Virtual Event, July 24–29, 2021, Proceedings, Part I 23* (pp. 41-48). Springer International Publishing.
- Lee, Y., & Tang, H. H. (2022). How to apply service design thinking on designing accessibility apps: A case study of public transportation for the visually impaired. <https://doi.org/10.21606/drs.2022.493>
- Meroni, A., & Sangiorgi, D. (2011). A new discipline. In *Design for services* (pp. 9-33). Gower Publishing Limited. <https://doi.org/10.4324/9781315576657>
- Radnor, Z., Osborne, S. P., Kinder, T., & Mutton, J. (2014). Operationalizing co-production in public services delivery: The contribution of service blueprinting. *Public Management Review*, 16(3), 402-423. <https://doi.org/10.1080/14719037.2013.848923>
- Senge, P. M. (2018). *The fifth discipline—the art and practice of the learning organization*. (Long, G. J. Trans.), Taipei, Global Views. Original work published 1994.
- Sung, S. S. (2020). *Anthropologists in Baigongli 2 Innovative lessons of thick data*. Taipei, Reveals Books.
- Service Science Society of Taiwan (2015). *Service System View and Value Co-creation Theory*. Journal of Design. New Taipei City, Future Career Publishing Co., Ltd.
- Tronvoll, B., Brown, S. W., Gremler, D. D., & Edvardsson, B. (2011). Paradigms in service research. *Journal of Service Management*, 22(5), 560-585. <https://doi.org/10.1108/09564231111174951>
- Tseng, Y. M. (2018). Research and analysis on the problem of overcrowded shelters for stray animals. Legislative Yuan. Retrieved from: <https://www.ly.gov.tw/Pages/Detail.aspx?nodeid=5249&pid=170919>
- Vargo, S., & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. *Journal of Marketing* 68 (1), 1–17. doi:10.1509/jmkg.68.1.1.24036.

Wymer, W. (2021). Addressing complex social problems with a multi-environmental stakeholder coalition. *International Review on Public and Nonprofit Marketing*, 18(3), 403-418.
<https://doi.org/10.1509/jmkg.68.1.1.24036>