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# Enabling Collaborative Governance through Systems Modeling Methods

## Public Policy Design and Implementation

**CED⁴**
System Dynamics Group

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**Series Editor**

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# Foreword
(by John M. Bryson)

Humans have a rather astonishing array of cognitive, emotional, and behavioral limitations. Given all of that, it is somewhat surprising that we have emerged as the dominant species on the planet. It must mean that most of the competition was and is relatively weak. After all, we are vastly outnumbered by bacteria, viruses, crustaceans, insects, fish, birds, and much else. Nonetheless, based on our ability to think, make and use tools, cooperate, and procreate, we have been able to shape our environments in ways that enabled "victory," at least for a large fraction of (the now-quite-numerous) us. For example, noted cognitive scientist, linguist, and popular science author Steven Pinker argues in his book *The Better Angels of Our Nature* (2011) that violence in human societies is generally down from previous times. In addition, Pinker in his book *Enlightenment Now* (2018) and Nobel Prize-winning economist Angus Deaton in *The Great Escape* (2015) argue that the available data indicate a general improvement of the human condition over recent history.

The victories, however, are never complete and never permanent. Governance regimes and vital institutions can be fragile; power can be abused; civic engagement can be badly skewed and otherwise problematic; knowledge, theory, and analysis can be incomplete or just plain wrong; learning may be incomplete, superstitious, or absent; public values such as liberty, justice, equity, security, and democracy can be undermined. Our cognitive, emotional, and behavioral capacities; inclinations to cooperate; and institutions face some severe challenges, including the fact that we humans in some circumstances can be our own worst enemies. The causes and consequences of climate change, serious threats to global security, severe inequalities, terrible human rights violations, instabilities in the Middle East, and other issues addressed in this book are just some of the many challenges.

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To address these and other challenges we need good ideas (policies, programs, etc.) worth implementing that can be implemented, along with coalitions of support large enough and strong enough to adopt the ideas and protect them during implementation. More broadly, we need to have worthy *aspirations* (vision, mission, values, principles, goals) that can be achieved via *approaches* (governance arrangements, policies, strategies) that are supported by the *capabilities* (institutional, political, social, economic, organizational, administrative, technological, financial, analytic, engagement-oriented, etc.) necessary to achieve them.

Unfortunately, the big challenges we humans face are all embedded in large, complex—or at the very least, quite complicated—systems. So right off the bat our cognitive, emotional, and behavioral limitations cause mischief *absent* good institutions built around a sound, pragmatic understanding of the problem at hand and approaches to managing the challenges effectively. We individuals can only keep a few pieces of information in short-term consciousness at a time—thus the informational content of most systems totally outstrips any individual's capacity to keep it in mind. We need some sort of external representation and memory to keep track of it all, let alone analyze it. The challenge is much worse when you take feedback effects into account. In short, we humans are badly disabled when it comes to handling dynamic situations involving lots of inter-related elements, stakeholders, and feedback effects. Add in the cumulative disabilities of all the key actors and stakeholders involved or affected and you have a great pool of ignorance. When that ignorance infiltrates the resource pool that supports and guides action, some really dumb, disappointing, and often extremely damaging stuff can happen.

So how do we come up with worthy aspirations, approaches to achieving them, and the capabilities needed to power the approaches? Problem formulation and problem-solving using systems principles can help. Drawing on these principles is especially useful for coming up with good ideas worth implementing that can be implemented. When deployed in a group setting or when key stakeholders are otherwise engaged with understanding, analyzing, and addressing important challenges, systems principles can also help with building the coalition of support needed to adopt recommendations flowing from the effort and protecting them during implementation.

*Enabling Collaborative Governance Through Systems Modeling Methods* is a valuable and much-needed book. As the editors Carmine Bianchi, Luis Luna-Reyes, and Elliot Rich note in their introduction, the focus is on "collaborative governance for public policy and managerial problem-solving through systemic principles, as well as through the use of group processes to facilitate agreement and buy-in regarding collective strategies." In other words, the book is meant to foster understanding and analysis of complex systems in such a way that changes can be made to produce better outcomes. The inventory of systems modeling and analysis approaches is diverse. This volume focuses on a few of these, including system dynamics modeling, participatory approaches to system dynamics modeling, and the use of system dynamics for performance management. The book shows clearly how system dynamics thinking can make extremely valuable contributions to collaborative governance, policy making, and implementation not likely using other methods. Hooray for this book!

The book is *especially* timely because of the heightened need for collaboration across boundaries of many kinds, including business, government, nonprofit, civil society, and national boundaries, if important, and especially public, challenges are to be addressed effectively. The book can help broaden the understanding and use of system dynamics approaches in the fields of political science, policy analysis, and public, nonprofit, and business management. Indeed, my hope is that schools of public affairs, public policy, public administration, and planning will all embrace systems approaches, and system dynamics in particular, as part of their curricula. That way the stock of knowledgeable practitioners can increase so that the flow of good collaborations, analyses, interventions, and governance can increase. As a result, one can easily imagine we can all be made better off—and that is precisely what we ought to want.

# Introduction

**(by Carmine Bianchi, Luis F. Luna-Reyes, and Eliot Rich)**

Public policy implementation remains a vital topic for research and practice, particularly in the current debate surrounding the pursuit of sustainable social development and community quality of life. Lack of coordination between the political and administrative levels in a single agency is a major cause of inconsistency in the provision of public services. Moreover, with trends on New Public Management (Osborne & Gaebler, 1992), New Public Governance (Osborne, 2006), Networked Government (Bryson, Crosby, & Bloomberg, 2014; Stoker, 2006), and Joined-up Government (Bogdanor, 2005), coordination among government agencies and coordination among government, the private sector, and civil society become also necessary. Inconsistent policy design and unsustainable policy implementation are associated often with the use of an overly narrow, static and non-systemic view that is insufficiently robust for the dynamic complexity of the current spate of "wicked" social problems (Eden, Jones, & Sims, 1983), e.g., unemployment, youth disengagement, social cohesion, domestic violence, child abuse, crime, corruption, terrorism, poverty, migration flows of refugees, homelessness, climate change, and natural disasters. Such policy areas involve a multitude of complex dynamic problems that today's societies expect to deal with as they pursue resilience and improved quality of life. Failing to consider the dynamic complexity of such problems

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increases the risk of policy resistance and of the counterintuitive, unpredictable behavior of the systems that a public agency may try to affect through its own actions. In addition to the intrinsic complexity of the problems, coordinating policy and actions to solve them usually involves a multitude of policymakers and other stakeholders from the public, but also from the nonprofit and the private sectors.

Moreover, the literature on collaborative governance notes the need to avoid adversarial conditions between the public and private sectors in problem examination and resource acquisition and deployment (Ansell & Gash, 2008). The current political climate promotes investment in programs that provide high value to both private and public sectors, without a good understanding of the possible trade-offs that skew results toward one sector or another over time.

This opening chapter sets out a structure for considering collaborative governance for public policy and managerial problem-solving through systemic principles, as well as through the use of group processes to facilitate agreement and buy-in in collective strategies. Such a collection of tools, techniques, and frameworks is needed to establish the value of these approaches and to accelerate their dissemination through the field.

As mentioned in previous paragraphs, the importance of collaboration among government agencies and other partners, such as private organizations and nonprofits, is part of several streams of literature such as collaborative public management, multi-partner governance, joined-up government, public value management, or networked government (Bryson et al., 2014; Stoker, 2006). Also, collaborative approaches to developing governmental IT projects are appealing for several reasons (Faerman, McCaffrey, & Van Slyke, 2001; McCaffrey, Faerman, & Hart, 1995). Collaboration is frequently triggered by a problem that requires actions involving multiple stakeholders (Ansell & Gash, 2008; Bryson, Crosby, & Stone, 2006; Luna-Reyes, 2013): (1) a complex problem requiring external assistance (Bryson et al., 2006; Dawes, Cresswell, & Pardo, 2009; Vangen & Huxham, 2011), or when the problem or task requires expertise beyond organizational boundaries (Black, Carlile, & Repenning, 2004; Daley, 2009), (2) an opportunity to use resources in a more effective way (Bardach, 2001), and (3) the opportunity to innovate in the provision of services (Page, 2003; Yuan & Gasco-Hernandez, 2019). Ansell and Gash (2008) developed a model to guide collaboration processes across organizational boundaries. Their model comprises five main components: starting conditions, institutional design, and facilitative leadership determine the collaborative process which, in turn, determines outcomes. Starting conditions refer to the main incentives and constraints to participate in a collaborative effort, comprising asymmetries in terms of power, resources, and knowledge, as well as the previous history of collaboration among partners. The second element in their model, institutional design, involves participatory inclusiveness, forum exclusiveness, clear ground rules, and process transparency.

Institutional design may also include, more generally, the main decision-making rules, design policies, network structure, and assessment mechanisms. A third important component of the model involves facilitative leadership. The fourth component involves the collaboration process itself. Often, the literature considers this

as a set of virtuous (or vicious) cycles where collaboration brings commitment among participants and shared understanding about the problem area, improving results (Vangen & Huxham, 2011). The virtuous cycle becomes a trap when there is no trust, people will not develop commitment or shared understanding, and when the likelihood to obtain the planned outcomes is low. Commitment and shared understanding specify the way in which collaboration enhances processes to reach positive outcomes as the fifth component of the model. Bryson, Crosby, and Stone (2015), on the other hand, characterize collaborative governance as a black box of interactions between collaboration processes and structures. Such interactions express themselves in the face of leadership, technology, governance, and capacity to collaborate. They also suggest that systems approaches could be useful to understand the black box better, providing a better understanding on the complexity of both problems and the necessary collaboration. This edited volume is an attempt to respond to their call and provide a first approximation to collaborative approaches through systems approaches.

## Systems Approaches and Collaborative Governance as Included in This Volume

Systems approaches are diverse and include both hard and soft methodologies, as well as unitarian, pluralistic, and coercive perspectives (Jackson, 2003). This volume focuses on a few specific perspectives among the diverse set of systems approaches. First, most of the contributions in the book relate to system dynamics, a system approach based on the understanding of dynamic behaviors over time as well as feedback processes that explain the behaviors over time (Richardson, 2011). Also, contributions in the book focus on participatory approaches to system dynamics identified in the literature as Group Model Building (Richardson, Andersen, & Luna-Reyes, 2015; Vennix, 1996). Finally, the book presents a specific application of system dynamics to performance management. In the following sections, we briefly describe these approaches.

## Group Model Building as an Approach to Collaborative Modeling

Group Model Building (GMB) is a technique for exploring complex problems that use some combination of collective effort to produce knowledge artifacts. While similar approaches are practiced widely, under names like Joint Application Design, Collaborative Workshops, Brainstorming, Delphi, Participatory Modeling, and many others, we focus here on the use of GMB and System Dynamics (SD) Modeling. In this context, the knowledge artifacts include constructs specific to SD,

such as causal maps and reference and aspirational behaviors over time as well as focal and prioritized issue lists, domain epistemology, and other outcomes common to collective ideation (Black & Andersen, 2012; Luna-Reyes et al., 2019). A GMB project may be a one-shot activity, though it is often part of a series of stakeholder and modeler tasks that include revisiting and refinement of the models and other work products (Andersen, Richardson, & Vennix, 1997; Scott, 2018).

GMB efforts usually include a mix of formal and informal activities. With some variation depending upon the context, these include stages of solicitation of individual perspectives, followed by an articulation of a dynamic hypothesis expressing facets of the problem through system behaviors over time. These, in turn, are linked through causal structures common to SD models. There is a rich literature on how to prepare for and execute the modeling effort (Andersen & Richardson, 1997, 2010; Hovmand et al., 2012; Richardson & Andersen, 1995; Richardson et al., 2015) as well as how to interpret the formal and informal materials generated through the process (Black, 2013; Black & Andersen, 2012; Luna-Reyes et al., 2019). In our own experience, GMB projects tend to be very intensive and expensive efforts and warrant the careful preparation described by these authors. Even with careful preparation, there are often moments where improvisational facilitation skills are beneficial.

In his Forrester Award lecture to the International Conference of the System Dynamics Society, Vennix (1999) notes three motivations for including GMB in systems projects: improved knowledge capture, model implementation, and increased participant learning. When stakeholders provide insights into the problem collectively, we anticipate more effective (e.g., insightful) and efficient (e.g., ideas per hour) results. As perceptions of possible root causes may vary based on the position of the individual, successful articulation of contrasts and parallels are surfaced. In the context of GMB, model implementation again takes many forms: illustrations of classic system archetypes (Kim, 1993) or variations of small models that capture classic systems behaviors (viz., "Boom and Bust," see (Sterman, 2000)). Even models with limited fidelity to data can produce meaningful lessons, stimulate exploration of the problem, and increase stakeholder engagement (Ghaffarzadegan, Lyneis, & Richardson, 2011). Developing robust simulation models is very difficult to accomplish during the time constraints of a GMB meeting. Anecdotal reports of multi-day GMB efforts with the modelers working overnight to produce refined models indicate that the effort was of limited value.[1] On the other hand, integrating stakeholders into the validation of a robust model may improve both the quality of the model and the learning outcomes (van Nistelrooij, Rouwette, Verstijnen, & Vennix, 2015).

The third motivation, increased participant learning, is perhaps the particularly valuable facet of a GMB project. Here we recognize the potential growth of the systems perspective among participants. Broadening the view of the problem to

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[1] David Andersen notes that in his experience attempting to create a robust running model during a GMB was akin to a "parlor trick" rather than of value. Andersen, D.F., (n.d.), personal communication.

account for multiple perspectives, enabled through the co-creation of causal models, specification of desirable and undesirable outcomes, creates a platform for leverage and change. It also opens opportunities to share aspects of the problem that cross organizational boundaries and priorities. As participants work together over several sessions to define, refine, and strategize a complex problem, their trust in each other and their organizations is expected to increase. Both formal research and informal observation note that active participation in the modeling process may affect the feelings of ownership among the stakeholders, increase interpersonal trust, and reinforce the value of the process and the outcomes.

The evaluation studies surrounding GMB-based SD projects demonstrate both promise and pitfalls. Rouwette, Vennix, and Van Mullekom (2002) performed a meta-analysis of 107 case studies that integrated stakeholders into the modeling process. Their conclusions showed mixed results: Many case studies reported positive learning effects, and an increase in commitment, though the variety of assessment techniques and data reports made summary judgments uncertain. Hovmand et al. (2012) help address the inconsistency through the application of standardized scripts that improve effectiveness and address cultural barriers. More recent studies provide focused insight into outcomes, with emphasis on the role of boundary objects linked to participant recollection (Scott, Cavana, & Cameron, 2016). Stave, Dwyer, and Turner (2019) found that participant satisfaction and outcome quality may differ within the same intervention, so that care needs to be taken on how to evaluate GMB results at the individual and organizational level. McCardle-Keurentjes, Rouwette, Vennix, and Jacobs (2018) extend the evaluation space through a controlled experiment examining the role of models in a group setting, finding partial support for the role of qualitative models on insight and confidence in a group decision process. As is usually the case, more study on the effectiveness of GMB is warranted.

A final observation on the role of SD and GMB comes from the use of existing models to help develop consensus or motivations for stakeholder action. In these applications, the model can be used as an experimental platform to examine the effect of policy choices on possible futures. Large-scale, data-driven models such as C-Roads (Sterman et al., 2012) help stakeholder groups envision possible futures and affect national and global futures (Rooney-Varga et al., 2018).

## Dynamic Performance Management

An important domain for public management well represented in this volume is the domain of performance management. Systems thinking and collaborative governance in this context are relevant because, in today's complex, plural, and fragmented governance settings, a single organization can manage only a subset of the resources affecting the wider system outcomes (Osborne, 2010). In this context, innovative performance governance methods (Bouckaert & Halligan, 2008) can become a key to foster the implementation of a "whole of government" approach

(Christensen & Lægreid, 2007) and to support an inter-institutional perspective where policy coordination and collaborative governance enhance better community outcomes. Hence, a prerequisite to implementing the collaborative governance of policy networks is an accountability system that effectively tracks inputs, processes, and outcomes (Crosby & Bryson, 2010; Emerson & Nabatchi, 2015).

Dynamic Performance Management (DPM) is a conceptual framework that challenges traditional performance analysis (Bianchi, 2016). Conventional approaches to performance measurement apply consolidated practices of accounting and statistical computation (including Balanced Scorecards), which often lead to static reporting, implying a bounded and lacking view of the system from which performance measures originate. These conventional approaches may also fail to use reported data (Bianchi & Rivenbark, 2014) and a bounded contribution of performance management to the understanding of the problems on which to focus, of their causes, and possible fixes.

Through DPM, it is possible to enhance the design and implementation of "intelligent" performance management systems, which can support the decision-maker's learning processes in assessing performance under a sustainability perspective. This framework may enhance the ability of performance management systems to cope with dynamic and complex problems. It can support decision-makers in understanding how the accounted financial results (e.g., cash flows) are affected over time by other quantitative (nonfinancial) variables (e.g., tourist visits) and by intangible assets (e.g., image, infrastructure obsolescence, crime levels, trust, governance capacity).

Also, DPM supports the design of performance management systems that foster trade-off analysis in both time and space (Bianchi & Williams, 2015). While trade-offs in time concern the effects of policies in the short vs. long term, trade-offs in space concern the effects of policies on a subsystem vs. another subsystem. For instance, to fix financial problems in the short run, a municipal administration may implement an indiscriminate reduction of urban renewal investments. Though this policy may improve financial performance in the short run, it would reduce the quality of life in the city and its suburbs in the long run. A reduction of urban renewal investments might gradually worsen the city infrastructures (e.g., concerning transportation, garbage collection, water distribution, parks) and the quality of supplied services. Inertial forces characterize these phenomena: the perception by citizens of the effects that such indiscriminate investment cuts generate on quality of life is not immediate.

The capability of a "dynamic" performance management system to frame such trade-offs may help policymakers to perceive delays affecting performance, to detect inertial and latent phenomena promptly, and to place performance measures into the broader context of the relevant system (Bianchi & Rivenbark, 2014). Failing to consider the dynamic complexity of such "wicked" social problems increases the risk of policy resistance and of the counterintuitive, unpredictable behavior of the systems that a single agency may try to affect through its actions. In addition to the intrinsic complexity of the problems, coordinating policy and actions to solve them usually implies that a multitude of policymakers and other (public and private sec-

tor) stakeholders collaborate. Collaboration requires that learning facilitators may support different players in achieving a common shared view of the system as a basis for sustainable policy design and implementation.

Applying DPM to collaborative governance requires extending its focus from an agency to an inter-organizational level, which underlies local area performance. This perspective of performance is an outcome of the aptitude of different stakeholders in a region (e.g., a city neighborhood) to collaborate for the development of common goods that may contribute to generating public value, to provide better conditions for individual local organizations to pursue sustainable development. This value may concern the social, competitive, and financial performance for both a local area and its operational agencies. It implies that not only short-term effects of policies (output measures) but also long-term results (outcomes) are gauged and affected. Such results relate to the generation of intermediate and long-term outcomes, leading to changes in common goods, through collaborative policies. For instance, the change in the attractiveness of a local area (long-term outcome) can be affected by each organization through policies aimed at improving the quality of infrastructure and services, number of businesses located in the area, average employment rate, citizen (or tourist) satisfaction, and the quality of the local environment.

By integrating multiple dimensions of sustainable performance, local agencies in a region would embrace together with other stakeholders an "outside-in" perspective of performance management. Through this perspective, policy design is first about a local area, rather than individual organizations. The role of each agency would be to focus—as the second step of analysis—on how to consistently contribute to implementing community policies.

DPM can foster collaboration in policy networks. Although common goods are not individually owned by any of the stakeholders—and therefore are not under their direct control—they are important levers to build and sustain the performance of local areas and the quality of life they provide. Therefore, the aptitude of a local area to generate community outcomes is a fundamental condition for the sustainability of performance in both the area and its organizations. Sustainable implementation of such policy requires an aptitude to balance (at least in the long run) three sets of goals, i.e., financial equilibrium, competitiveness (e.g., quality and timeliness of urban renewal), and social inclusion. Several chapters in the book implement DPM using a three-layer framework involving an understanding of strategic resources, performance drivers, and end goals.

## The Contents of the Volume

The 15 chapters of this book are in three sections. The first section discusses different frameworks based on systems approaches that foster collaborative governance networks and policy implementation. All these chapters illustrate the advantages of systems approaches in identifying a problem focus (Richardson, 2011; Sterman,

2000), as well as their potential to facilitate collaborative governance (Stave et al., 2019). In particular, Chap. 1 discusses a conceptual framework to map the size, scope, and depth of interactions between the organizations participating in a Los Angeles Police Department-led human trafficking task force. Based on the analyzed case, the authors illustrate the usefulness of the proposed framework for identifying innovative ways to conceptualize complex interactions among actors in governance networks.

The second chapter illustrates how feedback analysis can support public policymakers in identifying barriers to policy implementation. The case of the Swiss construction material industry applies the perspective of the resistance of existing business models to the diffusion of alternative logics.

Chapter 3 uses system dynamics modeling to illustrate how such approach can support co-production in planning sustainable outcomes and fostering public value generation in a small Italian town, with a specific focus on the museum and cultural industry. In particular, this research combines two different frameworks, i.e., the "Dynamic Multidimensional model" of network performance and "Dynamic Performance Management."

The topic of sustainable rural area development, with a specific focus on economic, social, and technical skill issues, is analyzed in Chap. 4. To this end, a conceptual feedback model captures the case of rural rice-producing villages in Central Java, which have been experiencing a youth labor shortage. The model is used as a basis to outline, discuss, and compare alternative policies to prevent and counteract crisis at both community and organizational levels.

Chapter 5 concludes the first section of the book. It focuses on the issue of policy implementation in the light of the United Nations agenda for the achievement of "Sustainable Development Goals." Based on a literature review, the authors discuss the role that system dynamics can play in policy implementation.

The second section comprises four chapters, focusing on specific systems methods and tools to enable collaborative planning and decision-making in various contexts. In particular, Chap. 6 discusses the topic of healthcare governance, with a specific focus on those countries that are moving toward middle-income status. The case of governance and planning of HIV/AIDS services at the provincial level in Vietnam is analyzed. A budgeting tool, including a system dynamics model and an interface that enables its use by planners and stakeholders, is illustrated.

The topic of client attitudes to group decision-making process outcomes comes to our attention in Chap. 7. To this end, the results of research conducted by the authors with a sample of New Zealand public servants, who were seen by their organizations as most likely to commission and conduct group decision-making processes, are illustrated. They consider the role played by group model building, and system dynamics in enhancing consensus building in the identification of outcomes and the factors affecting them.

Chapter 8 faces the issue of environmental policy implementation, with specific attention to the Swedish context. In this regard, the authors emphasize the usefulness of feedback analysis in identifying the driving forces behind failures in the implementation of environmental measures.

Chapter 9 concludes the second section. Here, the focus is on metropolitan transportation planning and the use of innovative tools to explore trade-offs, build consensus, and foster collaboration on collective action problems among network actors. In particular, the contribution presents the role of the "Multicriteria Decision Analysis" approach to evaluating alternate scenarios in the Chittenden County Metropolitan Planning Area (USA).

The third section of the book focuses on how system dynamics modeling may enhance performance management and governance through outcome-based "dynamic performance management." Six chapters contribute to this goal.

In particular, Chap. 10 illustrates the role of dynamic performance management and governance in framing community outcomes sustainability through the perspective of patronage policies. This approach is useful to explain how patronage appointments may be reinforced over time if they do contribute to the performance of the public sector. The illustrated models also help policymakers in identifying the drivers of performance that can be related to patronage and in looking at potential dominant feedback loops that may generate dysfunctional outcomes from patronage.

Chapter 11 illustrates how dynamic performance management (DPM) may enhance collaborative governance in designing and implementing sustainable wind energy policies in Brazil.

The governance of public emergencies through DPM is the focus of Chap. 12. The case of the Chinese earthquake in the Wenchuan county is adopted as a discussion basis to illustrate the usefulness of DPM in identifying relevant performance outcomes, their drivers, and the strategic resources affecting them.

Chapter 13 applies DPM to the performance governance of universities, with a specific focus on the so-called third mission. Through the identification of the relevant institutional logics and the actors holding them, the facilitators in the collaborative DPM modeling process can develop specific solutions and techniques to manage tensions between involved stakeholders.

Chapter 14 illustrates how DPM can help decision-makers focus on the critical drivers impacting on desired results in the field of chronic care management and governance. The case of the Italian region of Lombardy is adopted as a discussion basis to illustrate the usefulness of the proposed framework to enhance collaborative governance in the analyzed context.

The final chapter focuses on the application of DPM to university institutions. DPM is used to frame the problem of pursuing sustainable and balanced outcomes associated with the three main higher education missions: teaching, research, and knowledge transfer to the society.

In sum, this volume constitutes a first approximation on using systems approaches and dynamic performance management as tools for collaborative governance. As suggested by several chapters in the book, models and simulations used in some specific systems approaches may contribute to facilitating problem focus and collective understanding of collaborative governance. Chapters in the book are making this point, especially in the area of performance management. The explicit connection between resources and outcomes promoted by this view helps managers to understand better how to improve policy and to create positive outcomes that create public value.

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# Part I
# Systems Approaches to Collaborative Governance Networks and Policy Implementation

# Chapter 1
# Applying Governing Networks and Multilevel Scales to Address Wicked Problems

**Henrik P. Minassians and Ravi K. Roy**

**Abstract** The question of how to govern multiscale problems in today's networked environment is an important topic in the fields of public administration and public management. This chapter addresses the complexities involved with managing the interaction of actors operating in dynamic networks and various scales of governance. Traditional NPM-based approaches, in particular, have proven grossly insufficient for addressing the complexities associated with network systems and the scalar politics associated with managing wicked social problems like global-sourced human trafficking. Our approach builds on Cash et al.'s (*Ecology and Society* 11:8, 2006) argument that there is no single, correct, or best governing approach or scalar model that can be universally applied across the board. We propose a more sophisticated and nuanced paradigm that draws on a dynamic set of approaches that reflects the type of network and scale of players within the specific political, economic, and social context in which they operate and interact. The key issue is whether the existing, evolving, and proposed governance structures and processes are designed to fit the purpose of the outcome. Adaptive governance allows different networks to identify modes that fit a particular purpose. How networks and related governance scales are conceptualized tends to vary across fields of study. Drawing on the rich literature from political science and environmental studies, this chapter explores innovative ways of conceptualizing the complex interactions among governance network actors. We apply this conceptual framework to help us map the seemingly intractable collective action challenges associated with multilevel scalar politics that are continually evolving within a rapidly changing world.

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This study provides extensive discussion of the literature and examines how evolving public networks of actors came together to address the human trafficking problem in a locality.

**Keywords** Network governance · Scalar politics · Public management · Wicked problems

Public administrators throughout the world operate in highly differentiated political, social, and economic contexts. Consequently, the resources and capacities of public administrators and the agencies in which they work tend to vary widely across these contexts. With the intensification of globalization in recent decades, economic, social, political, and ideological issues are increasingly transcending national and regional boundaries. Indeed, many of these issues extend beyond the scope of sovereign governments and often circumvent the formal apparatuses of the state. Constrained in their ability to tackle such problems at their foreign source, local public administrators must adapt to working in environments that are increasingly unstable and hence much less predictable. Theodoulou and Roy (2016) claim that as a result, "a new era characterized by 'unreason' and 'confusion' where 'no one is in charge' is quickly eclipsing 'rationalized' processes that have characteristically been associated with the relatively stable nation-state–centric system." In the past few decades, this has been exacerbated due to the rise of greater reliance on government contracting. Hence, formal top-down organizational structures and processes emphasized in traditional public management paradigms are increasingly being reconsidered.

Traditional public management paradigms emphasizing the role of formal organizations are proving inadequate to address many globally-sourced wicked problems such as human trafficking. As a result, concepts such as *network governance* are increasingly studied. Milward and Provan (2006) attribute the rise of societal networks to the hollowing-out of the state and the weakening capacity of governments to address complex social, political, and economic issues. Relatedly, the multilevel and multiscale character of many of today's policy issues and solutions reflect the network structures through which they have emerged. Scholars and practitioners of public management must develop innovative conceptual approaches that allow us to map the activities of multiscale networks. This will equip us better as we address complex, wicked social problems with the appropriate policy and administrative tools.

A major challenge facing public managers in tackling wicked social problems is the difficulty in conceptualizing the complex collective action issues that come into play when numerous state and social network actors are involved. This study relies on Gibson, Ostrom, and Ahn's (2000) typology as a foundation for our conceptual

framework. Considering that the natural sciences have long understood the importance of scales, there is a paucity of knowledge in the social sciences. More specifically, in the social sciences, the idea of scales has been less explicit, less precise, and more variable.

To help us illustrate the applicability of this framework, we will examine the interactions of different purposed organizations operating in complex cross-organizational environments. These include, for example, state, county, municipal, nonprofit, private, and voluntary networks. More specifically, we will apply this framework to map the size, scope, and depth of interactions between the organizations participating in a Los Angeles Police Department-led human trafficking task force. Using this approach, we will be better able to assess the task force's impact in reducing human trafficking-related crimes and activities, which range from physical violence and drug addiction to money laundering and vandalism. The size, scope, capacity, and resources of different actors reflect the political spatial dynamics in which they operate. Whether the framing of a policy problem is a local, regional, national, or trans-boundary issue is determined largely by the political context through which it emerges (Delaney & Leitner, 1997).

In recent decades, domestic governments have been compelled to change how they function and operate. On an international scale, the intensification of globally-sourced economic, political, and social problems are compelling governments to think and initiate actions beyond their borders. Compelling factors drive these changes, including domestic pressures for fiscal austerity placed on local governments, a growing demand for integrated services aimed at improving customer service and satisfaction, the increasing role of e-governance, as well as the demand for cross-sectoral and cross-governmental collaboration.

As we shall explore in greater depth, traditional official government agencies operating at the municipal, state, and federal level have been attempting to augment their capacity to cope with the growing complexities described above by "scaling-up" their collective resources through intergovernmental cooperative action with a variety of state and nonstate actors. Campbell and Lindberg (1990) argue that the ability of local governments to mobilize resources in pursuit of their goals is dependent upon the strength of the relationships that they have built with network actors. Different types of governance models reflect the distinct socioeconomic, political, and administrative processes that they operate through. Rhodes (1997) asserts that the development and evolution of governance structures directly influence the interaction of state and nonstate actors. While the state continues to play a leading role in policy formation and implementation, societal actors increasingly promote innovative agendas and related strategies through governing networks. Rijke et al. (2012) assert that the fit-for-purpose governance framework can become the alternative starting point for guidance to the decision makers. Adopting different governance forms, in return, requires institutional reforms and adaptations.

## 1.1    The Rise of Governance Networks

At the turn of the twentieth century, the bureaucratic governance model was introduced, which emphasized formal hierarchically-organized structured state institutions (Lewis, 2003). Peters (1998) brings out that under the bureaucratic model, formal rules and procedures were adopted outlining the distinct roles of government vis-a-vis the market.

The rise of network governance emerged in response to coordination dilemmas experienced by multiactor systems aimed at making state, market, and societal partnerships more strategic (Considine & Lewis, 2003). Scholars such as Lowndes and Skelcher (1998) assert that network governance regimes aim to foster a culture of trust and cooperation among voluntary players. Trust is facilitated largely through the cultivation of long-term relationships (Provan and Milward, 2001). Powell, Koput, and Smith-Doerr (1996) and Forrer, Kee, and Boyer (2014) assert that networks are organizational alliances which are linked together through common goals and purposes. Peters (1998, 2004) argues that networks provide political, economic, and social benefits to the constituents they serve through the adoption of common goals by helping to create economies of scale. Individual organizations often do not possess the wherewithal to fulfil their mandates and serve their communities. In addition to reaping the benefits that are associated with larger economies of scale, networks can also facilitate the development of social-capital across organizational jurisdictions and national borders. Agranoff (2004) outlines four distinct types of administrative networks, which range from basic information sharing to deeper collaborations involving shared financial and political resources.

Types of Policy and Administrative Networks

1. *Informational*: Members share ideas and knowledge, which they use to inform work in their home organizations.
2. *Developmental*: Members exchange information and ideas. Educational resources provided to assist employees in the development of capacities to improve performance.
3. *Outreach*: In addition to helping members engage in informational and developmental activities, network members share client contact information and resource opportunities.
4. *Action*: Members work to alter their home organization's policies and routines to help achieve the network's common goals. Formal collaborations include sharing of funds, service delivery, or development of common resources for the network's future use.

Networks are most effective when their members work together in the pursuit of common outcomes. However, one must note that sometimes the paths of participants may diverge. The views and interests of some network participants may converge over broad goals and purposes advocated by their shared network while diverging over specific policies and strategies. Therefore, depending on the particular circumstances, participants may find it advantageous to engage cooperatively

with their network partners in certain circumstances while disadvantageous under others.

The structure of each type of network is distinct and tends to support particular levels of participant engagement. Some network structures tend to be more open and encourage broad participation of state and societal actors operating at multiple levels. Others, however, tend to restrict participation to formal actors and limit the amount of citizen engagement. In horizontal networks, relationships among participants are relatively symmetrical. In vertical networks, by way of contrast, the interaction between participants tends to be more formally-structured. Consequently, interactions among participants within vertical networks are more sympathetic with formal governmental processes. Naturally, the influence of public sector agencies tends to be more effective within vertical networks.

## 1.2   Multisector Networks and the Importance of Scales

As noted above, the prime benefit of governing networks is that they facilitate strategic partnerships between varieties of public, private, non-profit, and citizen groups so that they can work together more effectively to improve community engagement and create public value. Local governments and citizen groups operating at the grass-roots level tend to be most effective because of their immediate proximity to the problems and opportunities that exist within their communities. At the same time, local governments, which are often small in scale and scope, struggle to implement bold agendas. Local governments often lack political and economic resources as well as the capacity to mobilize local stakeholders in support of "big issues" of national or international scale. Take, for example, the issues of the wicked problems of internationally-sources drug and human trafficking.

More enlightened local public administrators have begun to see the wisdom in scaling-up their resources by cooperating with other actors and agencies operating outside their relatively small municipal jurisdictions. However, there are costs associated with cooperation and collective action. Indeed, local governments, who tend to be relatively small and vulnerable, tend to be risk-averse to change and innovation. This risk aversion is especially so when it may require local governments to subordinate much of their operational power and authority to outsiders. Therefore, in order to take advantage of the benefits offered through network connections, municipal regimes have to rethink how they function and operate fundamentally. After all, the decision to work cooperatively within a larger network inevitably involves trade-offs. While participation within a larger network will allow participants to "scale-up" their resources by supporting collective action, individual municipalities may be compelled to place the larger concerns of the network ahead of their immediate needs. Local politicians and agencies may not always find this politically expedient. Indeed, some policymakers have criticized the rise of community governance regimes as being a threat to the democratic process by empowering special interests.

## 1.3   The Application of Network Scales

The function of applying the concept of scales to public policy was initially introduced through the environmental management science literature (Biermann, 2007; Burch et al., 2019; Folke, Hahn, Olsson, & Norberg, 2005; Schultz, Folke, Österblom, & Olsson, 2015; Termeer, Dewulf, & Van Lieshout, 2010; Young, 2002; Young et al., 2012). As noted above, the application of scales is becoming an increasingly salient topic in the network governance discourse. Scaling involves mapping the spatial, temporal, quantitative, and analytical dimensions of a given phenomenon in order to measure its influence on its political, social, and economic environment.

In addition, several scholars (Chaffin, Gosnell, & Cosens, 2014; Lebel, Garden, & Imamura, 2005; Rijke et al., 2012; Van der Heijden, 2019) assert that the scaling of a given problem (be it at the local, state, national, or global level) involves political framing and strategic decision making. Indeed, problem scaling often reflects the political strategy of actors or agencies seeking to claim credit or avoid blame (Termeer et al., 2010). This perspective suggests that actors and agencies frame problems following the scale where they can exercise the most influence.

This study applies a scaling approach to examine the cross-collaboration of multilevel and multiunit organizations and entities operating within a networked environment (Driessen, Dieperink, Laerhoven, Runhaar, & Vermeulen, 2012; Gibson et al., 2000; van der Heijden, 2019). Networks are neither homogenous nor monolithic entities. Each scale involves a set of highly complex interactions related to cross-collaboration and coordination among network participants. Complexity is confounded by the fact that each network engenders its own set of scalar politics and internal rationales or mental models (Denzau, Minassians, & Roy, 2016; Denzau & Norh, 1994). Additionally, each network reflects the internal and external political contexts in which they developed and continue to function and operate.

Acute conceptual challenges arise from the fact that each of these governing approaches engenders their own discrete set of assumptions related to scale, size, and scope of the organizations and the networks of which they may be a part. Before we can examine co-dependent and co-collaborative networks, we must first address these conceptual issues. We will continue by identifying and unpacking four types of governing systems. These include monocentric, polycentric, multilevel, and adaptive governance (Biermann, 2007; Folke et al., 2005; Hooghe & Marks, 2003; Kickert, Klijn, & Koppenjan, 1997; Ostrom, 2010; Termeer et al., 2010). When discussing each of these approaches (or any combination of them), one must analyze their distinct definitions of governance as well as how actors operating at multiple levels in state and society interact within a network.

### 1.3.1   Monocentric Governance

According to Kooiman (2003), Pierre and Peters (2000), in a monocentric governance network, the state is the center of political power and authority. In this top-down approach, the state sets the agenda, defines societal problems, as well as mobilizes the resources in order to carry out the objectives of the policy. In monocentric governance models, the principal scales of operandi are formal organized political units, institutionalized and clearly defined with constitutional and statutory frameworks. Cities, towns, and counties are classic examples (Kickert et al., 1997). Within the American context, these scales overlap in their functions and jurisdictions. From a scalar perspective, the size of a governing entity's political and legal jurisdiction dictates the substance of politics as well as structures the level of interaction that occurs among participants operating within the governance network.

Naturally, the size of a governing entity's resources and jurisdictional scope are important factors that influence that amount of power it can wield. The main challenge for smaller-scale entities may be a lack of capacity to accomplish their desired goals. By way of comparison, the main challenge facing large-scale entities may be a lack of trust and political support among its citizens who feel disconnected from the process and ignored by their authorities. Under the monocentric governance framework, overlapping jurisdictions can pose capacity problems or create gaps within the network. Large governmental entities possess the resources and capacity to address societal issues but lack the agility to respond quickly and can appear distant and unresponsive to citizens' needs. While smaller governmental entities may struggle with resource issues, they tend to have stronger connections with their citizens.

### 1.3.2   Polycentric Governance

The application of the concept of polycentric governance to metropolitan regions involving multiple jurisdictional interactions was first systematically explored by V. Ostrom, Tiebout, and Warren (1961). Ostrom brings out that "[p]olycentric connotes many centers of decision-making which are formally independent of each other" (p. 831). Schaap (2005) cautions that in cases where overlapping jurisdictions exist without clear and coherent distinctions between their functions, conflicting purposes and actions will likely result between them. According to Ostrom et al. (1961), polycentric forms of governance are more adept in apportioning the correct mix of resources toward the public goods that are most needed within their communities than are those where power is more centrally concentrated. In his 2010 article entitled "Polycentric Systems for Coping with Collective Action and Global Environmental Change," Ostrom asserts that "polycentric systems are characterized by multiple governing authorities at differing scales" (p. 552). Consequently, under this governance regime, various actors operating at multiple levels of society and

government have the opportunity to address collective action problems directly as they may arise.

### 1.3.3 Multilevel Governance

The concept of multilevel governance characteristically manifests in the form of what has been termed *tri-level policy administration*. This approach emphasizes the role played by international organizations and their influence on national governments. Conversely, other writers on multilevel governance emphasize the role that domestic actors play in the international policy arena (Hooghe & Marks 2003; Marks, 1993; Pierre, 2000). According to Young and Horak (2012), there are two dimensions of multilevel governance. The first focuses on the interaction between different multilevel governments and policymakers. This dimension focuses on the discrete role that federal, state, local municipal governments play in coordinating and cooperating, if possible, in the implementation and design of policies. It is argued that the devolution of responsibilities down to the localities will afford them greater levels of autonomy, creativity, and flexibility. Lazar and Leuprecht (2007) suggest that multilevel governing approaches encourage broader intergovernmental interaction in policy making. However, fragmentation associated with this approach has raised new challenges in the form of disjointed policies, procedural gaps in some instances, and redundancies in others.

The second dimension of multilevel governance involves robust levels of engagement on the part of nonstate actors in shaping policy design and implementation. This bottom-up approach emphasizes policy making initiated by actors operating at the grass-roots level (Agranoff 2004). While state actors and institutions continue to play an important role, their formal power and influence are diminishing. This is particularly so in situations where the nature of a public policy problem challenges long-held distinctions between the local, national, and global as those between state and civil society. Proponents of this form of governance argue that agents may circumvent arcane and slow-to-act formal governmental processes. Fawcett and Marsh (2017) assert that it has become increasingly important to focus on the interaction between informal actors as well as the scale and scope of their activities in addition to the traditional roles played by formal institutions.

### 1.3.4 Adaptive Governance

Within network governance environments, knowledge is power, and the quality of information and the ability to apply it is essential. Those that possess more accurate knowledge about how their environment (including any veto points and the preferences of other actors) are better able to make strategic decisions and maximize their chances of success.

Adaptive governance is an evolving theoretical framework that focuses on the socioeconomic and institutional foundations of multilevel governance. Its multidisciplinary origins trace back to systems ecology, geography, sociology, and complexity theory. Adaptive governance attempts to examine the interaction between actors, organizations, and institutions operating at various levels of state and society in order to find an innovative solution to emerging issues and problems in the postmodern era. According to Phal-Wostl et al. (2007), adaptive management is learning from the outcomes of past and current strategies in order to take corrective action in real time. In adaptive management, the critical issue is "size-to-fit" the circumstances (Rijke et al., 2012). Under this model, actors engage through a process of continuous learning about what policies and strategies work best and which ones do not. Formal actors, however, often operate in state organizations that are bound by strict rules and rigid processes and, therefore, not as well-positioned as are nonstate network actors to engage in this kind of adaptive learning-based framework. Nonstate actors are often able to reflect on new information that may be gleaned from their network interactions and apply it promptly.

Proponents of this approach suggest that we are operating in a world characterized by continuous and abrupt change. Thus, our actions often result in unpredictable outcomes. Therefore, the linkages between social and ecological systems and the interplay of the multiple scales and levels that exist within them are essential to the adaptive governance approach. In contrast to monocentric and multilevel governance approaches, the concept of scales is not solely limited to spatial and jurisdictional scales. Rather, temporal, institutional, management, network, and knowledge scales are also critical elements in this approach (Cash et al., 2006; Gupta, 2008).

One of the early challenges of adaptive governance was the New Public Management (NPM). Emphasizing private sector values such as "timeliness," "responsiveness," and "cost savings," this new form of "managerialism" began to take root in some of the world's leading public bureaucracies in the 1980s. While differing definitions and explanations have surfaced over the years, Donald Kettl has outlined six core characteristics that appear to be shared in the vast majority of literature related to the NPM: "productivity, marketization, service, orientation, decentralization, a policy orientation, and accountability for results." However, it was the NPM's emphasis on devolution of governance and the "contracting out" of public services to private, for-profit entities that most notably led to the hollowing-out of the state.

Devolution, however, can be a double-edged sword. Devolution promotes the idea that local authorities should possess greater autonomy and influence over the design and implement policy. Local institutional values, cultures, and goals will have a stronger influence over implementation processes and outcomes. Therefore, the successful implementation of many policies requires the coordinated actions of a variety of actors operating at multiple levels of government. In the absence of any overarching authority to ensure coherence in process and outcome, the implementation of locally implemented policies can become disjointed and discombobulated.

Drawing on insights from the NPM, Eakin, Eriksen, Eikeland, and Øyen (2011) look at how technical and financial capacities, organizational learning and

participation, as well as accountability are potentially obstruct adaptive governance. Young (2002) asserts that major challenges with adopting an adaptive governance approach are cross-scale and cross-level issues. Such issues reflect the size of different actors and organizations as well as the fiscal, institutional, and knowledge resources that are accessible to them. Scale mismatches can create massive challenges for management when attempting to align the functions of multiple actors and organizations. Cross-level issues can arise due to the interdependence between various levels. Policy decisions and actions taken at both higher and larger levels could trigger new challenges at the local and smaller scales.

## 1.4   Scalar Politics and Reconsideration of New Public Management and Networks

Under the pressures and imperatives of globalization, the world is continually experiencing radical and dynamic change. Therefore, it is unrealistic to believe that any single, one-size-fits-all, public management approach can adequately account for ubiquitous novelty and uncertainty. By their design and nature, traditional scalar political environments are structurally inadequate to address the complexity and uncertainty that is intrinsic in globally-sourced problems. That said, we must explore innovative, dynamic, more open, and flexible public management approaches if we are to address intractable globally-sourced problems such as human trafficking successfully.

Scholars of public administration and management must develop an improved understanding of how scalar thinking undermines public trust and structures aimed at creating public value by supporting rigid hierarchal ones that both create and reinforce perverse power dynamics. Ontologies emphasizing multiscale horizontal networks need to be explored with greater frequency and depth (Marston, Jones, & Woodward, 2005). While soft connections between informal and formal actors are essential elements of network governance paradigms, organizations and networks operate within actual physical spaces that reside within sovereign or quasi-sovereign boundaries and jurisdictions. Paasi (2004) asserts that there needs to be more spatial integration if we are to develop a better understanding of how specific kinds of scalar relationships produces unequal power structures. Leitner, Sheppard, and Sziarto (2008) have been addressing this issue by examining the co-implication of different *spatialities*. These include scales, contexts associated with places, networks, and the positionalities that shape power dynamics, and how power is allocated within state and society.

MacKinnon (2011) proposes to replace the politics of scale with the concept of "scalar politics." In so doing, he suggests that scale is not about the contestation between actors per se, but rather about how specific institutionalized practices are

scaled differentially. Swyngedouw (1997) adds that scales are produced through a process that is heterogeneous, conflictual, and contested. More specifically, the scales are fluid rather than fixed or defined firmly. Scales tend to vary from one region to the next and are prone to change as the participants change. Consequently, politics, which is in a state of perpetual flux, dictates the scalar relations between actors within a given network.

The prevalence of scalar political systems is neither accidental nor axiomatic. Rather, they are socially constructed instruments of power. The establishment and maintenance of any political system and the power dynamics that are set up within it depend upon the choices made and the actions taken by influential actors within the system. Scalar politics involves the struggle between actors and stakeholders as they vie to increase their positions within a given scale or attempt to expand their influence into a higher one. The struggle is often resolved by broadening their purpose and expanding their political influence over the policy areas they cover. Allen and Cochrane (2007) argue that the interconnectedness of networks is critical to the creation of political economies of scale. Therefore, according to Cox (1998), local actors attempt to construct associations that strengthen their linkages with larger regional and national institutions to secure their mutual dependence. However, the connections developed through these associations do not always result in collaboration and cooperation. Indeed, such associations can turn fiercely competitive as local actors begin to expand their presence into a larger entity's turf.

A notable characteristic of networks and scales is that they self-create (or co-create) and transform their missions and purposes to ensure their relevance in ever-changing local, regional, and global environments. Networks rarely disappear. Most often, dying networks change their purposes and redirect their energies toward emerging concerns. Prior experience and pre-existing arrangements often lay the foundation for their present and future interactions (Deleuze, 2004). That it is to say, they are often path dependent. Such dynamics could constrain the new network as it seeks to augment its influence within a policy area in which it already operates it or attempt to expand into new ones. Therefore, inherited scalar structures and "politics of the moment" are reflective of the structuration of the past.

Scalar politics, therefore, reflects not only network size and the level of interaction among its participants, but also how scales within a network are socially constructed. Groeneveld and Van De Walle (2011) suggest that post-NPM reforms focus on structural design and organizational culture. Changes in structural design often occur as a result of a culture shift. From a constructivist perspective, management of networks requires leadership in building trust, unified values, and common purpose as well as the involvement of participating organizations. Norman and Gregory (2003) suggests that leaders wanting to maintain their legitimacy and ensure the effectiveness of their networks in the post-NPM era should focus on building a common ethic and a cohesive culture.

## 1.5    Methods: Participatory Action Research

This study utilizes Action Research methods by relying on using a spiral process, which alternates between action and critical reflection, continuously refining methods, data, and interpretation. Action Research has never been a unified approach to inquiry. It has been developed, for example, as a tool for organizational learning; as a critical and emancipatory community learning process pioneered in the global South through the work of Freire, Fals Borda, and others; and a variety of other interpretations. Through the utilization of participatory Action Research, the researchers for this study were appointed to the Los Angeles Police Department Human Trafficking Taskforce along with 80 participants. The inquiries used a variety of tools and methods in order to engage with different groups of people, including vulnerable groups, in order to identify and test actions by the public and nonprofit participants within the taskforce. Weekly meetings were held throughout the 4-month field study, with 80 participants from various county, city, and nonprofit agencies and community-based individuals involved in addressing issues with street-level trafficked women and girls. This study used Action Research and engaged in a social process of collaborative learning by realizing that groups participating within this task force have come together in order to change current practices in order to learn about their newly shared social and organizational world. Through this participatory method, the researchers then were able to identify literature that could explain this particular phenomenon.

## 1.6    Case Study and Discussion: Governance Challenges
with Addressing Street-Level Trafficked Women

Although street-level human trafficking is not a new development in global urban settings, the attempt to eradicate it remains a formidable challenge. The wicked and, in many cases, the intractability of the problem has frustrated the efforts of policy-makers and bureaucracies operating at all levels to stop it. We will illustrate the complexity of the scalar interaction required for joint action in a large network by examining the stakeholders involved with human trafficking in an urban setting. When it comes to the sex trafficking of minors in Los Angeles, there are county, city, community, and nonprofit groups that have jurisdiction over providing services and support systems. The county participants consist of the Sheriff's Department, District Attorney, Children's Special Investigation Unit, Office of Child Protection, Probation, Children and Family Services, Public Social Services, Health, Mental Health and Public Health, and Child Support Services. In the City of Los Angeles, the responsibility lies with the LA City Police Department and the City Attorney's Office who all interact with 14 community church groups and nonprofit organizations (see Appendix 1 – charts 1 and 2).

With that said, as a result of the 2000 Trafficking Victims Protection Act (TVPA), law enforcement agencies received new tools for protecting national and local victims of human trafficking. The TVPA was the first comprehensive federal law to address human trafficking. The innovative law provided a three-pronged approach to tackling the trafficking problem. The main local and national strategy is to increase public awareness and prosecute offenders through new federal criminal statutes. U.S.C. legislation 1590 criminalizes sex trafficking where force or coercion involves persons under the age of 18. To this end, the US Federal Bureau of Investigation joined the Los Angeles Police Department's Taskforce on human trafficking in 2010. The purpose of this joint task force was to bring resources and expertise in addressing local human trafficking issues. Additionally, the police department recruited an author of this study to serve as a consultant as part of the human trafficking task force. First-hand stakeholder observation and interaction gave us a unique and intimate understanding of the intricate policy and administrative challenges that policymakers and law enforcement face when addressing this wicked problem. The study was carried out as a participatory Action Research case study by drawing directly on first-hand observations of stakeholders who are directly involved. We interviewed 80 participants in the human trafficking task force operating within one particular police precinct from 2014 to 2016. The governance structure of Los Angeles County and its interaction with the City of Los Angeles represents some of the pressing challenges that a network of this size encounters (Fig. 1.1).

The participants operating within the public sector network have varying missions and goals. Consequently, collaboration across overlapping and blurred jurisdictions remains difficult. For example, according to Los Angeles Police



**Fig. 1.1** The conceptual model of decentralized resources governance from a polycentric perspective. (Source: UN Habitat (2013))
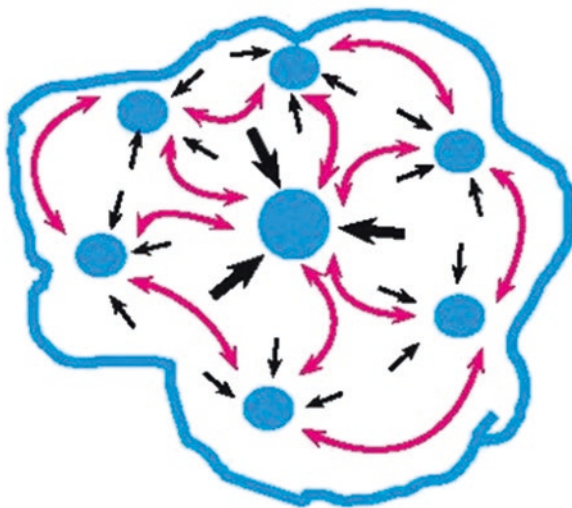
Department's 77 street community police station (and recent data from the County), 75–80% of trafficked minors come from the county-run foster care system. The system is basically a revolving door, where at-risk youth who enter the foster care system are often recruited into prostitution. Rescuing a minor from this requires intricate coordination among a variety of agencies and actors. These include: (1) law enforcement agencies (city or county); (2) the department of social services who must authorize funding for the care of the minor; (3) the department of children and family services, charged with identifying and providing supportive services in the form of housing and adult supervision; (4) the departments of mental health and health services who are responsible for providing physical and psychological services; (5) the courts who have ultimate authority over the fate of the minors; and (6) the local school district which has its special jurisdiction and social programs associated with it. Also, there are many community-based and nonprofit groups that must work collaboratively with public agencies. These include, for example, Saving Innocence, Run2Rescue, Saddleback Church, Eastside Church, Gems Uncovered, and others. The Saddleback Church, for example, has an anti-sex trafficking unit, where church members assist public officials with the rescue and relocation of minors to safe houses across different states.

The preliminary analysis of the taskforce on the trafficking of minors illustrates multiple governing authorities at differing scales, with polycentric patterns. As stated earlier, in cases where overlapping jurisdictions exist without clear and coherent distinctions between their functions, conflicting purposes and actions will likely result between them. Consequently, under this governance model, anti-trafficking actors operating at multiple levels of community and government have the opportunity to address collective action problems directly as they may arise. The managerial dilemma associated with polycentric governance is getting multiple actors operating at various scalar levels to coordinate their activities.

In recent years, the California State Legislature decriminalized prostitution, thus shifting the responsibility of caring for minors from juvenile hall facilities to foster care home residences. This well-intention act created an unforeseen problem; traffickers are now exploiting the foster care youth rehabilitation program to recruit minors into prostitution rings. As noted above, the Department of Children and Family Services relies on a limited number of community-based non-profit organizations to provide vetting and supportive services of the foster care residences. Adding to the problem, under mandate by the US Justice Department, LA Police vice unit officers cannot serve more than 5 years at a time. Consequently, institutional memory and knowledge related to foster care placement is very limited within that agency. These developments have created a "capture-by-contract" problem where official agency control and oversight has diminished.

This case illustrates both the complexity and fragmentation associated with voluntary collaboration within a polycentric network. As noted in this study, in more traditional (hierarchal) organizational decision-making models, the role of formal institutions such as the rule of law, organizational processes, procedures, and strate-

gic plans are often highly useful in helping to identify how various units operate and interact with one another. Polycentric network interactions and processes are much more informal and discombobulated. Consequently, it is extremely difficult to define, and hence map out, the purposes, missions, and goals of each stakeholder (whether internal or external to the government) operating within a polycentric network.

The issue of nationally sourced human trafficking of young girls in Los Angeles (LA) provides a vivid example. When the Los Angeles Police Department arrests a juvenile trafficked girl, the next step is to turn the case over to the LA Department of Children and Family Services (DCFS), who then must secure a suitable foster care residence for the minor. The case is subsequently referred to the Department of Mental Health (DMH) for behavioral assessment. Meanwhile, the case is handed to the LA Sheriffs Department for an investigation that works hand-in-hand with the LA County Courts and the district attorney's office in pursuing any related legal action or mandates. The LA Unified School District provides to their educational needs, the LA Department of Public Social Services for providing health care and supportive services funding, and local community nonprofit groups that provide wraparound services. The size and scale of the actors and resources involved with a single case are enormous and complex. Each official county and volunteer community organization involved with any given trafficking case has its distinct jurisdiction, purpose, mission, and goals, making coordinated action plan extremely difficult to conceptualize, map-out, and facilitate.

Attempts to manage polycentric governance interactions under the New Public Management initiatives have been especially problematic. NPM approaches, such as devolution of authority to local authorities, have not improved the capacities for addressing the complex, inter-sector, and cross-scalar concerns, which are contributing to the trafficking problem. As key regulatory and planning functions devolved to lower-scale administrative agencies and the contractors and community groups, decision-making and coordination have become fragmented and less coherent. Given the multiple social, ecological, political, and economic factors contributing to social vulnerability, in particular communities, coordination across scales and sectors is critical.

## 1.7   Conclusion

This chapter addresses the complexities involved with managing the interaction of actors operating in dynamic networks and various scales of governance. Traditional NPM-based approaches, in particular, have proven grossly insufficient for addressing the complexities associated with network systems and the scalar politics associated with managing wicked social problems like global-sourced human trafficking. Our approach follows Cash et al.'s (2006) argument that there is no single, correct,

or best governing approach or scalar model that can be universally applied across the board. We propose a more sophisticated and nuanced paradigm that draws on a dynamic set of approaches that reflects the type of network and scale of players within the specific political, economic, and social context in which they operate and interact with the consideration that public entities still heavily rely upon contracting out of services.

# Appendixes

## *Appendix 1*

### COUNTY OF LOS ANGELES

**LEGEND**

**APPOINTIVE**
- ■ REQUIRED BY COUNTY CHARTER
- ❑ REQUIRED OR AUTHORIZED BY STATE LAW
- ★ ESTABLISHED BY ORDINANCE OF THE BOARD OF SUPERVISORS

**ELECTIVE**
- ● REQUIRED BY COUNTY CHARTER

ELECTORATE

ASSESSOR — DISTRICT ATTORNEY — SHERIFF — BOARD OF SUPERVISORS — GRAND JURY

EMPLOYEES RETIREMENT ASSOCIATION / BOARD OF RETIREMENT / BOARD OF INVESTMENTS

OFFICE OF EDUCATION / BOARD OF EDUCATION

REGIONAL PLANNING COMMISSION

EXECUTIVE OFFICE OF THE BOARD OF SUPERVISORS

AUDITOR-CONTROLLER — COMMUNITY DEVELOPMENT COMMISSION/HOUSING AUTHORITY — COUNTY COUNSEL — FIRE DEPARTMENT — CHIEF EXECUTIVE OFFICER — ARTS COMMISSION — ASSESSMENT APPEALS BOARD — BOARD ADVISORY COMMISSIONS & COMMITTEES — CHILDREN'S SPECIAL INVESTIGATION UNIT — CIVIL SERVICE COMMISSION

CHILDREN & FAMILY SERVICES — PROBATION

COUNTYWIDE EQUITY OVERSIGHT PANEL — EMPLOYEE RELATIONS COMMISSION — INFORMATION SYSTEMS ADVISORY BODY — OFFICE OF CHILD PROTECTION* — OFFICE OF THE INSPECTOR GENERAL

OPERATIONS — CHILDREN & FAMILIES' WELL-BEING — HEALTH & MENTAL HEALTH SERVICES — COMMUNITY SERVICES — PUBLIC SAFETY

CHIEF INFORMATION OFFICER — INTERNAL SERVICES — REGISTRAR-RECORDER/COUNTY CLERK

CONSUMER AFFAIRS — MUSEUM OF ART — TREASURER & TAX COLLECTOR

HUMAN RESOURCES — NATURAL HISTORY MUSEUM

CHILD SUPPORT SERVICES — COMMUNITY & SENIOR SERVICES — PUBLIC SOCIAL SERVICES

HEALTH SERVICES — MENTAL HEALTH — PUBLIC HEALTH

BEACHES & HARBORS — PUBLIC WORKS — PARKS & RECREATION — REGIONAL PLANNING — PUBLIC LIBRARY

AGRICULTURAL COMMISSIONER/WEIGHTS & MEASURES — CORONER — ALTERNATE PUBLIC DEFENDER — MILITARY & VETERANS AFFAIRS — ANIMAL CARE & CONTROL — PUBLIC DEFENDER

*As of printing, has not yet been established by County ordinance.

Note: Several departments report directly to the Board of Supervisors or are headed by elected officials, but work with the Chief Executive Office through the clusters. These are: Assessor, Auditor-Controller, Executive Office of the Board of Supervisors, County Counsel (Operations); Community Development Commission (Community Services); Children & Family Services (Children & Families' Well-Being); Sheriff, District Attorney, Fire, Probation (Public Safety).

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## Appendix 2

### ORGANIZATION OF THE CITY OF LOS ANGELES
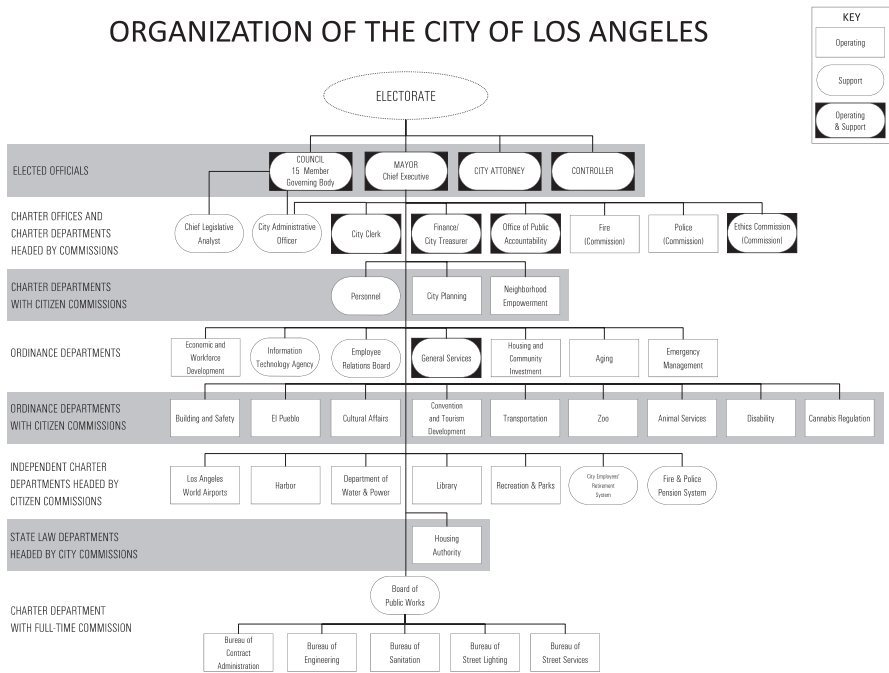


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# Chapter 2
# Participative Governance of the Swiss Construction Material Industry: Transitioning Business Models and Public Policy

**Daniel Kliem and Alexander Scheidegger**

**Abstract** Insights from research into transitions of socio-technical systems start to influence policy design, pushing for more sustainable production and consumption systems. Policy implementation is often met with resistance from a variety of actors and faces systemic inertia to change. We examine this resistance and the role of business models within industry-sector transitions through a case study on the Swiss construction material industry. Business model logics can form barriers to change and inhibit the diffusion of alternative logics. Using a system dynamics perspective, we identify feedback loops that form barriers to transitions. These feedback structures promote the understanding of an organisation's role in a changing environment and to anticipate problematic future scenarios. Causal loop diagramming explicates the need for participative governance as it builds on shared mental models among relevant key actors. This study demonstrates the value of using dynamic systems thinking to understand the role of business models in industry sector transitions.

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## 2.1   Introduction

Advocacy for sustainable resource management of the construction material industry has gained momentum in response to increasing global urbanisation, aiming at a transition towards circular economies (UNEP and ISWA, 2015; Uyarra & Gee, 2013). Material flows for construction activities make up to 50% of developed nations metabolisms (Leising, Quist, & Bocken, 2018; Spoerri, Lang, Binder, & Scholz, 2009) and account for 5–10% of Europe's energy consumptions (Iacovidou & Purnell, 2016). Societal acceptance for further expansion of the mining industry is decreasing, as mining activities collide with urban development, highlighting a need to close material loops and reduce energy demand (Abrahamsen, Graff, & Sturm, 2017). Industry sector transitions require a fundamental restructuring of existing markets, technologies, infrastructures, business models and legal frameworks (Bolton & Hannon, 2016), to decarbonise industries, close material loops and achieve emission goals of the Intergovernmental Panel on Climate Change (IPCC) by 2050 (Iacovidou & Purnell, 2016). Focussed on understanding long-term change dynamics, socio-technical transition research has emerged in response to call for more towards more sustainable production and consumption systems (Geels, 2002; Kemp, Loorbach, & Rotmans, 2007). Along with the uptake of the Sustainable Development Goals (SDGs), socio-technical innovation policies have gained momentum (Ludwig, 2019). Within these systems of increasing complexity and uncertainty, unintended consequences of policies as well as discrepancies between long- and short-term consequences appear omnipresent and potentially lead to systemic lock-ins to inferior practices (Edmondson, Kern, & Rogge, 2018).

Despite these transitions requiring rapid actions, vested interests in certain technologies, institutionalised routines and deeply rooted beliefs constitute regimes, forming barriers against fundamental transitions (Markard, Raven, & Truffer, 2012). Regime actors with vested interests to maintain a status quo are assumed to be a major source of policy resistance (de Gooyert, Rouwette, van Kranenburg, Freeman, & van Breen, 2016). Understanding the role of these actors, and the decision that lead to systematic pushbacks, can help to identify leverage points. A key challenge in socio-technical transitions is to build support for policy mixes that stimulate virtuous, rather than vicious system configuration (Edmondson et al., 2018). From an institutional perspective, policy research integrates transition concepts in the form of long-term visions for evolutionary system innovations (Rotmans, Kemp, & van Asselt, 2001). These visions need to build on leverage points for systemic change and require support from a relevant stakeholder group to accelerate transitions. To reduce the policy resistance of industry sectors, systemic lock-ins and leverage points for policymakers need to be identified (Geels, McMeekin, Mylan, & Southerton, 2015). To understand the phenomena of lock-ins of dynamic system, we want to understand *"What are regime-stabilising dynamics in an industry sector"?*

## 2.2    Theoretical Background

A central heuristic to conceptualise and describe the transition dynamics of socio-technical systems is the multi-level perspective (MLP). Central to the MLP are societal, political and market rules, as well as resource structures, that form stable and reinforcing relationships over time, resulting in a dominant regime (Geels, 2004). Relationships between technologies, infrastructure, regulations, cultural norms, user patterns and industrial standards manifest at the regime level and strengthen its stability through coalitions, synergies and the accumulation of political power (Geels, 2011). Greater landscape trends, such as the orientation towards more sustainable production and consumption system, exercise pressure on the regime (Foxon, Hammond, & Pearson, 2010). Regime challenging technologies emerge at the niche level, a safe space for the development of marketable production and consumption alternatives. Fostering and nurturing these safe spaces is central to transition management (TM). Focussed on active management of socio-technical transitions, transition management is an attempt to influence the diffusion of innovation and unlock pathways of socio-technical systems for sustainability (Geels, 2002). Innovations and alternative technologies challenge a dominant logic of how consumers and producers meet and exchange goods and services (Boons, Montalvo, Quist, & Wagner, 2013).

Existing or emerging barriers to transitions have been found on various levels, such as firms or sectors (Bolton & Foxon, 2011), institutional and policy (Busch, Roelich, Bale, & Knoeri, 2017; Francart, Larsson, Malmqvist, Erlandsson, & Florell, 2019), consumer (Joshi & Rahman, 2015) and within larger system structures (Geels, 2012; Hall & Roelich, 2016). Overcoming regime lock-ins and opening potential windows of opportunities for niche players is a central promise of transition management (Turnheim & Geels, 2013). Governance of these complex systems involving a multitude of stakeholders from the public, private and NGO domains over time requires innovative, experimental and participative approaches (Loorbach & Rotmans, 2010). It requires systemic cooperation of policymakers, private actors and other relevant stakeholders, leading to the formation of coalitions among different levels of power and agency. Agency describes the ability of actors, technology and institutions to influence and shape their trajectories (Smith, Stirling, & Berkhout, 2005). Power can facilitate or circumscribe agency, for example, by prioritising certain actions or diminishing the feasibility of action for certain actors (Smith et al., 2005). Identifying the role of different actors within a system helps to assess their ability to interfere with a status quo. Such complex, dynamic relationships contain feedback mechanisms and mutual dependencies and involve actors from multi-level political powers (Hooghe & Marks, 2002). Based on the interaction and feedbacks within subsystems, transition management aims at coordinating interactions and influencing feedbacks on different levels, by involving stakeholders with participative methods. These participative methods focus on building shared visions among relevant actors, enabling real-world experimentation and providing a safe space for the development of alternative products or services (Foxon, 2011).

A key challenge to the operationalisation of socio-technical transitions research is the identification of relevant units of analysis, describing the narrative of transitions (McDowall & Geels, 2017). Bidmon and Knab (2018) operationalised the socio-technical regime and its emerging alternatives by looking at business models and focussing on the behaviour of organisations from a market perspective. Business models enable an abstract representation of an organisation and the logic it applies in a market, beyond the sole formulation of a strategy (Bidmon & Knab, 2018; Schaltegger, Lüdeke-freund, & Hansen, 2016). Business models are an intermediary between an organisation's strategy and its operations and capture relevant elements for the organisation's functioning (Nußholz, 2017). Bidmon and Knab (2018) identified business models (1) as part of the regime, (2) intermediates between the regime and niche and (3) non-technological niche innovation. Accelerating the diffusion of innovative technologies often means to develop new business models or to re-design existing business (Bidmon & Knab, 2018).

Along with the emergence of innovative technologies, changes to the practices of production and consumption among institutions, markets, technology and innovation are inevitable (Geels, 2002). Such changes manifest at the business model level, influencing the value creation and value capture mechanisms of organisations and thereby the logic of how the organisation functions (Teece, 2010). Research into the role of business models in transitions has focussed on emerging, rather than incumbent business models and lacks knowledge on regime-destabilising dynamics (Bosman, Loorbach, Rotmans, & van Raak, 2018).

Following the literature on transition theory and the identified research gap on regime destabilisation, we argue that the concept of business models could provide an operational perspective. Understanding business models and their regulatory environments in transitions requires a dynamic perspective on the system (Papachristos & Adamides, 2016). Limited understanding of systems can lead to an inefficient distribution of resources by public or private institutions or divert the attention away from the problem's cause towards treating symptoms. Understanding causal relations in a system, as well as the feedback among and within subsystems, is fundamental to understanding the behaviour of a system (Ulli-Beer, 2013). Abdelkafi and Täuscher (2016) focussed on the role of sustainable business model analysis from a socio-environmental perspective. They argued that system dynamics is equipped to reveal the impact of the natural environment on the organisation and to visualise the main feedback loops between the firm and the environment. This study takes a system dynamics perspective to understand the role of business models in socio-technical transitions, combining the perspectives of organisations and industry sector actors.

## 2.3   Methodology

Understanding the regime-stabilising dynamics from a business models perspective requires the identification of feedback structures and delays, which are crucial when moving from understanding towards managing complex systems (Papachristos,

2011; Ulli-Beer, 2013). Complementary to Loorbach and Rotmans' (2010) transition management approach, system dynamics builds upon tools and techniques to understand and improve system steering capabilities. In the context of transition management, system dynamics has predominantly been applied to study transition in descriptive ways, whereas simulation and modelling has only been applied in few cases (Bennich, Belyazid, Kopainsky, & Diemer, 2018; Papachristos, 2011; Papachristos & Adamides, 2016; Ulli-Beer, 2013; Valkering et al., 2017; Yücel & van Daalen, 2012). System dynamics modelling processes build around problem conceptualisation, testing of dynamic hypothesis, learning about the behaviour arising from the causal structure and ultimately testing of new policies (Luna-Reyes & Andersen, 2003; Sterman, 2001). System dynamics explicitly deals with feedback between subsystems, non-linear behaviour and their endogenous structures that create certain behaviour (Richardson, 2011). Capturing feedback loops within multiple subsystems and describing endogenous, dynamic interactions is a core strength of system dynamics (Sterman, 2000). Defining a regime in socio-technical systems is a challenging task, as potentially multiple regime co-exist among multiple levels. By eliciting mental models of dominant actors in the industry, a system boundary can be developed and shared problem perception developed (Vennix & Forrester, 1999). By capturing a shared perception of the regime, we attempt to create a boundary object to focus the discussion (Black, 2013; Black & Andersen, 2012).

System dynamics methodology suggests group model building and case studies research to elicit mental models and form causal models of individual realities (Richardson, 2013). A combination of both is applied in this research, integrating insights from various levels. Business models are analysed from a "firms-in-industries" perspective, generating insights into the role of specific business models in transitions (Geels, 2014, p. 275). Changes in the regulatory environment and potential changes in the "industry-environment" of the organisation are derived from the group model building sessions. Group model building builds on the mental model of stakeholders by eliciting variables and causal connection in interactive settings (Vennix & Forrester, 1999). A three-stage process is followed to connect different perspective.

### 2.3.1   Step 1: Group Model Building

Group model building workshops with stakeholders are used to define system boundaries and identify problematic behaviour and potential causal links to relevant business models. To avoid prescriptive problem identification by the researcher, the participants need to state problematic dynamics that are important in their mental model (Luna-Reyes et al., 2006). Throughout this process, the system boundaries are iteratively tested with regards to time, geography and the value chain of interest. Resulting from the discussion on problematic dynamics, reference modes of behaviour are developed. Reference modes describe problematic behaviour over time (Sterman, 2000) and frame the narrative for the business model analysis. The dynamic hypothesis developed by the participants is transferred to the

operational level of business models in step 2, to test the reactions of different business models to the hypothetical changes in their environment. The process of defining shared problems and eliciting mental models is at the core of group model building (Vennix, Akkermans, & Rouwette, 1996; Vennix & Forrester, 1999).

### 2.3.2 Step 2: Participatory Business Model Analysis

Addressing dynamics that impact existing business models is a way to identify the role of business models in transitions (Knab, 2018). Semi-structured interviews with the participating companies are conducted to understand the impact of external dynamics on business models along a value chain. The semi-structured interviews analyse the inner working of companies to understand the relevant decision rules that either hinder or accelerate transitions. Data from these case studies is collected based on Upward and Jones' (2016) extended version of Osterwalder & Pigneur, (2013) business model canvas. The dominant business model of each organisation is mapped, and the outcome of the group model building workshop serves as an input for the dynamic analysis of each business model. This dynamic input is used to understand adaptations to the business model, identifying key decision-making rules.

### 2.3.3 Step 3: Synthesis

The results of the group model building workshop and the case studies are synthesised in a causal loop diagram (CLD). It is an explicit method to map causal connections, specify relevant units of analysis and to study system behaviour (Sterman, 2000). CLDs uncover the hidden assumptions of stakeholders by mapping mental models that shape the system (Sterman, 2000). Understanding mental models of relevant actors and identifying key decision variables improves systemic understanding (Ulli-Beer, 2013). Thereby, the assessment of long-term consequences of current governance practices is improved (Sterman, 1989). Once fundamental causalities between business models and their regulatory policy environment are identified, causal loop diagrams can be used to generate insights that might be buried in linear displays of causal connections (Repenning, 2002). This feedback-based approach to complexity provides a comprehensive way to communicate knowledge among diverse stakeholders (Meadows, 1989). Incorporating collaborative designs approaches in transition management serves as a learning tool in multi-stakeholder environments (Ulli-Beer, 2013), which is key in transition management (Loorbach & Rotmans, 2010).

## 2.4   Case Study

Waste streams from construction activities, excavation and demolition material add up to 86 million tons per year in Switzerland (Schneider, 2016). Despite being among the countries with the highest environmental standards for the construction industry (Groesser, 2014), 15–20 million tons of mineral materials are disposed of annually, a significant part of the national metabolism (Schneider, 2016). High construction activities and decreasing access to mining and disposal sites provide a compelling incentive to redesign material loops and transition towards a circular economy. "Kies für Generationen" (Gravel for generations) is a project that aims at improving the capability of Switzerland to be a self-sufficient provider of gravel for future generations. Initiated by the Federal Agency for waste, water, energy and air, the platform gathers representatives from the gravel and recycling material industry, environmental NGOs and various public institutions. It assembles the characteristics of a transition arena, in which knowledge is generated and exchanged via an institutionalised platform (Loorbach, 2007). Political, institutional, social and market dynamics appear to form barriers to the diffusion of alternative products and policies. To overcome these barriers, system thinking and system dynamics are proposed to understand feedbacks and to identify leverage points for intervention (Meadows, 1999).

The participants of the group model building workshops, as shown in Table 2.1, constitute most relevant stakeholders in the construction material industry. The selection of participants was based on their availability for the workshops of step 1, as well as their role in current industry transitions.

During the group model building workshop, participants identified a set of variables that could describe the state of the system, relevant to their organisation. Based on these variables, the discussion narrowed the scope of the problem to a set

**Table 2.1** Group model building participants

| Stakeholder |
| --- |
| Industry association of construction material recycling |
| Industry association of builders |
| Industry association of gravel and concrete producers |
| Industry association of cement producer |
| Environmental NGO |
| Federal agency for circular economy, focus on construction waste |
| Cantonal agency for natural resource management |
| Cantonal department for building and civil engineering |
| Cantonal department for spatial planning |
| Municipal construction department |

**Table 2.2** Stakeholder scenarios

| Variable | Tendency |
|---|---|
| Availability of disposal volume | Decreasing |
| Availability of primary gravel | Decreasing |
| Recycling of demolition material | Increasing/constant |
| Usage of recycling material | Constant/increasing |

of key variables whose behaviour over time bears challenges to the industry. Table 2.2 summarises the key trends for the mineral material industry.

According to participants of the group model workshop, the availability of disposal volume and primary gravel, recycling of demolition material and the usage of recycling material are key variables. The relevant timescale of these developments varied between 10 and 30 years, according to the participants. A central discussion point during the GMB workshop was an increasing gap between the disposal volume and primary raw material availability relative to the uptake and usage of recycling. The resulting accumulation of excavation and demolition material was perceived as a central problem to all involved stakeholders. The gap between the deposition of excavated soil, demolition material and volume generation from extraction have been subject to various studies on material flows in Switzerland (Rubli & Schneider, 2018; Schneider, 2016).

Moving towards a circular economy appeared as a rational solution towards closing the gap between the material flows, by increasing the recycling of demolition and excavation material as well as quotas of recycling material. Participants debated whether the uptake of recycling quotas is likely to increase or remains constant, revealing different mental models regarding underlying dynamics. Motivated by this gap in perception around central concerns of the stakeholders, the focus for the case study with companies evolved.

### 2.4.1 Dominant Construction Material Regime

Based on the discussion of participants, we elicited their dominant regime of the construction material industry. The declared goal of the regime is to ensure long-term resource availability, from both a policy and business model perspective. Despite the increasing challenges to spatial planning and urban development, implementation of sustainability concepts for a circular economy faces barriers. Current policies and business model logics are implicitly built around a regime providing access to primary resources, but circular economy policies are part of the discourse. During the workshop, transitions phenomena ranging from explicit transition policies towards a circular economy to adaptations of business model practices have been discussed. The dominant transition areas are detailed in the remainder of this section.

### 2.4.1.1  Federal Waste Management Policy

The Swiss national regulations governing the avoidance and use of waste (VVEA) details the reduction and treatment of wastes, as well as the construction and operation of waste plants (Bundesamt für Umwelt (BAFU), 2018). Among the policies governing the transition, waste management is identified as a leverage point on a federal level. The goal is to provide a legal framework that strengthens the obligation for improved resource efficiency. Being implemented in 2016, material categories raise the barrier for disposal of material. Different categories of construction waste are defined based upon their direct impact on the usage of gravel pits as disposal sites. Mineral waste from construction waste is subject to inspection and can be disposed only to exclusive waste collection sites. However, according to participants, material flows from construction and deconstruction activities appear to exceed current disposal capacities, leading to further allocation of land. Enactment of the regulation is the responsibility of individual cantons. This structure exemplifies the multi-level nature transition processes, with federal legislation enacted by cantons. Local policymakers face multi-dimensional pressure, ranging from national agendas to local organisation.

### 2.4.1.2  Planning of Extraction and Disposal Volumes

Self-sufficiency plays an important role in the national agenda but is also an important concern on the local level. The availability of raw materials for construction purposes presents a central concern on the national level. Currently, building stock raw material consists mainly of primary material, sourced from gravel extracted in quarries. Linking gravel extraction to the creation of disposal volume carries implications for local political support for land allocation. The economic feasibility of long transport distances is low; hence, local networks of companies ally to voice industry concerns. Companies that depend upon the access to gravel quarries and disposal sites have a strong incentive to lobby for further land allocations. The resulting political power pressures spatial planning for disposal and extraction to account for the needs of local organisations. Analogue to the interests of companies, local planning policies tend to base strategic decisions for land allocation on rather conservative forecasts for improvements in recycling capacity. Following these allocation mechanisms, the provision of primary gravels remains rather high, enables price advantages compared to recycling and thereby reduces incentives for advances in recycling innovation. Cantons with abundant and low-cost access to mineral resources face different local pressure to consider strict enforcement of regulations, opposed to urban cantons. Consequently, local implementations of the national agenda differ regarding the strategic goal.

### 2.4.1.3  Recycling in Public Procurement

The provision of sufficient disposal volume is an important political concern for self-sufficiency. The power to allocate land is within the judiciary of cantons. Along with decreasing "Disposal volume", the "Political support for Land allocation" for gravel extraction forms on different political levels, from neighbourhoods, over local communities to cantonal policies. All levels bear political power to decisively interrupt the process of further "Land allocation". To accelerate a change in conditions for closed material loops, policies support recycling products with quotas in public tenders. Public buildings and infrastructure projects include standards that require certain minimum recycling rates. Standards and norms for the usage of recycling materials currently apply to non-critical building components, indicating a need for learning by experience feedback loops (Sterman, 2000). Increasing the usage of recycling material in buildings is a complex process since safety is a central concern; hence, adjusting standards and norms requires resources from both companies and institutions. Launching innovative products demands resources from companies, emphasising the need for institutional support during niche developments. Beyond the provision of financial resources, education regarding the potential of recycling materials is an important form of institutionalised support (van Mierlo & Beers, 2018). Thereby, public procurement policies can exceed the potential of recycling quotas within current frameworks and increase the overall market volume for recycling materials. A regulatory framework that allows for extended application of recycling material incentivises companies to experiment with innovative technology applications.

### 2.4.1.4  Business Models

Companies for the case study are selected based on the following key activities along the construction material industries value chain:

- Extraction of primary gravel
- Disposal/recycling of demolition/excavation material

Selected study partners compete in the same part of the value chain but depend on different resources. Two business models were idealised, describing the dominant logics behind the provision of primary raw materials and recycling alternatives.

1. The business model "Recycling" creates value from recycling demolition material. It generates profit by selling recycled gravel and treating excavation material.
2. The business model "Extraction" creates value from gravel extraction and filling the resulting volumes with excavation material.

In the business model "extraction", the gravel quarry generates multiple values, with the receipt of disposal material and sales of primary gravel. The incentive to generate disposal volume trumps the economic attractiveness of gravel extraction since disposal volume is a scarce resource.

In the dominant business model logic, a gravel quarry is a key resource to achieve dominance over emerging alternatives. Without regulatory pressure, regime stability of primary production and consumption systems around extraction activities persists. Organisational strategies tend to focus on increasing the outflow of recycled gravel or increasing the available disposal volume by extracting gravel. Innovation is currently concerned with improving the deconstruction capacity, adding more value to the raw materials for recycling activities. With improved sorting equipment and diversified sources of deconstruction material, organisations attempt to improve processes and quality of the material's origin. Companies in cantons with high construction and demolition rates, mostly in urban areas, lack local access to extraction and disposal resources; hence a tendency towards recycling materials is inevitable.

On the other hand, companies without spatial constraints and accessible gravel reserves lack the regime pressure to change practice and transition towards circular value chains. Despite a lack of pressure, innovative products and technologies are emerging in rural areas, yet the market acceptance for secondary materials remains low due to an existing abundance of primary materials. Without a significant shift in the political regime of resource security in rural areas, the market demand for recycling materials is expected to remain low. Consequently, a reinforcing business model logic to extract gravel for the creation of disposal volumes leads to a continuous demand for new mining concessions, a central argument in political discussions. To establish organisational legitimacy for land allocation, companies establish their value proposition as material managers of local waste streams.

Apart from geographical limitations to expansion, social acceptance of land allocation plays an important role and increases companies to adjust their activities. Company representatives highlighted the importance of managing stakeholders as part of their business model. Without the support of stakeholders, access to the key resource is limited. The pressure for stakeholder support demonstrates the important dual role of land allocation for political and private actors. Being a central concern for both business models and public policy, the perception of stakeholders regarding "Primary gravel availability" determines the "political support for further land allocation". If the "primary gravel availability" exceeds the market demand and raw material coverage is considered high, political support is likely to decrease. From a market perspective, the limits to gravel extraction form a relatively weak feedback loop since the sales of gravel is not a primary concern. One CEO stated, *"Profits can only be made with the receipt disposal material"*, indicating that a low "disposal volume" increases the "desired gravel extraction" and consequently the "gravel extraction". To account for the needs of local civil societies, companies are actively engaging in governance processes. Transparency of operations, long-term vision for local developments and active communication strategies towards the community are central to the social acceptance of organisational activities. Consideration of an extended range of stakeholders reflects that organisations are integrating sustainability concerns in their business models. A strong focus is placed on social value creation, along incremental increases in environmental efficiency. Schaltegger et al. (2016) frame this process as the result of co-evolutionary processes, in which business models adapt to external developments.
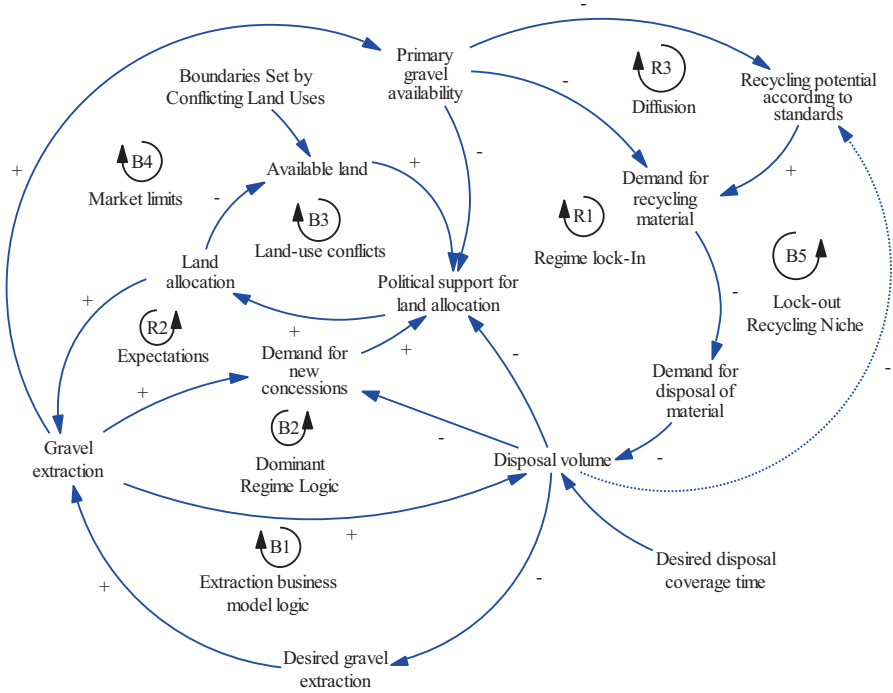
**Fig. 2.1** Governance dynamics of Swiss construction material industry

Shifting the value generation from gravel extraction to disposal volume enables extracting gravel enables companies to reduce primary raw material prices, blocking the "Demand for recycling material". Evidently, these reinforcing feedback mechanisms make recycling an unattractive alternative compared to extracted materials. R1/R2/R3 form a dominant regime where the reinforcing incentive to extract gravel persists as long as the demand for disposal of material is high, potentially tipping towards recycling if these conditions swop dominance. The CLD in Fig. 2.1 shows the multi-level nature of this complex system, highlighting the interconnectedness of certain business models, its regulatory context and various political governance layers. Understanding the structure of these attributes within complex systems could improve guidance on the governance of transitions. A system dynamics perspective on relevant policy levers helps to classify and understand the potential barrier on the landscape, regime and niche level. By identifying dominant logics (B1/B2), lock-in to a local extraction regime (R1/R2), a lockout of recycling niches (R2/R3) and landscape and regime conflicts (B3/B5), the complexity of the problems is reduced and made explicit for further discussion.

## 2.5 Discussion

Barriers to transitions can result from a multitude of factors, ranging from technical to social barriers. The CLD suggests that mental models of incumbent actors support the dominant extraction regime. Placing these mental models in transitions dynamics shows that barriers to transition can emerge as side effects of policies. The case study found the dominant regime evolving around the availability of primary resources, exercising the most pressure on the political support for land allocation. This feedback loop dominates the diffusion of alternative products, as there is not enough institutionalised support for the development of recycling alternatives. Policies to intervene do not suffice to change the dominance of the regime stabilising loops towards the diffusion on niche alternatives. The recycling industry has not fundamentally redesigned the production and consumption system of the construction industry, suggesting that recycling alternatives currently exist at the crossroads between niche and regime. Business models as the enabler of innovation place the current states of recycling between take-off and stabilising phases. As intermediates between the technological niche and the socio-technical regime, business models potentially form new rules and accelerate the breakthrough of innovations (Bidmon & Knab, 2018). The regime-stabilising dynamics and leverages to nurture niches, derived from Table 2.3, are detailed in the following section. The following discussion demonstrates the relevance of mental models, dynamic feedback structures and delays, some of the fundamental attributes of complex systems (Sterman, 2000).

### 2.5.1 Mental Models Stabilise Regime Dynamics

Different time horizons have shown to be a decisive factor for policy inertia, a well-known driver for misperceptions in system behaviour (Sterman, 1989). As described by case study partners, decision making in organisations is rather a short-term oriented process and prone to business cycles (end of year reports/financial statements) than spatial planning policy by governmental agencies. Guided by significantly different time horizons, governmental spatial planning policies determine mineral reserves for the next 25–50 year. These reserves are not necessarily freed for extraction, yet they provide the basis for discussion on multiple political levels. Based on the current projections for the development of the built environment, cantons plan reserves for around 20 years. Depending on the gravel extraction and the resulting disposal volume, the window of opportunity for recycling standards opens. This chicken or egg situation assembles characteristics of the discussion on electric vehicle infrastructure, where mental model regarding "range anxiety" delays the diffusion, depending on the local context (Turnheim et al., 2015). In a rural context, increased demolition material in combination with policy effects (such as VVEA) might reduce disposal volume. The incentive of extraction business models is to increase the available disposal volume in the short term by extracting gravel.

**Table 2.3** Policy overview

| Policy area | Actor | Policy goal | Feedback loops | Potential barriers to transition | Associated policy lever | Transition lever |
|---|---|---|---|---|---|---|
| Waste management | Federal state | Dissociate gravel extraction and creation of disposal volume | B2 | Federal law prescribes filling gravel quarries | Phase-out of extraction activities | Landscape changes |
| Waste management | Federal state | Recovery obligation | R1 | Limited authority on local implementation and auditability | Increase demand for recycling material | Niche incubation |
| Spatial planning | Canton | Security of supply | B2, R3, R2 | Supports the extraction business model | A circular economy-based spatial planning policies | Regime mental models |
| Public procurement | Federal, cantonal, municipal departments | Create additional demand for recycling material within the current regulatory framework | R2, R4, B5 | Reinforces current recycling practices | Increase recycling potential by adjusting the regulatory framework | Niche incubation |
| Concessions | Business model extraction | Extract gravel to secure disposal volume | R1, R2, R4 | Reinforces the lock-in of extraction and lock-out of recycling | Incentivise recycling activities | Regime legitimacy |
| Compensations | Municipalities | Balance community and enterprise interests | R2, R3, B2, B3, B5 | The societal and economic relevance of gravel quarries | Primary resource taxation and disposal fees | Regime legitimacy |

Consequently, the supply of gravel exceeds the actual demand, while at the same time, the demand for recycled gravel is artificially kept low, despite norms and standards. Therefore, the long-term strategic planning of resource allocation emphasises securing gravels pits rather than incentivising investments in recycling capacity. "*The incentive to invest in processes and techniques depends on policies to stimulate demand and provide a long-term perspective*", as stated by case study partners.

Along with norms and standards, institutionalising usage of recycling materials requires aligned mental models of the different stakeholder. The creation of a common vision, unifying the perspective of policy designers and private organisations, is a central leverage point (Kemp et al., 2007). The recognition of leverage points bears the potential to turn the feedback loops in which the extraction regime dominates in favour of recycling alternatives.

### 2.5.2   Top-Down Goal-Setting Versus Local Implementation

Implementation of circular economy concepts via policies results from landscape changes, where broader sustainability concerns manifest in political action. The introduction of policies is a top-to-bottom process, where national agendas determine top-down goals for local action. It appears that policies such as the VVEA have a direct impact on local business models. Organisations react bottom-up, by mitigating perceived negative consequences on their operations with political action on intermediate political levels, ranging from municipalities to cantons. Since enforcement of the national regulation takes place on these intermediate levels, local resource-planning carries conflict potential. Depending on the mental models regarding regional materials flows and the perceived interdependencies between land use for extraction and disposal, the adaption of national policies can diverge on a local level. Thereby, transition inertia evolves along with the expectations of actors. The locally perceived urgency of extraction and disposal of raw materials results in conservative estimations regarding the potential of niche alternatives. On a firm and industry sector, the lack of demand for recycling alternatives drives a chicken or egg situation in which insufficient capacities prohibit a virtuous feedback loop.

### 2.5.3   Systemic Niche Incubation

Institutionalised support via safe operating space, in which product innovation can be harmonised with the management of natural resources is vital to the diffusion of alternative materials. Business model insights suggest that the competition with primary extraction materials results in low prices and tightens the window of opportunity for alternative products. SMEs that supply alternative building materials criticise frameworks and laws that impose too many restrictions in building law and

standards. In their view, this limits the freedom for designing and implementing innovative solutions. Thereby, more inclusive public procurement can provide businesses with a variety of market opportunities to diffuse innovations. Cantons at the forefront of advancing sustainability policies provide incentives for local companies to invest in recycling capacity. Stimulating demand by setting minimum rates of recycling material in project calls, as well as increasing implementation of certification schemes, are being used. Public procurement policies thereby spiral in co-evolution with norms and standards towards higher usage of alternative materials and designs. Cooperation is needed to achieve greater impact, and the role of planners and architects was emphasised, as the first instance in the planning process. On the builders' side, various factors were highlighted, such as incentives for sustainable construction, willingness to take risks and the role of specifications in construction processes. Due to the high relevance of costs in decision making, it was once again emphasised that without the right signals from public policies, there will be no incentives for companies to invest in more sustainable materials and processes. Levelling the quality of primary and secondary raw materials is key to turn the discussion of whether primary or secondary material is used redundantly. This cultural change requires a rethinking of political processes in which communities and cantons actively involve a variety of stakeholders.

### 2.5.4   Legitimacy of Business Models

Business models as a unit of analysis enabled an integrated perspective of multiple levels, ranging from decision making within an organisation to industry sector-wide impacts. Business models in transition as potential barriers to transitions follow the logic of both regime and incumbent actors. Regime business models focus on maintaining favourable conditions that allow them to keep their competitive advantage, whereas niche business models seek to open windows of opportunity. In several cases, adaptations to the extraction business models were observed, acknowledging the negative externalities of their business models. These companies expressed a tendency to "give back to society", mitigating the impact of their operations on society, such as pollution, impact on local capital (ecological and social), consequences of operating heavy machinery and traffic. Beyond the remuneration of communities for local business externalities, companies integrate communities and municipalities as part of their stakeholders. These stakeholders play a central role in the political process of allocating land, negotiating multiple interests. Especially the role of municipalities as a local enforcer provides power and agency, hence making them a key stakeholder of extraction industries. Municipalities have expanded their stake in the financial success of companies by introducing various forms of compensation. The principle of indemnity is applied by an increasing number of communities, to compensate for the disturbance caused by proximate extraction, processing and disposal activities. Demands for remuneration for local stakeholders have created an urgency for companies to assess their strategy for community

reimbursement. Statutory fees for concessions and ongoing charges for extraction activities reduce the profitability of gravel extraction, further shifting the profit margin towards incoming disposal materials. Balancing the financial gains from extraction activities, acceptable reimbursement of local stakeholders and securing local raw material supply reflect political challenges to municipalities.

Table 2.3 provides a summary of the policies that different actors apply within the construction material industry. Based on the insights generated through the development of the CLD, policy goals and the associated barriers for the transition towards a circular economy have been discussed. The following sections discussed the wider implications of these results.

## 2.6   Conclusion

The main contribution of this study is not the identification or emergence of new theories but improved understanding of relevant factors and their role in governing sustainability transitions. Introducing business models as a unit of analysis and using system dynamics to identify regime stabilising feedbacks has proven to add understanding to transition dynamics.

### 2.6.1   Operationalising Transition Management

Conceptually linking business models and transition management operationalised research into the stabilisation of regime and leverage to potentially weaken these feedbacks. Linear business models and the competition with circular business models exercise a dynamic relationship among themselves as well as between their environment, supporting Geels' (2014) findings on co-evolutionary dynamics. Choosing business models as a unit of analysis enabled the detection of endogenous drivers of policy resistance and provided a narrative for change. A deeper understanding of business models within transition contributes to accelerating the emergence and diffusion of required innovations (Geels, 2017). Using a "firm-in-sector" perspective, linked to regulatory frameworks for innovation, can help to identify economic factors that incentivise companies and consumers to act upon and utilise innovative products and services (Vértesy, 2017). The concept of business models elevated the discussion to a discussion on a level which was relevant to both individual organisation and policymakers. System dynamics thereby helped to uncover the feedback loops to connect the lock-in of the current regime with dominant business model logics. We identified micro-dynamics within business models that helped to understand the impact of public policies on the organisation-relevant business models, and on the other hand, identified policy-relevant macro-dynamics. Eliciting decision-making rules of actors in the system helps understanding underlying patterns,

which can manifest in lock-ins of the regime and policy resistance. By either reinforcing existing structures or breaking dominant paradigms, active transition management needs to understand these mental models and decision rules.

### 2.6.2   Tools for Participative Transition Management

Improved understanding of transitions and about desirable pathways lies at the heart of managing stakeholders in transitions. This active management builds on a sense of urgency of societal actors and is required to define the scope (Loorbach, Frantzeskaki, & Avelino, 2017). Combining instruments, such as group model building and case studies, helped to develop a shared language among experts. It served as a flexible methodology to facilitate learning in multi-stakeholder processes, which can be used as a foundation for further research about causal mechanisms that accelerate or hinder transitions. Using institutional theory and the concept of agency has helped to select a relevant group of participants, which has been shown as central to transition management (Fuenfschilling & Truffer, 2016). The applied methodological combination helped to understand how actors, technology and institutions evolve and shape their mutual trajectories (Geels, 2014). Transition management is built on the need to "develop a feeling of mutual interdependence among heterogeneous actors, meaning that they can achieve more together when dealing with a complex situation than on their own "(van Mierlo & Beers, 2018, p. 8). System dynamics modelling and simulation can help to create such a participative learning environmental for different political actors (canton, community, neighbourhoods), NGOs and industry associations, by providing a safe space for learning and experimenting. Such environments can train systems thinking capabilities regarding trade-offs between short-term gains and long-term consequences (Sterman, 2002). Identifying unintended consequences on different levels and identifying structural causes among different stakeholders stimulates a social learning process, a central aspect to the governance of transitions (Safarzyńska, Frenken, & Van Den Bergh, 2012).

### 2.6.3   System Dynamics in Transition Management

The involvement of different actors, via a participatory process of visioning, learning and experimenting (Ulli-Beer et al., 2017), is crucial to the different transition levels, ranging from strategic visions, over tactical processes (networks, agenda building, lobbying) to operational processes (experiments, innovation) (Loorbach et al., 2017). The goal is to "create a societal movement through new coalitions, partnerships and networks around arenas that allow for building up continuous pressure on the political and market arena to safeguard the long-term orientation and goals of the transition process" (Loorbach & Rotmans, 2010, p. 239). Building

shared visions among stakeholders that take feedbacks into account can be a key artefact in transition management (Kemp et al., 2007). The visions trigger stakeholder involvement and serve as boundary object in participative processes, providing critical social learning for accelerated transitions (Black, 2013; Ulli-Beer et al., 2017; van Mierlo & Beers, 2018). The relevance of unifying the problem perception of key actors and the resulting social learning has recently been highlighted in the literature on transitions as a leverage point for change (van Mierlo & Beers, 2018). Integrating system dynamics to understand key dynamics and leverage points can sharpen the focus for intervention in early-stage processes and improve the efficiency of resource usage.

### 2.6.4  Limitations of the Study

The case study analysed the causal mechanism among two idealised business models, competing on primary and secondary gravel supply, a specific step in the supply for construction material. We excluded complementary material flows; for example, the production of cement was excluded, and thereby, policies regarding energy consumptions and $CO_2$ emissions. Even though this represents a limitation of the study, the central argument for business models as a relevant unit of analysis has proven valid. More fundamentally, discussing transitions implies the questions: Transition to where? Sustainability has many definitions and is subject to changes in values and perspectives, hence requires continuous negotiations among stakeholders. System dynamics has a tradition of providing an explicit perspective on long-term systems sustainability and encompasses the possibility to understand different value systems (Király & Miskolczi, 2019). Since this study focused on the regime-stabilising dynamics, the role of destabilisation in favour of alternative policies must be explicit about defining a concept of sustainability.

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# Chapter 3
# Leveraging Collaborative Governance: How Co-production Contributes to Outcomes and Public Value in a Small Town

Vincenzo Vignieri

**Abstract** Collaborative governance is increasingly considered an effective approach to improve outcomes and public value. This chapter focuses on co-production as an instrument to implement collaborative governance at local level. It is not uncommon that small towns develop co-production processes to deliver cultural and touristic services. Out of a literature review, the study develops a Dynamic Multidimensional Performance Management framework to explore the impact of co-production on community outcomes. To this end, this chapter discusses the case "Museo Civico di Castelbuono (MCC)",which concerns the co-production process of the guided tour of the museum's venue. The resulting model provides insights into how co-production improves management outcomes, organizational, and community-level performance, finding that the motivation of co-producers drives service capacity. Lastly, the analysis of performance drivers and associated measures offers several implications for policy design and implementation and suggests strategic levers to make collaborative governance work.

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## 3.1   Introduction

Recent research in Public Management has shown that system complexity (OECD, 2017; Sørensen & Torfing, 2007), as well as top-down policy design and fragmentation (Bovaird, 2007), are considered major causes of inconsistency in the attempt to improve community outcomes. Consequently, scholars have shown a considerable interest in those forms of interactive (Edelenbos & van Meerkerk, 2016a) or collaborative (Cepiku, 2016; Morse, 2011; O'Flynn & Wanna, 2008; O'Leary & Bingham, 2009; Osborne, 2010) governance, focusing on how public sector organizations may improve service quality and community's outcome promoting co-production with users and citizens (Bovaird, Stoker, Jones, Loeffler, & Roncancio, 2016; Nabatchi, Sancino, & Sicilia, 2017; Osborne, 2008; Pestoff, Brandsen, & Verschuere, 2013; Verschuere, Brandsen, & Pestoff, 2012).

Co-production deals with civic engagement, stakeholder participation, and self-organization. It is related to collaborative governance since "government actors must respond in certain ways to participation and self-organization" (Edelenbos & van Meerkerk, 2016b, p. 20). Co-production can be conceptualized as a process of cooperation among public managers, professionals, third-sector organizations, and users with the aim to provide a given public service (Thomas, 2013), where "the inputs used to produce a good or service are contributed by individuals who are not in the same organization" (Ostrom, 1996, p. 1073). In this perspective, participation in the co-production process can either contribute to delivering more effective public services, and it may additionally realize other societal ends (Cepiku & Giordano, 2014). Such a method may improve service quality and support a community in achieving superior quality of life outcomes (Bianchi, Bovaird, & Loeffler, 2017) and diminish inequity in the fruition of public services (Jakobsen & Andersen, 2013).

It has been stated that there is a "lack of knowledge and discussion of the output and outcome of interactive governance, about its effectiveness and efficiency, but also its legitimacy" (Edelenbos & van Meerkerk, 2016b, p. 5). Therefore, this chapter focuses on co-production as an instrument to implement collaborative governance (Bovaird, 2007; Bovaird & Loeffler, 2016; Pestoff et al., 2013) to explore how co-production impacts on community outcomes and associated performance measures. It is not uncommon that small towns develop co-production processes to deliver—for instance—cultural and touristic services (Buonincontri, Morvillo, Okumus, & van Niekerk, 2017; Durose, Mangan, Needham, & Rees, 2013). In such a way, a public organization may use inputs and resources from the local stakeholder network to provide public services.

The paper discusses the case "Museo Civico di Castelbuono (MCC)" in which a guided tour of the venue is co-produced by tourists (end users) and a non-profit organization (associating a group of professional volunteers).

This case study provides insights into how co-production may improve organizational results and community outcomes. In particular, the analysis explains how a co-production process may lever in additional resources that allow a local museum to deliver guided tours to tourists at a better quality, while improving the civic engagement within a local community.

This study explores the effect of such a form of collaborative governance on community outcome by integrating the Dynamic Multidimensional Model of Network Performance proposed by Cepiku (2014, 2016) with the outcome-based Dynamic Performance Management (DPM) approach proposed by Bianchi (2016). The combined model explains the performance of the collaborative governance setting at intermediate, organizational, and community levels. This explanation reduces the "complexity gap" (i.e., the gap between the problems faced by institutions and their capacity to tackle them) (OECD, 2017, p. 3). The model also identifies causality among community outcomes, connected to strategic resources and associated performance drivers.

The paper is structured as follows. Section 3.2 introduces and discusses the concept of co-production relative to public governance and outlines the theoretical framework. Section 3.3 illustrates how an outcome-based DPM approach frames the co-production process. The paper highlights how an outcome-based approach supports stakeholders in understanding how to leverage co-production to improve service quality and civic engagement. Finally, we illustrate policy insights through a case study focused on the guided tour of the MCC in Castelbuono, Italy.

## 3.2  Co-production as a Mode of Collaborative Governance

Governance has been used as an umbrella term (Bovaird & Löffler, 2009; Frederickson, 2009) and it has produced a considerable theoretical and ideological debate (Osborne, 2010) which has involved a variety of fields from political sciences to organizational research (Keast, Mandell, & Agranoff, 2014), with the risk of losing conceptual accuracy (Cepiku, 2013). While Rhodes (1997, p. 652) contended that governance had replaced the word government, Fukuyama (2013, p. 3) suggests that it reflects the "government's ability to make and enforce rules and to deliver services." Governance can be interpreted as "the way in which stakeholders interact with each other to influence the outcomes of public policies" (Bovaird & Löffler, 2009, p. 9). Collaborative governance studies have put more emphasis on collaboration rather than on governance (Cepiku, 2016). Collaborative governance may be a way to manage relationships between the public and private sectors (Huxham, Vangen, Huxham, & Eden, 2000). It spans the spectrum from cooperation, through coordination, to collaboration and can be considered an alternative conception of public governance in respect to New Public Management, where the market and hierarchy were predominant practices (Borgonovi, 2002; Osborne, 2006; Pessina, 2014). Collaborative governance takes place in an institutional environment where multiple actors find a collective logic. It differs from competition and hierarchy because of the voluntary base of collaboration, which in turn depends on the value generated and on the incentive mechanisms (Hill & Lynn, 2003).

Ansell and Gash (2007, p. 544) defined collaborative governance as a "governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus oriented,

and deliberative and that aims to make or implement public policy or manage public programs or assets." For being collaborative, a public agency must have a leading role within the governance setting and has to set up a deliberative forum aimed at planning and managing public policy, in this case, through the involvement of "non-state" stakeholders. There is no unanimous definition of collaborative governance. To Ansell and Gash (2007, p. 545), between the two terms, the critical one is "governance." The latter concept embraces both the classical governmental regimes (such as laws, rules, and administrative procedures) aimed to provide goods and services (Lynn, Heinrich, & Hill, 2001), and a collective decision-making logic that includes public and private actors (Stoker, 2004). Governance arises when two or more organizations collaborate to create public value (Imperial, 2005) and the term "governance" should be only be used when governance generates value, better organizational performance, or reduced transaction costs than acting alone (Bardach, 1998; Dyer & Singh, 1998; Huxham, 2012). Therefore, collaborative governance is a mode of "governance" where both public and private stakeholders structure rules and processes which support them in accomplishing a task that is difficult or impossible to achieve without collaborating (Imperial, 2005; Wood & Gray, 1991).

The emerging setting configures a "hybrid model" (Cepiku, 2016, p. 142) where a collective decision making aims to address problems which cannot be solved by a single organization (Agranoff & McGuire, 2003) and/or to deliver public services by engaging citizens and non-profit organizations within a new collective action logic (Edelenbos & van Meerkerk, 2016b). From these emerging relationships, new forms of collaboration may be developed, involving specific management issues (Huxham et al., 2000). Co-production may represent an outcome of these collaborative arrangements since it engages direct and indirect users (e.g., community members and volunteers) as real service co-producers. In other words, the network governance (Klijn, 2008) implements its collaborative arrangements (Emerson, Nabatchi, & Balogh, 2012; Howlett & Ramesh, 2017) by involving a plurality of actors, particularly public sector agencies, end users, not-for-profit organizations, citizens and volunteers, to deliver a public service and improve the achievement of public purposes (Sorrentino, Sicilia, & Howlett, 2018).

Therefore, co-production can be seen as a mode of collaborative governance (Alford, 2014, 2016; Bovaird & Loeffler, 2016; Cepiku, 2016; Edelenbos & van Meerkerk, 2016b; Pestoff et al., 2013) and "the line between governance and production is porous" (Alford, 2016, p. 159). Indeed, the delivery of public services is not frequently under the responsibility of a single organization; rather, overlapping competencies and decisions regarding the service—from planning and design to evaluation—may be shared between organizations intertwined vertically and/or horizontally as well as service users and communities.

Co-production emerged in the public administration literature since the 1970s (Brandsen & Pestoff, 2006; Ostrom & Ostrom, 1971; Ostrom, Parks, Whitaker, & Percy, 1978; Parks et al., 1981). The statement has been that public service organizations depended as much upon the community for policy implementation and service delivery as the community depended upon them (Osborne, Radnor, & Strokosch, 2016). It is about the involvement of citizens in the "execution of public

policy as well as its formulation" (Whitaker, 1980, p. 241), and it "is about professionals and citizens making better use of each other's assets, resources and contributions to achieve better outcomes or improved efficiency" (Bovaird & Loeffler, 2016, p. 254). Within a collaborative governance approach, the interactions emerging from co-production processes are relational rather than transactional (Alford, 2016). The value coming out from partners' interactions has been a prevailing perspective. However, some authors criticized this "social" perspective, putting emphasis mainly on professional relationships (Boyle & Harris, 2009). Literature has debated around the nature of users' contribution: does co-production exist only if citizens contribute voluntarily, or it can be conceptualized even in case of coercion? Whitaker (1980, p. 243) believes that the voluntary aspect is the predominant one, while Alford (2016, p. 160) asserted that voluntarism is the core of co-production, but it may include compliance measures to solicit the user to co-operate.

Both relational and voluntary features of co-production entail performance management activities for collaborative governance settings. Such a challenge requires the design and use of appropriate performance measurement/management systems that can support decision-makers' understanding of the most relevant performance dimensions and determinants (Cepiku, 2016). These systems should also strengthen coordination and bolster stakeholders' aptitude in "framing dynamic complexity, and support them in pursuing sustainable outcomes" (Bianchi et al., 2017; Bianchi, Bereciartua, Vignieri, & Cohen, 2019, p. 2).

## 3.3  A Dynamic Multidimensional Performance Management Approach to Assess the Performance of Collaborative Governance

Managing collaborative governance is crucial for achieving successful outcomes (Klijn, Steijn, & Edelenbos, 2010). To this end, the end results of a co-production process, namely the performance of a collaborative governance system, needs to be analyzed at different, though interdependent levels (Cepiku, 2014). Provan and Milward (1995, 2001) have developed a model that measures the effectiveness of a network at three different levels of analysis: organization/participant level, network level, and community level. Cepiku (2014, p. 178) revised such a model by addressing the main gaps she found in the literature, primarily by enlarging the scope of performance determinants, by addressing the classic exogenous vs. endogenous dichotomy. This model identified exogenous factors, internal resources across the network, processes and structural characteristics of network management, and external resources and support. The latter category of determinants can be even influenced—perhaps with a time delay—by network management, though it is not under its control. Management processes and structures, together with internal resources, affect management outcomes, which are conceptualized as intermediate results (i.e., the quality of interaction). The final results of the collaborative

governance setting are considered at two levels "community-level performance" and "organizational-level performance" (Cepiku, 2014, p. 179), and they are produced by management outcomes (intermediate results) and external resources and support.

The model developed by Cepiku (2014) addresses the main limitations of traditional approaches to performance management of collaborative arrangements. These are associated with the often-unclear distinction between determinants, intermediate, and final results and the prevalence of a static model of performance. However, this model does not frame the processes of accumulation and depletion of resources and how they change over time because of the impact of the final results on them. Moreover, this approach to performance determinants does not differentiate resources according to their nature—such as physical, capacity resources, information, resources generated by management routines (e.g., knowledge, image, social capital), and financial resources (Bianchi, 2016; Morecroft, Sanchez, & Heene, 2002). In addition, though this model seems to adopt a causal and feedback perspective of results, such a point of view is too aggregated to allow decision makers to identify effective leverage points where to intervene to improve the system's performance, so to improve the endowment of shared resources across the network.

The Dynamic Multidimensional Model of Network Performance (Fig. 3.1) model can be further enhanced by adopting a dynamic and outcome-based perspective of performance. The outcomes of co-produced public services are affected by the behaviors of professional groups, non-profit organizations, citizens, and communities (Bovaird et al., 2016; Osborne et al., 2016). By modeling such interactions, one may frame co-production as a way of collaborative governance and, most importantly, its effects on the community's outcomes. The combination of an
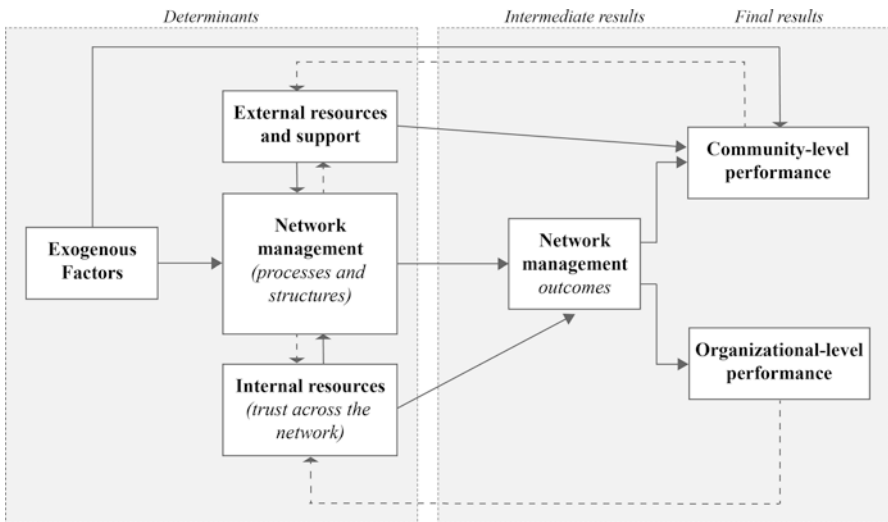


**Fig. 3.1** A Dynamic Multidimensional Model of Network Performance (Cepiku, 2014, p. 178)

institutional and an inter-institutional perspective of performance entails measures that enable managers to gauge the effectiveness of all interactions among partners on the wide-system outcomes (Bianchi, 2010).

Evidence suggests that policy outcomes and features of complex systems are loosely considered as a source of policy sustainability (OECD, 2017). While managing short-term results (i.e., output) of a single organization is generally considered feasible, problems occur when we try to measure the long-term impact produced by the aggregated contributions—in terms of outputs—of many public/private organizations in the dynamic and complex environment in which they operate (i.e., a local governance setting). DPM is an effective approach to deal with challenges posed by such contexts (Bianchi et al., 2017): policy coordination, collaboration, a trade-off in time and space, time delays between decisions and results, and nonlinear feedback relationships affecting system's outcomes.

By combining System Dynamics (Forrester, 1961; Sterman, 2000) with performance management systems, this approach may support decision makers in coping with a static and a sectoral perspective of results. It strengthens a holistic view of public policies and reinforces coordination and collaboration (Ghaffarzadegan, Lyneis, & Richardson, 2011; Vignieri, 2019) among a stakeholders' network. Figure 3.2 shows a DPM view. It is based on three layers: end result, performance drivers, and strategic resources (Bianchi, 2016).

The first step in applying DPM is the identification of end results (both outcomes and outputs). The second step implies the identification of performance drivers as crucial factors affecting end results. Performance drivers are conceived as ratios between the current strategic resource level and related benchmarks, desired levels, standard, expected, or normal value (e.g., "skills/desired skills" ratio, affecting
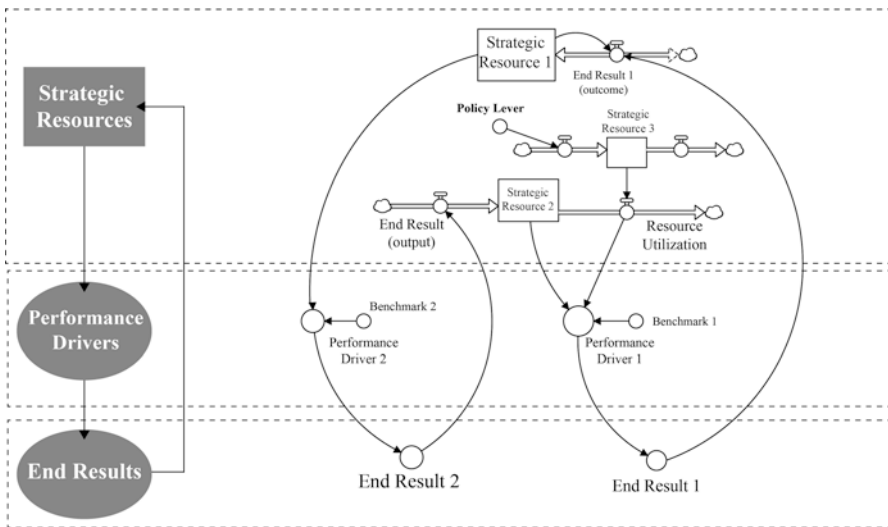


**Fig. 3.2** A Dynamic Performance Management view

service delivery failure rate). As a third step, DPM supports decision makers to outline policies to adopt to affect strategic resources (i.e., the stocks of tangible and intangible factors to build up and deploy together with others) that will influence performance drivers, and—through them—the end results, which will then feedback on the strategic resources, making a policy sustainable.

The two models presented in this section can be combined into an innovative and more effective conceptual framework: the Dynamic Multidimensional Performance Management (DMPM) model of collaborative networks.

The DMPM model takes both the benefit of three levels of network performance proposed by Provan and Milward (1995) and the distinction and clarification—discussed above—provided by Cepiku (2014, 2016). Then, it is further enhanced by combining these advantages with a systemic approach to modeling (Forrester, 1969), a causal feedback analysis (Sterman, 2000), and it is strengthened by adopting an "instrumental" view of performance (Bianchi, 2016, p. 73). Through DPM, it is possible to identify those performance drivers (the gray area in Fig. 3.3), which have an impact on the end results (both intermediate and final). In this way, the combined model also covers causal connections between performance determinants, intermediate and final results, which are rather loosely pointed out in the Dynamic Multidimensional Model of Network Performance.

The emerging framework reveals how collaboration can be a strategy and a means of collectively improving network governance (McCaffrey, Faerman, & Hart, 2008). In fact, in a collaborative governance setting, resources are rarely
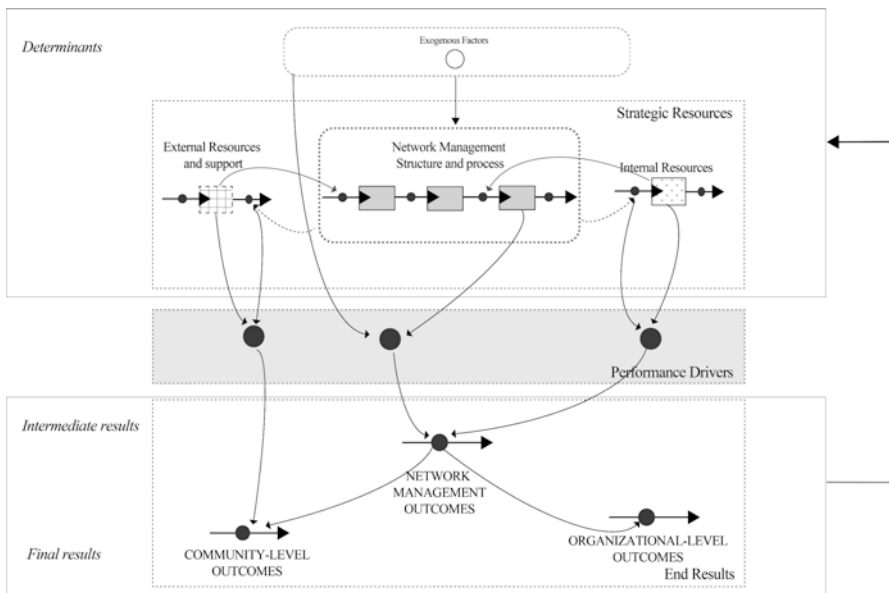


**Fig. 3.3** The Dynamic Multidimensional approach to Performance Management (DMPM) of collaborative networks

managed or controlled by the same agency (e.g., municipality, non-profit organizations); different organizations and players rather manage them. Also, some resources are shared across the network, and stakeholder collaboration may well be a strategy to generate public value and outcomes. To this end, the DMPM approach supports networked organizations in identifying their contributions to the achievement of broader network outcomes (Bianchi et al., 2017; Bianchi & Rivenbark, 2014; Bivona & Cosenz, 2018) and managing collaboration strategies. Therefore, the DMPM framework can be adopted to analyze and discuss the performance of the co-production process described in the case at hand.

## 3.4   Case Study: The Guided Tour of the "Museo Civico di Castelbuono"

This case study explores the case of the co-production of the guided tour offered to visitors of the "Museo Civico di Castelbuono" (MCC), taking place in Castelbuono between 2016 and 2017. This empirical study was set in Castelbuono, a small town in Sicily (Italy), and it represents a good example to illustrate the effectiveness of the DMPM framework. The case study analysis was carried at the end of 2018, and document analysis, semi-structured interviews, and questionnaires were used to frame the collaborative governance setting. As Lang, Roessl, and Weismeier-Sammer (2013, p. 237) suggested: "in order to enhance our understanding of citizen participation, context-sensitive research that goes beyond merely descriptive governance analysis is needed." In this sense, the use of multiple sources of evidence may adequately profile the context (Morris & Wood, 1991) and offer insight into the effects of such a co-production process on community outcomes. As Forrester (1992, p. 56) emphasized, the information for understating the causal relationships responsible for the observed dynamics can be attained from different sources, ranging from decision makers' "mental databases" to numerical databases. Likewise, as Yin (2013, p. 116) put it, "no single source has a complete advantage." To ensure data consistency and increase their internal validity, a case study strategy needs to triangulate multiple sources of information (Lewis, Thornhill, & Saunders, 2007). Therefore, a case study research strategy has been tailored. (1) Initially, a document analysis (e.g., administrative and publicly available documents) was adopted to identify main actors co-producing the service. Then, to develop the DMPM model, primary data were gathered through a mixed method. Particularly, (2) semi-structured interviews were conducted with the President of the Pro-Loco (Pro-Loco is an organization that promotes and foster the tourism in the small town), the Director of the MCC, and a group of Volunteers working for the Pro-Loco; (3) surveys were handed out to groups of assisted tourists, and (4) a museum management reports were reviewed. Lastly, (5) assessing and validating the performance measures and propositions advanced in this study entailed engaging all the co-production partners in the second round of semi-structured interviews.

Such a research strategy was aimed to address five complementary needs: (1) understanding the rationale behind the service and get acquainted of the co-production process; (2) framing how end-users of the service, Pro-Loco volunteers, and museum personnelare involved in each phase of the guided tour, as well as the nature of their contribution/benefit; (3) deducing how and to what extent the museum uses external resources and skills to deliver the service; (4) supporting model building; and (5) sharing, assessing, and validating research findings and implications. As a synthesis, Table 3.1 connects each source of evidence used to develop the case study to its relative target of inquiries and purpose.

The "Museo Civico of Castelbuono" (MCC) is the city museum to which the municipality entrusts the preservation and promotion of the local heritage. The MCC venue is the "Ventimiglia castle", an institutional seat symbol of the city, and, due to its functions and peculiarities, the heart of the city's history, culture, and religious practice. The cultural policies of the MMC are led by a board of five people, a President elected among them, and a Director. Both board members and the Director are

**Table 3.1** The sources of evidence: target of inquiries and purposes

| Source of evidence | Target | Purpose |
|---|---|---|
| Documentation | ProLoco Website | Understating the scope of the service and the way users can co-design the service. |
| Documentation | Programme Framework Agreements between the Municipality, MCC, and PRO-LOCO. | Understanding the role of each actor and the process. |
| Documentation | MCC management and cultural reports for the years 2016, 2017, and 2018. | Understanding the strategy and the positioning of the museum. |
| Open Interview | President of the Pro-Loco [2 interviews] | Understating the role of the organization, the resources provided by the volunteers, and the service' phases. |
| Open Interview | Director of the Museum [2 interview] | Understating the aim of the organization, the cultural offering, and the operation. |
| Open interview | Pro-Loco volunteers [6 interviews] | Understanding the knowlegde of volunteers', their skills and motivation to collaborate |
| Questionnaire | Museum's Visitors [20 questionnaires] | Understanding the visitors' needs, perceived quality of the visit, weaknesses, strength of the entire process. |
| Participant observation | Guided tour of the museum | Understanding how the service is delivered. |
| Semi-structured interviews | City council member delegated to tourism and culture policies Director of the Museum President of the Museum President of the Pro-Loco Pro-Loco volunteers | Assessing and validating the performance measures and sharing the propositions advanced in the study with the local actors |

appointed by the Mayor of the town. The President steers the institution and has the power to represent the Museum. The Director has an executive role with respect to the decisions of the board. Also, this role implies greater commitment to cultural plans, scientific coordination of projects, and "town-wide" heritage preservation issues.

For six centuries, the castle was the residence of the aristocratic Ventimiglia family. Since 1920, the castle has been owned by the municipality. Thanks to a fundraising effort, it was bought by citizens. Nowadays, the museum preserves and exhibits handmade works related to the cult of Saint Anne, linked closely with the Palatine Chapel, where the holy relic of the Saint is preserved. The other two sections of the museum are devoted to providing historical and architectural information on the fabric of the castle and the urban evolution of the city, and to exhibiting contemporary art and a permanent modern art gallery. The cultural offering of the MCC (such as exhibitions of contemporary arts, concerts, and conferences) and the beauty of the venue (a nice-looking Castle of the middle age) attracts many visitors from the entire region. Table 3.2 reports visitors of the MCC from the year 2014 to 2018.

The guided tour service of the MCC is offered from the year 2017, and it involves three actors: the museum, the Pro-Loco (a non-profit organization in charge of promoting tourism and culture), and tourists. Pro-Loco employs volunteer workers,

**Table 3.2** Visitors of the Museo Civico di Castelbuono: years 2014 – 2018. Pictures of the venue (source: Museo Civico di Castelbuono)

| Year | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| Visitors | 34,833 | 30,816 | 36,243 | 38,040 | 39,212 |

Pictures of the venue:
1. The castle: external view (Courtesy of Museo Civico Castelbuono, photo credit Minutella, V.)
2. The castle: a view of the courtyard (Courtesy of Museo Civico Castelbuono, photo credit Minutella, V.)
3. The castle: a detail of a door (Courtesy of Museo Civico Castelbuono, photo credit Minutella, V.)
4. Modern and Contemporary Art Pinacoteque, (Courtesy of Museo Civico Castelbuono, photo credit Puccia, M.)
5. "Ex Scuderie": temporary exhibition space, (Courtesy of Museo Civico Castelbuono, photo credit Minutella, V.)
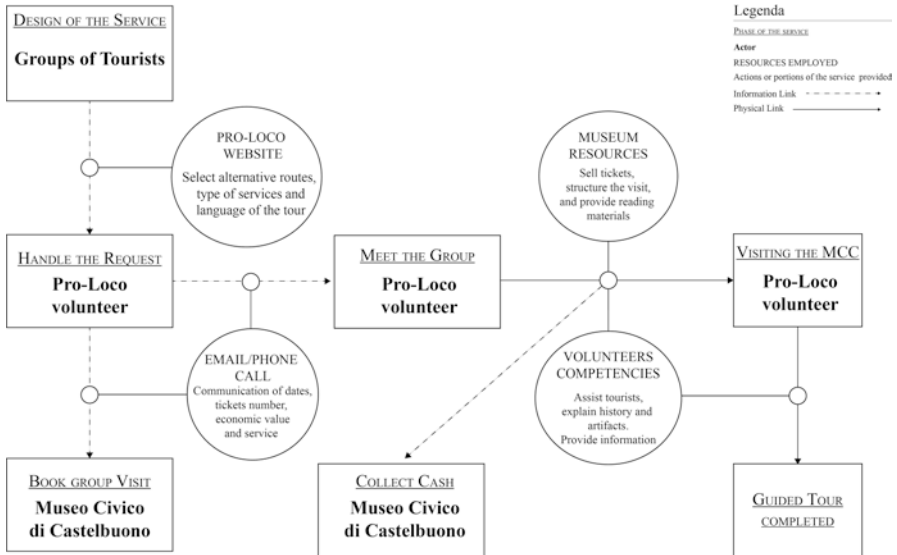
**Fig. 3.4** Outline of the co-production process for the guided tour service at MCC

whose task is to assist tourists in visiting the museum according to the service logic presented in Fig. 3.4. The process features seven phases. First—through the Pro-loco website—tourists can design the service. They choose among alternative routes, define the language (the tour is offered in English, German, Japanese, and Italian), the length of the visit, and the tour schedule. Thereafter, the request is managed by a volunteer who forwards the booking to the museum administration and makes an appointment for a volunteer to meet and assists the visitors on the selected date. Then, the museum sells tickets, collects the money from them, and gives tourist brochures and reading materials. The Pro-Loco volunteers conduct the guided tour. It is worth underlining that, in doing this task, they offer additional resources (e.g., languages, cultural and artistic competencies, pedagogy skills, etc.).

The process described above and presented in Fig. 3.5 can be conceptualized as an "individual" form of co-production (Bovaird, Van Ryzin, Loeffler, & Parrado, 2015, p. 4; Loeffler & Bovaird, 2016, p. 5). To this end, Table 3.3 reports the nature of the contribution/benefit co-producers bring to and take from each phase of the service.

As Table 3.3 shows, people individually contribute to most phases of the service: it seems that people voluntarily provide to the co-production processes for the sake of their willingness to participate in public affairs and less because of market incentives (Alford, 2009). Each tourist enjoys the guided tour and experiences the benefit of the process individually; in the same fashion, the Pro-Loco volunteers contribute individually to the process. Differently, the museum pursues its collective self-interest (Pestoff, 2012) by complying with its institutional mission (i.e., to show, preserve, and promote the cultural heritage of Castelbuono). At the organizational level, this adherence configures a collective way of obtaining benefits, but the personnel who work for the museum individually contribute to the process. Therefore,
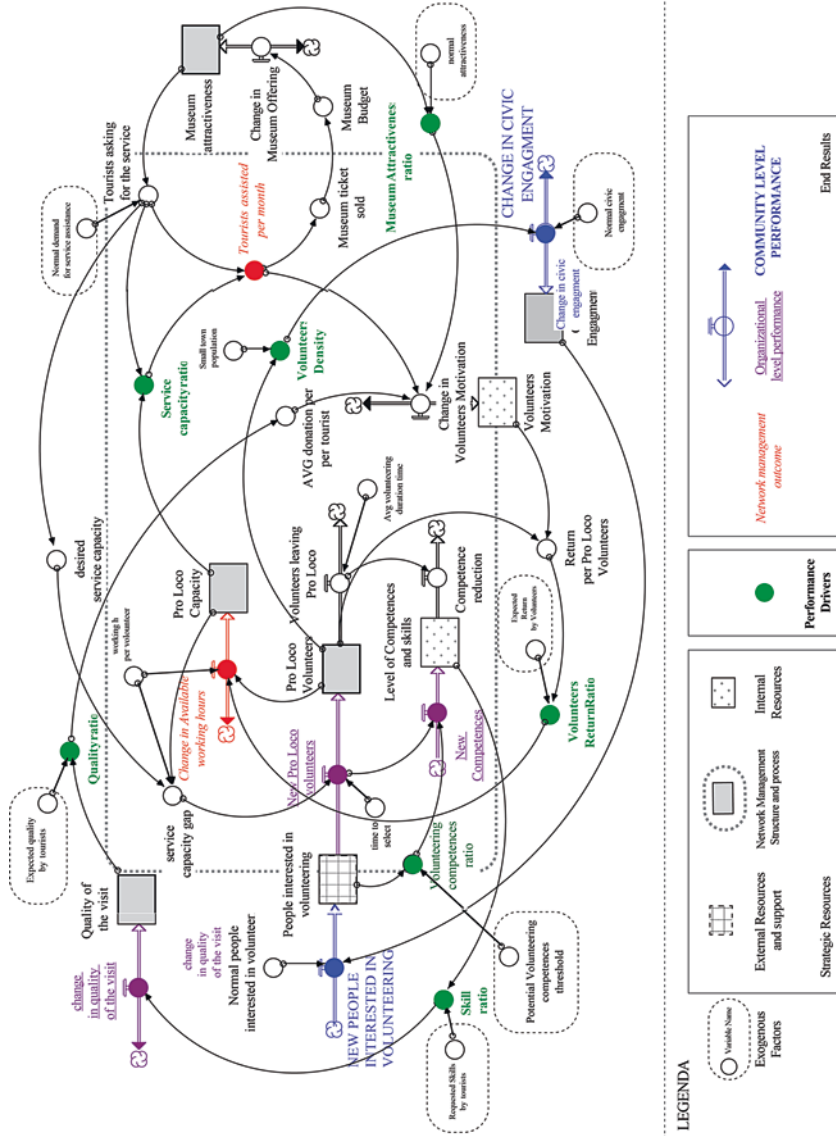
**Fig. 3.5** A DMPM model of the collaborative governance setting co-producing the guided tour service at MCC

**Table 3.3** Types of co-producer(s) contributions according to the phase of the service (source: author own elaboration)

| Phases of the service | Co-producer(s) | Inputs/resources | Type of contribution/benefit |
| --- | --- | --- | --- |
| Service Design | Groups of tourists | Information<br>Needs | Individual contribution<br>Collective benefits |
| | Pro-Loco | Internet Website<br>Volunteers<br>Touristic tour/packages | Collective contribution<br>Individual contribution<br>Collective contribution |
| Handle the request | Pro-Loco | Volunteers<br>Information | Individual contribution<br>Individual contribution |
| Book the visit | Museum | Information<br>Need | Individual benefit<br>Collective benefit |
| Meet the group | Pro-Loco | Information | Individual contribution |
| Collect money | Museum | Staff | Collective benefit |
| Visiting the museum | Pro-Loco | Volunteers<br>Competencies | Individual contribution<br>Individual contribution |
| | Museum | Collections and venue<br>Staff<br>Materials<br>Tourists satisfaction | Collective contribution<br>Individual contribution<br>Individual contribution<br>Individual benefit |
| | Tourists | Cash<br>Knowledge | Individual contribution<br>Individual benefit |

the co-production process delivers both public and private values (Alford, 2016; Löffler, Parrado, Bovaird, & Van Ryzin, 2008).

Three main results emerge from the co-production of the guided tour of the MCC. They relate to the three levels of analysis identified by Provan & Milward (2001, p. 415) and are identified as organizational, network, and community-level performance. Consistently, the performance of the system co-producing the guided tour of the MCC is explored at three different levels: (1) management outcome (intermediate outcome), (2) organizational performance (final outcome), and (3) community-level performance (final outcome). Table 3.4 outlines the performance levels of the collaborative governance and associated performance dimensions and the organization(s) they pertain to. The identification of such results and measures was enabled by the interviews with the key decision makers.

At the management level—as an intermediate result—two dimensions characterize the performance of the collaborative governance: the "number of tourists assisted per month" by the Pro-Loco volunteers and the "change in volunteers available working hours." Both intermediate outcomes are crucial for either the Pro-Loco and the Museum. The first captures the volume of the co-production, while the second measures a change in the service capacity (an increase indicates an increased availability of volunteers for running the service).

At the organizational level, there are three final results: "change in the average quality of the visit," which is the variation of an intangible asset (quality of the visit) that pertains to the museum. Two other end results at this level are: "New Pro-Loco volunteers" and "new competencies." They represent the change in the strategic resources deployed by the Pro-Loco to assist tourists.

**Table 3.4** Performance levels and dimensions of the collaborative governance

| Level of performance | Performance dimension | Interested organization(s) |
|---|---|---|
| Management level | Tourists assisted per month | Pro-Loco, Museum |
| | Change in volunteers available working hours | Pro-Loco, Museum |
| Organizational level | Change in quality of the visit | Museum |
| | New Pro-Loco volunteers | Pro-Loco |
| | New Competences | Pro-Loco |
| Community-level | Change in civic engagement | Museum, Pro-Loco, and community |
| | New People interested in volunteering | Museum, Pro-Loco, and community |

At the community level, the "Change in civic engagement" is the variation of people willing to participate in public affairs, and "new people interested in volunteering" represents the quantitative counterpart of such engagement. These three performance dimensions represent three end results, which are a suitable starting point for applying the DMPM model to this collaborative network. A mixed-method approach was used to build the model. Qualitative information concerning policy structures and management decisions was gathered from primary and secondary sources (Forrester, 1992; Morecroft, 2015). In fact, through semi-structured interviews, it has been possible to identify the main results concerning the three levels of performance. Here below are reported two answers given by the co-production partners during the interview in the assessment phase. The extraction concerns the following issues (1) the value created through the co-production of the service and (2) the results each decision maker expects to achieve for its organization.

1. *Can you describe the value created through the service?*

    (a) *Improving tourism experience.*
    (b) *Improving Castelbuono's Image.*
    (c) *Improving tourists' satisfaction.*
    (d) *Improving cultural experience as a learning experience.*
    (e) *Creating value for the community, the local area, and the businesses.*

2. *Can you describe the results your organization expects to achieve through participation in the co-production process?*

    (a) *Implement organizational' mission.*
    (b) *Promote cultural heritage.*
    (c) *Improve efficiency in service delivery.*
    (d) *Provide opportunities for young volunteering.*
    (e) *Improve the quality of a visit.*
    (f) *Satisfying users' and visitors' needs.*

Figure 3.5 provides a simplified insight into the stock-and-flow structure for a preliminary system dynamics-based simulation model, framing three levels of network performance. The model takes an external perspective (Bianchi, 2010) and maps the

co-production process by illustrating accumulation and depletion processes which occur in the resources of the collaborative governance. The model represents the service process logic that maps the relationships among all the network participants. The purpose of the model is to show how performance determinants affect three levels of performance and where each partner may intervene to affect system performance. A main limitation of the model regards the demand side, which is underrepresented.

At the center of the model shown in Fig. 3.5, there is the Pro-Loco volunteers' maturation chain. By a "Normal rate of people interested in volunteering," the inflow "New people interested in volunteering" increases the stock of "People interested in volunteering." The flow "New Pro-Loco volunteers" (organizational-level performance) increases the resource "Pro-Loco Volunteers." This last stock is reduced by a "Leaving rate" according to an average "volunteering duration time." Volunteers maturation chain is the engine of the co-production process since it provides new volunteers and, at the same time, increases both the stock of "Pro-Loco capacity" (management outcome) and the "Level of Competence and Skills" (organizational-level performance).

A "Normal demand for the service" exists as an exogenous factor. Thus, the "Number of tourists asking for the service" can be managed by the collaborative network only if the "Pro-Loco capacity" is enough for satisfying such a demand. The "Service capacity ratio" is a first performance driver that measures the adequacy of Pro-Loco service capacity with respect to the demand. It affects the number of "Tourists assisted per month" (network management outcome). Indeed, with a poor service capacity, the Pro-Loco can realize low activity volume and, as a consequence, a small number of tourists assisted in a month. The number of "Tourists assisted per month" is a management outcome since it represents the quantitative purpose of the co-production process and a goal for collaborative governance. The higher the number of "tourists assisted per month", the higher the "Museum Revenues" and the "Museum budget" will be. An increase in "Museum budget"—all other conditions being equal—is likely to improve the "Museum attractiveness," which in turn raises the actual demand for the service. This feedback represents a growth process for the service demand and is driven by a continuous improvement of the museum attractiveness.

The "number tourist assisted per month," according to an "Average value of donation per tourist," also determines volunteers' motivation—an internal resource and a measure of the trust within the network. The stock of "Volunteers motivation" may capture financial donation to Pro-Loco, as well as tourists' acknowledgment and public recognition of volunteers' efforts for offering the service. The network's asset "Volunteer Motivation" is also affected by the "Museum attractiveness ratio," which compares the actual "Museum attractiveness" with a normal value. Such a performance driver captures the additional contribution given by the volunteers to "Museum attractiveness." The higher is the contribution, namely the ratio, the higher the impact on "Volunteers Motivation" will be. On the other side, each

Pro-loco volunteer has an expected level of possible reward upon his/her contribution (tourists' donations to volunteers for the service done). The ratio between "Volunteers' expectation" and the actual value of "current volunteers' return" is a performance driver that measures the attitude of volunteers to volunteer more. Indeed, the "Volunteers return ratio" affects the "change in available working hours," which as flow increases the "Pro-Loco capacity."

Volunteers offer their time and competencies, which are a key feature of the guided tour service. The stock "Level of competencies and skills" represents an internal resource for the network, which cumulates the skills of newcomer volunteers. The level of such a strategic resource is compared with the scope of skills and competencies expected by tourists (e.g., languages, knowledge of history, the reliability of the volunteer) through the driver "Skill ratio" which affects the "change in the quality of the visit" (organizational result). The "Quality of the visit" may or may not meet tourists' expectations. The performance driver "Quality ratio" captures the quality fit and impacts on the "Average donation per tourist." The higher the "Average donation per tourists", the higher the "Volunteer motivation" will be. An increased motivation will reinforce this process sustaining volunteers' propensity to allocate their time and skills for the collaborative network plans.

The model includes two policies carried out by the Pro-loco: the first aims to control the service capacity by correcting the stock of "Pro-loco volunteers" on the basis of the "Desired service capacity" which is adjusted according to the perceived demand for the service; the second policy has the purpose to properly evaluate the competence and skills of each "New Pro-Loco volunteer" according to a competence threshold. This selection process ensures that volunteers' competencies are properly evaluated and recognized by group members before a volunteer can start to assist a group of tourists.

The DMPM model aims to understand the impact of collaborative governance on community outcome and also support the implementation of co-production strategies intended at improving such outcomes. Such a model frames the whole co-production system from a *macro* perspective by identifying how the resources owned by the collaborative governance system affect all three levels of network performance. The conceptual model allows decision makers to understand the dynamic relationships among performance determinants and results by focusing on performance drivers and associated accumulation and depletion process of strategic resources. The main advantage resulting from the combination of the two models is the ability of the developed DMPM model to frame the specific complexity of the collaborative governance setting and to explain the causality chain behind the performance. Through these benefits, policy-makers can able to find effective leverage points where to intervene to improve management outcomes, organizational, and community-level performance.

## 3.5 Explaining the Effects of Co-production on Management Outcomes, Organizational, and Community-Level Performance

The explanation of the impact of performance drivers on end results is clustered into three groups: management outcomes, organizational, and community-level performance.

### 3.5.1 Management Outcomes

The first management outcome is the volume of "tourists-assisted per month." This intermediate result changes according to the external demand for the service, which can only be satisfied when the service is adequate when compared to the demand. To meet the demand for the service and achieve a certain level of service standard, the board of the Pro-Loco should consider keeping the service capacity (the numerator of the service capacity ratio) as close as possible to the service demand (the denominator of the service capacity ratio). In this way, the board may avoid schedule pressure on staff and unsatisfied demand by adequately managing volunteers' working shifts.

The "Change in available working hours" is a second management outcome. It is affected by the "Volunteers return ratio," which compares the actual level of volunteers' motivation and the expected reward of volunteers. It is worth underlining that motivation will decline as time passes, but volunteers are not always the same as they will change as well over time. Therefore, the role of the collaborative governance is to motivate volunteers by giving them an adequate level of acknowledgment—such as public recognition, credits on museum's website, and involvement in other projects—for the assistance they provide to tourists when visiting the museum. Performance drivers provide a measure to manage this task.

### 3.5.2 Organizational- and Community-Level Performance

The organizational result for the MCC "Change in quality of the visit" is affected by the performance driver "Skill ratio." The strategic resource associated with this driver—namely, the "level of competences and skills" is not managed by MCC managers; the Pro-loco board rather controls it through ad hoc policies. The decision rule of the board affects two organizational results, which have a direct effect on this resource: "New Pro-Loco volunteers" and "New competences." In this case, the DMPM model highlights specific critical issues where collaborative governance may play a crucial role in coordinating the selection process of volunteers and—through this—the level of competences and skills available for delivering the service.

At the community level, the co-production process has an effect on the "Change in civic engagement," which is an outcome of collaborative governance. This end result is affected by the performance driver "Volunteer density" that compares the stock of volunteers with the size of the small-town population. Such a result changes the intangible strategic resource "Civic engagement," which conceptualizes population willingness to contribute to public affairs. This community resource, in turn, influences "New People interested in volunteering" as a quantitative dimension of civic engagement. To continue offering such services or designing a co-production process of new services, stakeholders have to put an effort into maintaining a high level of civic engagement over time.

### 3.5.3   Linking Performance Drivers with Collaborative Governance

The model (Fig. 3.5) was developed by connecting together the evidence gathered through the qualitative analysis (Table 3.1) so that it may frame the co-production process, actors' policies, and reflect the governance structure. Indeed, the purpose of the model arose from the analysis of mental and written information (Forrester, 1992).

The DMPM framework supports both policy design and performance management since it (1) allows local actors to identify effective leverage points on which to act to improve system's performance; (2) highlights performance drivers as key performance determinants, and (3) offers a set of performance measures to gauge both intermediate and final results.

To show the benefits of the proposed approach and makes these relevant to the collaborative governance, Table 3.5 reports and defines each performance driver, associating this with the end result upon which it has an effect, and clusters such a driver within a level of performance.

An analysis of performance drivers offers significant implications for policy design. For instance, if the goal is to increase the number of tourist assistants per month, both the museum and the Pro-Loco policy-makers have to intervene on the determinant of service capacity. Therefore, an analysis of performance drivers allows one to understand the effects of the current resource level on the three layers of collaborative governance performance. Indeed, the contribution of co-production to outcomes and public value is located along with these causal connections.

## 3.6   Conclusions

In the last 10 years, the management of public sector organizations has become increasingly characterized by system complexity (Bouckaert, Peters, & Verhoest, 2017; OECD, 2017). Collaborative governance (Agranoff & McGuire, 2003;

**Table 3.5** Performance drivers, definition, and associated end result and level of performance

| Performance driver | Definition | End result affected | Level of performance |
|---|---|---|---|
| Service Capacity Ratio | A comparison among the number of tourists asking for the service and the Pro-Loco Capacity. | Tourists assisted per month | Management outcome |
| Volunteers Rewards Ratio | The level of fit between the rewards offered to volunteers and what is expected by the volunteers. | Change in available working hours | |
| Quality Ratio | The ratio between the quality of the service and the quality expected by tourists. | Average Donation per tourists | |
| Service Capacity Gap | The difference between the desired level and the actual level of service capacity. | New Pro-Loco volunteers | Organizational level performance |
| Volunteering competences ratio | A comparison between the competences owned by the people interested in volunteering and a competences threshold | New Competencies | |
| Skill ratio | A comparison between the competences and skills provided by the volunteers (e.g., languages) and the skills requested by tourists | Change in quality of the visit | |
| Volunteers Density | A ratio between the number of volunteers and the size of the population. | Change in civic engagement | Community-level performance |

Ansell & Gash, 2007; O'Flynn & Wanna, 2008; O'Leary & Bingham, 2009), vertical and cross-organizational coordination of public policy (Bouckaert, Peters, & Verhoest, 2010), joined-up government (Bianchi, 2015), and whole of government (Christensen & Lægreid, 2007) approach have been the response prompted by public management scholars and practitioners. A complementary debating issue relates to the "value" created and/or co-created by public services. Within such a debate, a stream of literature focused on co-production (Fugini, Bracci, & Sicilia, 2016; Osborne et al., 2016; Radnor, Osborne, Kinder, & Mutton, 2014) as a form of collaborative governance (Bovaird & Loeffler, 2016) has emerged.

This research explores the impact of co-production on community outcomes. The case study relates to the co-production of the guided tour service of the MCC venue, and it has provided insights into how co-production improves management outcomes, organizational, and community-level performance. The co-production process of the guided tour of the MCC has been investigated by developing a DMPM model which combines the Dynamic Multidimensional Model of network performance (Cepiku, 2014) with the DPM framework (Bianchi, 2016).

The model framed how the network co-produces the guided tour service of the MCC venue and how it is possible to leverage in additional resources—such as service capacity, competencies, and skills of volunteers—through collaborative governance. Also, the DMPM model identified performance drivers that focused critical dimensions for managing the performance of collaborative governance and

for designing public policy aimed at improving organizational and community outcomes. In this sense, performance drivers work as critical network's nodes: the driver "Service capacity ratio" affects the volume of activity the network may develop; the driver "Volunteers rewards ratio" has an influence on the service capacity level; the "skill ratio" influences the quality of the visit; the driver "Volunteer density" has an impact on the civic engagement. Performance drivers bridge performance determinants to the three levels of network performance and unfold the effects of relationships within the co-production process on community outcomes. For the MCC case, the "volunteer motivation" is an internal resource capturing the trust across the network, and it can be maintained only through the management process. Such a resource affects the service capacity level and thus the actors' ability to co-produce the service. Finally, the stock of volunteers has an impact on the community outcome "civic engagement."

To summarize, this chapter (1) has shown that co-production contributions are provided individually by the collaborative governance actors; (2) has developed the DMPM framework as combination of two conceptual frameworks for framing and managing performance of collaborative governance; (3) has explored the effects of co-production process on civic engagement finding that volunteer motivation drives service capacity level and through this civic engagement.

Model limitations concern the absence of longitudinal data against which compares possible simulation outputs. The advancement of the DMPM model into a formal model capable of simulating so to ascertain how co-production improves the system's outcomes can well be the future development of this work. With a quantitative form of a DMPM model, future research avenues might explore several aftermaths of co-production. These refer to the improvement of organizational benefits, the relevance of collaboration for the co-production of this kind of services, and the role of common goods, particularly intangible shared resources such as the Image of the town (Vignieri, 2018, 2019), the quality of the visit, and the level of civic engagement, in ensuring outcome sustainability.

The DMPM model can support policy-makers in designing co-production processes, though it is a starting point for building a System Dynamics model capable of exploring alternative policy design and implementation strategies through simulation, while the conceptual model explains the causal connections among the co-production process and community outcomes.

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# Chapter 4
# The Conceptual Dynamic Model of Rural Development Towards Sustainable Self-Sufficiency

**Athor Subroto and Vanda Ningrum**

**Abstract** The inability of rural areas to accommodate inhabitants' aspirations and the dynamics of life among young people led to youth migration towards urban areas. This phenomenon causes villages to experience a shortage of labor. Development agents for an innovative and productive life in agricultural development are lost. Making the village attractive for youth requires a comprehensive rural development strategy in all aspects, including economic, social, and technical skill issues. This study built a conceptual model based on the causation relationship within a causal loop diagram of several relevant aspects, such as economic, social, and skill development facets in achieving sustainable rural area development. We draw the relationships and interaction among relevant variables in the system from in-depth interviews, focus group discussion (FGD), surveys, and the use of secondary data. The location is concerned with rural rice-producing villages in Central Java, which have been experiencing a youth-labor shortage. Alternative strategies were identified based on the conceptual model, such as (1) the development of modern rice agriculture to secure job availability, which can nurture juvenile farmers. Income security and flawless production activities for farmers to guarantee remuneration adequacy become the second priority. The third strategy improves the role of educational institutions in providing knowledge and developing skills for students in the agricultural-based village and rural development. Lastly, infrastructure building is vital to open up access to economic activities, reduce the cost of production, and foster the trading schemes capable of creating innovative young farmers, and a plethora of jobs.

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## 4.1 Introduction

### 4.1.1 The Aging of Agriculture: Some Empirical Evidence

Our paper considers the question of young people's aspirations in agriculture as a viable basis for development in rice agriculture. Indonesia, the world's fourth most populous nation, has committed itself to beef up its food security. However, most of the plans concerning food security are missing what we believe is the major issue: the retention of young farmers. The study of rural youth aspiration becomes necessary because young lives' choices and outcomes are affected partially by their aspirations. The nature and formation of youthful aspirations, therefore, have direct implications in emerging visions and models of future agriculture. Young peoples' aspirations inform the choices they make regarding their participation in these visions (Anyidoho, Leavy, & Asenso-Okyere, 2012).

The large numbers of rural youth who migrate to the city either for study or working purposes push the youthful labor shortages in agriculture. Youthful people escape from agriculture because their job aspiration is for work in the city. They expect to get adequate salary and secure jobs as an employee in prestigious companies or become a civil servant. Almost all of our young respondents (15–24 years old) in this research are not willing to be a farmer and regenerate their parents' job in agriculture as their career focus. This situation also happened earlier in Malaysia, where youth were unhappy about the prospects of agriculture as a means of livelihood in rural areas. The Malaysian experience offers some suggestions on how to cope with the rural-to-urban exodus (Argent & Walmsley, 2008; Weicker, 1993). These include improvement in rural work opportunities, improving the "meaningfulness" of jobs in rural areas, improving the socio-economic environment in rural areas, and overcoming the rural–urban imbalance in socioeconomic life (Nor Bin Abdul-ghani, 1979). Minza (2014) found that most of the rural youth who attended school in the city choose to work and live in the city (Liu, Shen, Xu, & Wang, 2017) rather than to return to their countryside.

Hannan (1969), based on field studies in Ireland, reports that migration decisions are based mainly on economic fulfilment and social mobility aspirations. Driving these decisions are local conditions, occupational and income earnings' aspirations as well as individual characteristics and discontent with the current youth unemployment situation and associated economic crisis in the European Union (Narciso Pedro & Carrasco Pons, 2017; Van Mol, 2016). Economic factors, such as perceived economic opportunity and perceived quality-of-life (Anastario et al., 2015; Wilson-Figueroa, Berry, & Toney, 2010), can explain 83% of the variation in young adult in-migration rates in Venezuela (Jones & Zannaras, 1976). In Yugoslavia

(which is now the Czech Republic and Slovakia), according to Rusinow (1972), a combination of an economically and socially unassimilable volume of rural–urban immigrants jeopardized agricultural production and productivity. This imbalance should lead planners either to create wider possibilities for the employment of unskilled labor coming from agriculture or more acceptably consider ways of tying youth to the village and its agricultural base. In the United States, a study using the logit model developed by Black in 1981 and the so-called Black's theoretical model (Black, 1981) estimates migration probability amongst the youth. The analysis yields several insights into the determinants of migration: local labor market conditions, an individual's employment success, migration experience before and after high school graduation, and personal characteristics such as aptitude, sex, family status, school experience, and family background (Black, 1983). Datta (2018), based on multi-site fieldwork in Bihar, India, urges that insertion of emotions [emotional geographies] in the analysis of migration helps to disentangle the dissonance between migrants' economic success and social rejection in the city.

Meanwhile, in Japan, a study concludes that the migration of young people to the city in search of employment or for higher education primarily causes changes in the age structure of the population of Tokyo (Alston, 2004; Kawabe, 1984). In Thailand, a study carried out by Funahashi (1996) found that there was a massive out-migration of young adults and an increasing tendency of those who remain in the villages to work in nearby factories or service industries. The outmigration has led to a severe agricultural labor shortage. In many rural villages, the population seems to be composed mostly of young children and their grandparents (Funahashi, 1996; Jampaklay & Richter, 2012). Now, in Indonesia, agriculture is populated by older people with an average age of 52 years old (Agriculture Census, 2013). Aging farmers are also phenomena in agrarian countries in the world. In Africa, 65% of African inhabitants are still living and working in rural areas (Leavy & Smith, 2010), with young people less interested in staying in the countryside (White, 2011). The departure of youth leaves fewer people to work the land because the able-bodied and working-age group will have migrated to the urban areas (Juma, 2007). Thirty years ago, some scholars had attributed the absence of youth in the rural areas as the main reason behind marginal production yields in smallholder farming. Recently, White (2011) stressed that the problem of young people turning away from agriculture causes lower food production. Turning away from agriculture also causes structural problems, including deskilling of rural youth, the downgrading of farming and rural life, chronic government neglect of small-scale agriculture, and limited rural infrastructure development. These well-documented problems may contribute to the decline in popularity of farming, particularly among the young.

Tuscia (2008) reports on an imbalance in European farming between farmers who exit from their farm and new agriculture run by young farmers. There the average farmer's age is 65 years old. Another study in Asia showed similar problems. In Japan, statistics reveal that the elderly now dominate the agriculture sector. In 2008, 46.8% were 70 years or over, and 57.8% of full-time farming households consisted of elderly full-time farmers with no males aged under 65 years (Yamashita, 2008).

### 4.1.2  The Indonesian Rice Agriculture Experience

Figure 4.1 shows that 60.79% of Indonesian farmers are over 45 years old and only a small proportion of young farmers are aged less than 30 years. The proportion of child labor is smaller than 20 years ago. A compulsory education program has a high impact on the decrement of child labor in agriculture. Government policy now requires children to attend school, and student tuition is subsidized. Every child, even in rural areas, now has access to junior high school.

In fact, 24.53% of the Indonesian population are young people (16–30 years old) and more than half of those youth live in the cities (53%). There have been a declining number of youthful people living in rural areas. Job availability in the cities attracts youthful people to move from their village. Every year, around 52,000 youthful people move to the city for a better living.

The statistics show that 51.05% of youthful people are employed, 20.25% are students, and 8.99% are unemployed. Although the numbers of youthful people working in agriculture are still high (25.23%), there has been a declining trend for the last 10 years. Nowadays, youth tend to choose to work in the trading and manufacturing sectors. From 2004 to 2014, the agricultural sector decreased by 10%, while the trading sector increased by more than 50% (58%), and the manufacturing sector increased by 40% (Table 4.1).

The shifting of young people away from agriculture is in line with a reduction in farm households by 5.1 million households during the last decade (Agriculture Census, 2013). Although the decline has increased the average farmer's holdings of agricultural land, rice production will decrease, and there are no farmer generations for the future. This decline has become a threat to the sustainability of national food production.
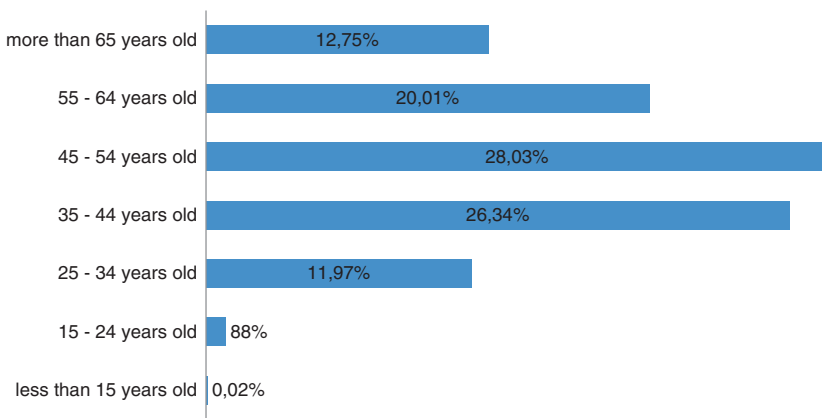


**Fig. 4.1**  The farmer in Indonesia, by age class in 2013. (Source: Badan Pusat Statistik (BPS) (2013))

**Table 4.1** Percent labor change 2004–2014, by sector

| Sector | Change (%) |
|---|---|
| Agriculture, forestry, hunting, fishery | −10 |
| Mining | 33 |
| Manufacturing Industry | 40 |
| Electricity, gas, water | 24 |
| Construction | 58 |
| Trade, Restaurant, and Accommodation | 27 |
| Transportations, storage, and communication | −8 |
| financing, insurance, business service | 165 |
| Community, Social, and personal services | 72 |

Source: Badan Pusat Statistik (BPS) (2004, 2014)

Another issue of aging farmers in Indonesia is their very low education level. Seventy percent of farmers in Indonesia have only an elementary-level education. These farmers will have difficulty innovating and following new agricultural technologies that can help increase productivity. It means that turning the youth to agriculture is very important. According to Successor Theory, youth is the future successor to farmers who will be the basic role of developing regional agriculture (Man, 2012)

## 4.2   Research Method

Central Java is a reasonable location to study the cause of the aging farm population. This province is among the highest three regions for paddy agricultural household right after East Java Province and West Java Province. Central Java is also the second top province in rice production after East Java. Even though this province is one of the major rice source provinces; nowadays, the average age of the rice farmer is 52 years old. Most of the farmers (78%) are small farmers with an average tenure of 0.37 ha (Agriculture Census, 2013). Central Java is currently faced with the threat of no farmer regeneration. Youthful people in this province are more interested in leaving the village and agriculture. From 1980 to 2015, the province was listed as the largest source area for migrant which in average the net emigration is 515,214 (Badan Pusat Statistik (BPS), 2016)

We collected our data through direct, in-depth interviews in the rice farming villages of Sidodadi in the Sragen district, Sidowayah in the Klaten district, and Kepuh in the Sukoharjo district, all within Central Java. The interview protocol employed structured questions in 150 households (50 households in each village). Interviews were conducted with the head of the household and one child in the family (15–24 years old). Other than the interview, we used some other articles' data taken from

previous research at some different locations in Indonesia. The respondents' profiles can be seen in Table 4.2.

Most of the subjects in this study engaged in rice farming, especially the family head. The average size of their tenure is less than 1 ha. This hectarage does not support a passable living standard. The minimal poverty line, as set by BPS, is 0.65 ha (Susilowati & Maulana, 2016). The farmers are then forced to improvise strategies for their survival. Aside from being farmers, they also usually work in other sectors, such as being cattlemen, small traders, and dabsters. Seasonal work and unsecured income in the paddy field impel farmers to do many jobs in rural areas.

Table 4.2 shows the diversity of tenure ownership. Sidodadi has a tenure greater than Sidowayah and Kepuh, and most farmers will rent from the people who have moved into the city and leave the land inherited in the countryside. In Sidowayah, however, most of the farmers are workers for the landlord (sharecropper). The average land tenure is only 0.49 ha. They work the paddy fields belonging to neighbors or other families and then earn wages by agreement. There are three types of paddy production sharing agreement between landlord and tenants; there are *"Maro,"* *"Mertelu,"* and *"Mrapat."* In a *Maro* system, owners and farmworkers (sharecropper) share rice production at a proportion of 50%, excluding the cost of production. In the *"Mertelu"* system, farmworkers bear most of the costs of production and share one-third of the crop with owners. On the other hand, *"Mrapat"* differs from the first two systems, as the farmworker is paid as labor. All the decisions are made by the owners as long as the landowner controls production activities.

Most farmers have a low-level education in all three villages. When a farmer has a higher level of education, farming is not the main job in their lives. They will usually have another profession such as teaching, civil servant, or working as a wholesaler in the area. They will hire workers to carry out their agriculture with a production sharing system or rent their land to the farmworker.

The respondent's age data are consistent with national statistics: the vast majority of farmers (61%) currently are over 50 years old, and only 4% are 30 years of age. The old farmer who is still active in agriculture today started to be a farmer when they were aged less than 30 years. However, when this study was conducted, we did not find respondents who decided to become a farmer at a young age (less than 30 years) (see Table 4.3).

The scarcity of youth in rice agriculture is inseparable from the aspirations of the youth who choose to work outside paddy field activities. To understand their aspirations, the author used social reproduction analysis that occurs in the countryside. Wells (2014) defines social reproduction as the material and discursive practices which enable the production of a social formation (including the relation between the social groups) and its members over time. Furthermore, Muwi (2012) explains the relationships that occur within social formations are formed through the institutional field, both formal and informal. Formal relationship occurs in the school environment, and informal relationships occur in the family environment and peer group.

In the next section, we will explain the process of social reproduction in the field of family, school, and agricultural systems in shaping rural youth aspiration and answer why young people choose to move away from agriculture.

**Table 4.2** Respondent profile

| | Name of village | | |
|---|---|---|---|
| | Sidodadi | Sidowayah | Kepuh |
| Number of household respondent | 50 | 50 | 50 |
| *Is the family head works in the paddy field (as a main job or side job)?* | | | |
| Yes | 96% | 98% | 90% |
| No | 2% | 2% | 8% |
| Blank data | 2% | 0% | 2% |
| *Education* | | | |
| No education | 14% | 6% | 24% |
| Elementary | 16% | 38% | 22% |
| Junior high school | 20% | 12% | 22% |
| Senior high school | 30% | 28% | 24% |
| Diploma degree | 12% | 4% | 2% |
| University degree | 8% | 12% | 6% |
| *Land ownership* | | | |
| Owned by farmer | 52% | 14% | 47% |
| Rent | 23% | 4% | 21% |
| Owned by other party (sharecropper) | 4% | 71% | 32% |
| No land | 21% | 11% | 0% |
| Average land hectares | 0.84 | 0.49 | 0.75 |

**Table 4.3** Farmer's respondent by age (n = 151 farmers)

| | Starting age as farmer | | | |
|---|---|---|---|---|
| Age farmer | >= 50 | 30–49 | <30 | Percentage by age |
| >= 50 | 11% | 38% | 51% | 61% |
| 30–49 | 2% | 42% | 56% | 35% |
| <30 | n/a | n/a | n/a | 4% |

## 4.3 The Participatory System Dynamics Modeling (PSDM)

Several scientific works have used Participatory System Dynamics Modeling as a robust method in understanding many stakeholders inside the system (Macmillan et al., 2016; Stave, 2010). According to Stave (2010), PSDM is the use of a System Dynamics perspective in which stakeholders or clients participate to some degree in different stages of the process, including problem definition, system description, identification of policy levers, model development, and policy analysis.

PSDM is more than simply eliciting knowledge from clients about the problem and the system. It involves building shared ownership of the analysis, problem, system description, and solutions or a shared understanding of the tradeoffs among different decisions.

The goal of a System Dynamics (SD) approach is to understand how a dynamic pattern of behavior is generated by a system and to find leverage points within the system structure that have the potential to change the problematic trend to a more desirable one. The dynamic patterns of behavior and the leverage points can be explored by the participation of all the problematic situation's stakeholder through a Group Model Building and its derivatives (Rouwette, 2011; Rouwette, Vennix, & Van Mullekom, 2002; Vennix, 1999)

The key steps in a System Dynamics approach identify one or more trends that characterize the problem, describing the structure of the system generating the behavior, and finding and testing leverage points in the system to manage the problematic behavior and wicked issues, especially in public sector.

The benefit of using SD to manage problematic behaviors and wicked issues is shown by Bianchi, Bovaird, and Loeffler (2017). These authors apply dynamics performance management to balance the outcome of three very contrasting objectives of stakeholders in the policy-making process—improving service quality, improving quality of life outcomes, and improving conformity to the principles of public governance support co-production. Other than that, SD also has been widely used in the strategic management field (Cosenz & Noto, 2016). Thus, System Dynamics is an appropriate modeling approach for sustainability questions because of the long-term perspective and feedback dynamics inherent in such questions.

## 4.4 The Conceptual Dynamic Model to Sustain Youth in Agriculture

In this section, we develop a theory of why young people leave agriculture and migrate to the cities that are addressed. To understand this question, a hypothetical model is built by building a dynamic hypothesis based on the principle of causality called causal loop diagram (CLD) that is commonly used in the System Dynamics literature (Forrester, 1961; Sterman, 2002). The use of the dynamic hypothesis to capture the problematic situation in the social system has been widely used in a variety of social research, which is formed in a developing society group (Kapmeier, 2006).

However, the development of the conceptual model in the CLD form is based on the qualitative approach and uses relevant variables based on empirical evidence that occurred in the three rice-farming-based villages through direct observation, in-depth interviews, and focus group discussion. Thus, the CLD model could not be comparable to the Collaborative Governance Model (Ansell & Gash, 2008) or, moreover, pertained as its amendment (Gibson, 2014).

The conceptual model comes through collaborative work and discussion with local government, farmers and their families, and non-government organizations (NGOs) as well. These efforts aim to deepen the understanding of how all the stakeholders' roles interact collaboratively in the governance in a rural area (Wellbrock et al., 2013) on the prevention of youth from abandoning the village. It could do so by providing enough sustainable employment from agriculture activities.

Even though by providing rapid growth employment opportunity, i.e., energy-related extractive industry (Seyfrit, 1986) and agriculture (Unay-Gailhard, Bavorová, Bednaříková, & Ponkina, 2019) per se does not guarantee the youth to stay in rural areas (Seyfrit, Bjarnason, & Olafsson, 2010), even if it is correlated with home place identification (Rönnlund, 2019). The model also tries to accommodate pressures coming from related parties to make a sustainable solution to sustain youth in comfortable agriculture professions (Ansell & Gash, 2008; Loorbach, 2010)

The model is built into three stages. The first hypothesis looks at how future job aspirations are formed from the productive population in the village (including youth) based on economic, demographic variables. The second hypothesis is formed from rice farming conditions in the villages affecting the aspiration of youth to engage in agricultural activities. Moreover, third, the aspirations of the youth to carry on the agricultural activities have an impact on the sustainability of rice production in a village (locally) and nationally (see Fig. 4.2).

We start our discussion by considering the young productive age population in the village, consisting of school-aged, graduated, and young people who have entered the labor market. They have job aspirations so that as the growing population reaches a productive age, the more jobs are expected. Data show that the revenue generated from such jobs strongly influences the expectation of the work. Remuneration becomes important for the youth because of life's constant desire for
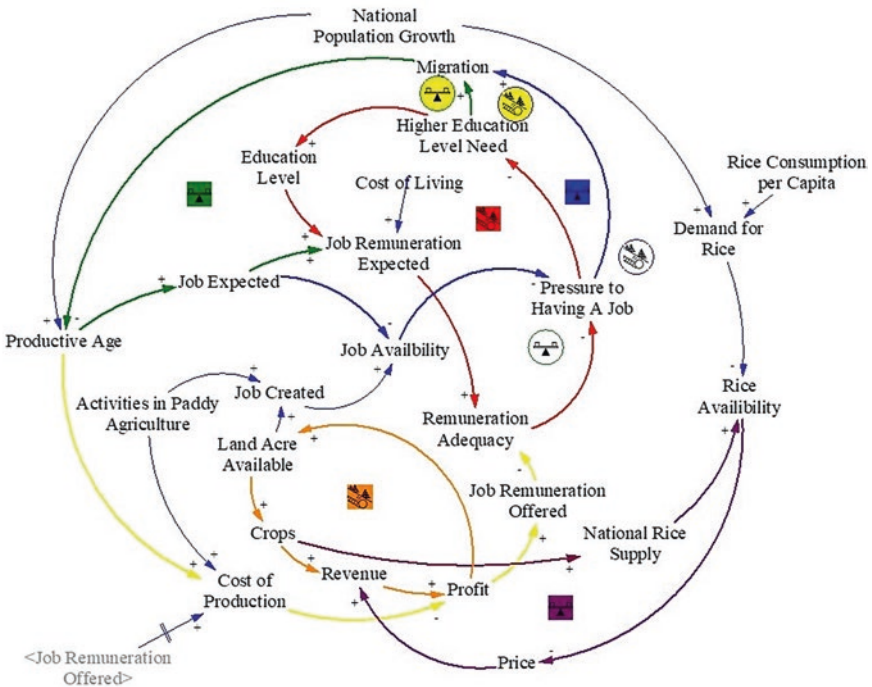


**Fig. 4.2** Proposed model of youth aspiration to sustain food security

incremental gains and consumption patterns among the younger generation, as influenced by various social and technological factors. Professions and considerations that meet consumption demands as well as perceived remuneration from higher levels of education increase the attention of rural youth.

Besides economic and demographic factors, agricultural conditions of paddy fields in the village also provide experience for the youth in influencing future job aspirations. In general, the availability of work in the field is determined by the activities of rice production. Planting and harvesting activities are activities that require much human energy. Farmers spend more time in these actions as compared to other activities such as fertilizing or weeding. Because rice agriculture is a seasonal activity, income arrives irregularly. The availability of land, the rising cost of production, the harvest quantity fluctuation, and trade systems that do not benefit farmers also cause the farmer income to come under scrutiny. Thus, the more the land available and activities in paddy agriculture, the more jobs will be created, and more jobs become available. Job availability and remuneration adequacy together increase pressure to obtain rural employment. When jobs are scarce or remuneration low, young people decide to migrate to find a job for a better living outside of agriculture, that is, to get the regular time and income.

Youth are not interested in becoming farmers due to limited land held by the family; the average paddy field's land is less than 1 ha. The more children they have, the availability of land to guarantee their jobs in agriculture is, moreover, getting smaller. Each child in this family then will try to find a job outside agriculture and migrate from the village to the cities and to look for other jobs. On the other hand, the available jobs in cities with a fixed contract and secure income are limited, so most of the work is informal with no legal protection.

The gap between the job availability and welfare from agriculture eventually creates pressure for youth to get a job outside the village. The phenomenon of high migration in the 1980s, when most of the youth in Desa Kepuh migrated to the city and became food street traders, the remaining workers in older age were left with low productivity in rice agriculture. Likewise, with Sidodadi in Sragen district, farmers are very dependent on the availability of farm laborers from outside the village to work their paddy fields for planting and harvesting seasons. After the year 2000, when many paddy field areas were converted to factory buildings, the young people who were still living in the village would choose to work in a factory.

The loss of interest of young people to return to the fields is an existential threat and creates a crisis around farmer regeneration and the future of rice farming in the village. Such conditions threaten family food security. At a time when families can no longer produce rice, hence, the need for rice is highly dependent on the availability of imported rice on the market. USDA data show that the domestic rice production rate in Indonesia decreased on average as much as 6.5% from 2008 to 2015. In 2017–2018, it decreased only 0.4%, while the domestic rice consumption increased by 4% (USDA, 2019). Thus, the total rice consumption has still been rising faster than production, as the growth rate of national rice area and yield has faltered (USDA, 2012). A large amount of consumption that cannot be supported by domestic production led to the Government of Indonesia taking the rice import policy.

Although many factors of food security have not been identified in this study, the strategy to attract young people to turn back to rice agriculture is fundamental in supporting the sustainability of rice farming in the village. We tried to create some strategies, based on the conceptual model, that can attract young people to become involved in rice agriculture.

The first strategy is to introduce agricultural skills and knowledge in the schools' curriculum. By providing the knowledge and skills of rice farming at the level of primary and secondary schools, it prepares students to be smart farmers. This knowledge is vital to make future independent farmers and has bargaining power from production within the rice trading system. The security of income in rice agriculture can protect farmers from price fluctuations in the market and the number of tons of harvested. Guaranteed incomes will help farmers to meet the standard of life and provide a positive experience for the child, so that they will value agriculture as an essential thing in life.

The creation of off-farm employment opportunities in rural areas is arguably crucial because the rice field area in the village is limited to accommodating the growth of the youth labor force. The creation of more employment opportunities in rural areas will reduce unemployment and reduce youth migration to the city. Retaining youth in the village is very important to maintain rice production and would combat the current labor shortage for planting and harvesting. Their presence in the village will also be an asset to rural development, and it reduces the likelihood of land sold by the family farmers in the absence of youth generation in the village.

## 4.5 Preliminary Result of Research and Discussion

From the survey, 10% of young farmers aged 35 years and below were engaged in rice agriculture. There was some difference from the old farmers who relied on income sources from the paddy yield, whereas young farmers combined activities with a range of non-agricultural activities include a small trader, unskilled labor, or low-level employee, civil servant, bricklayer, and builder. This multitasking related to Dries, Pascucci, and Gardebroek's (2011) analysis, which mentions non-agricultural activities unconnected to the farm business and off-farm activities. This kind of multitasking is referred to as income diversification (Błąd, 2010). That kind of plurality is influenced by access to urban areas, farm size, arable crops, permanent crops, and farmer age (see Table 4.4).

Sidodadi, Sidowayah, and Kepuh villages are located near an urban area called Solo Raya, which has a high urbanization rate. Many studies indicate that urbanization increases the opportunity to find off-farm employment and correlates income diversification with proximity to an urban area (Alasia, Weersink, Bollman, & Cranfield, 2009; Christiaensen & Todo, 2014; Ingelaere, Christiaensen, De Weerdt, & Kanbur, 2018; Su, Eriksson, & Zhang, 2018; Xu et al., 2019). Farm size also is characterized as a determinant of income diversification. Furthermore, limited farmland forces young farmers to find other activities off-farm as a survival strategy

**Table 4.4** Income diversification in three rice farming villages

| | All farmers | | Youth farmer (35 years old and below) | |
|---|---|---|---|---|
| Activities | n | % | n | % |
| Pure farmer | 134 | 65 | 2 | 10 |
| Small trader | 11 | 5 | 2 | 10 |
| Unskill labor or low-level employee | 33 | 16 | 14 | 67 |
| Civil servant | 19 | 9 | 2 | 10 |
| Bricklayer and builder | 9 | 4 | 1 | 5 |
| Total | 206 | 100 | 21 | 100 |

in response to internal resource constraints. Arable crop and the permanent crop are also a determinant of diversification. Seasonality seems to be a key factor in explaining income distribution. Based on our discussion with young people in villages, they want to do many things at a young age for the experience, so they are very thirsty to try all the possible jobs they can do.

There are changes in the economic and social structure in the villages, which were previously dominated by farmers, but at this time, there has been a change in the structure of rural livelihoods. It is seen from the development of the growing manufacturing industry in Sragen and Sukoharjo district. Some areas of paddy field have been converted to an industrial area and bear alternative employment besides rice agriculture employment.

Based on the results of focus group discussion with young farmers in the villages, rice farming activities do not take time all day. They only need to be full time in the field during the planting and harvest season. Otherwise, young farmers still have time to do other gainful activities that could increase their income. Most young farmers have passed high school level and that allows them to enter the off-farm labor market without moving out of the countryside. They believe that reliance only from rice farming income is very unlikely to meet the needs of life. In a bad season where there are pests, drought, floods, and drops in the market price, the paddy yield cannot cover the cost of living and production cost for the next season. In this situation, income from off-farm activities can cover their needs, including farm cost production to continue.

It is evident that income generated from agriculture is insufficient for the continued viability and, thus, the reproduction of the farm itself. Income diversification has become a norm for the survival of farming families and farms (Bessant, 2006).

## 4.6   Conclusion and Implication for Further Research

This paper describes youth aspirations in rice farming with various aspects through social reproduction analysis. Similar to some literature, this aspiration is not constructed individually but formed through the institutional field, both formal and

informal. Families and schools drive young people to pursue a job in the city since they consider the income from rice farming to be very insecure about covering the household's needs. Our observation through the current school's curriculum, students are prepared to acquire, other than agricultural knowledge and skills, thus creating alienation of youth from agriculture. In the last 10 years, the rice producer-based villages have experienced a crisis of farmers' regeneration.

There are prospects for encouraging youth involvement in agriculture if the policy goes beyond the usual approach of directing youth involvement in rice farming. Despite farming not being the main aspiration of youth in rural areas, many youths are still optimistic about agriculture's future. The interesting point found in this study is that to encourage the youth involved in agriculture is by providing jobs for them, including non-agricultural jobs, i.e., pluriactivity (Bessant, 2006; Evans & Llbery, 1993; Loughrey, Donnellan, & Thia Hennessy, 2013). The availability of work in the rural area will reduce the exodus of youth to urban areas and provide opportunities for young people to be able to continue rice production on their parent's land. Today, agricultural land now is considered an investment and provides additional revenue and changes the traditional view that agriculture is a way of living.

Integrated government policies supporting rice agricultures should be created in rural areas. Rice production systems, rice trading systems, and educational curriculum all converge in agriculture development. This development encourages parents to demonstrate the positive side of being a farmer to their children and supports rural development that creates employment opportunities. In search of a sustainable and integrative policy to sustain youth in agriculture, it would be great if the next research agenda will simulate the data using the proposed model from this paper.

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# Chapter 5
# Policy Implementation: A Review of Selected Literature

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**Abstract** Successful policy implementation advances sustainable development. However, doubt remains about the importance of the policy implementation concept. Meanwhile, the world over, many policies fail to achieve their intended objectives. Efforts of the theoretical perspectives to develop a compressive theory to guide policy implementation are so far futile. This chapter uses select literature to examine the theoretical underpinning and practice of policy implementation concept. Interest in policy implementation should be strengthened and should focus on the realization of the Global Sustainable Development Agenda. Global trends have presented governance and collaboration with issues that require policy implementation attention. We conclude that the adoption of dynamic system modelling will address the complexity and dynamism of policy implementation and benefit policy implementation success.

**Keywords** Policy implementation · Collaboration · Governance · Sustainable development · System dynamics · Compliance

## 5.1 Introduction

It is increasingly becoming essential to adopt policy implementation. Policy implementation theory and practice contribute to sustainable development achievement and impact. However, policy implementation remains a key and legitimate challenge in the policy cycle. Statutes, executive orders and court decisions incorporate policy decisions. Policy implementation is understood as the carrying out a policy decision, translating a policy decision into action (Hudson, Hunter, & Peckham, 2019, p. 31). Failure to implement policy means there has been wastage of resources,

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time and expertise spent in formulating plans; it also damages the standing of leaders, as a lack of political will or weak institutional capacity (Mthethwa, 2012, p. 21). World over, many policies have fallen short of achieving their intended objectives (Yanguas & Bukenya, 2016, p. 43). Changes in policies and political regimes have not helped solve the problem either. Poverty continues to reign in the developing world, and attempts to implement strategies to get out of it have so far met with limited success. Policies to improve the well-being of the masses are often futile or inappropriately applied (World Bank, 2019, p. 53). Challenges of climate change, governance failure and inadequate social services have made limited progress.

Policy implementation theory, research and practice ought to concentrate on achieving the Global Sustainable Development Agenda. This agenda aims at achieving goals that make a positive change for people and the planet. Policy implementation research is yet to develop a suitable theory to guide practice. The real world needs sound knowledge about policy implementation (Blanco-Mancilla, 2011, p. 23). Collaborative policy implementation and governance, which are essential in solving world challenges, can be enhanced by implementation system modelling methods (Emerson, 2018). The world challenges include climate change, advancing in technology and innovation. Winter (2012, p. 41) notes the performance of recent studies under different labels such as performance, public–private partnerships, governance outsourcing, street-level bureaucracy, management, network studies, new public management, principal–agent studies, compliance and regulatory enforcement.

Policy implementation theory has had three generations: the top-down, bottom-up and the third generation (Imamura, 2015, p. 21). Howlett (2018, p. 14) suggests the emergence of the fourth generation of implementation theory. The theoretical perspective on policy implementation examines how government organs or ministries, people and groups interact with their external environment in the delivery of policies (deLeon & deLeon, 2002, p. 46). However, to date no single theory can adequately explain policy implementation (Howlett, 2018, p. 15).

This chapter has two specific objectives: (a) to examine the theoretical underpinning of policy implementation, and (b) to examine policy implementation practice. The paper reviews literature regarding the themes under study. We contribute to other scholarly work on policy implementation conceptual tracing by O'Toole (1986, 2000), Sabatier (1986), Goggin, Bowman, Lester, and O'Toole Jr. (1990), Matland (1995), Saetren (2014) and Howlett (2018). The chapter re-examines and reassesses the literature on policy implementation concept, given in view of the recent developments in policy implementation theory and practice. This chapter will guide investigators and help both students and practitioners make sense of the complex variables which emerge. Scholars will build on the emerging variables that influence policy implementation to develop a comprehensive theory with a view of improving policy implementation success and conceptual furtherance. Similarly, variables that affect policy implementation are applied in systems modelling to understand better the possible impact, or consequences, of possible interventions before implementation (Park & Kim, 2016, p. 23). This work contributes to the broader public policy literature and scarce literature on policy implementation systems modelling.

This chapter has two sections: the theoretical underpinning and the practice of policy implementation. In the following section, we explore the theoretical underpinning of policy implementation and then examine policy implementation practice.

## 5.2   Theories That Underpin Policy Implementation

Scholars agree that policy implementation is complex and therefore needs a multi-theoretical account (Winter, 2012, p. 24). While this is true for the time being, it can be a process of developing a single explanatory theory. The structured study on policy implementation aims at successful execution of policy. Attention to policy implementation emerged as a result of government failed attempts to achieve policy objectives. There was an implementation gap between policy intent and actual results. Policy failure challenged notions of bureaucratic organization and called upon policy scholars to pay closer attention to policy implementation. By 1975, Hargrove (1975, p. 45) cited implementation as a missing link in the study of public policy. Efforts were made to identify factors that contribute to effectiveness (or ineffectiveness) of government interventions and thus secure (or eliminate) continued funding (Saetren, 2014, p. 13).

However, the focus on policy implementation within the core disciplines of public affairs began to dissipate in the 1990s, leading some to conclude that interest in the subject had or that the focus was no longer useful without more precise research questions, constructs and methods to analyse complex systems declined (Moulton & Sandfort, 2016, p. 56). Hupe and Sætren (2015, p. 34) pointed out that that policy implementation was out of fashion and allegedly dead. We emphasize that policy implementation is still alive and relevant. As noted above, the study of policy implementation emerged from the interest of policy scholars to explain the root causes of policy failure. Many policies, especially in the developing world, fall short of achieving their objectives.

We will now review the top-down, the bottom-up, the third-generation perspective and the fourth perspective of the policy implementation concept. In the following section, we examine the characteristics, contributions, key factors and critique of the four perspectives.

## 5.3   Top-Down Perspective

In this first generation of policy implementation, researchers believed that policy implementation could happen inevitably once authoritatively declared (Marume, Mutongi, & Madziyire, 2016, p. 45). Every actor was seen to be efficient and willing to act on the orders given to him or her without further reflection or discretion. The organizational hierarchy would be followed without any interruption. Top-down theorists believed authoritative decisions and centrally located actors were

seen as most relevant in producing the desired policy effect (Matland, 1995, p. 36). The main contributors towards the top-down approach are van Meter and van Horn (1975, p. 25) who developed one of the first top-down models, identifying the communication process within the implementation phase. Hill and Hupe (2009, p. 46) added the resource factor to the implementation process. The common top-down recommendations are: making policy goals clear and consistent; minimizing the number of actors; limiting the extent of change necessary; and placing implementation responsibility in an agency sympathetic with the policy's goals (Marume, Mutongi, and Madziyire 2016, p. 41).

Matland (1995, p. 37) outlines the criticisms met by the top-down implementation perspective research, namely, domination by qualitative data; failure to recognize the significance of actions taken earlier in the policy-making process; and underestimating the real-life processes such as the role of politics, which could lead to resentment among the implementers who prefer a different solution. Attempts to insulate an inherently political matter from political debates and actions may instead lead to policy failure. The other criticism is that top-down models emphasize the statute framers as key actors; yet local service deliverers have expertise and knowledge of the actual problems, and therefore, they are in a better position to propose purposeful policy and practical implementation strategies.

## 5.4   Bottom-Up Perspective

In this second generation of policy implementation, scholars acknowledge that the implementation process is complex and embossed by the exercise of discretion of the different actors within the chain of the process. Bottom-up theorists like Hjern (1982, p. 37) emphasize the local-level or target groups and service deliverers as key players in policy implementation (Hill & Hupe, 2002, p. 27). Hjern's model, which is one of the contributions to the bottom-up paradigm, identifies relevant actors, such as voters, elected representatives and street-level bureaucrats involved in policy implementation and their action (or inaction). It has, however, been criticized for being inconsistent and biased. Like the top-down model, Hjern's model overemphasizes the ability of one side to dictate the actions of the other. Berman (1980, p. 15) contends that most policy implementation problems stem from the interaction of a policy with the micro-level institutional setting. Contextual factors within the implementation environment can completely dominate rules created at the top of the implementation pyramid, and policy designers will be unable to control the process. Under these conditions, according to the bottom-uppers, if local-level implementers are not given the freedom to adapt the program to local conditions, it is likely to fail. Bottom-uppers argue that the goals, strategies, activities and contacts of the actors involved in the micro-context of the process must be understood to understand its implementation. The influence of policy on the action of street-level bureaucrats predicts the policy's effect (Marume et al., 2016, p. 45).

Hjern (1982, p. 24) and his colleagues, Hjern and Hull (1983, p. 25) and Klijn (2008, p. 56), have contributed to the bottom-up perspective with their network methodology. In this approach, policy implementation relies on perceptions, the structure of networks and qualities of actors in a network. Variations in actions can be explained largely by local-level differences; yet all actions may fall within a limited range where the borders are set by centrally determined policy. Najam (1995, p. 35) identified some independent variables that determine the policy implantation concept. These are content of the policy, nature of the institutional context, administrative capacity, commitment of the implementers, support of clients and coalitions forming the target group. Paudel (2009, p. 24) summarized the variables in the bottom-up and top-down theories as policy decision-maker, structure, process, authority and discretion. However, the bottom-up models have been criticized for its inadequacy. Street-level bureaucrats have great discretion in their interactions with clients and are likely, as agents, to subordinate the goals of their principals and concentrate on their own. Given this challenge, therefore, flexibility and autonomy involved in bottom-up models might be appropriate when the goals of the policy formulators and implementers are the same. If they differ greatly, it leads to poor implementation (Parra, 2016, p. 52).

## 5.5  The Third-Generation Policy Implementation Perspective

The call for the third-generation policy implementation research paradigm emerged in the 1980s. It was based on the premise that further theoretical development and more rigorous scientific research was necessary. The third-generation perspective aims at combining top-down and bottom-up perspectives. It is more scientific in rigour and quality than the previous two in its approach to the study of policy implementation. The following key defining features have been proposed by Goggin et al. (1990, p. 34) and Goggin (1986, p. 13) of the third-generation paradigm, namely: clearly defining the key variables; empirical analysis guided by theoretically derived hypotheses; and use of more statistical analysis using quantitative data to supplement qualitative analysis. It also endorses the use of multiple measures and methods; more comparison across different units of analysis within and among policy sectors; and application of longitudinal research of least 5–10 years. These features of the third-generation research are still far from being implemented (Howlett, 2018, p. 21).

The explanation for this implementation deficit is, to a large extent, due to the very demanding nature of the third-generation research design and the inherent dualities and between some of its essential features that make it hard to optimize them all simultaneously. Some of the variables identified in third-generation include policy learning, behavioural change, networks, advocacy coalitions, backward and forward mapping, and coalition partners (Winter, 2012, p. 40). Building on organi-

zational theory literature, Matland (1995, p. 21) proposes variables of mechanisms of normative, coercive and remunerative that can be used for gaining policy compliance from actors. He adds consideration of local context, oversight and actors roles. He notes that high levels of conflict, especially involved in coercive approaches, make implementation harder. Conflict, whether perceived or actualized, has to be controlled to allow actors to raise issues and solutions. Otherwise, it may lead to violence and poor policy implementation. The contributors do not consider the interrelationships between variables and, therefore, no logical flow of relationships that can empirically contribute to theory building. While the third-generation paradigm set its goal on analytically understanding how implementation generally works, scholars have never succeeded in setting up a single theory to combine all the different approaches. Second, progress is reported more on methodological issues than theoretical issues (Yin, 2009, p. 25). It is vital to review the theories in the following section; some of which originate from other disciplines but underpin policy implementation. We start with the theory of street-level bureaucrats, followed by game theory, principal–agent theory, instrument choice theory, institutional theory, complexity theory and the normalisation process theory (NPT).

### 5.5.1   Theory of Street-Level Bureaucrats

This theory by Lipsky (1980, p. 31) posits that the success of policy implementation depends majorly on those who are relied upon to implement policy. The street-level bureaucrats use their discretion in policy implementation. The street-level bureaucrats are responsible for most of the central activities of public agencies, such as determining program eligibility, allocation of benefits, judging compliance, imposing sanctions and exempting individuals and businesses from penalties. These activities involve direct interactions with citizens. So, the street-level bureaucrats exercise considerable discretion (Meyers & Nielsen, 2012, p. 34). The street-level bureaucrats adopt a policy mandate to circumnavigate varying resource constraints. The street-level bureaucrat theory does not pay attention to the need for participation. Zhan et al. (2014, p. 28) use a case study of China to highlight the relevance of stakeholder participation in policy implementation success. The street-level bureaucrats cope with time and financial resource constraints as they rationalize policy objectives. The degree of discretion among front-line implementers determines the success of policy implementation (Signé, 2017, p. 17).

### 5.5.2   Game Theory

This theory was used in the 1980s and 1990s to enhance policy implementation success (O'Toole, 2000, p. 36). It explains that policy implementation can be possible through enhanced cooperation. This calls for the engagement of mangers along the

implementation process. It suggests that influencing various behaviours of managers facilitates cooperation. Game theory principles such as coercion, enforcement, education and persuasion are used to achieve policy compliance and accepting the implementation strategies (Scholz, 1991, p. 26). This approach requires balancing enforcement effort depending on compliance. However, this approach requires a high degree of information that is often lacking in weak institutionalization of systems. Also, it does not consider the unequal ability of some actors to resist or dictate actions. Game theory did not address the divisions within the state itself, which impacts on the ability to implement policy to match the political policy aims and objectives.

### 5.5.3   Principal–Agent Theory

This theory is concerned with the relationships in policy implementation. According to its basic assumptions, a principal (manager) and his or her bureaucratic agents may not share all preferences, and the relationship is characterized by information asymmetry, which systematically disadvantages principals (Winter, 2012, p. 18). Civil servants can galvanize a great deal of discretion over time in pursuing policy goals, and the ability to decide how and for whom the law and regulation are applied. In this case, the principal is dependent on the goodwill of the agent. The principal–agent theory underlined the importance of including mechanisms in the implementation designs that ensure effective oversight by administrative actors. Implementation mechanisms, such as structures, curtail agent discretion allowing senior officials to control street-level bureaucrats giving those on the ground autonomy to perform their work effectively. Principal–agent theory shows the need for structures that allow the senior officials to control street-level bureaucrats. However, the principal–agent theory did not discuss how implementation mechanisms might be adopted and what they should comprise to produce desirable policy outputs (Howlett, 2018, p. 26).

### 5.5.4   Instrument Choice Theory

This theory began from the need that to a large extent, policy implementation involves applying one or more of the basic techniques of government—variously known as policy tools, policy instruments or governing instruments—to resolve policy problems (Schneider & Ingram, 1990, p. 24). The instrument choice theory recognized that much policy activity, including policy implementation and decision-making, revolved around the selection and implementation of these tools, which served as the basic building blocks and content of policy designs. Government decision involves choosing among or combining the several tools available that contribute to advancing policy goals and aims. It is the choices of the tools that are evaluated

in policy appraisals (Linder & Peters, 1991, p. 47). This policy implementation approach, however, largely ignored top-down and bottom-up behavioural issues and other concerns having to do with problems around the design and operation of compliance and service delivery mechanism. The exact mechanisms through which tools are chosen and applied are not clear, thus undermining the need to carefully examine the contexts of instrument use which often lapses into a political or technical conception of policy implementation in which the 'best' choices are always made (Lascomes & LeGales, 2007, p. 58).

### 5.5.5   *The Institutional Theory*

The institutional theory underpins the role of formal and informal regulative, normative and cognitive pillars in determining human behaviour and decision-making during policy implementation. The theory recognizes institutions as comprising the state, market and society rules, regulations, norms and cognitive cultural practices, which guide human behaviour and decision-making, and therefore the decisions regarding effective policy implementation. However, the theory does not consider the complex systems and interactions with its consequent co-evolution in influencing compliance that takes place in the policy implementation environment (Sherraden & Barr, 2005, p. 38).

### 5.5.6   *Complexity Theory*

Complexity theory (CT) studies complexity and complex systems and the phenomena of complexity, emergence, self-organization and co-evolution to which they give rise (Kauffman, 1996). The theory underpins the complex combination of multiple and contingent causation and emergent properties. It provides tools for analysing complex systems (Maguire, McKelvey, Mirabeau, & Öztas, 2006, p. 46). CT examines uncertainty and non-linearity in complex systems such as the policy implementation. Complexity theory emphasizes interactions and the accompanying feedback loops that constantly change policy implementation systems. While it proposes that systems are unpredictable, they are also constrained by order-generating rules (Boulton, 2010, p. 34). Complexity theory presents the idea that the whole (the system) is more than the sum of the parts (the individual agents), while, at the same time, developments of the whole stem from the (interaction of the) parts. CT stresses that systems tend to develop non-linearly and are subject to various feedback mechanisms. They are also dominated by self-organization and usually co-evolve with other systems. Co-evolution entails tracing connections between arenas or separate streams, patterns of relations between decisions and developments (Klijn, 2008, p. 15). CT does not, however, prescribe mechanisms for achieving positive and stable policy implementation.

### 5.5.7   The Normalization Process Theory (NPT)

The NPT focuses on the contribution of social action to policy implementation (implementation, embedding and integration) (May & Finch, 2009, p. 26). It focuses on how implementing a new intervention or practice involves people working together. NPT considers practices and perceptions of different groups of people involved in implementing a new intervention; the context where it is being implemented; and the intervention/practice itself. NPT provides a set of tools to understand and explain the social processes that frame the implementation of material practices. Material practices become routinely embedded in social contexts as the result of people working, individually and collectively, to implement them. May et al. (2018, p. 35) operationalized policy implementation to be achievable through four mechanisms, namely: coherence, participation, collective action and reflexive monitoring, which we term as the normalization process.

The NPT notion of coherence involves a process of differentiation where the new working practice is identified by its differences from other practices. The second NPT notion of participation is concerned with defining and organizing the people involved in any type of complex interaction. Before a new working practice or policy action can become embedded, it is necessary for actors to be enrolled in social networks and to work together to participate in that new working practice. It is also necessary for the actors concerned to become engaged in the process of change and in interpreting how the new practice relates to shared beliefs or norms about what constitutes legitimate working practices. The third NPT notion of collective action is concerned with the work that individuals and groups undertake for a new practice or system to become embedded and form part of everyday working practices. This notion relates to the collective action that involves investing the effort to achieve a policy goal, which could include resistance as well as acceptance or compliance. The fourth NPT notion of reflexive monitoring is concerned with how the implementation of a new policy practice is continuously evaluated by the participants, both formally and informally (Murray et al., 2011, p. 38). Whereas the Normalization Process Theory is usable in the policy implementation, it has been majorly used in the medical profession (Alverbratt, 2015, p. 11). The variables used in the normalization process may be measured by the normalization measure development (NoMAD) survey tool developed by Finch et al. (2016, p. 12). It measures coherence, participation, collective action and reflexive monitoring as the independent variables. The dependent variable is policy implementation with two components of embedment and integration. Until now, implementation studies have tended to present long lists of variables without exploring the theoretical relationship between them. While the NPT ignores institutions and motivation in policy implementation, it is a theoretical base provided by implementation science. Normalization process theory (NPT) is, therefore, an opportunity to further advance the policy implementation concept. A systematic review of articles that have so far used the normalization process theory shows that almost all studies are from the developed countries (May et al., 2018, p. 28).

## 5.6 The Fourth-Generation Implementation Perspective

Howlett (2018, p. 28) suggested a fourth generation of implementation studies. He proposes combining contemporary policy process models. These models include the advocacy coalition framework (ACF) by Sabatier (1987, p. 37), multiple streams framework (MSF) by Kingdon (1984, p. 28) and others. By extension, these models explain or can be adapted to address policy implementation issues. The multi-stream framework views policy processes as several semi-independent streams of events and actors interacting with each other to define and control the policy agenda. These streams include the policy solution, politics, program, process and problem. The activities flow together periodically. Each confluence point in the five-stream framework would bring something new, such as new actors, new tactics and new resources to contribute to policy implementation. During the implementation process, some of the occurrences may be unpredictable or predictable such as floods or elections, respectively, but provide a window of opportunity for policy entrepreneurs to move their preferred issues and solutions for implementation (Howlett, McConnell, & Perl, 2015, p. 68).

The foregoing alludes to the fact that policy implementation studies need to do more. It is noted that most policy implementation research has been conducted in, and regarding, the United States, albeit with the goal of general understanding. Some empirical studies have been conducted outside the United States and Western Europe. Investigations suggest that the approaches developed in Western liberal contexts may have limited utility in other settings (O'Toole, 2000, p. 28). It is also noted that there is a need for large population longitudinal-empirical studies (Mugambwa, Nabeta, Kaberuka, Munene, & Rudaheranwa, 2017, p. 68). A lot can be learnt from a trans-Atlantic focus and dialogue (Saetren, 2014, p. 12). Each of the different theories and perspective presents a separate approach to policy implementation in the larger public policy context. Hence, none of the theories provides a comprehensive model of policy implementation. A merger of theoretical approaches is necessary to arrive at the awaited theory of policy implementation (Nilsen, 2015, p. 45). The emerging variables are usable in policy implementation system modelling. We now turn to the implementation practice which, in our view, offers promise for the prominence of policy implementation research.

## 5.7 Policy Implementation Practice

The practice of policy implementation provides a promising future for the furtherance of the concept. A review of policy implementation practice is useful for the researchers and practitioners. Areas of policy implementation practice are highlighted; the stressed applications throw light on the critical areas for policy implementation modelling. The application of policy implementation is essentially useful in the process of achieving the Global Sustainable Development Agenda 2030. In

this regard, the world has emphasized governance and collaboration, whereby the implementation of these essential tools can be beneficial in achieving Sustainable Development Goals and attaining competitiveness in the globalized world (Winter, 2012, p. 38). These systematic issues have been emphasized by the World Economic and Social Survey Report for global attention to deliver SDGs (UN, 2018, p. 68). In the following section, the policy implementation practice is discussed, starting with governance and then collaboration. We later discuss the relevance of policy implementation systems modelling.

### 5.7.1   Governance

Governance, in general, comprises the rule of law, effective institutions, transparency and accountability in the management of public affairs, respect for human rights and the participation of all citizens in the decisions that affect their lives. Governance requires effective political leadership that promotes strategic vision and broad consensus on policy implementation and procedures that are needed to foster peace, stability and sustainable development (UNDP, 2016, p. 68). Governance functions and interplays with institutions at different levels in implementation of policy. This includes understanding the role of formal and informal institutions in facilitating and curtailing policy implementation. Conversely, governance can be improved by embracing and implementation of policies such as science technology and innovation (STI) policies. This includes modelling policy implementation systems applications discussed later in this chapter. Indeed, many countries have adopted STI policies, systems and structures. STI promotes knowledge creation and transfer (Nidhi, 2016, p. 48). However, the implementation gap remains, especially in the developing world. National systems of innovation were introduced in many countries but have made a marginal impact on some economies and improvement regarding the quality of social well-being. This partly explains the slow and/or stagnant development process (Giovannini, Niestroy, Nilsson, Roure, & Spanos, 2015, p. 17).

There is equally untapped potential to improve social well-being through implementing e-governance. E-services such as e-health, e-learning, e-courts and e-payments are critical in moving towards universal access to basic services (Nidhi, 2016, p. 37). The implementation of e-governance is low, especially in developing countries where it is most needed. Low implementation of e-governance is mainly due to cost, digital divide and skill gap. E-governance implementation will continue to solve contemporary challenges that include environmental and climate change, poverty, hunger, conflict and human hopelessness. These issues pose human existence challenges. Decisions to confront these human challenges with implementation of policies on climate change mitigation, individual and collective forest pledges, zero-deforestation commitments have been ineffective. Government decisions that reduce different human activities to acceptable levels—on land and below water—are difficult to act upon. For instance, Njiru et al. (2018, p. 32) reported

depletions of fish in East African waters, even when fisheries policies are in place. Equally, attempts to implement environmental governance policies have been unsuccessful due to institutional failures, poor technology, weak accountability mechanisms, information asymmetry, lack of coordination and lack of skills (Aliyu, Modu, & Tan, 2017, p. 24). These outstanding issues can ably be improved by dynamic system modelling.

An examination and analysis of institutions, structuring factors, such as the institutions of governance, which shape the policy implementation process, is needed. This is useful to fully understand why policy outcomes often fall significantly short of policy intentions. Institutional actors and actions guide the implementation of policies. Understanding the effect of institutions (regulative, normative and cognitive dimensions) on policy implementation is useful in establishing why some systems deliver policy-relevant impacts while others fail (Mugambwa et al., 2017, p. 36). A case in point is the decentralization policy which has been adopted by most developing countries without exceptional implementation success (Koelble & Siddle, 2013, p. 37). In decentralization, partnerships and interdependencies between actors call for accountability in terms of policy implementation. Therefore, decentralization policy implementation needs to be investigated at multiple levels of institutional action. Implementation of aid policies also needs attention because it has delivered mixed results in the developing world. Aid often remains ineffective and weakly aligned with the recipient country's plans and budgets, resulting in negative consequences.

In the following section, we discuss street-level bureaucracy and compliance because of implementation before collaboration.

### 5.7.2   Street-Level Bureaucracy

Recent literature has reiterated the relevance of street-level bureaucrats in policy implementation. These street-level bureaucrats implement public policies. The street-level bureaucrats were originally studied by Lipsky (1980, p. 35) whom he refers as front-line workers who interact directly with citizens and have substantial discretion in the execution of their work. They come in daily contact with the needs, problems, aspirations and interest of the citizenry and their environment. They have first-hand knowledge of the shortcomings, adequacies and inadequacies of the policy being implemented; can predict decisions; share goals; and establish stable institutions. Examples are teachers, police officers, general practitioners and social workers. The street-level bureaucrats are considered significant instruments of government who make benefits of the various enacted policies reach the public (Onyekwelu, Okpalibekwe, & Dike, 2015, p. 87). They apply their judgment and tailor their decisions and procedures depending on specific contexts and needs of society. The street-level bureaucrats, therefore, need some freedom to adjust the policy programme for effectiveness and legitimacy. Bureaucratic autonomy allows planning and the efficient implementation of policy in light of a country's unique

context. However, their response to client issues is limited by time and information. Very often, the rules street-level bureaucrats use do not correspond to the specific situation of the client. A certain level of discretion helps the street-level bureaucrats to develop coping mechanisms in their work. Discretion increases the meaningfulness of policy and the willingness of street-level bureaucrats to implement policy (Tummers & Bekkers, 2014, p. 46). There is a consensus that the performance of street-level bureaucrats determines state capacity, which is central to economic and social development. Abdullah (2016, p. 52) and Im (2014, p. 56, 2017, p. 46) explained how street-level bureaucrats were instrumental in transforming Malaysia and Korea, respectively, into high-income nations. Tools of bureaucracy were engaged in Malaysia and Korea, namely, expertise, implementation power, proceduralism and the rule of law. Bureaucracy need not just be a passive and neutral tool of the executive branch but can actively aid in policy implementation and consequently improve social and economic well-being.

Some street-level bureaucrats sometimes fail to use discretion to enhance policy implementation. Bureaucracy is expected to be rational and execute policy to the common good, but some actors promote their self-interest. They serve themselves and push decisions that advance and protect their interests or the agencies where they have an interest, which has bad implications for service delivery and well-being of society who are not equitably served. Compromised street-level bureaucrats lead to poor policy implementation and a dysfunctional state (Vogler, 2019, p. 28). The interest in street-level bureaucrats has, therefore, come out of the need to rationally and efficiently tackle and solve some of the problems of society. The wok of street-level bureaucrats is marred with politicization, corruption, dictatorship, tribalism and defective recruitment processes which make them deviate from State norms and guidelines. The challenge with policy implementation practice is how to sustain good behaviour among street-level bureaucrats. Syafruddin et al. (2015, p. 29) described four groups of models of professional bureaucratic behaviour; they are models autocratic, custodial models, models of supportive and collegial models. These are characteristic of a good professional bureaucracy. There is a need also to examine how bureaucrats can work collectively and collaboratively while delivering state action. Government can reinvent itself through bureaucratic work and its higher creativity, more risk-taking and greater productivity. In the same regard, government reinvention remains a critical topic of interest to practitioners on how best this can best be done considering the work environment with bureaucratic controls such as formalization, red tape and centralization.

### 5.7.3 Compliance

Increasing attention is being devoted to compliance, pointing to its criticality as the final frontier of policy implementation. Compliance is the understanding of why the targets of the policy frequently fail to act in the way that policy designers intended and wanted, even when it appears to be in their self-interest to do so. Compliance

with government policies enhances policy impact and governance effectiveness but varies tremendously across policies and contexts (Harring & Rönnerstrand, 2016, p. 47). In some cases, voluntary compliance with government policies is hardly observed at all, or extremely high. Incentives can be used to encourage compliance to close the compliance gap. This is the gap between the intended actions and what comes out from targets on implementing policy. Alternatively, governments may prohibit, regulate or require specific behaviours, with penalties attached for non-compliance. The boundaries between adequate levels of compliance and inadequate levels of compliance that indicate or lead to policy failure are often unclear. A modest level of non-compliance may be tolerated. Therefore, what constitutes a compliance problem is not specific. Weaver (2015, p. 28) observes that the target compliance gap emerges from the following six broad sets of factors:

1. Incentive and sanction problems, where positive and/or negative incentives are insufficient or uncertain enough to ensure compliance. This may also involve shame.
2. Monitoring problems, where target compliance may be difficult or costly to supervise. This happens where activities involved are illegal or done secretly in private.
3. Resource problems, where targets lack the resources to comply even if they want to and recognize the advantages to do so. These resources may be not only cash but also other things that facilitate public well-being such as health, ability to draw easily from existing infrastructure, human capital and strong social networks.
4. Autonomy problems, where targets do not have the power to make decisions that comply with the policy even if they want to. To address this non-compliance, the target needs to be empowered to gain autonomy over their actions. Second, the party with the decision-making power has to be influenced.
5. Information problems, where targets lack information that would make compliance more likely. For instance, the goals of the policy may be vague. In this case, information campaigns of various forms may reduce the information gaps.
6. Attitude and objectives problems, where targets are hostile/mistrustful towards providers or programs. Compliance is more likely when non-compliance is seen as socially unacceptable.

What remains a challenge in compliance is balancing between the motivation of the target to act within expectations of policy implementer and implementer's effort. Weaver's (2015, p. 28) broad sets of factors may also be induced by political players. On his part, Checkel (2005, p. 42) grouped non-compliance causes into reasons of choice, inability and inadvertence. Normally, when policymakers are designing new public policies or revising old ones, they cannot know how the targets of policy will react. So, compliance cannot be automatic or universal. Compliance is an issue that must be explicitly addressed when designing policies and actual implementation. To remedy this situation, policy practitioners can learn about possible implementation implications by looking at experiences of other related scenarios in similar political jurisdictions, or context. In this case, modelling allows thinking

comprehensively about the causes of target non-compliance and how to address those causes. Non-compliance is multi-causal and needs the right well thought out and tested diagnosis to achieve the desired outcomes. The bureaucrats can also facilitate compliance by upholding public values and prevailing over politicians who tend to protect non-complaints. Further, consideration should be made of situational imperatives, which are conditions that overwhelm any other considerations in a target group's decision on whether to comply with the policy. Sometimes these situational imperatives substantially lower the prospects for target compliance (Indiahono, Purwanto, & Pramusinto, 2018, p. 48).

Policy targets are not homogeneous, and so, strategies that secure compliance from one client may not work for all. An effective analysis of target compliance should: (1) consider impacts of policy incentives, monitoring, resources, etc. on specific sub-groups of targets; (2) identify potential causes of target non-compliance and consider strategies to deal with them; and (3) analyse impacts on unintended targets and develop strategies to mitigate them, if necessary. Weaver (2015, p. 47) advised increasing compliance by framing. Framing compliance as a choice between life and death can be used to increase compliance. Whereas framing may not be credible, it has registered positive results in case of reducing HIV/AIDS infections and low cigarette smoking. However, continuous framing has not ended new HIV/ AIDS infections and deaths due to cancer of the lungs as a result of non-compliance. In the same way, the framing of adverse effects of climate has not stopped environmental degradations (Harring & Rönnerstrand, 2016, p. 68). This points to the compliance deficit that requires to understand what Bondarouk and Mastenbroek (2018, p. 17) consider as scope, effort and substance dimensions in framing. Additionally, increasing compliance requires paying attention to aspects of monitoring, territory, staffing and prioritization.

Policy non-compliance may signal that there is something wrong either with the policy or that something is wrong with the targets who are being uncooperative by failing to comply with it. Therefore, policy experts should not believe that they possess all the relative information, and the policy that they have come up with is the best option, given, for instance, the political constraints. Policymakers must, therefore, listen to and learn from the targets of public policy, who are, after all, also citizens. It is critical to listen to both what they say and what they do and correct mistakes. Failure to correct policy mistakes is likely to be a recipe for policy disaster, either in the near-term or later. The ultimate goal of compliance is to bring about behavioural change without using heavy-handed tools such as coercion or financial incentives (Schiff, 2016, p. 38).

Compliance does not only refer to individual actors but also between countries that have agreements which require mutual collaboration. Sanctions are applied to countries in non-compliance. Given collaborative agreements, Checkel (2005, p. 16) observed that reliance on monitoring and sanctions has proved to be costly to the parties. He further reiterated that the likelihood of achieving compliance depends in part on the structure of the particular problem and the strength of the incentives for individual international partners not to defect. The incentives not to defect are generally stronger in collaboration situations than cooperation situations. This is

because the decision to have collaborative agreements has been objectively seen as a better choice. Therefore, policies and agreements need to be examined if they have a beneficial balance of advantage, and existing gains would be protected. The literature on individual and inter-state compliance notes that sustaining compliance is still a challenge in policy implementation practice. It is not clear how to determine policy incentives that are attractive enough to register compliance and most importantly achieving similar compliance between varied contexts.

### 5.7.4   Collaboration

Collaborative networks are a critical approach in policy implementation and delivery of public goods. Collaboration is aimed at achieving sustainable development and social well-being. Collaborative networking involves coordination of complex structures and multi-actor networks and shapes performance. The complexity of the task involved in collaborative networks and its coordination calls for dynamic system implementation modelling (Schroeder, 2001, p. 38). For instance, the process of achieving peace and justice requires the coordination of education, police, justice system and prison systems. Therefore, collaborative network management has to be strengthened by inter-institutional system modelling. This is because effective management of collaborative networks involves complex decision-making mechanisms which require modelling. While scholars such as O'Toole (2015, p. 37) studied networking behaviour, involving public managers and public action embedding, they did not guide on how to shape processes, outputs on policy actions. We, therefore, propose that collaboration for policy implementation can be improved with dynamic system implementation modelling. Wherein there is a need for examining the interdependent structures that affect policy implementation.

Global trends have given birth to regionalism and multilateralism to achieve competitive advantage. Collaborative institutional structures formalize and diffuse challenges with regionalism and multilateralism. Some of the contemporary challenges that have emerged in global governance are in sectors of security, defence, trade, hunger, poverty and health (Linn, 2017, p. 19). However, States are continuously collaborating to solve the challenges and have culminated in the signing of agreements and protocols. Implementation of these collaborative understandings has often faced failures and hesitations. Compliance with agreements and protocols has been influenced by domestic politics and interests. Free movements have, for instance, cause unemployment to national citizens, when foreigners with better skills occupy the available employment positions. Consequently, partner countries deny foreigners jobs. Coordination between the political and administrative officers and citizens is often lacking, leading to policy failures, yet improved provision of public services benefit to all.

Additionally, some inter-sector and bilateral relationships and agreements have been initiated between countries of the world to promote collaboration. Modern information technology tools have to be utilized to coordinate different stakeholders

and utilize feedback loops. The feedback is shared and provides lessons for continuous learning. Therefore, a collaboration done meaningfully improves policy implementation (Pradhan, Su, Fu, Zhang, & Yang, 2017, p. 36). Equally, global collaboration trends call for appreciation of science, technology and innovation (STI) which embraces dynamic systems modelling. Dynamic, collaborative systems modelling has the potential to address contemporary policy implementation challenges such as ineffective institutions, contextual differences and poverty. Consequently, STI and its collaborative mechanisms guide the realization of sustainable development (Schot & Steinmueller, 2018, p. 6).

Implementation of useful agreements is often frustrated by partner countries. This stand-off calls for policy implementation research to avert the collapse of useful agreements and protocols as well as studies on how to make collaborative arrangements work. It is important to understand the factors affecting implementation and compliance. Some of the internationally renowned collaborative agreements include the UN Framework Convention on Climate Change and the Kyoto Protocol. The key agreements are in sectors of international financial regulation, trade, human rights and security (O'Brien & Gowan, 2012, p. 18). In this direction, the achievement of Millennium Development Goals was a disappointment and confirmed the gap between policy rhetoric and program implementation. Equally, the 2030 Sustainable Development Agenda needs collaboration for its successful implementation.

Policy implementation is relevant in the context of global challenges of deepening poverty, growing inequalities within and between countries, and the uneven impacts of economic and financial globalization (Taylor, 2015, p. 34). Collaboration in the implementation of agreements will help the different regional blocks to achieve global competitiveness. These include, among others, Southern African Development Community, East African Community, North American Free Trade Agreement, The Association of Southeast Asian Nations and European Free Trade Association (McKay, Armengol, & Pineau, 2005, p. 45). In the following section, the concept of system modelling is developed, and its relevance to policy implementation practice is set out.

## 5.8   Policy Implementation Systems Modelling

Models are means by which a systems thinker comes to terms with complex real-world problems (Godfrey, 2010, p. 9). Systems modelling is a way of making a mental model of the world specific; it is a structural account of real-world systems. The function of a model is to act as a proxy for a real system so that it can be understood better and the possible impact, or consequences, of possible interventions that can be explored before implementation. Implicit in the modelling process is that decision-making affects the system, which in turn affects decision-making. Feedback from the world stimulates changes in mental models, which Sterman (2000, p. 167) terms this 'double loop learning'. This leads to new understandings

and reframing of the situation, new goals and decision rules, and new decisions. Modelling requires that stakeholders are integrated. While modelling, concepts such as complexity, adaptation, feedback, interconnectedness and emergence are quite salient. However, two challenges are envisaged; first, the modelling process is the difficulty in identifying the position of the modeller relative to the actual system. Second, models are subjective, and all stakeholders will have their unique perspective on the system. Considering the complexity of policy implementation, modelling helps to forecast how actors collaborate to achieve success.

Agustinata (2008, p. 68) specifies a policy implementation systems model. He considers six influencing factors on policy implementation in the framework: (1) external forces: factors that are beyond the influence of policymakers; (2) policies: instruments that are used by policymakers to influence the behaviour of the system to help achieve their objectives; (3) internal factors: factors inside the system (i.e., endogenous) that are influenced by external forces and policies; (4) relationships: the functional, behavioural or causal linkages among the external forces, policies and internal factors that produce the outcomes of interest, organizing the available information as well as for the process of elicitation and discovery of such information; (5) the value system of policymakers: the value system contains the criteria for indicating the desirability of the various policy outcomes based on the resulting outcomes of interest; and (6) stakeholders: which reflects their goals, objectives, actions and preferences.

### 5.8.1  System Dynamics Modelling and Policy Implementation Success

Sterman (2000, p. 67) defines system dynamics as a perspective and set of conceptual tools that enable us to understand the structure and dynamics of complex systems. System dynamics is also a rigorous modelling method that is used to build formal computer simulations of complex systems and use them to design more effective policies. So, system dynamics is appropriate for the analysis of problems in policy implementation. Therefore, the model tells a story about how things work in the relevant portion of the world, which informs decision-making. It expresses a set of logical relations, cause-and-effect mechanisms on which to base inferences. Causal models can be adapted for practitioners in the policy arena. They provide a warning (Wheat & Bardach, 2017, p. 42). Variables emerging from theories are useful to predict the factors that are important, the different categories to consider and the appropriate definitions, the causes and the effects.

Policy implementation is a dynamic system with unpredictable actors. Policy and decision-making processes are routinely challenged by the complex and dynamic nature of problems. System dynamics modelling has demonstrated considerable value across many different fields. It helps decision-makers understand and predict the dynamic behaviour of complex systems in support of the development of

effective policy actions. The support provided in the way of strategies and activities to facilitate the implementation of the policy has to be dynamic and emergent (Currie, Smith, & Jagals, 2018, p. 68). It is suggested that interventions in complex systems require adaptive approaches because such systems are dynamic and somewhat unpredictable (Begun, Zimmerman, & Dooley, 2003, p. 117). Therefore, policy implementation success can be enhanced by system dynamics modelling. Computer simulation models use system dynamics methodology to analyse the effects of implementing policies. The developed model can be expanded to experiment with various scenarios for policy management (Park & Kim, 2016, p. 69). System dynamics modelling is therefore useful to find the best solutions to the predictable challenges.

Wheat (2010, p. 45) describes the process of system dynamics modelling for policy to have two high-level stages. First, problem explanation: explaining the reasons for the problematic dynamic behaviour of the system by building an explanatory model. Second, policy design: designing and testing policies that could improve the dynamic performance of the system by building a policy structure and integrating it with the base model. The policy-design structure is a stock-and-flow feedback structure; it contains decision rules that define when a new policy comes into play, how it works and what changes are made to it over time that will improve the performance of the whole system. Modelling is useful to avoid undertaking the costly and time-consuming or even totally unrealistic experimental implementation in complex, real-world systems. If the assumptions made when developing the model's new decision rules are too naive, simulation results will provide an unrealistic picture of the efficacy of the policy. Wheat further advises that in practice if systemic behaviour is to be improved, then systemic structures must be improved, and this cannot be achieved through only testing parameter changes in a model. However, this type of policy structure design can be made easier by using findings from the literature on public policy that indicate which are the most important feasibility questions to ask. One such source is the implementation framework developed by Mazmanian and Sabatier (1989, p. 5) and cited by Wheat (2010, p. 53), which has been used to assess the implementation of policies around the world. This can provide a checklist of important questions and warnings that are useful when attempting to represent impediments to policy implementation in a policy-design structure. The checklist includes tractability of the problem, statutory influences and non-statutory influences that impact on policy outputs.

Given that public policies are prone to failure, system dynamics modelling is the first step in a long process that requires a thorough analysis before implementation takes place. Policy failure occurs because of the complexity of both the environment and the policy-making process (Ghaffarzadegan, Lyneis, & Richardson, 2010, p. 45). Traditional policy implementation approaches are prone to conflicts out of issues that may have been suppressed during policy-making, rent-seeking, costs, delays, erosion of policy goals and disappointing outcomes (Wheat & Bardach, 2017, p. 37). Therefore, public policies have to cope with certain issues which make resolution difficult using traditional approaches. These issues are policy resistance, the need for and cost of experimentation. Other issues are the need to achieve con-

sensus between diverse stakeholders, overconfidence which limits questioning assumptions and the need to have an endogenous perspective for individual and organizational learning. Moreover, system dynamics models focus on the representation of the structure that causes problematic behaviour. This structure allows policy implementers and stakeholders to comprehend the current state of affairs from an endogenous perspective. Therefore, it is vital that a thorough analysis and evaluation of policies is done so that they yield the expected benefits. System dynamics contributes to policy analysis and implementation by its principle of operational thinking. Operational thinking focuses on how things act in practice, not in theory. Therefore, assumptions and biases are exposed in the context of a simulation model, allowing policy implementers to evaluate not only the impact but also the feasibility of the proposed policy. Effective modelling requires collaboration between modelling disciplines and policy research disciplines. This helps to improve the understanding between policy inputs, outputs and outcomes (Wheat, 2015, p. 26). In this manner, policy implementers can validate and champion policies that cater for more benefits to the community in a cogent and logical fashion, which is assured by the mathematical formality embedded in system dynamics models due to its differential equations rationale.

System dynamics modelling generates internally consistent projections. The model provides an opportunity to experience setbacks and test redesign strategies in ways that may later be useful for the street-level implementers. Wheat and Bardach (2017, p. 35) advise to start with qualitative implementation modelling followed by quantitative simulations; it helps to reduce chances of resistance to formal simulation without cognitive biases of mathematics. The simulation model adds value to the qualitative approach by quantifying the cause-effect relationships and likely dynamic behaviour likely to emerge over time. The qualitative model sensitizes policy designers on the technical, administrative and political feasibility issues likely to fail a policy. The quantitative simulation adds value to the qualitative diagrams by revealing the dynamics of complex systems and experimentation.

## 5.9   Conclusion

This chapter has reviewed policy implementation theory and practice; four generations in implementation studies have been examined. It is agreed that work remains to develop a comprehensive theory to guide policy implementation (Winter, 2012, p. 35). The four policy implementation perspectives' attempts to develop a theory have so far been futile (Saetren, 2014, p. 46). Implementation science has made strides in developing the normalization process theory (NPT) and measurements that are relevant in policy implementation. Scholarly efforts can build on NPT and other identified theories to move the effort further to a conclusive comprehensive policy implementation theory.

Policy implementation practice provides an opportunity for the furtherance of the concept that had been declared dead. Globalization has presented governance

and collaboration for the attendant application of policy implementation. Implementation of collaborative and governance systems offers promise to achieve sustainable development goals (UN, 2018, p. 268). These should be exploited more to further policy implementation studies and practice. It is clear that policy implementation has become more relevant than before. It is noted that many policies implemented, especially in developing countries, fail. The relevance of street-level bureaucrats and the compliance in policy implementation have been discussed. Bureaucrats collaboratively uphold public values which make policy implementation predictable. Policy implementation practice is complex and dynamic. There is a need for coordination of political and administrative officers as well as and citizens who are the policy recipients for voluntary policy compliance. This chapter proposes policy implementation systems modelling to actualize policy decisions. Policy implementation systems modelling will reduce possibilities of policy failure, conflicts, rent-seeking, unnecessary delays and minimize costs of policy experimentation in the real world. Policy implementation systems modelling is a training ground to practice implementation and tests feasibility (Wheat & Bardach, 2017, p. 37). System policy implementation systems modelling can utilize the variables identified in the theoretical review to improve systems of governance and collaboration. This chapter guides investigators and helps both students and practitioners make sense of the complex variables that influence policy implementation with a view of improving policy implementation success.

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# Part II
# Systems Methods to Enable Collaborative Planning and Decision Making

# Chapter 6
# A Model-Based Governance and Planning Tool for HIV/AIDS Services in Vietnam

**Gary Hirsch and James Rice**

**Abstract** Planning services for HIV/AIDS is complicated by the nature of the disease and the way it spreads. Reducing the HIV/AIDS burden in a country requires sophisticated tools and agreement among stakeholders about effective strategies. This chapter describes a tool for governance and planning of HIV/AIDS services at the provincial level in Vietnam. The tool includes a System Dynamics (SD) model and an interface that enables its use by planners and multiple stakeholders. The tool can be used to allocate constrained budgets more effectively or develop idealized solutions and calculate their cost. It can meet the needs of countries like Vietnam that are moving toward middle-income status and taking greater responsibility for funding, management, and governance of HIV/AIDS services.

**Keywords** System dynamics · Governance · HIV/AIDS · Vietnam · Simulator

## 6.1 Introduction

Policymakers, care providers, purchasers, and consumers of health care services are diverse actors calling for sustained gains in the reduction of the human and economic costs of diseases across the globe. These gains are more likely when the actors are invited into scenario-based planning and simulation modeling exercises that are supported by modern computer-assisted modeling software. This has been particularly powerful in South East Asia with HIV/AIDS, a disease with challenging characteristics of both communicable and chronic diseases.

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HIV/AIDS has been the subject of a number of System Dynamics modeling efforts. Many of these were conducted in the 1990s and early 2000s, though some were conducted more recently. They include efforts focused on the USA (Crawford & Wenstøp, 1990; Edwards, Shachter, & Owens, 1998; Homer & St. Clair, 1991; Lounsbury & Levine, 2001, 2002; Martin & MacDonald, 2012), the UK (Brailsford, Shahani, Roy, & Sivapalan, 1992; Dangerfield & Fang, 2000, 2001; Dangerfield, Fang, & Roberts, 2001; Gibb, Ades, Gupta, & Sculpher, 1998; Roberts & Dangerfield, 1989, 1990a, b, 1991, 1992), Canada (Meagher, Hanvelt, Schneider, Copley, & Marion, 1998; Meagher, Marion, Hanvelt, Schneider, & Copley, 1998), East Africa (Bernstein et al., 1998), Malawi (Greenwood, Kircher, Cezar, & Tertilt, 2013; Headley, Rockweiler, & Jogee, 2008; Qu, Symalla, & Barney, 1998), Southern Africa (Lauwers, Pruyt, Hens, & Brans, 2008), Botswana (Viladent, 2006), Zimbabwe (Pedercini, 2002), India (Edgar, Durham, & Higgins, 2005), and multiple countries (Grassly et al., 2002) or on generic issues related to HIV/AIDS (Kim & Thompson, 2010; Atun, Lebcir, & Coker, 2004; Vallipuram, 1991). Many of these efforts yielded valuable insights about HIV/AIDS prevention and treatment programs and policies. Some dealt with specific modes of transmission (sexual, intravenous drug use), while others examined the impact of treatment and diagnostic modalities such as highly active antiretroviral therapy (HAART) and prenatal testing. The model described in this chapter advances the state-of-the-art by putting an interactive simulation model into the hands of stakeholders including planners, providers, policymakers, and advocates from the provincial and national levels. It includes an interface that makes the model directly accessible by these users.

This chapter describes a model-based tool and system to support provincial-level governance and planning of HIV/AIDS services in Vietnam. It was developed in the province of Hai Phong as a prototype for potential application in other provinces. The effort to develop this tool was part of the US Agency for International Development funded Leadership, Management, and Governance (LMG) Program, carried out by Management Sciences for Health, that supported the transition of HIV/AIDS services funded by the US President's Emergency Plan for AIDS Relief (PEPFAR) to local support in Vietnam (https://www.pepfar.gov/). The LMG project operated in 46 countries and collaborated with health leaders at all levels to improve leadership, management, and governance practices to create stronger health systems and improved health for all, including some of the world's vulnerable populations. The LMG project achieved these objectives by:

- Promoting enhanced performance improvement processes for individuals and teams driven by country leadership
- Using participatory processes and gender-aware approaches that enabled health leaders and policy-makers to address their own challenges and achieve results
- Building and using evidence-based approaches
- Leveraging partnerships through public and private investments in leadership, management, and governance for greater health gains worldwide (LMG, 2018)

## 6.2   Conceptual Framework for Modeling

The tool is based on a System Dynamics (SD) model. It includes an interface that supports collaborative engagement with the model by non-modelers and enables a wide range of stakeholders to participate in the planning, financing, and governance of HIV/AIDS services. In addition to public health officials and health care providers, these stakeholders include those affected by the disease and members of vulnerable populations such as intravenous drug users and sex workers. Hands-on use of the model by stakeholders promotes productive conversations about important issues and development of a shared understanding crucial to finding strategies that can be implemented with broad political and economic support. The model and interface form a learning environment that enables stakeholders to jointly explore strategic alternatives and policies for the system they are governing, they can then choose the interventions with the greatest potential for effective performance and resilience in the face of an uncertain policy environment. There is a history of these learning environments to support governance of regional health systems dating back to the 1990s with health care microworlds (Hirsch & Immediato, 1999; Hirsch & Kemeny, 1994) and continuing with more recent work as part of a project called ReThink Health (Homer, Milstein, Hirsch, & Fisher, 2016).

The challenge facing Vietnam and other countries making the transition from low-income to middle-income countries is how best to take greater local host-country ownership of their HIV/AIDS programs that have been largely donor-supported. Planning HIV/AIDS programs must be done in a dynamic environment in which the programs' implementation will affect the future prevalence of HIV/AIDS. Planning services is especially complicated because HIV/AIDS has the characteristics of both an infectious disease and chronic illness. People with the disease can remain contagious for long periods of time unless they are treated effectively with antiretroviral drugs. The model captures multiple feedbacks that make an SD model an appropriate choice. Some of these feedbacks are epidemiological (e.g., more people with HIV can transmit it to others resulting in more new cases). Others are financial (e.g., preventing new cases will leave more budget available for treatment and prevention which will result in even fewer cases). There are additional feedbacks in the model as vulnerable populations and people who are HIV positive interact with and utilize programs depending on available capacity. A governance and planning system based on an SD model has the advantage of embodying these interactions and allowing planners and multiple stakeholders to project potential impacts. They can see how different configurations of services might play out in terms of HIV/AIDS prevalence and future requirements for services.

Planners of these services at the provincial level in Vietnam are typically well-trained in traditional public health methodologies but are not modelers. The planning tool based on the model therefore needed to have a user interface that makes it easier for non-modelers to understand and use. The tool also needed to support *two modes of planning*.

1. One is a *normative mode*, that allows planners and other stakeholders involved in HIV/AIDS governance to explore mixes of service interventions directed at high priority target populations and that have the greatest effect in reducing new cases of HIV/AIDS and its prevalence and consequences over time. This allows them to find the best possible mix of services, calculate needed levels of expenditures, and then think about where the necessary sources of funding might be best developed and mobilized.
2. The other is a *budget-based mode* that starts from the opposite direction with assumptions about funding levels. Planners and other stakeholders working interactively with the model can then reallocate funds among services to achieve the greatest impact within given levels of funding. This latter mode is important in countries where a transition from donors to local and national funding is taking place and there may not be the same level of support available in the future.

After first describing the structure of the prototype model developed in the Vietnamese province of Hai Phong, this chapter presents scenarios that illustrate how the model can be used in these two different planning modes.

The planning and governance tool was used in two sessions in February and May of 2014 in Hai Phong. The first session introduced an initial version of the tool and also provided valuable feedback that helped to improve its design and use. The second session trained people in the use of the "improved" version that has been translated into Vietnamese. Both sessions included members of the various stakeholder groups mentioned above, working in teams that engaged in intense conversations while working with the model. The result was a tool that could be used by planners in Hai Phong as part of their annual cycle of budgeting and program planning and reporting on plans to the national HIV/AIDS agency and advocacy groups. The underlying model was also designed to readily use specified data from any of Vietnam's 62 other provinces. This would enable the model and interface to be used for governance and planning in each of those other provinces.

## 6.3   The Model

The HIV/AIDS model contains the factors that affect the rate of new HIV cases, the prevalence of HIV and AIDS, costs of dealing with the disease, and deaths and other consequences in a province in Vietnam, specifically Hai Phong. The model simulates scenarios from 2012 to 2020 that were possible when there are changes in budgets, treatment and preventive services, staffing, and other variables that affect the spread and consequences of HIV. The model tracked 2 years of history and then projected results out 6 years to 2020. Stakeholders were focused on the short- and medium-term impacts because of impending budget cuts, even though consequences might play out over a longer period of time. The purpose of the model was not to forecast specific numbers of people with HIV but to help stakeholders understand
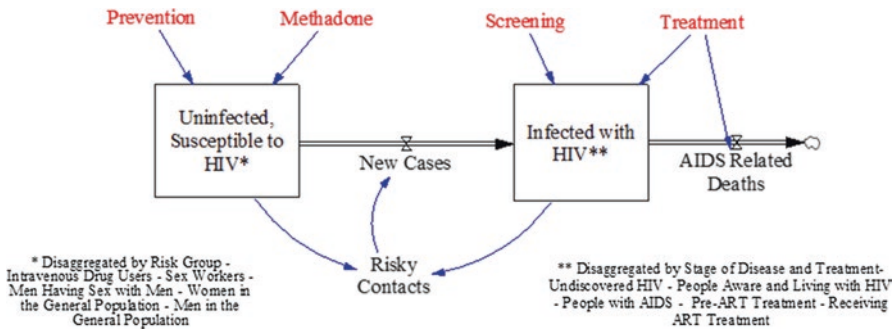
**Fig. 6.1** Overview of HIV/AIDS model (Interventions in red)

the relative effects of different interactions and the costs and benefits of pursuing alternative strategies.

While there are bound to be similarities with other HIV models, this model was developed "from scratch" based on the way HIV prevention and treatment was organized in Vietnam. For example, this included a pre-ART stage for patients who are HIV positive but not sick enough to receive ART (reflecting rationing of ART to patients with the greatest need). The model also divides the vulnerable population into multiple risk groups such as Intravenous drug users and sex workers in line with local program frameworks and then tracks them as they acquire HIV and move through stages in the disease and treatment modalities. The model structure was reviewed and validated by local experts from both the provincial health ministry and consultants who had been working on HIV-AIDS in Vietnam for a number of years and modified based on their suggestions.

## 6.3.1  Overview

Figure 6.1 shows an overview of the model at a very simple level. Uninfected people may be part of groups that make them particularly vulnerable such as intravenous drug users (IDUs), sex workers (SWs), or men who have sex with men (MSMs). Or they may be part of the general adult male and female populations who develop HIV through unprotected intimate contact. The model represents each of these populations separately, along with the factors that cause people to move between risky behavior that makes them more vulnerable to HIV and safer forms of behavior such as regularly using condoms in sexual encounters. Some contract HIV as a result of risky behavior and become new cases.

People infected with HIV and AIDS move through several stages, becoming infected, learning that they have HIV as a result of screening, entering pre-ART treatment, and entering ART treatment when qualified to do so. (At the time, ART treatment in Vietnam was only available to people whose CD4 count had fallen below a certain level determined by health officials. Pre-ART treatment for people

whose CD4 levels were above that threshold met other medical needs but did not include provision of ART because of its cost.) Some who contract HIV are less fortunate, do not get treatment, and suffer the effects of AIDS, though they may later enter ART treatment. Except for those receiving consistent ART treatment, people already infected with HIV can infect others. Contacts with those already infected drive the rate of new cases. Those aware of being HIV+ as a result of screening are assumed to modify their behavior to some extent and reduce the chances of transmitting the virus.

## 6.3.2   Movement of People with HIV/AIDS Through Disease Stages and Treatment Programs

Figure 6.2 shows how the model represents people developing and living with HIV and AIDS. The boxes represent groups of people at different stages of the disease, and the arrows show movement from one stage to the next. The diagram shows that the process starts in the upper left-hand corner by uninfected people becoming infected with the HIV virus. The way in which they become infected depends on who they are. Members of risk groups such as intravenous drug users (IDU), female sex workers (FSW), and men having sex with men (MSM) develop HIV from activities such as needle-sharing and sexual contact. Others, men and women in the general population, get the virus from intimate contact with members of these risk groups as well as each other. Members of these groups are tracked separately in the model once they have become infected because they are also the source of infection for additional people in their groups. The model also tracks children who acquire HIV from their mothers in the absence of preventing transmission from mother to child treatment (PMTCT).
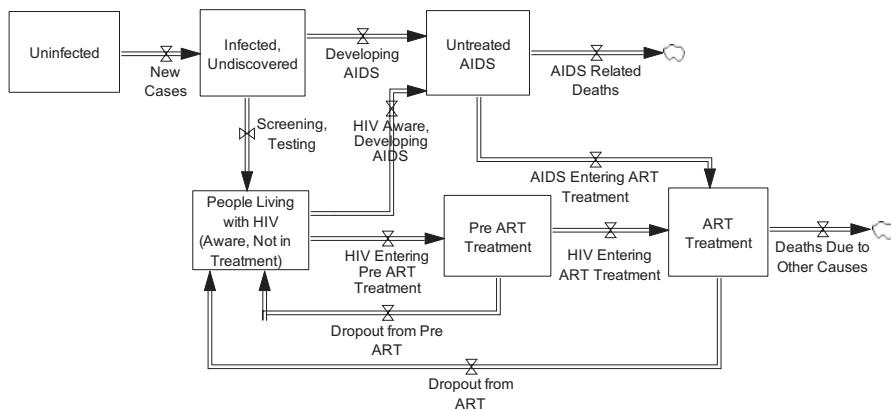


**Fig. 6.2** Flows of people in model once they have been infected with HIV

People initially do not know they are infected (the group called "Infected, Undiscovered"). Screening done as part of Voluntary Counseling and Testing (VCT) may alert them to the fact they have HIV, and they move into the group marked "People Living with HIV (Aware, Not in Treatment)". Once these people are aware of their HIV status, they may choose to enter pre-ART Treatment. When their CD4 counts fall below a certain level, they become eligible for ART (Antiretroviral Treatment) and can start their treatment if there is room in ART programs. People who have HIV and do not get treatment may eventually develop AIDS which can lead to death unless they begin to get ART Treatment. People can also flow backward along these arrows. Those receiving ART, for example, may feel they no longer need treatment or may not like the side effects and drop out.

To give the reader a sense of the scale of the problem in Hai Phong, the following are numbers of people estimated to be in each stage at the model's starting point in 2012:

| | |
|---|---|
| Infected, undiscovered | 4140 |
| People aware, living with HIV | 1160 |
| Receiving pre-ART treatment | 540 |
| Receiving ART treatment | 3915 |
| With AIDS, not in treatment | 1280 |
| Total | 11,035 |

The following are estimated new cases, people moving from Uninfected to Infected, Undiscovered), by population group in 2012:

| | |
|---|---|
| Intravenous drug users (IDU) | 153 |
| Sex workers (SW) | 16 |
| Men having sex with men (MSM) | 52 |
| Males in general population | 59 |
| Females in general population | 144 |
| Children | 8 |
| Total | 432 |

These numbers were derived from a study done by the FHI/360 organization (FHI/360, 2013) that brought together many pieces of data needed for the model as well as projections of how rates of new cases were expected to evolve in the next few years. FHI/360 had been working on HIV programs in Vietnam for a number of years and brought this experience to bear in developing the data and estimates that were used for the model. Additional data were provided by the Health Department in Hai Phong from a detailed registry of people with HIV. Rates of movement from one stage of illness to another were calibrated based on changes in numbers of people at different stages of the disease, taken from Health Department and FHI/360 data. The model was then used to simulate the trajectory of HIV/AIDS in Hai Phong

to verify that results of a baseline simulation matched observed and projected new case incidence and the overall prevalence of HIV/AIDS.

The following movement took place in 2012 and was replicated at the beginning of each simulation. Potential changes in flows due to increases or decreases in program capacities are also described.

***Screening, Testing, and Counseling*** Approximately 26,000 people were screened, about 2% of the province's adult population, and 278 cases, a little more than 1%, were identified in people who did not previously know they had HIV. This rate of new positive findings can increase if more people are screened or if the number of peer educators increases. Peer educators focus on people in the most vulnerable groups, encouraging them to be tested, thereby increasing the likelihood by up to 20% that those tested will have a positive finding.

***Pre-ART Treatment*** 558 people entered pre-ART treatment during the year, 48% of those who knew they had HIV and were not yet in treatment. This percentage and others that affect the flows of people between "boxes" in Fig. 6.2 were developed by running simulations with the model and adjusting the parameters to reproduce the stable, gradually decreasing trends projected by FHI/360 based on their estimates of new cases and people at various stages of the disease and treatment continuum. More limited or expanded capacity of pre-ART programs or budgets for those programs can shut off the flow entirely or increase the number flowing in by as much as 67%. Ten percent of those in pre-ART are assumed to drop out each year without going on to ART.

***ART Treatment*** 435 or 80% of those in pre-ART entered ART treatment from the pre-ART stage. An additional 128 (10%) of those with AIDS also entered ART treatment. Ten percent of those in ART treatment dropped out during the year for a variety of reasons, about 390 people. As a result, the number of people receiving ART treatment grew by 193 (435 + 128 − 390). Reducing ART capacity to zero will shut off all new admissions and cause the number of people receiving ART treatment to drop to 1672 by 2020, a reduction of 70% from the number that would have been there without any change in ART capacity. Doubling ART capacity would make it easier for people to join ART treatment programs (e.g., more locations, shorter waiting times), but only result in a 15% increase in ART program enrollment by 2020 because that is primarily dependent on the number of new people coming through pre-ART Treatment.

***AIDS and Deaths*** Five percent of those who do not get treatment develop AIDS during the year (252 people), and 129 die of AIDS-related illnesses. The estimate of deaths assumes that people with AIDS will live 10 years before succumbing to AIDS-related illnesses.

As indicated above, many of the numbers used in the model were derived from a document prepared by FHI360 entitled "A Snapshot of HIV in Haiphong." The baseline simulation, a projection of what will happen if the HIV situation in Hai Phong remains reasonably stable, projects a similar trend in new cases to the

FHI/360 work, declining from 432 in 2012 to 388 in 2015 and further to 363 in 2020. As a result of this stable and slowly declining rate of new cases, the number of people with HIV and AIDS is projected by our model to grow only moderately from 11,033 in 2012 to 11,778 in 2015 and 12,867 in 2020. Much of the increase in the total population with HIV and AIDS occurs as a result of growth in numbers of people in pre-Art and ART treatment. People receiving ART treatment go from 3914 in 2012 to 4913 in 2020.

### 6.3.3   Drivers of New Cases

The model represents behavioral factors and the degree to which programs affect the fractions of people in each population group who engage in risky behavior, making them vulnerable to developing HIV. The intervention programs represented in the model include clean needle and condom distribution, peer education, provision of methadone maintenance, and IEC/BCC (Information, Education, and Communication/Behavior Change Communication). ART treatment also affects the number of new cases by reducing the number of people with HIV who can transmit the virus (treatment as prevention). Screening, counseling, and testing also affects new cases through its effect on the number of people who know they have HIV and change their behavior to some extent. **They may also eventually enter ART treatment as a result of knowing their HIV status.** Increases or decreases in spending for each of these interventions cause shifts in the fractions engaging in risky behavior and, in turn, the projected number of new cases.

## 6.4   The Interface

The interface for the provincial HIV/AIDS model was developed by Forio (https://forio.com/). It has a series of user-friendly input screens for specifying interventions involved in each simulation and output screens that present understandable views of model results. The input screens are divided into two groups that support each of the planning modalities, one that starts with a budget and allocates it to various services and the other that starts with desired resources and calculates the expected level of expenditures for the resulting services. An initial screen enables users to choose the planning modality.

Figure 6.3 provides an example of an input screen that allocates budget among preventive, screening, and treatment services, as well as methadone maintenance for intravenous drug users. Figure 6.4 shows an input screen used to allocate resources based on targets, independent of budget. The interface also has numerous screens for reviewing results, starting with a "dashboard" that provides an overview and screens that enable the model's users to drill down and get a more detailed
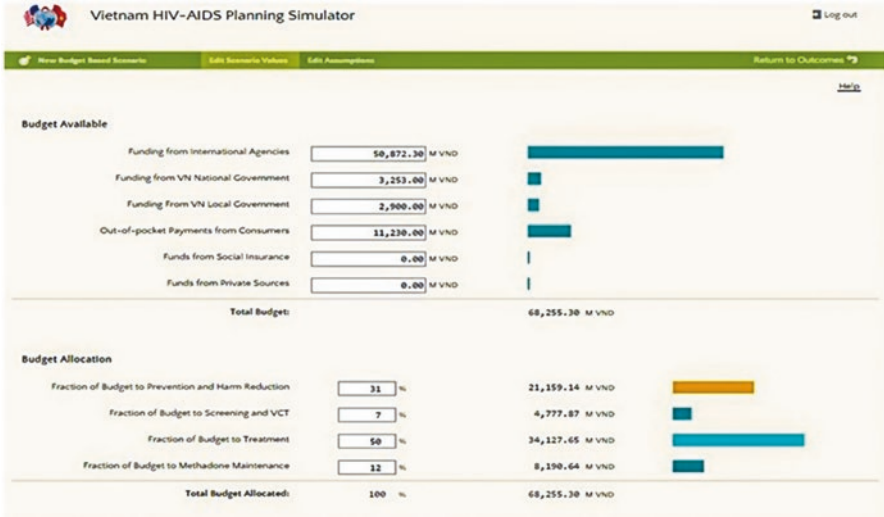
**Fig. 6.3** Scenario input screen: anticipating funding and allocating budget to functions
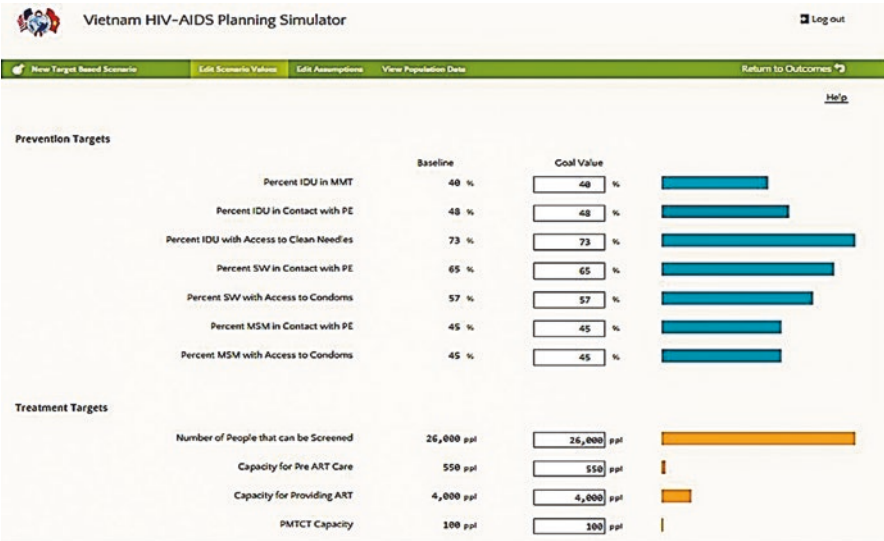


**Fig. 6.4** Scenario input screen: setting resources based on targets

understanding of what is going on in each simulation. The outputs include a number of reports and spreadsheets that can serve as inputs to a mandated annual planning process. Figure 6.5 shows the results "dashboard" with an overview of simulation results for key measures compared to a baseline simulation and indicates, with
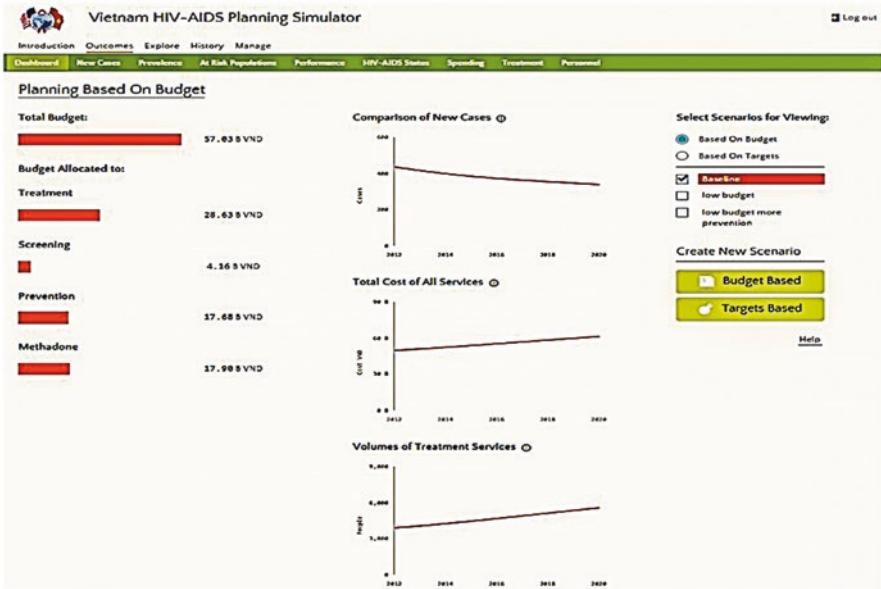
**Fig. 6.5** Outcomes dashboard

selections on the lower menu at the top, areas in which more detailed results are available.

Budgets and costs are shown in Vietnamese Dong (VND). About 20,000 VND equals one US dollar. The screens on the following pages are shown in English, but the interface was also translated into Vietnamese so that the model could be used "hands-on" by stakeholders and would be available for ongoing use in provincial health planning and governance without the assistance of consultants.

## 6.5 Using the Model: Two Scenarios

### 6.5.1 Planning Based on Available Budget

In this first scenario, the model users examine the effect of a transition in funding from international donors that reduces the available budget, and then they experiment with a strategy to make better use of the reduced budget. In a baseline simulation, HIV/AIDS appears to be a fairly stable and slowly improving problem in Hai Phong. Donors at the various international agencies that have been supporting many of the HIV/AIDS programs anticipated transitioning down to lower levels of funding in the future and to a more focused technical assistance role. In this scenario, we will first examine the effect of a reduction of about 40% in funds available from
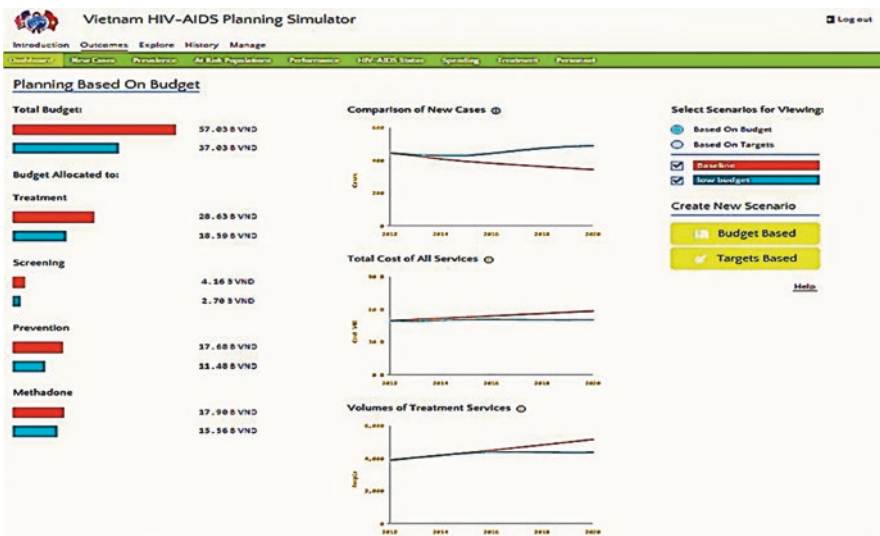
**Fig. 6.6** Dashboard showing results of scenario with lower budget

donors. These funds support various prevention and treatment programs. For the purposes of this scenario, we assume that the reductions in donor funding are applied equally across the board to all programs. Figure 6.6 shows the results with a reduced budget alone.

The three line graphs in Fig. 6.6 compare results for new cases, total costs, and volumes of treatment with the low budget scenario (blue line) to the baseline simulation (red line). All of those line graphs have a horizontal axis showing time that runs from 2012 to 2020. The bar graphs on the left-hand side of the screen show the effects of a new budget in blue resulting from the decreased contribution from international organizations compared to the baseline budget in red.

The results shown in Fig. 6.6 indicate that a consequence of the lower budget is a higher rate of new cases compared to the baseline. While total costs are lower as you would expect, the volume of treatment services is also lower, which contributes to the higher rate of new cases since there are fewer people receiving ART and more are able to spread HIV. Clearly, the increasing rate of new cases is not desirable when we would have expected it to decline given the baseline projection. What can be done to reduce the number of new cases? Is it possible to craft a strategy constraind by this lower budget that produces a better outcome in terms of new cases? Let's try shifting some more of this limited budget to prevention and harm reduction. We would start by clicking on the Budget Based button under Create New Scenario on the right-hand side of the screen to go back to the screen shown in Fig. 6.7 for inputting a new budget-based scenario.

On that screen, we set the Funding from International Agencies to 30.5 B VND again so that we are working with the same decreased budget. Then input new percentages to shift the allocation of the budget toward more Prevention and Harm
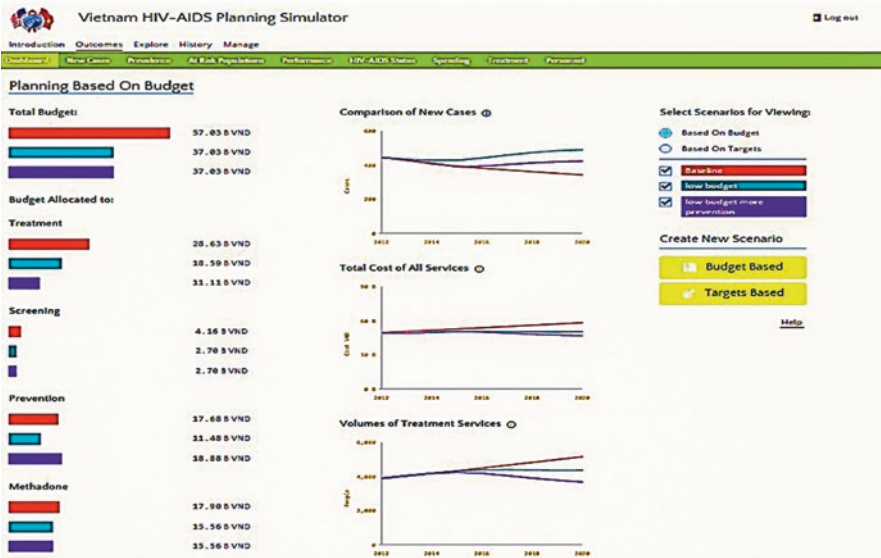
**Fig. 6.7** Results of scenario with lower budget and greater allocation to prevention

Reduction. Let us try a 51% allocation to prevention and harm reduction versus 31% in the baseline. Of course, we cannot allocate more than 100% of the budget, so we will have to reduce something else. For this example, we will reduce the allocation to treatment from 50% in the baseline to 30%. The screen shown in Fig. 6.7 would then appear once the new scenario has been run, with the purple lines and bars representing the new scenario.

As evident from the new cases graph in Fig. 6.7, this strategy definitely helped move the trajectory of new cases (purple line) closer to where it had been in the baseline simulation (red line) and much lower than the scenario in which we only had a reduction in budget (blue line) without any change in strategy. The middle graph shows we were able to live within the lower budget and achieve this reduction in new cases at a lower cost than in the baseline. It was also possible to experience a slightly lower cost than with the lower budget alone while achieving a much better result. The bottom graph shows that we sacrificed something in terms of fewer people receiving ART, which kept new cases from being reduced further since ART treatment contributes to prevention.

### 6.5.2   Planning Based on Targets

The other mode for planning described earlier is to set targets for programs and services at desired levels and project the impact and cost. One would start by going to the input screen shown in Fig. 6.4. This screen enables users to run new scenarios

based on targets that are different from the baseline. The first set of targets determines the percentage of at-risk populations that will be targeted with specific preventive interventions. The left-hand column shows the percentages covered by each intervention currently and in the baseline scenario. The right-hand column allows the user to change those percentages by typing in a new number. Changing the percentages for a scenario will increase or decrease the number targeted, the effect on new cases, the number of personnel required, and the total cost incurred. The second set of targets sets the capacities for various treatment and screening services. Again, the baseline values are displayed in the left-hand column: numbers people of that can be screened and capacities for pre-ART, ART, and PMTCT services.

To illustrate this mode of planning, users assume a scenario in which funding is not an issue, and leaders can plan based on desired target populations and program capacities. This will enable users to examine the effect that higher levels of resources can have on new cases, see how we can reach a goal of reducing the rate of new cases, and what the cost would be to reach that goal. For example, if users want to simulate an aggressive program of prevention and treatment to get a meaningful reduction in the number of new cases, they might include:

- Increasing coverage by preventive programs (needle and condom distribution, IEC and BCC programs) to cover larger percentages of vulnerable populations, either doubling the percentage covered or increasing it to 100%, whichever is less.
- Increasing the percentage of people in vulnerable populations reached by peer educators, either doubling the percentage or increasing it to 100%, whichever is less.
- Doubling the capacity of methadone maintenance programs by increasing the percentage of IDUs that can be covered from 40 to 80%.
- Expanding ART treatment program capacity from 4000 to 8000 and pre-ART capacity from 550 to 1100.
- Doubling VCT/screening capacity from 26,000 to 52,000 per year.

The results of a simulation with these programs would appear on the dashboard screen shown in Fig. 6.8.

The left-hand side of the dashboard displays values of key resources used in the simulation based on the settings on the input screens. In the center, there are three graphs that, as in the previous example, display the rates of new cases (with a vertical scale of 0–600 new cases per year), number of people in ART treatment (0–9000), and the total cost of HIV-AIDS services in the province (0–120 B VND per year). The red line in each graph reflects the baseline simulation, while the blue line represents the one we have named "high targets." As you can see, there has been a significant effect over time on new cases, achieving an important goal. New cases decline from about 435 per year to 185, where they had previously declined to 350 in the baseline simulation where there were no changes in programs. Part of this decline results from there being more people receiving ART (treatment as prevention), as shown in the middle graph where the number increases to over 7300 versus about 5600 in the baseline. The final graph shows the challenge that this simulation

**Fig. 6.8** Results with high targets scenario

poses, costs that are significantly higher than in the baseline, reaching about 85 B VND by 2020 compared to about 61 B in the Baseline. This scenario promises significant impacts on new cases but raises the question of where the necessary funding will come from.

The items on the lower menu at the top of the outcomes screens allow users to dig more deeply into the results and get a better idea of what is going on. For example, if a user wants to see the components of cost, they would click on "spending" and see the screen shown in Fig. 6.9. It displays graphs of the components of spending in this (high targets) simulation toward the bottom of the screen. The blue lines represent spending in this scenario and the red the baseline spending. Much of the growth in cost over time appears to be coming from treatment, as shown in the lower left-hand graph in Fig. 6.9, as more people are able to receive ART treatment.

If the user wanted to see how this simulation compared to the baseline on a cumulative basis, for the entire period 2012–2020, they would click on "performance" in that menu and go to the screen shown in Fig. 6.10. The blue bars represent the high targets simulation. The graphs show about 730 fewer new cases over the entire time period, 202 fewer deaths, and 129 B VND more spending. The final graph on the right shows the additional cost for each new case that is avoided. The cost of 177 M VND (about $8850 US) shown on the bar graph seems reasonable when the lifetime costs of health care for someone with HIV-AIDS are considered as well as the costs of lost productivity and premature death.

Figure 6.11 shows the composition of the population with HIV-AIDS in 2020 and the "cascade" starting with all having the disease (Total Infected) to those living with HIV who are aware of their status, those getting any care (pre-ART and ART),

**Fig. 6.9** More detailed view of spending in high target scenario compared to the baseline
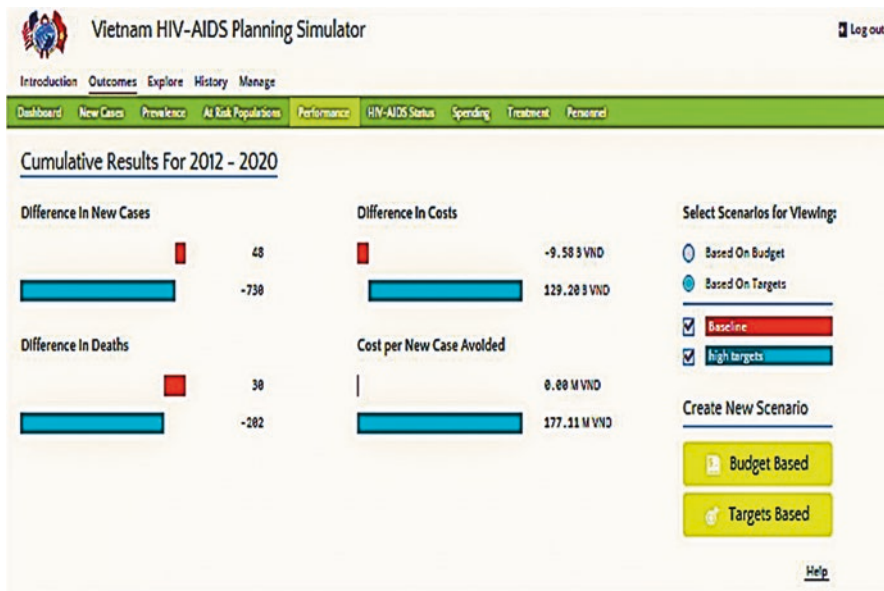


**Fig. 6.10** Graphs of cumulative performance for the years 2012–2020 compared to baseline

**Fig. 6.11**  Graphs of HIV-AIDS by status (cascade)

and those receiving ART. The left-hand bar graphs show that the total population that is infected by 2020 in the high targets scenario (blue bar) is slightly reduced over time (better prevention) compared to the baseline (red bar) while the number aware of their condition increases due to more screening as do the numbers receiving any care and specifically ART as a result of greater capacity in Pre ART and ART programs. The right-hand line graphs confirm this picture, showing how these differences between the scenarios evolve over time.

## 6.6   Conclusion

This chapter has described a, budgeting, governance, and planning tool developed for provincial level HIV/AIDS services in Vietnam. The tool is based on a model of HIV/AIDS and the mechanisms by which it spreads in various populations. An elaborate interface with screens in Vietnamese enables it to be used for planning and governance by stakeholders who want to support strategies that meet their multiple programmatic needs. A workshop in February 2014 in Hai Phong with a broad group of stakeholders demonstrated a widespread interest in the model as well as revealing several improvements that could lead to a more useful tool (See Fig. 6.12). The stakeholders attending the workshop included medical and other professionals from the Provincial Health Ministry and other government agencies and NGO's and people representing the various risk groups (e.g., intravenous drug users, sex

**Fig. 6.12** Stakeholders using HIV/AIDS model in February 2014 workshop

workers), including several who were living with HIV. The workshop was led by facilitators and participants were provided with supporting materials that explained the model's underlying structure. There were several rounds of simulations by participants working in small groups alternating with debriefings that enabled them to share insights.

Training in May 2014 with the improved model readied planners and other stakeholders to use the improved model as part of their required provincial annual planning cycle. The model was then used to support annual planning in Hai Phong province. As indicated earlier, the model was also designed to be readily adaptable for use in other provinces by using a spreadsheet to input each province's unique demographic and HIV data. Unfortunately, USAID's support for Management Sciences for Health's work in Vietnam ended at that point, which prevented us from tracking the model's further use beyond Hai Phong province.

Feedback from the multi-stakeholder group that attended the workshops and personnel we worked with at the Provincial Health Ministry indicated that working with the model had an important effect in helping them understand the need for diverse stakeholder perspectives and comprehensive strategies to deal with HIV/ AIDS. This was especially important in light of the impending budget reductions by international donors that might cause them to eliminate an element of such a strategy entirely.

The result of this work is a model-based tool that:

- Enables multiple stakeholders with diverse perspectives to develop a shared understanding of the system of interacting forces that affect the prevalence and

burden of HIV in a defined population. The resulting picture of this system provides a framework for assembling data on the magnitude of the problem and the strength of various contributing and mediating factors.

- Supports diverse stakeholders' ability to pose "What if?" questions about alternative scenarios and strategies for dealing with HIV and immediately see the results in terms of projected HIV and AIDS prevalence, deaths, service utilization, and expenditures. These answers are not meant to be forecasts but reveal the likely impacts of different strategies relative to each other and to a neutral "baseline" scenario in which no new programs are implemented. This capability, together with a user-friendly interface, allows for intensive interaction, more rapid learning, and a deeper understanding about how the real-world system might respond to various interventions.
- Can be used flexibly to arrive at the most effective strategies regardless of resource constraints or to determine the most effective strategies that can be implemented within limited budgets. This flexibility is especially important in developing countries where resources are limited and, as in this case, local governments are taking over programs previously funded by foreign donors.

Effective planning for and management and governance of complex health problems such as HIV/AIDS can increasingly benefit from the use of simulation models such as this one developed in Vietnam.

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# Chapter 7
# Collaboration Governance and System Dynamics Modelling: What Do Clients Want?

**Rodney J. Scott and Robert Y. Cavana**

**Abstract** System dynamics modellers sometimes involve decision makers in the modelling process, a method known as "group model building". Group model building has been used to support group decision making and collaborative governance. Group model building has been associated with several different outcomes; it is not clear which of these outcomes are important to the clients that choose to engage with system dynamics modellers to provide group model building solutions. This chapter reports on group decision making in the context of public policy design and implementation and explores which outcomes are important to potential clients in the New Zealand public sector.

Senior management within four government agencies identified the employees who were most likely to commission and conduct group decision processes. These individuals participated in detailed semi-structured interviews, and completed a written questionnaire, exploring the contexts in which group model building may be useful and the outcomes sought in each situation. The results suggest that, even within the public sector, the importance of a particular outcome will depend upon context. However, public servants generally appear to value trust and agreement over policy quality when conducting group-decision processes. Knowledge of the outcomes sought by potential clients helps guide the outcomes measured by researchers and helps practitioners to tailor communication messages to clients.

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## 7.1   Introduction

Over almost 40 years, system dynamics practitioners have experimented with involving the client in the modelling process (Greenberger, Crenson, & Crissey, 1976). These methods are now known as "group model building" (Vennix, 1995, 1996). Group model building includes a range of approaches that can be broadly categorised on two axes: the level of participation (Kolfschoten & Rouwette, 2006) and the use of quantitative versus purely qualitative models (Coyle, 2000). In some group model building interventions, models are built by experts with some input from participants, using quantitative modelling from the outset (Kolfschoten & Rouwette, 2006). In others, the model is built in workshops with or by participants, using qualitative data. In this latter group, simulation occurs only at the end of the project (Kolfschoten & Rouwette, 2006) if at all (Cavana, Boyd, & Taylor, 2007). There has recently been a greater effort within the group model building community to provide greater clarity on exactly how interventions work (Andersen, Richardson, & Vennix, 1997), with the development of repeatably "scripts" that describe different process steps (Hovmand et al., 2012). The scripts used in the New Zealand case studies mentioned in this chapter can be found in the book "Group Model Building: Using System Dynamics to Achieve Enduring Agreement" (Scott, 2018).

Group model building practitioners and researchers (employing a range of participative approaches) noticed that group model building resulted in changes in the behaviour of participating individuals and groups. There have been over 200 published studies reporting on the effectiveness of group model building (Rouwette, Vennix, & Van Mullekom, 2002; Scott, Cameron, & Cavana, 2015). These studies note a range of outcomes which in the group model building literature are considered to be "changes in the beliefs, evaluations, intentions and behaviours of participants" (Rouwette, Vennix, & Felling, 2009, p. 582).

Expert practitioners typically conduct group model building interventions on behalf of "clients" (Vennix, Scheper, & Willems, 1993). While some studies refer to the client as the organisation or organisations that hired the group model building practitioner (Rouwette, 2003; Thompson, 2009; Vennix, 1995), others refer to the individuals who make the decision to commission or purchase the practitioners services (Andersen et al., 1997; Eden & Ackermann, 2004; Martinez-Moyano & Richardson, 2013; Rouwette, 2011; Rouwette et al., 2009; Rouwette & Vennix, 2011). In the context of this chapter, clients are assumed to be the individuals who make purchasing decisions on the group process used. This has some similarities with the "gatekeeper" role described in other papers (Luna-Reyes et al., 2006; Richardson & Andersen, 1995; Rouwette, Korzilius, Vennix, & Jacobs, 2011). This

chapter also distinguishes between "clients" (who make purchasing decisions) and "participants" (who take part in the group process).

Several recent papers have explored the use of group model building in a New Zealand public service context (e.g. Cavana et al., 2007; Cavana, Smith, Scott, & O'Connor, 2014; Scott, Cavana, & Cameron, 2013, 2016a, 2016b). These report 12 outcomes associated with group model building: insight, mental model change, enduring mental model change, mental model alignment, enduring mental model alignment, communication quality, consensus, commitment to a conclusion, strategy implementation, power levelling, persuasive content, and perceptions of workshop conclusions by non-participants. It is not clear if these outcomes are typically important to clients, or of no consequence at all.

Group model building literature suggests that different outcomes may be emphasised or ignored depending on the context (Rouwette et al., 2009; Zagonel, Rohrbaugh, Richardson, & Andersen, 2004), and implores researchers to be very clear about the outcomes sought in a particular intervention (Andersen et al., 1997). However, in many studies it is not clear how the outcomes measured by the study relate to the intended outcomes valued by the client (Dwyer & Stave, 2008; Eskinasi, Rouwette, & Vennix, 2009; Huz, Andersen, Richardson, & Boothroyd, 1997; Rouwette et al., 2011; Vennix et al., 1993; Vennix & Rouwette, 2000).

Related fields, such as "soft OR", have asked what their clients typically value, and argued that this is a critical question for researchers and practitioners alike (Eden & Ackermann, 2004). These authors described their experiences of interacting with clients, and comment on what they believe clients value, but did not present any empirical research. This chapter seeks to address that deficiency, and thereby contribute to the evidence base for understanding what clients of group decision-making processes, like group model building, typically value.

An alternate view is that understanding what clients want is part of the client engagement process—that each intervention should begin with a detailed and explicit discussion with the client on the purpose of the intervention (Martinez-Moyano & Richardson, 2013). Although such discussion is a component of good practice, there are advantages for researchers and practitioners of knowing a priori the outcomes that clients in a particular situation are likely to value. Group model building researchers need such information in determining which outcomes warrant further attention, while practitioners can improve their initial communication with prospective clients by understanding the outcomes that are most likely to be of interest.

This chapter reports on research designed to explore client attitudes to group decision-making process outcomes. There has been an increasing trend within the public service in many countries for collaborative decision making (Ansell & Gash, 2008). As a group decision-making process (or "group-decision support system"; Andersen, Vennix, Richardson, & Rouwette, 2007), group model building has been applied in many public policy settings (Mingers & White, 2010). This chapter reports on research conducted with a sample of New Zealand public servants who were seen by their organisations as most likely to commission and conduct group decision-making processes. Their opinions were canvassed through the use of

semi-structured interviews and a numerical scale questionnaire. They were asked to rate the importance of outcomes reported in group model building studies with New Zealand public servants, and also to suggest other outcomes that were important to them. The interviews discussed when and why group-decision processes would be used, and when different outcomes were important or unimportant.

The chapter is structured into four sections after this introduction. The first section reviews the outcomes reported in the previous papers related to this topic. The second section describes the research methods. The third section reports on the results of the interviews and questionnaires. Finally, there is a discussion of what this means for group model building research and practice.

## 7.2 Group Model Building Outcomes

Group model building describes a range of qualitative and quantitative system dynamics methods that involve the client in the modelling process. The 12 outcomes considered in this chapter were selected from 5 case studies that examined group model building in a New Zealand public service context (Cavana et al., 2007, 2014; Scott et al., 2013, 2016a, 2016b). These studies used only qualitative group model building methods, but similar results have been reported using quantitative methods (e.g. Huz, 1999; Rouwette et al., 2011; Van Nistelrooij, Rouwette, Vestijnen, & Vennix, 2012; Vennix et al., 1993).

These case studies evaluated several public service group model building processes using three evaluation tools: a survey tool (Scott et al., 2016a), a pre-test/post-test/delayed-test questionnaire (Scott et al., 2013) and semi-structured interviews (Scott et al., 2016b). A prior meta-analysis compared the data gathered using survey tools and post-intervention interviews (Rouwette et al., 2002); this analysis revealed no difference in the outcomes reported by participants in group model building using either method.

The survey was based on a popular tool used in earlier group model building studies (Rouwette, 2011; Vennix et al., 1993; Vennix & Rouwette, 2000) that was administered immediately after participation in a group model building workshop. This was used to confirm that participants felt that the process had contributed to increased communication quality, insights, consensus and commitment to conclusions. Strategy literature reports these outcomes as being predictive of effective strategy implementation (Noble, 1999; Scott et al., 2016a; Skivington & Daft, 1991). Participants also compared the process to a hypothetical "normal" meeting and believed that group model building was comparatively more effective and more time-efficient (Scott et al., 2016a).

The survey also revealed that non-managers rated the presence of an independent facilitator as important to their experience of the workshop (Scott et al., 2016a). This was related to "power levelling" (van Nistelrooij et al., 2012), where less-powerful members are less disadvantaged in their contribution to the discussion (in this study, the positional rank was used as a proxy for power).

The pre-test/post-test/delayed-test questionnaire collected participants' recommendations for actions to address the problem at hand (Scott et al., 2013). This tool was administered immediately before, immediately after, and 12 months following participation in a group model building workshop. The results of this evaluation demonstrated that participants changed their mind during the workshop and that these decision preferences persisted for at least 12 months. Because of its enduring nature, this difference was attributed to "mental model change". Mental models are a construct from cognitive science that has attracted significant attention in the group model building literature (Doyle & Ford, 1998). Mental models are generally regarded as an "internal representation of an external reality" (Jones, Ross, Lynam, Perez, & Leitch, 2011), or "small scale models that the individual believes is analogous to how the world works" (Craik, 1943). Group model building literature distinguishes between "mental model change", that is, any alteration of a participants' mental models regarding the system modelled, and "mental model alignment", which describes when participant mental models become more alike (Scott et al., 2013). Cognitive science literature differs on how stable and enduring mental models may be (see Johnson-Laird, 1983, versus Moray, 1998). Similarly, some group model building research has explored short-term changes in mental models (see Rouwette & Vennix, 2006), and other research has explored mental model change that persists over a year (Scott et al., 2013). The pre-test/post-test/delayed-test method was able to distinguish between these various outcomes, hereafter described as "mental model change", "mental model alignment", "enduring mental model change" and "enduring mental model alignment".

Participants' new decision preferences were categorised as coming from two sources—some were persuaded by the views of other participants, and others developed new insights from their participation in the process. New insights from participating were more enduring than those developed through persuasion (Scott et al., 2013). Finally, individuals who did not participate in the workshop process did not prefer the decisions made in group model building workshops to other decision alternatives (Scott et al., 2013).

These outcomes may be interrelated. The theory of planned behaviour (Ajzen, 1991) suggests that communication quality fosters insight and consensus, and insight and consensus contribute to a commitment to conclusions (Rouwette, 2003, Fig. 7.1a). Insight, consensus, communication quality and commitment to conclusions are predictive factors supporting effective strategy implementation (Noble, 1999; Scott, 2014). Group model building is believed to support mental model change through a combination of persuasive arguments from other participants and novel insights from the modelling process (Rouwette et al., 2011, Fig. 7.1b). Where group model building has been associated with a long-lasting alignment of participants (Scott et al., 2013, Fig. 7.1c), this has been explained as related to the enduring nature of mental models of dynamic systems (Doyle & Ford, 1998). Power levelling is believed to support improved communication by providing the opportunity for more varied interactions (van Nistelrooij et al., 2012, Fig. 7.1d). The rating of workshop conclusions by non-participants could not be related to other outcomes. Various authors have attempted to combine different theories (Richardson,
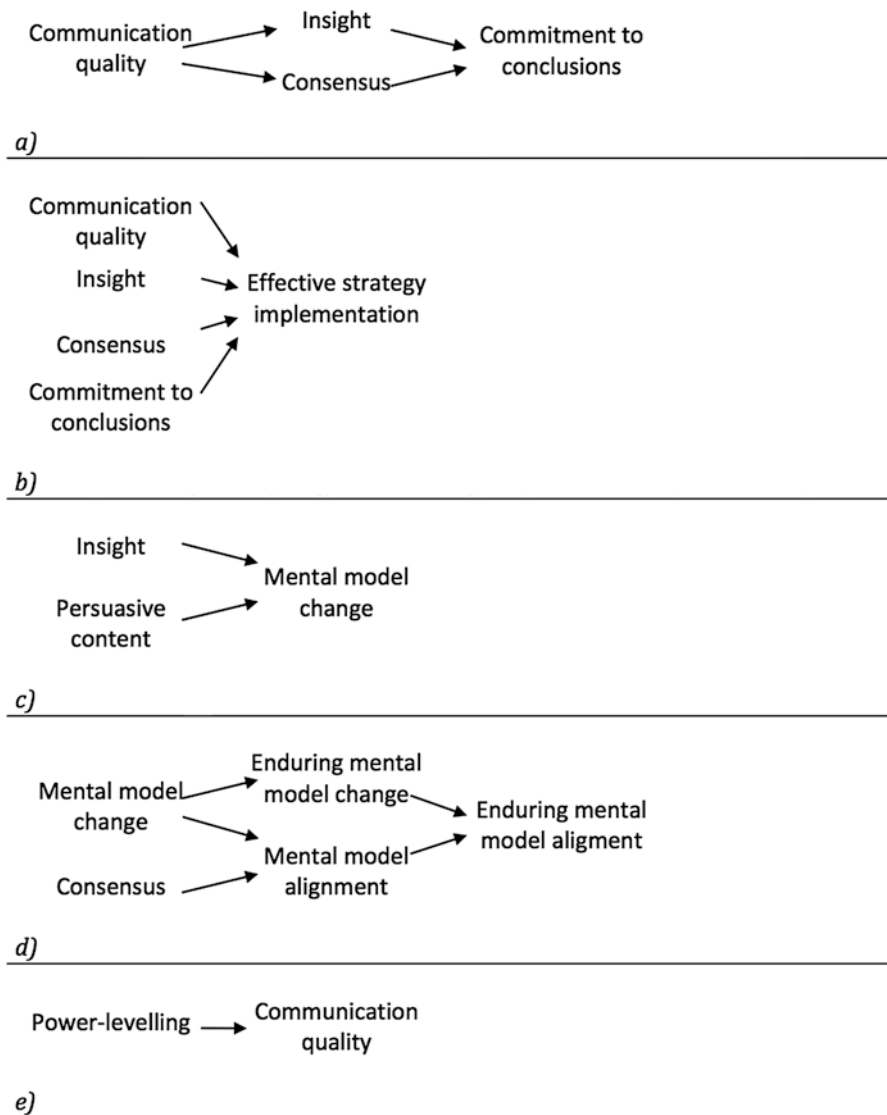
**Fig. 7.1** Theoretical relationships between reported outcomes of group model building. (**a**) Theory of planned behaviour (Ajzen, 1991; Rouwette, 2003). (**b**) Success factors for effective strategy implementation (Noble, 1999). (**c**) Modelling as persuasion (Rouwette et al., 2011). (**d**) Enduring effects of group model building (Scott et al., 2013). (**e**) Effects of power-levelling (Van Nistelrooij et al., 2012)

Andersen, Maxwell, & Stewart, 1994; Rouwette et al., 2011; Scott, 2017) though these connections remain theoretical or speculative.

In an earlier paper (Scott et al., 2016a), an individual client was asked to describe their desired outcomes for the group model building process. They indicated that

they wanted to: create among employees a common understanding of their new organisational strategy; create agreed on implementation actions for the strategy, and increase commitment to the strategy. The prevalence of these goals is unknown, whether within other organisations, or even other problem settings (or timing) within the same organisation. The purpose of this chapter is to inform our understanding of the importance of these outcomes and to identify other outcomes that may also be important.

## 7.3    Methods

The study described in this chapter explored the views of public servant clients—those that regularly conduct or commission group decision-making processes (see Sect. 7.3.1)—on the importance of a variety of outcomes associated with group model building.

The study employs a mixed-methods approach to evaluation research (Blaikie, 1993). Primarily qualitative methods were chosen to explore in-depth the experiences and beliefs of the interviewees (Kvale & Brinkman, 2008, see Sect. 7.3.2), supplemented by a quantitative survey to improve the reliability of findings (Blaikie, 1993, see Sect. 7.3.3). The interviews included open questions, where interviewees identified and discussed the outcomes that were important to them and direct questions about the reported outcomes being investigated. Interviews were transcribed, and the qualitative and quantitative data compared (see Sect. 7.3.4). While this mixed-methods approach was useful in validation of the interview results, the small sample size is not ideal for quantitative or statistical analysis. This and other limitations in the study design are described in Sect. 7.3.5, which should be factored when interpreting the results.

The study in this chapter was exploratory, but the authors hypothesised that both the nature of the outcome and several contextual factors would influence the importance of that outcome (see Fig. 7.2).
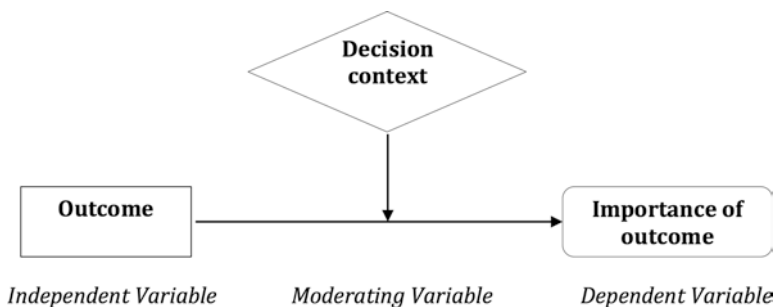


**Fig. 7.2**  Conceptual model for the importance of group model building outcomes in the New Zealand public sector

### 7.3.1   Sample Selection

Group model building is frequently conducted by expert "consultants" from the system dynamics community, for "clients" in the public sector and elsewhere. These clients choose between different potential methods for group decision making. Some will choose group model building, and some will choose other methods. For the group model building community to engage with and "pitch" their services to these clients effectively, they will be advantaged by understanding what these clients value. This study aims to explore the views of these clients and also potential clients—those that have not engaged with group model building before but who may do so.

As discussed below, the research involved a small number of research subjects. Consequently, the subjects chosen needed to be those who were most likely to represent the views of potential public sector clients and potential clients. The views of public sector clients and potential clients will not necessarily be the same as those of public servants more broadly.

The first author approached six New Zealand government agencies that have responsibility for developing public policy. Of these, four responded: the Ministry for Business, Innovation and Employment; the Ministry for Primary Industries; the Ministry for the Environment; the Department of Conservation. A gatekeeper (senior executive) at each agency selected individuals in their organisation who they believed most regularly commissioned or conducted group-decision processes, to aid work related to public policy. This study design uses a non-probability judgement sampling method (Cavana, Delahaye, & Sekaran, 2001), which is a form of intentional selection bias. The study design did not aim to pick a random sample that was representative of public servants, but instead to pick those public servants who were the most likely to be clients—those that most regularly commissioned or conducted group-decision processes. In a judgement sample, the risk to the validity of the study is that the gatekeepers were not able to accurately identify who in their organisation commissions or conducts group-decision processes. While it is plausible that such errors in selection occurred, it seemed likely to the authors that these gatekeepers would be better placed, with better information, to identify the correct sample than anyone else, or any other method.

Research using qualitative interviews ideally concludes when "data saturation" has been reached; the point in data collection when no new additional data are found that develop aspects of a conceptual category (Guest, Bunce, & Johnson, 2006). Conversely, logistics may require some estimate of the necessary sample size before the research has been conducted (Green & Thorogood, 2009). Francis et al. (2010) propose two steps for deciding data saturation: first, specify a minimum sample size (initial analysis sample); and second, specify how many additional interviews will be conducted without new ideas emerging (stopping criteria). The aims of the study and characteristics of the group influence the likely saturation point (Charmaz, 2006; Mason, 2010). Seven criteria have been proposed for determining an appropriate initial analysis sample size:

- The heterogeneity of the population
- The number of selection criteria
- The nesting of criteria
- Groups of special interest that require intensive study
- Multiple samples within one study
- Types of data collection methods use
- The budget and resources available (Ritchie, Lewis, & Elam, 2003)

The research in this chapter involves a selected, relatively homogenous group (public policymakers, managers, people who commission group-decision processes). There are no comparison groups, and the methods are primarily qualitative. These factors suggest a relatively small group is likely to be sufficient. Two comparable studies reported data saturation at 14 and 12, respectively (Francis et al., 2010; Guest et al., 2006).

There is no established theory on how to determine the appropriate number for stopping criteria, but three is commonly used (Francis et al., 2010). On balance, an initial sample analysis of 12 and stopping criteria of 3 was selected as most appropriate. After 12 interviews, the final 3 revealed no significant, new, unique information (i.e. achievement of data saturation). Though a robust sample for a detailed qualitative study, this is a small number on which to make meaningful conclusions on the quantitative survey data—this limitation is explored further in the Discussion section. Interviewee demographics are shown in Table 7.1.

**Table 7.1** Interviewee demographics

| Parameter | Value |
|---|---|
| Number of interviewees | 12 |
| Government agencies represented | 4 |
| Age<br>  Mean<br>  Range | 44 years<br>31–56 years |
| Length of employment in public sector<br>  Mean<br>  Range | 6 years<br>1–20 years |
| Gender<br>  Male<br>  Female | 6<br>6 |
| Organisational level<br>  Director<br>  Group manager<br>  Team manager<br>  Non-manager | 2<br>3<br>1<br>6 |
| Highest qualification<br>  Postgraduate<br>  Undergraduate<br>  Completed secondary | 9<br>3<br>0 |

## 7.3.2   Interviews

Each research subject took part in a face-to-face interview following a semi-structured format (Kvale & Brinkman, 2008). Each interview consisted of three themes: the interviewee's experiences with group-decision processes, the interviewee's desired outcomes (and when these outcomes might be most applicable) and the interviewee's opinions of the outcomes being investigated. Each of these themes is explored further below.

The interviewee was first asked to describe the context of problem settings in which they have used group-decision processes. This included prompts on the participating parties in the group-decision process, the decision being made and the consequence of that decision. Follow-up questions further explored the tools or processes that were used. This theme was used for three purposes: to establish the relevance of the interviewee as a person who regularly commissions or conducts group-decision processes, to investigate the kinds of problem settings encountered by public servants who use these processes and to discover what tools were being employed.

The interviewee was then asked which outcomes were important in the experiences they had described, why these outcomes were important, and what aspects of the decision context contributed to their importance. This was used to validate later questions: in this theme, the interviewee did not know which outcomes interested the researcher, and so the opportunity for subject bias (Orne, 1962, where individuals report what they think researchers want to hear) was reduced. This was also used to identify outcomes other than those being investigated.

Finally, the interviewees were supplied with a set of outcomes. This method necessarily involved the authors selecting a set of outcomes to test. Group model building literature includes upwards of 30 outcomes (though some may overlap, see Rouwette et al., 2002; Scott et al., 2015). The authors selected the 12 outcomes described in the 5 New Zealand public sector case studies described in Sect. 7.2 (Cavana et al., 2007, 2014; Scott et al., 2013, 2016a, 2016b). These were selected on the basis that those initial studies had presumably tailored their design to match the outcomes that they believed were important for the specific geographic (New Zealand) and sectoral (public sector) context. This selection process meant the omission of one outcome that ultimately proved important in the results—that of process efficiency, which has been assessed in other group model building literature (Vennix et al., 1993; Vennix & Rouwette, 2000).

For each of the 12 outcomes, the interviewer asked whether it was important, when it might be important and how successful the interviewer's existing processes were in achieving this outcome. When interviewees described an outcome as sometimes important, further prompts were used to explore what factors determined whether that outcome was important or unimportant. This theme was used to evaluate each of the reported outcomes in turn. When there was any confusion about the meaning of outcomes described (for example, "mental model change"), the

interviewer provided an additional explanation based on their understanding of how the terms have been used in group model building literature.

The interviews ranged in length between 30 min and 1 h and were recorded by an audio recorder. The interview transcripts were analysed as described in Sect. 7.3.4.

### 7.3.3   Questionnaire

A written questionnaire was given to the research subjects after the interview. The questionnaire consisted of two parts: demographic questions and questions on the importance of each of the reported outcomes of group model building.

The demographic questions concerned parameters described in Table 7.1. Previous research had revealed that age, gender and education level did not affect participants' reported experience of group model building (Scott et al., 2016a), but the effects of different clients' demographic variables on how they valued outcomes were unknown. As noted earlier, the organisational rank (manager versus non-manager) was used as an imperfect proxy for power, which is significantly more difficult to measure directly. The question on organisational rank was included to explore whether there was a relationship between rank and outcome preference; an earlier study revealed that less powerful participants rated the importance of an independent facilitator more highly (Scott et al., 2016a).

The second part consisted of seven-point numerical scale questions to provide a quantitative indication of the importance of each of the outcomes from the literature (Cavana et al., 2001). Research subjects were asked to rate each outcome, by circling a number between 1 and 7, where 1 meant that the outcome was of no importance and 7 meant that the outcome was very important. This provides a separate measure of the subjects' views on the different outcomes, similar to the qualitative answers in the third interview theme.

The written questionnaire was used to improve the reliability of the findings. The research design was primarily qualitative because the authors wanted to understand the research subjects' experiences and beliefs. However, the interview questions have not been validated, so combining interview and questionnaire results in a mixed-method study was used to improve reliability (Blaikie, 1993). One outcome (views of non-participants) was omitted from the questionnaire in error, and this is a limitation of the data.

### 7.3.4   Analysis

The responses to the interview questions were transcribed, then subject to content analysis using manual coding (Cavana et al., 2001). The 12 assessed outcomes (see Sect. 7.2) were pre-determined as codes, as these were the main subjects of the study in this chapter. Any additional outcomes mentioned by interviewees were also

coded. Other codes were emergent (Holsti, 1969; Strauss & Corbin, 1990). The analysis was then constructed based on the themes that emerged in the text, illustrated with verbatim responses where these were useful in explaining each theme.

The rated outcomes were compared using commonly applied statistical methods. The seven-point numerical scales used in the questionnaire were assumed to represent interval data (Cavana et al., 2001). A Kolmogorov-Smirnov test was used to confirm normal distribution, which allows the use of a Student's t-test to determine significance (Stephens, 1974). Results for each question were compared to a neutral response (a score of 4 on the 1–7 scale), and to the overall mean (a score of 5.3 on the 1–7 scale), using a two-tailed t-test (as results could vary in either direction—Stephens, 1974).

### 7.3.5   Limitations

The study in this chapter investigates the stated beliefs of a small number of New Zealand public servant "clients", to determine what outcomes they value as important in group decision making. These were then related to recently reported outcomes of group model building.

The individuals were selected by their agencies as those who most regularly commission or conduct group-decision processes, and so are likely to be the most relevant subjects for understanding potential group model building clients in the New Zealand public sector. Twelve individuals were interviewed. For detailed qualitative research, this number proved sufficient to achieve data saturation. For quantitative research, however, the sample size is small. The quantitative data was primarily used to support the results obtained by the interviews and should be used with caution as stand-alone measures that are representative of any broader group.

This findings presented in this chapter rely on the individuals' stated preference for different outcomes. It is possible that these do not represent individuals' actual preferences, and opens the possibility of a range of biases, including subject bias (Orne, 1962) and social desirability bias (Edwards, 1957). The results show a strong preference for agreement and efficiency, over an interest in decision quality. It is not obvious why individuals would (for example) choose to downplay their interest in improving decision quality through insight, or why it might be socially desirable to do so. These biases could potentially be addressed through an alternate study design that explored clients' revealed preferences rather than stated preferences (Samuelson, 1938), but collecting this data would be more challenging.

The framing of the interview as relating to "group decisions" may have led interviewees to focus on interpersonal (group) aspects. Perhaps asking instead about (for example) "solving complex problems" would have revealed greater preference for decision quality rather than group agreement. Different outcomes are likely to be important in different settings; however, group participation is one of the defining aspects of group model building, so framing the possible problems as "group decisions" did not seem inappropriate.

This chapter provides insights into the outcomes that are important to New Zealand public servants in commissioning and conducting group-decision processes. We would generally expect the results to be most applicable to settings that are most similar to this context. The descriptions of public servants' experiences with group decision making are consistent with international trends toward inter-agency and inter-stakeholder group decisions (Newman, Barnes, Sullivan, & Knops, 2004, and as explored in section Discussion), but this chapter does not specifically demonstrate that results of this study apply to other countries. Preferences in the private sector may vary from those in the chapter due to the different incentives of the commercial environment. The study would benefit from validation by similar studies in other contexts.

## 7.4  Results

Each interviewee demonstrated broad experience in commissioning or conducting group-decision processes and described multiple situations where group-decision processes had been used. This confirmed that the research subjects were well selected as potential clients or users of group model building methods.

The results come from interview and questionnaire responses and describe the importance of different outcomes in different contexts. The results were consistent with the conceptual model described earlier (Fig. 7.2), in that the importance of the outcome was affected by the nature of that outcome and several contextual factors. For some outcomes, interviewees described the outcome as important as a precondition to another more desirable outcome (for example, communication quality was seen as a pre-requisite for mental model alignment). Several interviewees described outcomes as mutually reinforcing.

A range of contextual factors influenced the importance of some outcomes: the stage of the decision process, the participating parties in the decision, and the demographics of the client, each explored below. Some outcomes were more important at different stages of the interview process, for example, insight was seen as more useful in generating new ideas at the start of a process, and consensus seen as more useful at the end of a process (see Sect. 7.4.1). The nature of the participating parties also affected the importance of some outcomes; for example, process efficiency was very important in potentially time-consuming government-stakeholder group decisions (see Sect. 7.4.2). Finally, client demographics had some impact on the results. While gender, age or education level had no significant differences, the responses varied by level of experience and organisational rank (see Sect. 7.4.3).

The results are presented in three parts: interviewees' descriptions of the importance of each outcome; how the nature of the participating parties affected the importance of each outcome; statistical analysis of the questionnaire results.

**Table 7.2** Outcomes volunteered by interviewees as important in past group decisions

| Organisation | 1 | | | 2 | | | 3 | | | 4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interview subject | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Total |
| Commitment to conclusions | ✓ | ✓ | – | ✓ | – | ✓ | ✓ | ✓ | – | ✓ | ✓ | – | 8 |
| Communication quality | ✓ | – | ✓ | ✓ | ✓ | ✓ | – | – | – | ✓ | ✓ | ✓ | 8 |
| Consensus | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | – | ✓ | ✓ | ✓ | – | 9 |
| Mental model change | ✓ | – | – | – | – | ✓ | – | – | – | – | – | – | 2 |
| Enduring change | ✓ | – | – | ✓ | – | – | – | – | – | – | – | – | 2 |
| Mental model alignment | – | – | ✓ | ✓ | – | – | – | ✓ | – | ✓ | ✓ | – | 5 |
| Enduring alignment | – | – | ✓ | ✓ | – | – | – | – | – | ✓ | – | – | 3 |
| Effective implementation | – | – | – | – | – | – | – | ✓ | – | – | – | – | 1 |
| Persuasive content | – | – | – | – | – | – | – | – | – | – | – | – | 0 |
| Power levelling | – | – | – | – | – | – | – | – | – | – | – | – | 0 |
| Insight | ✓ | – | – | – | – | ✓ | – | – | ✓ | – | – | – | 3 |
| View of non-participants | ✓ | – | – | – | – | – | – | – | – | – | – | – | 1 |
| Efficiency | ✓ | ✓ | – | – | ✓ | ✓ | ✓ | – | – | – | ✓ | ✓ | 7 |
| Further working together | – | – | – | – | – | – | – | ✓ | – | ✓ | – | – | 2 |
| Willingness to endorse | ✓ | – | – | – | – | – | – | ✓ | – | – | – | – | 2 |
| Attachment to language | – | ✓ | – | – | – | – | – | – | – | – | – | – | 1 |
| Participant disclosure | – | ✓ | – | – | – | – | – | – | – | – | – | – | 1 |
| Tiebreaking | – | – | – | – | – | ✓ | – | – | – | – | – | – | 1 |
| Completeness | – | – | – | – | ✓ | – | – | – | – | – | – | – | 1 |

Outcomes listed above the dotted line are the 12 outcomes investigated

## 7.4.1 Results for Each Outcome

Three different sources were used to determine which outcomes were most important: the second theme of the interviews, where interviewees were asked to describe the outcomes that had been important in past situations (see Table 7.2); the third theme of the interviews, where interviewees were asked about the importance of specified outcomes; and the written questionnaires, where respondents were asked to rate the importance of specified outcomes on a numerical scale. These three methods showed very strong agreement, with a few exceptions noted in relevant paragraphs below, where results relating to each outcome are discussed in turn.

*Commitment to conclusions* was the highest-ranked outcome by the questionnaire responses. Interviewees distinguished between finding something acceptable for agreement in the meeting (consensus) and being committed to supporting and implementing those conclusions. Commitment was more important when the goal was to affect change (interagency cooperation, joint action with stakeholders), than when an agreement marked the end of the process (providing advice to a Minister or senior manager). Three interviewees mentioned that they had previously relied on voting methods to reach an agreed conclusion; however, there was concern that these methods may sometimes lead to low commitment, particularly by those whose preferred conclusions were not selected.

*Communication quality* was also highly rated by the questionnaire and interview responses. Communication quality was seen as "*crucial*" and "*where it all starts.*" In particular, communication quality was seen as important when working with stakeholders who did not have a "*shared language*" ("*Engineers and planners don't even speak the same English.*"). Communication quality was seen as a pre-requisite for mental model alignment, which was seen as the ultimate outcome by one interviewee.

*Consensus* was generally rated as important in the questionnaire and interview responses. In many cases, coming up with "*any agreement*" was seen as a successful result. This was particularly the case in inter-stakeholder decision processes—public servants were keen that participants all agree, even if those same convenors did not see the detail of the agreement as ideal. Several responses laboured the distinction between an ideal solution and one that all participants found acceptable for agreement. Particularly in interagency processes, participants were seen as sophisticated negotiators who would trade-off different benefits to reach an acceptable agreement (in the absence of viable alternatives to a negotiated agreement). An agreement was often achieved around non-preferred but acceptable options.

*Mental model change* was one of the lower-ranked outcomes from the questionnaire responses, but *enduring mental model change* was one of the highest-ranked. Interview responses do not fully explain this difference. Mental model change was seen as a luxury by some interviewees—the goal was to reach an agreement, not have transformative experiences for the participants. Agreements were often seen as "*incremental*"—"*we're not expecting big shifts in how people see the world*". Occasionally there is a need for a "*step change*", and in those instances, a technique for supporting mental model change would be desirable, but this applied to a minority of circumstances.

*Enduring mental model change* was perhaps interpreted by some interviewees as enduring agreement with the workshop conclusions; interviewees noted common delays between group-decision processes and implementation, and were particularly concerned that participants would "*go feral*" or start "*throwing stones*" at the conclusions that they had previously agreed to—"(somebody) *effectively reneging would have been a disaster*". While enduring mental model change may be one mechanism for reaching enduring agreement with workshop conclusions (if participants' new models are more consistent with those conclusions), the two do not necessarily follow.

*Mental model alignment* was ranked moderately highly by the questionnaire responses. However, interviewees often described concepts similar to mental model alignment as their most sought-after outcomes. This was particularly true when interviewees were asked what outcomes were important to them (without being prompted with possible outcomes). Interviewees described "*shared understanding*", being "*able to understand where each other is coming from*", and "*seeing things from their point of view*" as especially important. One interviewee recalled his previous experience as a negotiator: "*People who are on opposite sides of the table don't have opposite perspectives, they have different ways of looking at the same problem*"…"*What seems a perfectly logical conclusion from your starting*

*point, they may come to the opposite conclusion, not because they disagree with the logic but because they're coming from a different place.*" Any tools or techniques that would allow participants to see the world in a more compatible way were seen as especially desirable. From these interview responses, it might be expected that mental model alignment would have been ranked more highly among the question-naire responses. It is possible but unconfirmed that the language "mental model alignment" was unfamiliar to respondents, and that this led to lower rankings than expected. The interviewer provided clarification on the meanings of the terms in the interview, but this clarification was not available to respondents while filling in the questionnaire.

*Effective strategy implementation* was an outcome that did not appear well understood by some interviewees, and it was difficult to relate some answers to the questions asked. Many group-decision processes did not involve strategy imple-mentation and therefore were not applicable. Where this was seen as important, interviewees drew distinction between talk and action ("*If you don't actually imple-ment it, then what's the point*"). Applied business research struggles to evaluate system changes (Shadish, Cook, & Campbell, 2001), and this is an ongoing research challenge for group model building.

Some interviewees valued the *persuasive content* of the decision process used. Previous group model building research demonstrates that some learning occurs from other participants in the workshop, and some represent new ideas from the modelling process (Scott et al., 2013). Interviewees were asked which of these was more important or should be more emphasised. Responses were mixed and closely followed interviewees' attitudes toward the importance of insight in their processes. Those who valued new insights saw persuasion toward existing beliefs as a barrier to creation. In contrast, those who valued agreement by any means (regardless of the quality of that agreement) saw compelling persuasion as a useful means to speed the arrival of agreement. Previous studies considering persuasion did not propose how the amount of persuasion or new insight could be increased or decreased (Rouwette et al., 2011; Scott et al., 2013).

*Power levelling* was a concept that drew polarised responses in both the ques-tionnaire and the interviews. Having less powerful members contribute was seen as useful in generating insight ("*If it's about ideas, then you really do want to be in the situation where all participants have equal opportunity to contribute.*"), and in increasing a sense of "*engagement and ownership*" by those participants. Power imbalances were sometimes seen as a strong barrier to participation—"*You can cer-tainly see situations where relatively junior people are afraid to talk*" and "*you just get the loudest voices and the ones with the quickest tongues.*" Where interviewees used techniques to encourage contribution from everyone, they typically involved forcing participants to take turns in offering perspectives—interviewees talked about "*going around the room*" to elicit input individually, or using "*snowballing*" techniques to aggregate individual contributions (Thomas & Carswell, 2000). This is very different to the way group model building is thought to create power level-ling, through allowing contribution and modification of the model through input from all participants (Black & Andersen, 2012; Van Nistelrooij et al., 2012).

In contrast, power levelling was sometimes seen as counter-productive. Towards the end of the group-decision process, "*when it comes close to closing the deal*", it was seen as sometimes beneficial for those "*who don't have authority…to sit quietly and listen to those that do.*" Some interviewees thought it represented a more durable outcome where those who had more power were more able to influence the content of the agreement—"*power is power*". Most interviewees described power levelling as relatively unimportant, and power levelling was overall rated as one of the less important outcomes of group-decision processes.

*Insight* was seen as useful "*at the beginning, to open things up*" or when "*prototyping*". However, in some cases, interviewees were more interested in coming up with "*any agreement*" than whether this agreement contained any new ideas. One positive aspect of insight was that in interagency processes, new ideas were not seen as being owned by an individual agency and, therefore, were easier for other agencies to agree with. Insight was seen as unhelpful when it complicated the parameters of the discussion and delayed progress to an agreement—"*you don't want new ideas when you've trying to nail something down.*" Overall, insight was not seen as very important in group-decision processes and was the lowest-ranked outcome among the questionnaire responses.

*Views of non-participants* were seen as sometimes very important and sometimes not important. In many cases, particularly where the end goal of the processes was to reach an agreement, it was sufficient for only those present to agree, so long as those people had authority to do so ("*As long as you've got the right people in the room*"). However, in some cases described by interviewees, buy-in by broader constituencies was vital. Stakeholders were used as focus groups, with the assumption that if they agreed with a proposal, it would likely be acceptable to other stakeholders with similar interests. Previous research found that conclusions developed through group model building were compelling to those present in the workshop, but not compelling to others (Scott et al., 2013). Client acceptance of solutions developed through system dynamics modelling is a long-standing challenge (Greenberger et al., 1976). Group model building aimed to overcome this challenge by involving clients in the modelling process (Vennix, 1996). Where participants have to relay findings to a broader constituency, or where participants are assumed to be representative of non-participants with similar interests, the problem of compelling communication of system dynamics conclusions is resurrected. Further research is needed to develop better ways of communicating conclusions from the application of system dynamics methods (Sterman, 2000).

*Efficiency* was seen as a key parameter ("*The biggest concern we have is time.*"), though participants were not specifically asked to rate its importance. Interviewees lamented that group-decision processes take considerably longer than decisions taken by individuals ("*If you were doing it by yourself, multiply the time by twenty and that's how long it takes with a group*"). Group model building participants have previously been asked to compare the speed of progress between a group model building workshop and a hypothetical "normal meeting" (Vennix et al., 1993; Vennix & Rouwette, 2000). In these studies, participants believed that group model building led to insight, consensus and commitment to conclusions more quickly

than a normal meeting. If speed and efficiency are very important to public servants in designing group-decision processes, greater care should be taken in evaluating the speed of group model building processes compared to other group-decision processes.

*Further working together* was suggested by two interviewees as a key outcome of group-decision processes. In this way, participants create their own "*culture*", "*cooperation is built incrementally*", and future decisions have a foundation of mutual trust and "*goodwill*". Previous research has evaluated further use of group model building tools by an organisation (Bentham & de Visscher, 1994), but not the willingness of participants to continue to work together. The boundary object mechanism for understanding group model building outcomes (Black & Andersen, 2012) proposes a reinforcing loop where "our progress fuels working together". Empirical evidence of this loop would reassure public servants that use of group model building can be part of a process to build ongoing collaborative relationships.

*Willingness to endorse* was mentioned by two interviewees. This related to the inclination to publically uphold the conclusions of the decision process and referred to situations where government was co-developing a product or programme in partnership with key stakeholders. The interviewees wanted an endorsement from the group decision participants, to prevent later reputational risk to the credibility of the programme. One popular group model building research tool (the "CICC" questionnaire—Vennix et al., 1993) includes a question on willingness to endorse: "I will uphold the conclusions/findings of these meetings in front of other members of my organisation (personal communication, Etienne Rouwette, 2011)." If this outcome is important to some clients, it may be useful to report specifically on willingness to endorse in future research.

Several other outcomes were mentioned by a single interviewee only. One described a desire for a technique to overcome participants' attachment to individual words and to focus more on the content and meaning of the agreement—*attachment to language* was seen as a barrier and delay to reaching agreement. This cannot be directly related to reported outcomes of group model building. Modelling (as a visual language) may act to interrupt any fixation on textual editing. Conversely, the act of defining variables may provide a new opportunity for language preferences to form a barrier to agreement.

One interviewee described the need for *participant disclosure*—"*we want people to put their cards on the table.*" This can be related to two findings in the group model building literature. In the group model building process discussed in Scott et al. (2013), participants literally put their cards on the table—writing the variables they believed were important on post-it notes, and sharing those with the group. Another study investigated the extent to which unique information (information only known to one person) was communicated within the group, and the extent to which participants used information received (McCardle-Keurentjes, Rouwette, & Vennix, 2008).

Another interviewee described the need for a shortcut to decision making between several choices where none is obviously better. "*If you've got three (options) and none is patently better than the others, then pick one*." The need for a

mechanism for *tiebreaking* was seen as sometimes stalling otherwise-successful projects when near completion. It is unclear how group model building could be useful at this stage—applying a system dynamics perspective at this time may challenge several underlying assumptions and re-open a process that was reaching its conclusion.

Finally, one interviewee believed that it was important to ensure that no important factors or risks had been omitted from the discussion ("*How do you check you've got all the important stuff?*"). In context, it seemed that this focus on *completeness* was likely related to the defensibility of the decision. System dynamics practitioners may believe that their methods are more comprehensive or holistic; however, this is difficult to measure empirically.

There was limited focus on policy quality, except indirectly (as inferred through the interest in insight, power levelling, and completeness).

Those that mentioned outcomes not raised in other interviews included men and women, managers and non-managers, and those with more and less experience. No pattern was apparent, but it was likely that the sample size was too small to detect such if it indeed existed.

### 7.4.2  Differences Due to the Nature of Participating Parties in the Decision Process

Interviewees were asked to describe the kinds of group decisions that they commission or conduct. These were then linked to different outcomes during the interviews. The analysis of the interview transcripts revealed that the nature of the participating parties in the group decision process influenced the importance of different outcomes, although some outcomes were described as important or unimportant irrespective of the participating parties. The nature of participating parties fell mostly into five categories: political decision processes, internal decision processes, inter-agency decision processes, government-stakeholder decision processes and inter-stakeholder decision processes.

*Political decision processes* typically involved agencies supporting their Ministers in negotiation with their Cabinet colleagues, or with support parties. Though public servants supported these group-decision processes by providing information, it was rare that they had any influence over the decision-support process used, and therefore could not choose to use group model building. The study in this chapter was conducted from the perspective of group model building practitioners, and therefore situations, where the decision process cannot be influenced, are less useful for analysis; as one interviewee noted: "*We can't control what they do.*"

*Internal decision processes* typically involved consensus decisions taken by peer groups within an agency. Where there was a disparity in the hierarchy, decisions tended to be taken by higher-ranked employees. These involved decisions on a course of action within a policy programme, or prioritisation and resource

allocation between policy programmes. These were typically convened by a member of that peer group, were either chaired by a group member or facilitated by an independent facilitator and required consensus agreement before completion—"*We were going to be locked in a room until we got this sorted.*" The exception to this pattern (mentioned by two interviewees) was when a higher-ranked employee convened a group process, and the group's task was to arrive at a consensus recommendation—"(*The Deputy-Secretary) expects that we can come up with something…without having to bang our heads together.*" In these situations, the group included people of different rank.

*Interagency decision processes* involved employees of different agencies attempting to reach consensus agreement on a course of action, or on a joint recommendation to Ministers. Again, these were either chaired from within the group or involved an independent facilitator. Where Ministers had demanded a joint recommendation, processes were driven to a conclusion and often involved participants making difficult compromises. In contrast, processes to agree on a joint course of action often included alternatives to a negotiated agreement—agencies could continue to operate separately if a satisfactory negotiated agreement could not obtained. Partial agreements or progress toward agreement were also considered acceptable outcomes. "*Sometimes it is about moving towards consensus, rather than achieving it.*" Interagency decision processes were seen as becoming more popular, with the creation of several secretariat units just to support and facilitate these discussions.

*Government-stakeholder decision processes* involved public servants working with stakeholders to reach an agreement. Typically public servants would begin the process with a tentative proposal, which would serve as the basis for negotiation—"*You never turn up with a blank sheet.*" Despite typically holding a monopoly or monopsony position, public servants were often disadvantaged by political or reputational drivers to achieve a negotiated agreement, or else the initiative would be considered a failure: "*There are usually win-wins, but they also know you're not going to walk away.*" Alternately, where government was contributing funding to a negotiated agreement, it was stakeholders who had an incentive to reach an agreement or walk away empty-handed. One example was where government would fund the production of an educational programme if stakeholders and government could agree to the content of that programme.

*Inter-stakeholder decision processes* involved public servants acting as convenors to facilitate an agreement between other parties. These processes aimed to arrive at consensus agreements, such that government did not need to act as a referee between competing interests. These processes were seen as increasing in popularity as they helped government avoid making contentious decisions, and were believed by interviewees to lead to less discord between opposing parties.

Interview responses commonly related the importance of each outcome to a particular decision context (as described throughout Sect. 7.4.1). For each decision context, content analysis was used to provide a simple count of how often each outcome was mentioned as particularly important or unimportant (see Table 7.3). In several cases, multiple interviewees described an outcome as particularly important in a decision context, notably: consensus in internal decisions; mental model

**Table 7.3** Important and unimportant outcomes for decisions involving different participating parties

| Participating parties | Outcomes mentioned as important[a] | Outcomes mentioned as unimportant or detrimental[a] |
|---|---|---|
| Internal decisions | Consensus (3), insight (2), commitment to conclusions (2), power levelling (1) | None mentioned |
| Interagency decisions | Mental model alignment (4), further working together (2), consensus (1), insight (1) | Power levelling (2), insight (1) |
| Government-stakeholder decisions | Efficiency (3), commitment to conclusions (2), willingness to endorse (2), enduring mental model change (1), consensus (1) | None mentioned |
| Inter-stakeholder decisions | Communication quality (1), enduring mental model change (1), mental model alignment (1), efficiency (1) | Insight (1), views of non-participants (1) |

[a]Numbers in parentheses refer to the number of interviewees who mentioned this outcome as particularly important or unimportant for decisions involving these participating parties

alignment in inter-agency decisions; process efficiency in government-stakeholder decisions. This last finding is of particular interest as process efficiency was not an outcome investigated.

The importance of the different participating parties was not anticipated. It may have been useful to ask separate interview questions about each type of decision group, as this would have allowed a more thorough examination of the relationship between participating parties and outcome importance. This could form the basis for further study.

### 7.4.3  Statistical Analysis of Questionnaire Results

The written questionnaire was primarily used to verify the conclusions of the interviews, as explored in the discussion of each outcome above. However, a comparative analysis of the questionnaire results revealed some interesting findings.

All of the outcomes assessed were rated as equally or more important than the neutral response (a score of 4 on the 1–7 scale), and some significantly more important (Table 7.4). This suggests that all outcomes assessed were viewed as somewhat important, and several were viewed as very important. There was a wide range of responses—only "communication quality" and "commitment to conclusions" were always rated at 5 or higher.

Outcomes were then compared against each other. Some outcomes were viewed as more important than others. "Communication quality" and "commitment to conclusions" were both viewed as significantly more important than the other outcomes, and "insight" and "power levelling" were viewed as significantly less important. Significance was determined by comparing scores for that outcome with the overall mean score (see Sect. 7.3.5).

**Table 7.4** Ratings of the importance of each outcome, relative to neutral and mean responses (n = 12)

| Outcome | Mean | Range | Standard deviation | Difference from neutral score[a] | Difference from overall mean[b] |
|---|---|---|---|---|---|
| Commitment to conclusions | 6.3 | 5–7 | 0.78 | +2.3∗∗ | +1.0∗∗ |
| Communication quality | 6.0 | 5–7 | 0.74 | +2.0∗∗ | +0.7∗∗ |
| Consensus | 6.0 | 4–7 | 0.95 | +2.0∗∗ | +0.7∗ |
| Enduring mental model change | 6.0 | 4–7 | 1.04 | +2.0∗∗ | +0.7∗ |
| Mental model alignment | 5.8 | 4–7 | 1.03 | +1.8∗∗ | +0.6 |
| Effective strategy implementation | 5.7 | 3–7 | 1.30 | +1.7∗∗ | +0.4 |
| Enduring alignment | 5.3 | 4–7 | 0.98 | +1.3∗∗ | +0.1 |
| Mental model change | 4.4 | 3–7 | 1.31 | +0.4 | −0.9∗ |
| Persuasive content | 4.3 | 2–7 | 1.71 | +0.3 | −1.0∗ |
| Power levelling | 4.2 | 2–6 | 1.11 | +0.2 | −1.1∗∗ |
| Insight | 4.0 | 2-6 | 1.35 | +0.0 | −1.3∗∗ |

∗p < 0.05
∗∗p < 0.01
[a]"Neutral score" is a score of 4 on a 1–7 numerical scale
[b]Overall mean = 5.3, difference rounded to one decimal place

The results from the numerical scale questions were also compared to each demographic field. The greatest differences were between the responses of managers (n = 6) and non-managers (n = 6) and between interviewees who had been in the public service for more than 5 years (n = 6), and those who have been in the public services for 5 years or fewer (n = 6).

There was no significant difference (p > 0.10) in the overall mean for managers (mean = 5.4) versus non-managers (mean = 5.2). Where the groups diverged was in their rating of the importance of persuasive content, this was ranked higher by managers than non-managers (5.0–3.5, p < 0.05). The authors had considered that non-managers might place a higher value on power levelling, as they had less institutional power, but there was no significant difference between the responses of managers and non-managers for this question (4.3–4.0, p > 0.05).

It had been considered that the outcomes valued by public servants might vary through their careers. There was no significant difference (p > 0.10) in the overall mean for those with more than 5 years of experience (mean = 5.2) and those with 5 years or fewer (mean = 5.4). However, experienced public servants were significantly more likely to value mental model alignment as a very important outcome (6.7–5.0, p < 0.05). In the interviews, more experienced public servants described "shared understanding" (possibly equivalent to mental model alignment) as critically important in group decision making.

## 7.5   Discussion and Conclusions

This chapter explores the views of New Zealand public servants who regularly commission or conduct group decision-making processes, and are thus potential group model building clients. This section describes some of the implications of these results. Section 7.5.1 identifies the public sector as a potentially growing market for group model building interventions. Section 7.5.2 explores the implications of these findings for group model building research. Moreover, in Sect. 7.5.3, the authors reflect on their own challenges with the findings of this research and their attitudes toward group model building and system dynamics modelling in general.

### 7.5.1   A Growing Market?

Many problems faced by public sector organisations are highly complex, with multiple actors, multiple stakeholders and conflicting outcomes (White, 2002). This makes public policy questions obvious targets for the problem-solving and problem-structuring applications of system dynamics (Rose & Haynes, 1999).

Two trends appear to be increasing the use of group-decision processes in the public sector. Instances of failed policy on issues that span organisational boundaries have driven demand for greater connectivity between agencies (Treisman, 2007). In New Zealand, this has manifested in calls for greater interagency coordination by the "Better Public Service" initiative (Scott & Bardach, 2018; Scott & Boyd, 2019; State Services Commission, 2011). Decisions based on consensus between stakeholders are thought to be more enduring than those arbitrated by government decision, leading to increased use of collaborative governance (Ansell & Gash, 2008; Emerson, Nabatchi, & Balogh, 2012; Newman et al., 2004)—in New Zealand this is being trialled through the consensus-based "Land and Water Forum" (Eppel, 2013). This growing field lacks agreed and accepted methods for supporting group decision making (Eden & Ackermann, 2013; Kim, 2008; Plottu & Plottu, 2011). The opportunity for group model building in the public sector appears large and is likely to be growing even larger (Bayley & French, 2008).

### 7.5.2   Implications for Research

If group model building has the potential to fill this opportunity, it is important to develop a sound empirical basis for the use and selection of group model building techniques. This empirical base should relate to the outcomes that potential clients are looking for.

The findings presented in this chapter suggest that, in most settings, public servants who commission group decision processes are primarily interested in

efficiently reaching an agreement between participants (consensus). Participants should be willing to endorse these agreements publically and to act on them when appropriate (*commitment to conclusions*). These are areas where there is strong evidence to support the effectiveness of group model building (Dwyer & Stave, 2008; Eskinasi et al., 2009; Huz, 1999; Rouwette, 2011; Scott et al., 2016a; Vennix et al., 1993; Vennix & Rouwette, 2000).

It is important that these agreements last. Government can move slowly, and commitment to these agreements must persist until the agreement can be put into action. While some group model building research evaluates enduring mental model change and alignment (Huz, 1999; Scott et al., 2013), further research is needed to evaluate the enduring agreement and the durability of commitment. It may be difficult to evaluate these outcomes due to problems of attribution (McCartt & Rohrbaugh, 1989, 1995; Rohrbaugh, 1987; Shadish et al., 2001).

Public servants who commission group decision processes are also interested in exploring outcomes where there is limited evidence. They are concerned by the speed it takes to reach a decision, for which group model building literature can provide only indirect evidence (participants making comparisons to hypothetical meetings, Vennix et al., 1993; Vennix & Rouwette, 2000; Scott et al., 2016a). They are also interested in building trust and goodwill between participants that in turn fuels future cooperation, an area that requires evaluation in group model building literature.

The lukewarm attitudes to achieving new insights were somewhat surprising, as was the general lack of interest in policy quality. Interviewees often seemed so focussed on reaching any agreement that policy quality seemed a lesser concern. This is likely to be important as group model building practitioners think about how to describe the potential benefits of their techniques to potential customers. However, there may be a need for some caution in applying this finding, as discussed in Sect. 7.5.3.

The findings presented in this chapter demonstrate that different outcomes are valuable in different contexts. The group model building literature is currently missing practical guidance on how to vary the processes used to emphasise or enhance different outcomes. Three areas of literature provide helpful but incomplete clues in this regard: experimental studies on learning outcomes; a meta-analysis of the outcomes of qualitative versus quantitative processes; participants' rating of the contribution of different process elements. Each is explored in the following paragraphs.

Several experimental studies compare the presence or absence of group model building components and how these contribute to various outcomes. These studies have evaluated the importance of the presence of a facilitator (Borštnar, Kljajić, Škraba, Kofjač, & Rajkovič, 2011; Shields, 2001), the creation of causal loop diagrams (Fokkinga, Bleijenbergh, & Vennix, 2009) and the opportunity for group feedback and discussion (Borštnar et al., 2011; Škraba, Kljajić, & Borštnar, 2007; Škraba, Kljajić, & Leskovar, 2003). Unfortunately, these studies were conducted in experimental settings unlikely to be representative of real-world behaviours (Scott, 2014).

A meta-analysis found that quantitative modelling processes are associated with more commitment to conclusions, consensus and system change than qualitative only processes (Rouwette et al., 2002). However, this analysis did not compare like interventions, as the quantitative processes involved far greater time commitment by participants (Scott, 2014).

Other studies ask participants to rate the contribution of different components to the success of the intervention (Eskinasi et al., 2009; Scott et al., 2016a; Vennix et al., 1993; Vennix & Rouwette, 2000). There are limitations to the ability of individuals to describe their own learning (Doyle, 1997; Nisbett & Wilson, 1977), and, further, the study design did not allow each component to be related to individual outcomes. Further guidance is required to allow practitioners to tailor their practice toward particular outcomes.

Despite broad variance across different decision contexts, the findings presented in this chapter generally showed strong support for interpersonal outcomes relating to trust and agreement, and relatively less support for outcomes relating to policy quality. A similar distinction is evident in two contrasting perspectives of group model building sessions (Andersen et al., 2007). One perspective considers the model as an allegedly realistic representation of the external policy environment ("microworld"—Zagonel, 2002; "virtual world"—Sterman, 2000). The second perspective considers the model as a socially constructed artefact for building trust and agreement ("boundary object"—Black & Andersen, 2012; Black, 2013; Franco, 2013; Scott et al., 2016b; Zagonel, 2002; "transitional object"—Ackerman et al. 2005). The findings presented in this chapter support the "boundary object" perspective as most representative of the views of public sector clients.

### 7.5.3   Reflections

Both authors have facilitated group model building interventions for public service clients in New Zealand. These include several published studies (Cavana et al., 2007, 2014; Cavana & Clifford, 2006; Cavana, Davies, Robson, & Wilson, 1999; Cavana & Tobias, 2008; Rees, Cavana, & Cumming, 2017; Scott, 2014, 2017, 2018; Scott et al., 2013, 2015, 2016a, 2016b; Scott, Cavana, & Cameron, 2016c; Tobias, Cavana, & Bloomfield, 2010), as well as countless others that were not part of formal research projects. Something that was striking to both authors is how little relation the findings presented in this chapter bore to our own experiences.

In our professional experience, clients most often present as having a policy problem for which they would like a method for arriving at the technically "best" solution. Rarely have we heard "we don't much care about the quality of the policy recommendations, so long as everybody agrees quickly and maintains a commitment to that agreement over time." Nevertheless, the research presented in this chapter suggests that the latter sentiment represents the most important outcomes in many cases.

Why might that be? How do we explain the variance between this research and our professional experience? We have no way of knowing, based on the data, but propose two possible explanations: preferences about future decisions may differ from those about the past, or clients may be (intentionally or unintentionally) misleading group model building practitioners. The following paragraphs briefly explore each explanation and how these hypotheses could be tested empirically.

The methodology used in this chapter asks research subjects to think about concrete past examples of group decision-making processes (through the interviews), as well as general, abstract or hypothetical group decision making (through the survey questionnaire). There was a reasonably strong agreement between both data sets. In a consulting context, the authors would typically ask at the outset what the client was hoping to achieve. It may be that the client's outcome preferences change over time. We speculate that clients may begin with the desire to use a group to reach a decision that is technically superior to one that any individual could arrive at on their own. Then, over time, they find that the process drags on, timelines slip, consensus is elusive or else individuals appear to reach agreement only to disagree later. It may be that group decisions tend to be frustrating. At the end of such a process, the client might then be more likely to reflect the sentiment from our data and claim that the most important outcomes are an efficient process that reaches a lasting agreement. The hypothesis that outcome preferences change over the course of a decision process could easily be tested; a researcher could gather data, using either the interview of survey questionnaire methods used in this chapter, both before and after the group model building intervention, and compare both data sets.

A second possible explanation is that the clients do not tell group model building practitioners the truth. This explanation seems counterproductive—when purchasing a consulting service, it seems likely that the service will be more beneficial if the client honestly communicates their needs. Nonetheless, we cannot rely on clients to always be rational (Munro, 2009). Instead, the variance between the data presented in this chapter and the authors' own professional experience may be explained by a social desirability bias. Social desirability bias describes the tendency of respondents to answer questions in a way that will be viewed favourably by others (Fisher, 1993; Grimm, 2010). Earlier in this chapter, we explain why the social desirability bias did not explain the results of this study, where most responses did not emphasise the importance of policy quality. Nevertheless, we can speculate that in a client-consultant discussion, social desirability bias may come into play. Clients may, in justifying an expenditure to themselves or others, prefer to describe outcomes that directly benefit society (better policies), than those that benefit a bureaucratic process (quicker, more stable decisions). To resolve this, we would need better ways of engaging with and understanding clients' actual needs. In general, it is difficult to fully control for social desirability bias, though several approaches have been proposed (Gittelman et al., 2015; Nederhof, 1985).

As practitioners as well as researchers, the findings in this chapter presented the authors with another challenge: if all clients want is to reach an agreement, does modelling quality matter? Like the previous question, this cannot be resolved using the data in this study. We consider two possible perspectives: that quality doesn't

matter, and instead practitioners should be looking to maximise any cognitive biases that tilt participants towards supporting conclusions derived from the model (see Scott, 2014, 2017, 2018); or alternatively, that group model building improves consensus and commitment to conclusions *because* participants can rationally be more confident about the quality of those conclusions through developing models that explain the behaviour of systems over time. Where the right decision is difficult to ascertain even in retrospect, the line can be blurry between a *bias* away from rational choice and a *heuristic* for increasing choice confidence (Tversky & Kahneman, 1974). We present no direct evidence to support either perspective but note that both authors also use system dynamics modelling when on their own, to analyse complicated problems. This suggests that, at least implicitly, we believe system dynamics modelling can improve decision quality for at least some problems types, and feel more confident in decisions that we have reached in this manner.

### *7.5.4   Conclusions*

Collaborative governance is a complex field, and success can be measured in many ways, from the success of the processes involved (Carey & Harris, 2016) right through to the resulting change in society (Scott & Boyd, 2017a, 2017b). Similarly, the success of system dynamics modelling can be measured in ways equally diverse. The core focus of this book is to relate the two—to show how system dynamics modelling can and should contribute to the practice of collaborative governance.

This chapter contributes to that discussion by exploring which of these outcomes are most valued by public sector clients. Our data shows that, even within the public sector, there exist a broad range of different group-decision contexts with different aims. In general, the research subjects preferred consensus and commitment to conclusions to cognitive change, which suggests the "boundary object" perspective of group model building may be most relevant to their needs. Potential clients value most outcomes reported in group model building literature, but more research is required to compare the process efficiency of group model building with other methods. Further, this chapter raises broader questions about the "boundary object" versus "microworld" perspectives on the use of system dynamics in a group decision-making context: how system dynamics practitioners think about group model building, how clients think about group model building, and how these two "worlds" communicate.

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# Chapter 8
# Multi-Criteria Policy Options Analysis of the Swedish Environmental Goals Using Indexed Causal Loop Diagram Modelling Method

**Hördur V. Haraldsson**

**Abstract** The 16 Swedish Environmental Quality Objectives (EQOs) describe the desired state of the environment within one generation in each of the areas the EQO addresses. In the brief history of the EQO, there has been need of understanding what and how to measure success towards fulfilling the EQO. There is a need to create a better transparency between the implementation of policy to carrying out measures, observing changes in the status of the environment into the desired direction. Identifying and understanding the feedback loops and key driving forces that render implementation of environmental measures non-successful are needed. This study analyses in what way environmental policy implementation can connect better to success indicators and observation of changes in environmental state over time. It also gives a proposal for a new gap analysis process coupling with simple system dynamic modelling. The case study shows that the implementation of environmental policy has to be put into the context of understanding different time delays of different factors within the system, i.e. the time until the environmental state has reached the target value. This study is ongoing and shows how novel qualitative analysis can be used to compare different types of policy options that address different types of strategies within the EQO.

**Keywords** System dynamics · Qualitative analysis · Sweden environmental objectives · Causal loop diagrams · Policy analysis · SOER

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## 8.1 Introduction and Purpose

This chapter showcases the approach the Swedish Environmental Protection Agency (SEPA) is taking in analysing the Swedish Environmental Quality Objectives (EQOs) and its policy options. This study shows how novel qualitative systemic analysis can be used to compare different types of policy options that address different types of strategies for the Swedish EQOs. The research is an ongoing development work and part of the analysis package of the SEPA work on the State of the Environment Report (SOER) and an overall assessment of the Swedish environmental long-term analysis.

### 8.1.1 Introduction to the Swedish Environmental Quality Objectives (EQOs)

In 1999, 15 environmental quality objectives (EQOs) were adopted by the Riksdag (the Swedish Parliament), as contained in Government Bill 1997/98:145, Swedish Environmental Quality Objectives—an environmental policy for a sustainable Sweden. The basic notion behind Sweden's environmental objectives was to address today's environmental problems and to avoid passing them onto the future generations. In 2005, the current 16 EQOs were adopted, with the overall direction guided by a generational goal: the success of changes in the environment need to occur within one generation and a target year of 2020 and possible extension beyond this date. The EQOs are as follows (Swedish EPA, 2019):

| | |
|---|---|
| 1. Reduced climate impact | 10. A balanced marine environment, flourishing coastal areas and archipelagos |
| 2. Clean air | |
| 3. Natural acidification only | 11. Thriving wetlands |
| 4. A non-toxic environment | 12. Sustainable forests |
| 5. A protective ozon layer | 13. A varied agricultural landscape |
| 6. A safe radiation environment | 14. A magnificent mountain landscape |
| 7. Zero eutrophication | 15. A good built environment |
| 8. Flourishing lakes and streams | 16. A rich diversity of plant and animal life |
| 9. Good-quality groundwater | |

The EQO's are followed up regularly, with annual reports to the Swedish government and through a SOER every session of parliament. The 5th SOER was delivered to the Swedish government in 2019.

The EQOs vary in their definitions and their measurement for success in time and space. For instance, the EQG "Clean Air" has clear and confined system boundaries and indicator target values for particle emissions. In contrast, the EQO "A Magnificent Mountain Landscape" has somewhat defused boundaries and indicator target values for measuring success. The reason for the discrepancy between the EQOs is the variety of different types of stakeholders (active, passive and dormant)

that are included in the EQOs definitions and which complicate the definition of success of the system and ultimately the measurement of success. Identifying the correct stakeholders as part of system boundaries definitions is crucial in order to define and measure success (Cavana, Davies, Robson, & Wilson, 1999; Cavana & Mares, 2004; Haraldsson, Sverdrup, Belyazid, Sigurdsson, & Halldórsson, 2007; Vennix, 1999).

The variety of stakeholders that are associated with the EQOs show that it is not possible to use a single indicator target value for measuring EQO success but necessary to bound a group of indicators that represent the overall success of the EQOs. Furthermore, it is important to link key questions (of the EQO) to the stakeholders and rank them in hierarchal order to address the time delays and feedback when considering policy options (Haraldsson et al., 2007; Haraldsson & Ólafsdóttir, 2018; Lorenz & Haraldsson, 2014). Through hierarchal ranking of questions, it has been shown that it is possible to identify a handful of parameters (e.g. 3–8) that can attribute to describe the overall behaviour of the system (Haraldsson & Ólafsdóttir, 2003; Haraldsson & Sverdrup, 2013).

The EQO "Good-Quality Groundwater" is an objective that is focused on a local and regional level but has a long time horizon (due to recharge rates of aquafers). On the whole, water availability per capita in Sweden is great but due to the pattern of urbanisation and geographic locations, some areas are vulnerable to changes in access to quality water. What was perceived as a given accessible resource can, through "small steps" of different activities, become a scarce more expensive service to maintain. An example of this is the Örby aquifer in south Sweden which lost over half of its recharge capacity over 50 years (Haraldsson, Sverdrup, Belyazid, Holmqvist, & Gramstad, 2008). The EQO "Good-Quality Groundwater" is an illustrative example of how other societal and political objectives can have unintended consequences upon the desirable environmental status of water. This EQO, with a resource perceived as abundant, has long delays in the visibility of long-term effects.

### 8.1.2   Issues with Measuring Success

One of the lessons learnt from the SOERs work was the need to define and understand how to measure success properly. The environmental problems are complex and often the goals formulated around solving them require a complex set of policy mixes. A mixture of short and long recovery times, covering different geographical scales, make it difficult to derive an effective set of policy options that can both address specific issues and not hinder goal fulfilment on a broader level. This poses challenges to policymakers that want to develop policies for improving the state of the environment and for the agencies and stakeholders involved that subsequently have to implement them. This complexity also creates difficulties when anticipating how policies affect the public administration, and the state of the environment is to be monitored and evaluated.

Policymaking initiatives and policy instruments that are implemented assume a central role in assessing progress towards the Swedish environmental objectives. Depending on the type of policy instrument, the link between the environmental state and the policy can be more or less transparent. Decisions taken at the political level have to be implemented by many different actors if the policy adopted is to be effective. Administrative instruments of various kinds often linger longer through the public administration before a change in activities in the society and an observed change of the state of the environment (Swedish EPA, 2012) (one example of this is the supervision under the environmental code and regulation). In other cases, instruments have a shorter implementation chain, like the nitrogen oxides charge, where a decision results in a change of activity more directly.

To enhance the transparency of the implementation chain and make the link between policy instruments and the chains in the state of the environment more visible, it is important to identify feedback loops and key driving forces that create the conditions for the implementation deficit that is repeatedly shown in the yearly reviews and in the SOERs of the EQO's (Swedish EPA, 2012, 2019). This would create a more solid base for policymakers to make informed decisions and for agencies and other stakeholders to make the right priorities in their efforts to achieve the Swedish environmental objectives.

## 8.2   Introduction to Case

In order to understand and test the new analytical approach for the EQO, a showcase study was chosen, i.e. the EQO *Good-Quality Groundwater* (www.sverigesmil-jomal.se). The definition of the EQO is as follows (Swedish EPA, 2012):

> *Groundwater must provide a safe and sustainable supply of drinking water and contribute to viable habitats for flora and fauna in lakes and watercourses.*
>
> *Groundwater is important as drinking water for humans and also affects the habitats of plants and animals in surface waters. Emissions of environmentally hazardous substances can contaminate this water resource – pesticides are one example, particularly in agricultural areas of southern Sweden. Sodium chloride (common salt) from roads salted in winter has also found its way into groundwater. As well as affecting the quality of the water, this causes corrosion of water mains…. Eskers and similar formations in the landscape are important sources of drinking water. These natural gravel deposits are also of significance for our energy supply, the natural and cultural landscape, and recreation. At the same time, there is pressure to extract gravel from them, for concrete and other uses. By creating more protection areas, the authorities can safeguard deposits of this kind against exploitation.*

The following assessment of the prospects of achieving the objective (forecast for 2020) was made in 2012 (Swedish EPA, 2012):

> *Contaminated groundwater occurs throughout Sweden, but mainly in agricultural and densely populated areas. A quarter of private wells supply water unfit for human consumption. Use of natural gravel has been curbed by stricter legislation. Meeting this objective will require measures taken in the areas of environmental supervision and water management.*

Each of the Swedish EQO's has several specifications which aim to clarify the attained state of the environment. The EQO Good-Quality Groundwater has a total of six specifications. They are (www.svergiesmiljomal.se):

- *The quality of groundwater is such that, with few exceptions, it does not limit the use of groundwater for public or private supply of drinking water.*
- *Bodies of groundwater covered by the Water Quality Management Ordinance (2004:660) have good chemical status.*
- *Discharging groundwater is of such quality that it contributes to good habitats for plants and animals in springs, lakes, wetlands, watercourses and seas.*
- *Bodies of groundwater covered by the Water Quality Management Ordinance (2004:660) have good quantitative status.*
- *Groundwater levels are such that there is no negative impact on water supply, ground stability or animal and plant life in nearby ecosystems.*
- *Natural gravel deposits that are of major importance to the supply of drinking water, energy storage and the natural and cultural heritage continue to go on.*

In the analysis of the EQO problem description, it was possible to aggregate the six specifications into two main concepts, water quantity and water quality. The specification addresses either quantity or quality of water supply. Therefore, the relevant question for policy was framed around the issue as:

"What are the main factors that maintain water quantity and water quality, and that contribute to fulfilment of the EQO?"

## 8.2.1 Defining System Boundaries

The EQO Good-Quality Groundwater can be defined into two target areas, water quality and water quantity. In both target areas, a specific objective of the future environmental state is described. The current status on water quality and water quantity illustrates the "gap" between the desired state and the actual state. In order to define the key parameters for the EQO, the author used five steps (Fig. 8.1).

The definition of key parameters is done through five steps; where the EQO goals and objective are defined (1) and a list of its specific objectives for the environmental state through space and time are detailed (2). The measures for success, i.e. what
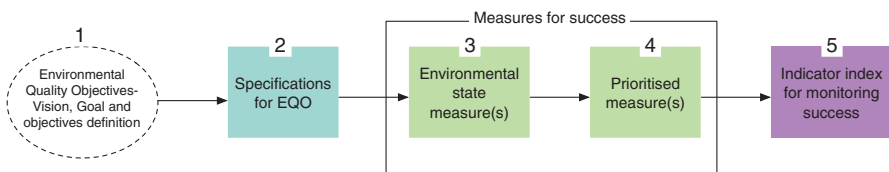


**Fig. 8.1** Defining key parameters through five steps
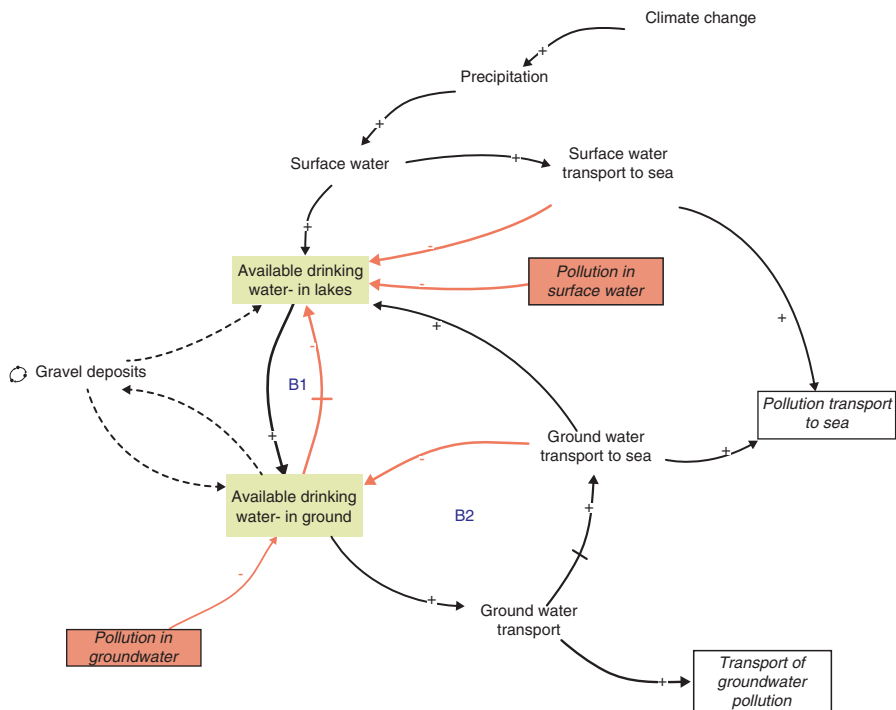
**Fig. 8.2** Water quantity expressed as available surface and groundwater for consumption

the desired environmental state is for each specific objectives and its indicator target value (3) are defined. The prioritised measures (4) are the specific objectives that contribute most to the fulfilment of the EQO, e.g. out of eight specific objectives of the EQO, four of them could contribute to 90% of fulfilling the EQO as a whole (Fig. 8.2). Since the specific goals have different definitions and different indicator units and values, it is necessary to define indicator index (5) that sums up the total impact of each prioritised measure relative to the fulfilment of the EQO as a whole. The non-prioritised measures are not considered when measuring the success of the EQO. The implication of this is that some of the specific objectives will not be fulfilled, and the EQO in its original definition cannot be completely reached. However, as previously stated, the EQO can be fulfilled to 90% if that is argued as an acceptable level. In the case study, the basic parameters chosen for measuring success where, "available drinking water in ground" and "pollution in groundwater". The parameters in the study are unitless.

## 8.3   Methods

The purpose of using prioritised EQO measures to define both status and progress toward success is to enable scaling of what policy parameters are necessary to preserve and maintain the function of the water quality and water quantity. For this purpose, a causal loop diagram (CLD) method was used (Binder, Vox, Belyazid, Haraldsson, & Svensson, 2004; Cavana & Mares, 2004; Haraldsson, 2004; Haraldsson, Belyazid, & Sverdrup, 2006; Haraldsson & Sverdrup, 2004; Richardson & Pugh III, 1981; Sterman, 2000), and a CLD was developed in order to define and confine system boundaries of the EQO and furthermore define the appropriate level of details for analysing the policy parameters. Causal loop diagrams show cause—effect of variables that either change in the same direction (indicated with a "plus") or change in the opposite direction (indicated with a "minus"). Processes that feedback in the same direction are called reinforced processes (indicated with R) since they amplify a condition and processes that feedback to give change in the opposite direction (indicated with B) balance (dampen) out a condition. Previous work (Burns, 2001; Haraldsson, 2005; Haraldsson et al., 2007; Luna-Reyes & Andersen, 2003; Wolstenholme, 1983, 1999) has focused upon using the system dynamic qualitative approach to highlight simple structures as either CLDs or stock and flow diagrams (SFDs), and often in relation to transferring a qualitative model to a quantitative one. This study utilises the CLD modelling approach from (Lorenz & Haraldsson, 2014; Lorenz & Neumann, 2012; Neumann, Anderson, & Denich, 2018) and utilises the modelling tool Consideo[1] to construct the CLDs and perform the qualitative analysis of different policy options. The analysis utilises the method described by Haraldsson and Ólafsdóttir (Haraldsson & Ólafsdóttir, 2018) where, a relative scale 0–100 as provided by the software, and the results are further categorised into short-term, medium-term, long-term and beyond long-term. In the CLDs, each link is categorised according to the four terms and given an indexed value as required by the method. The main advantages of using the CLD indexed approach is that all variables in the model are treated as unitless, and only their internal behaviour in terms of feedback loops is considered. Moreover, the method enables mixing both "soft" and "hard" values without considering their properties.

## 8.4   Results and Discussion

The analysis of the EQO Good-Quality Groundwater shows that the two prioritised EQO specifications, quality and quantity, is depended upon how accessible the water is and where the supply is. Although Sweden has a high water supply per capita and it is available in high quantity, the water is needed elsewhere. The urban areas in Sweden depend upon local water supplies. Therefore, the focus of the EQO

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[1] www.consideo.com
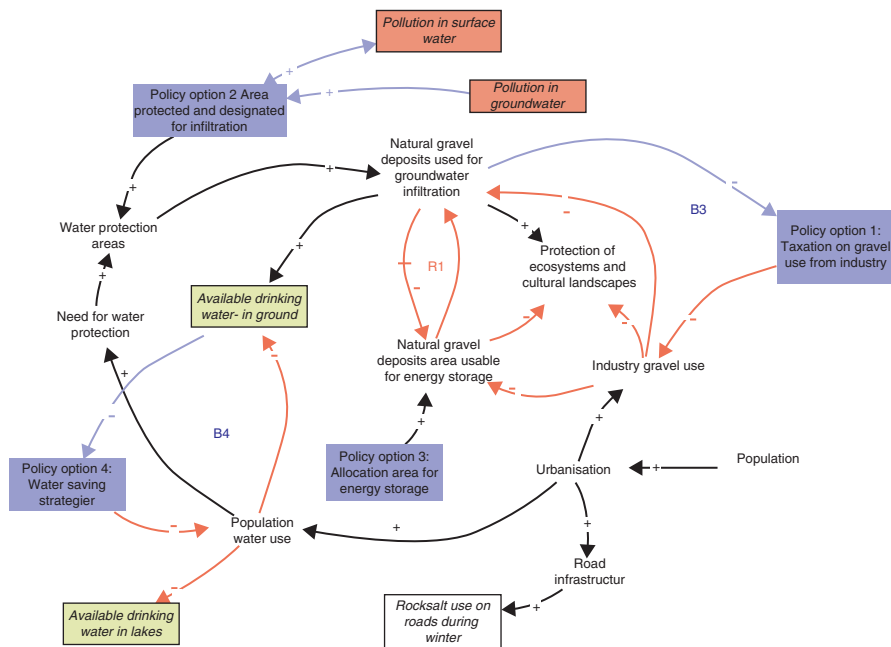
**Fig. 8.3** Natural gravel deposits provide ecosystem services through provisioning of water quantity and purification through infiltration. A different set of policy options are being planned (and are partially implemented) to maintain natural gravel deposits. The initiative, in part, for the policy option being concern is described by the feedback loops B3 and B4

Good-Quality Groundwater has been partially upon where water is available for urban use and its quality.

### 8.4.1 Results of the Causal Loop Diagramming

The EQG Good-Quality Groundwater CLD was mapped with focus upon water quantity and water quality. The main question posed and answered through the CLD was: "What are the main factors that maintain water quantity and water quality and that contribute to the fulfilment of the EQO?".

Figures 8.2, 8.3, 8.4 and 8.5 illustrated the definition of the system boundaries and confinement of the factors incorporated in answering the question. The key factors that the CLD addresses are the quantity status of the EQO through available drinking water (*surface water and groundwater) and qualitative status through pollution in the drinking water (surface water and groundwater)*.

Figure 8.2 illustrates the availability of drinking water as part of describing **water quantity status** of the EQO. The surface water and the groundwater provide available drinking water (B1). Available surface and groundwater are dependent
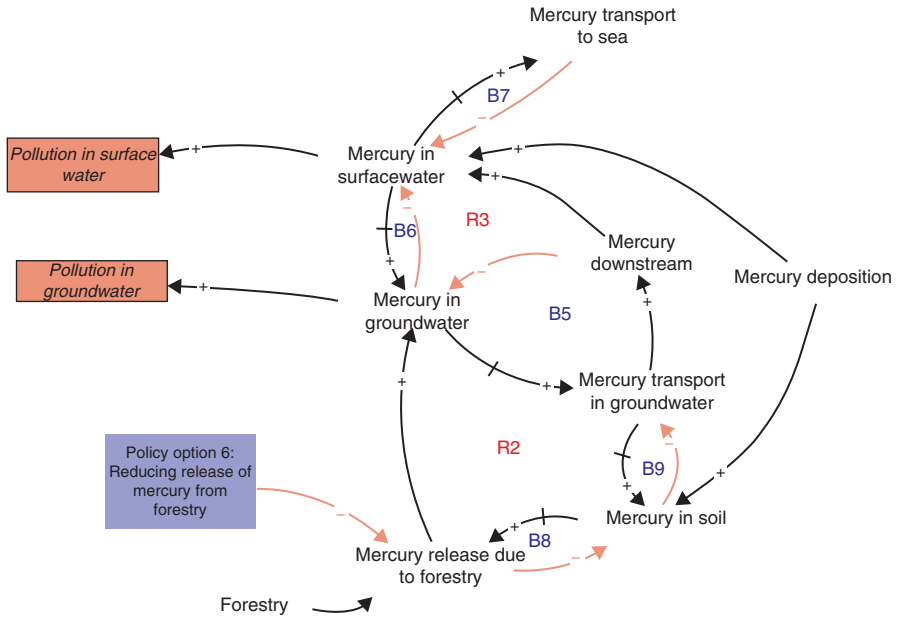
**Fig. 8.4** Mercury deposition as a source of pollution in groundwater
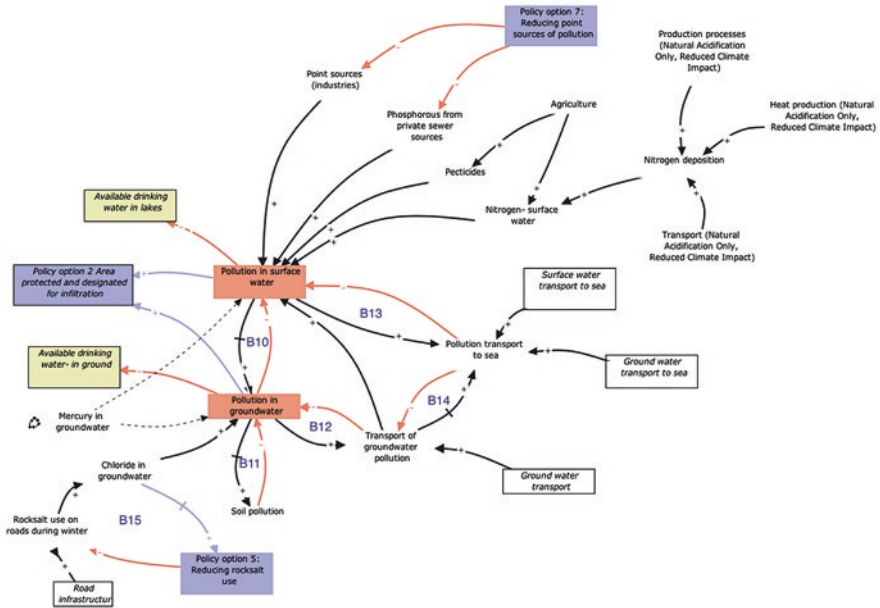


**Fig. 8.5** Water quality is expressed as the impact on available surface and groundwater. If the water pollution is above acceptable levels, the quality for consumption is reduced and therefore the available drinking water reduced

upon how much is flowing within the ground and on the surface and how pollution is affecting the available surface and groundwater available for consumption. The expression of water flowing out of the system is expressed through loop B2. The available water in the system is described through stocks of gravel deposits that can hold a certain water quantity (see Fig. 8.3).

### 8.4.2   Gravel Deposits as Ecosystem Functions

The gravel deposits can be considered as a form of ecosystem service (provisioning services) that provide both quantity and quality of water. This is described as (1) how much water quantity can the gravel deposits hold that is available for consumption and (2) how much does pollution affect the available water quantity for consumption. The quality aspect of the water is determined by how much of the water is affected by pollution and is in relation to the maximum level of contaminants allowable for consumption. In Fig. 8.3, the natural gravel deposits are the main stocks that hold the available water for consumption. Using the natural gravel deposits for water infiltration is a form of land use based upon a non-renewable resource, i.e. the gravel deposits. Moreover, in order to maintain that form of land use, it deprives the option of using the area for other activities that can jeopardise the fresh supply of water through pollution, or activities that physically remove the resource (gravel use). On the other hand, it is possible to shift the land use of the resource without jeopardising the ecosystem function through pollution or removal, e.g. *natural gravel deposits are useable for energy storage (R1).* Land use through energy storage is relatively small scale currently but shows the potential of how land use activities can shift over time. One of the secondary effects of using the land area as groundwater infiltration is the possibility to combine it with cultural landscape and ecosystem conservation.

Unfortunately, there has been a tradition within the commercial building sector to use gravel deposits as a foundation in the construction of roads and buildings (Swedish EPA 2012). This activity removes the gravel deposit altogether and reduces the total infiltration capacity of the gravel deposit area and its function for providing clean available drinking water for consumption (Fig. 8.3).

### 8.4.3   Policy Options to Influence System Parameters

A different set of policy options have been considered and partially implemented for maintaining the level of gravel deposits as well as reducing the level of water consumption and water pollution (Swedish EPA, 2012). Figures 8.3, 8.4 and 8.5 show different policy options that focus on influencing specific activities throughout the CLDs. The policy options are as follows:

1. Taxation on gravel use from industry (in place)
2. Area protected and designated for infiltration (in place)
3. Allocating area for energy storage (not in place but planned)
4. Water-saving strategies (partially in place)
5. Reducing rock salt use on roads (in place)
6. Reducing the release of mercury from forestry (not in place)
7. Reducing point source pollution from industry (partially in place)

Policy options show what is being influenced but do not describe the administrative level of details how the influence impacts the target factor. For instance, the policy option 1—taxation on gravel use from industry is a generic tax that resulted in shift in consumption of gravel deposits to other types of products. The policy options show where there is a possibility to shift or prevent activity from happening that in turn influences the water quantity and water quality of the system.

Figures 8.4 and 8.5 describe the **water quality status** of the EQO. Mercury deposition is source of major concern and important pollution factor (Fig. 8.4). The source of mercury is from industries outside of Sweden, and the deposition is directly into surface water and on soil. The mercury accumulates in the soil and is transported through the groundwater system to the surface and ultimately to the sea (see loops B5–B8). Although the biota is effective in storing the mercury in the soil, its level is affected by disturbance of the topsoil. The forest industry operations more often disturb the topsoil and cause the release of mercury. The policy option 6 shows the impact of the reduction of mercury release due to changed forest practices, e.g. clear cutting happening during winter when soil is frozen etc. The release of mercury due to forestry practices triggers the reinforcing loops (R2) which is strengthened by the reinforcing loop (R3), causing increasing levels of mercury in groundwater and surface water as long as the undesired activity continues.

In Fig. 8.5, the pollution in the surface water and groundwater affects the available drinking water. Although point sources of pollution are concentrated in specific areas in Sweden, they reduce the total amount of water available for consumption. Similarly, to mercury, some pollutants are stored in soil and transported through the surface or ground system (see loops B10–14). Others, such as chloride from rock salt are soluble and have impact as long as the source continues. Sources of pollution happen on different scales in time and space, as general deposition sources (nitrogen) and point sources (phosphorus). In Fig. 8.5, the policy options 5 and 7 aim at reducing point source releases. Policy option 5 is initiated through the loop B15.

## 8.5   CLD Policy Options Analysis, Results, and Discussion

The CLDs illustrate that the water quantity available for consumption is depended upon how much is physically being held in storage by gravel deposits (available drinking water in ground) and how much non-polluted water is available (indicated
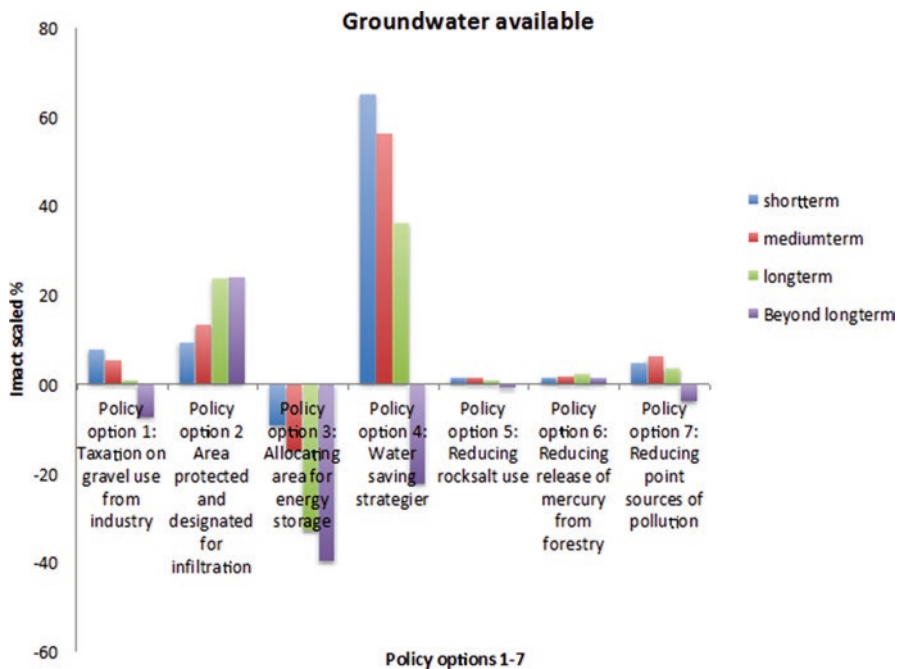
**Fig. 8.6** The impact of policy options upon groundwater available for consumption. Policy options 2 and 4 have a large impact upon maintaining available groundwater although the effect of the policy option 4 will reduce over time. Policy option 2 is stable option over time

by pollution in groundwater). Therefore, the policy options must focus upon two strategies in order to maintain the water supply for consumption:

Strategy A: Increasing the amount of water supply in natural reservoirs.
Strategy B: Reducing the level of pollutants reaching the groundwater.

For simplification, the policy analysis will focus on groundwater supply and pollution (and exclude the surface water) since the storing capacity of water is mainly in gravel deposits. ***The results in Fig. 8.6, 8.7 and 8.8 show relative impact of policies, scaled from 0 to 100.***

The results of policy option analysis show effectiveness of the different policy options. In Fig. 8.6, the policy option 4 has the largest impact upon increasing/maintaining the amount of groundwater available in the short and medium terms, whereas the policy option 2 is a stable measure over the short- and long-term perspective. Both these measures should be considered in combination. Policy option 3 is different since the focus of the measure is to increase energy production (as part of fulfilling other EQOs) but doing so will negate the possibility to use it for water consumption. Here, the relative impact is rather high and shows that this policy option should be carefully weighed against other options.
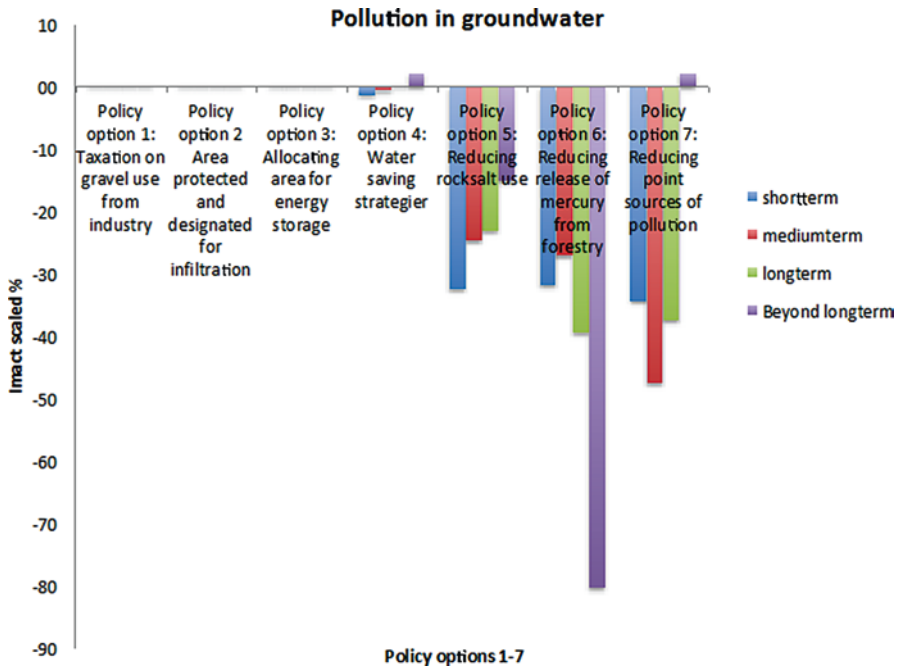
**Fig. 8.7** The impact of policy options upon reducing groundwater pollution. Policy options 5, 6 and 7 have strong impact upon reducing/preventing groundwater pollution

Figure 8.7 shows the impact of policy options upon reducing groundwater pollution. Policy options 5, 6 and 7 have strong impact upon reducing/preventing groundwater pollution, which is expected. But policy options 1–5 show virtually impact upon water quality measures.

Figure 8.8 shows the integrated effect of all the policy options upon fulfilling the status of available groundwater for human consumption and reducing/preventing pollution of groundwater as part of the EQO goal fulfilment. Although the two separate strategies, increasing the amount of drinking water (A) and reducing the level pollutant reaching the groundwater (B) have a win–win effect upon EQO goal fulfilment, the policy options impact differ between those two. The policy option 1–4 has an impact upon strategy A, whereas policy option 5–7 has a primary impact upon strategy B. When the effect of strategies A and B are put together into the context of EQO fulfilment as whole, the net effect (cocktail effect) of the policy options 1–7 slightly different than A and B separate. Figure 8.8 shows that policy options 1, 4, 5, 6 and 7 are most effective in the short term and medium term and show a sharp reduction in the effect of the policy in the long term, even negative. This indicates that these policy options should be designed through a short- to medium-term perspective, or with a shorter update cycle in mind. The policy options 2 and 3 are more effective in the long term and indicate that a longer policy planning cycle should be considered.
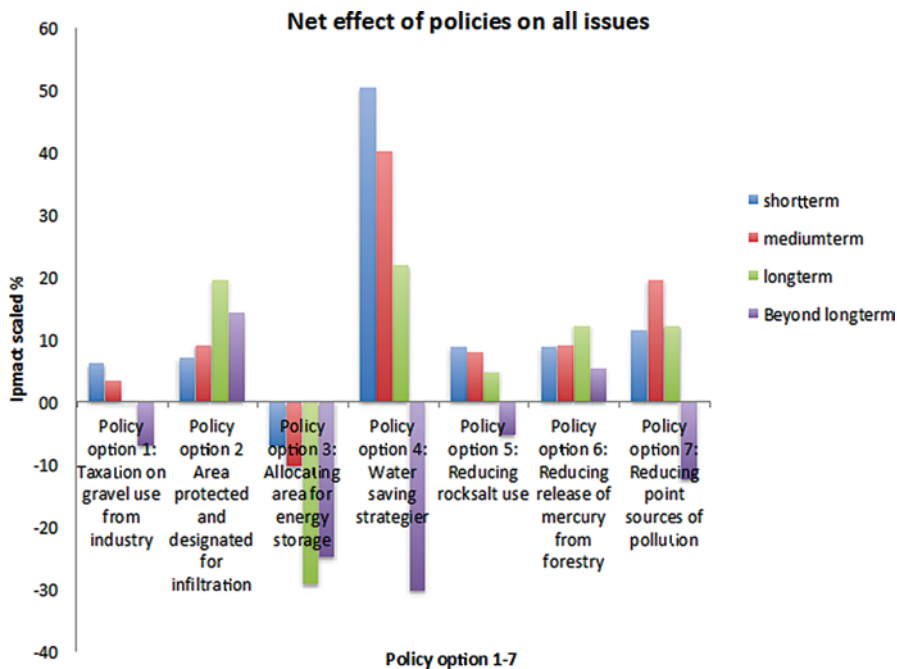
**Fig. 8.8** The net intended effect of all the policy options (apart from policy option 2) on both reducing pollution in groundwater and maintain a good quantitative status shows a high initial effect but a reducing effect over time

## 8.6 Conclusion

The assessment of the EQO "Good-Quality Groundwater" problem description resulted in an aggregation of the six specifications into two main concepts, water quantity and water quality. This aggregation allows for a hierarchal sorting of the six specifications contribution towards fulling the success of the EQO. The framing of the question allowed for ranking of the EQO specifications in terms of which of these contributed mostly towards maintaining water quantity of good quality. Furthermore, the CLD analysis and the identification of the feedback loops among system components enabled the proper testing of the policy options and their relative performance over time for the EQO. In complex policy analysis, this is a powerful first step towards scoping, which policy options are within the problem boundary. Analysis of these leverageable options in depth while discarding those less effective focusses the effort and help avoid a trial—error approach in policy support work.

The results presented in Figs. 8.6, 8.7 and 8.8 show a neutral weighting, i.e. connections between the factors have equal weighting in the model. The method gives a good indication of the impacts upon the strategies and their distribution within the model. The limitation of the analysis is that the relative impact description is generic and very depended upon the proper understanding of the system components. In this

case, it is the understanding the feedback loops and delays of the quantitative status (available groundwater) and qualitative status (pollution in groundwater) and the associated policy options. A further step would be weighting the impact between the factors (arrows) based upon known facts or data. Weighting would give a better idea of the prioritisation of the model factors and their relative strength of impact upon the goal strategy.

This type of qualitative analysis is a good way to start to identify the key variables for quantitative modelling work with a system dynamic modelling tool (Haraldsson & Ólafsdóttir, 2003, 2018). It also enables a better connection to relevant policy options early on in the stakeholder dialogue.

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# Chapter 9
# Participatory Multicriteria Evaluation of Metropolitan Transportation Planning System Scenarios: Navigating Trade-Offs for Collaborative Design of Sustainable Communities

**Asim Zia**

**Abstract**  Metropolitan Planning Organizations (MPOs) in the US policy context represent an example of a polycentric governance innovation to mediate persistent conflict between the local and state government agencies. The MPOs are required by federal law to develop a long-range Metropolitan Transportation Plan (MTP), at least every 5 years. Regional-scale priorities in MTP constrain economic growth and environmental sustainability options of local communities. These priorities set up synergies and trade-offs between regional, state, and federal transportation planning systems vis-a-vis local community goals.

This chapter presents an example of a novel policy and planning tool inspired by a participatory Multicriteria Decision Analysis (MCDA) approach as applied to evaluate alternate MTP scenarios in the Chittenden County Metropolitan Planning Area (CCMPO). This empirical application demonstrates the use of participatory MCDA approaches in formal and informal planning processes. This approach navigates value trade-offs and builds consensus and collaboration on collective action problems among network actors.

**Keywords**  Polycentric governance · Transportation systems · Governance networks Metropolitan planning organizations · Trade-offs · Participatory planning Sustainable communities

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## 9.1 Introduction

A growing number of studies characterize multi-level public–public and public–private inter-organizational partnerships as "governance networks" (Jones, Hesterly, & Borgatti, 1997; Kickert, Klijn, & Koppenjan, 1997; Klijn, 1996; Klijn & Skelcher, 2007; Koliba, Meek, Zia, & Mills, 2017; Lowndes & Skelcher, 1998; Provan & Kenis, 2007; Torfing, 2005; Zia, Meek, & Schulz, 2015). Multi-disciplinary enthusiasm about the characterization and analysis of governance networks has grown considerably in recent literature. Still, the mediation of multi-scale and polycentric governance networks by power and accountability relationships requires more theoretical and empirical study (Agranoff & McGuire, 2001; Bardach & Lesser, 1996; Kettl, 1996; Milward, 1996; Milward & Provan, 1998; Ostrom, 2009; Papadopoulos, 2003; Zia, 2013; Zia et al., 2015).

The empirical analysis of polycentric governance networks, cutting across multiple scales of governance (local to regional and national to international), is warranted to understand the emergence of collaboration and cooperation among organizations with often conflicting goals and overlapping jurisdictions. The shift in the locus of power from federal and state authorities to regional and local governments does not necessarily translate into more effective and equitable governance. Weir, Rongerude, and Ansell (2009), for example, found that vertical authority is probably as critical as horizontal expansion for effective and meaningful transportation policy implementation processes. Ostrom's (2009) Institutional Analysis and Development (IAD) framework laid out theoretical foundations to study polycentric governance networks across increasingly complex vertical and horizontal intermingling of governance actors in so-called action arenas. The emergence of collaboration across vertical and horizontal actors in polycentric governance networks is an active area of research that requires a deeper understanding of decision-making processes in the action arenas of governance networks. Further, akin to the participatory policy and planning literature (e.g., see Zia et al., 2011; Zia, 2018), development and testing of participatory decision-making tools to enable collaboration and cooperation in polycentric governance networks is very much needed for navigating value trade-offs and assisting with wicked governance and policy problems through adaptive management tools (Zia, 2018).

In the US context, Metropolitan Planning Organizations (MPOs) present a unique opportunity as real-world laboratories to investigate the dynamics of cooperation and conflict in polycentric governance networks. While MPOs are funded and regulated through federal agencies and legislation such as the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the subsequent SAFETEA-LU Act of 2006, local and regional scale governments, businesses and NGOs work formally and informally with MPOs to design and implement projects at the intersection of land use, transportation, and environment. Given the intermodal short- to medium- and long-range transportation planning responsibilities of MPOs, their programmatic activities must not only capture conventional efficiency measures but also capture broader social, economic, and environmental impacts of

regional transportation planning choices. The construction and use of a region's transportation infrastructure affect environmental, social, and economic conditions (Codd & Walton, 1996), including energy consumption, air quality, impact on natural resources, safety, neighborhood integrity, employment, and economic output.

Metropolitan Planning Organizations (MPOs) are required by federal law to develop a long-range Metropolitan Transportation Plan (MTP) at least every 5 years. This document must include the strategies, actions, and projects that will lead to "an integrated multimodal transportation system to facilitate the safe and efficient movement of people and goods" (ISTEA § 134(g)(2), (h)). The MTPs must also include planning for bicycle transportation and pedestrian walkways. Federal funds cannot be used for projects and services unless they are consistent with an adopted long-range plan. The MTP must also be financially constrained by a reasonably expected level of transportation funding. While safety, efficiency, and development of integrated multi-modal transportation systems are key goals of current federal legislation governing the design of MTPs, this study focuses on assessing the value trade-offs that are confronted by MPOs, and regional transportation planning networks that they are embedded within, for designing MTPs in terms of steering the region away from the business-as-usual scenario of a gasoline-driven transportation infrastructure and suburban growth to alternate scenarios of sustainable transportation and community design visions.

MTPs, like most any planning regime put forth to achieve consensus around collective actions, often serve as boundary objects around which competing trade-offs are weighed, debated, and contested. Different stakeholder groups will likely have different expected utility functions regarding one planning scenario from another. Few studies, to date, have focused on how different stakeholder groups frame these trade-offs from the perspective of multi-criteria analysis. This chapter provides an account of how stakeholders from one region within the small, rural state of Vermont view these trade-offs within the context of a participatory Multicriteria Decision Analysis (MCDA) analytical approach.

We focus our empirical analysis on the MTP development process being undertaken at the Chittenden County MPO (CCMPO). In 2015, the CCMPO adopted its last long-range transportation plan for a temporal horizon of 2005 to 2025. This plan, referred to as the 2025 MTP (Chittenden County Metropolitan Planning Organization [CCMPO], 2011), identified the major transportation projects, programs, and policies needed over the planning period and established the vision and goals that were to guide public decisions affecting transportation facilities and services in the CCMPO jurisdiction. The participatory MCDA intervention described in this chapter was made in 2010 when the CCMPO was working on producing a 5-year update to 2025 MTP, which looked at the 2010–2035 horizon. Most recently, in 2015, the 2035 MTP has been updated to 2040 MTP, and planning for 2045 MTP is underway. In a given 5-year planning period, CCMPO can influence $30 to $50 million federally funded transportation investments per year in its jurisdictional area.

For the CCMPO, the MTP not only addresses problems of congestion, accessibility, and mobility but lays out the framework for the transportation system of the future. The MTP acknowledges fiscal, political, and social realities while extending

beyond the status quo to better integrate the disciplines of transportation and land use planning through regional collaboration. The MTP is the region's principal transportation planning document and sets regional transportation priorities. It should, therefore, also be the central mechanism for structuring effective investments to enhance transportation system efficiency. It should consist of short- and long-range strategies to address transportation needs and lead to the development of an integrated, intermodal transportation system that facilitates the efficient movement of people and goods. As mandated by the federal government, the MTP must both articulate and work toward the region's comprehensive long-range land use plans, development objectives, and the region's overall social, economic, environmental, system performance, and energy conservation goals and objectives. It should also be consistent with the statewide transportation plan, and the CCMPO should make special efforts to engage all interested parties in the development of the MTP (CCMPO, 2011).

Chasing this vision, initial workshops were organized by the CCMPO in 2009 and early 2010 to develop a shortlist of two to four scenarios, in addition to a baseline business-as-usual scenario, for the CCMPO transportation system boundaries. As a participatory research intervention in this process, we implemented a participatory Multicriteria Decision Analysis (MCDA) study. We elicited value trade-offs and generate multi-criteria expected value functions of multiple stakeholder groups (or governance network actors) for comparing the baseline with two alternate 2035 MTP scenarios. While Paulsen, Crist, Kittel, and Varley (2010) used "cumulative effects analysis" to describe MTP scenario development processes, we recommend that participatory MCDA approaches could also be used as a complementary methodology for eliciting stakeholder values and goals and their weights on these values and goals when comparing alternate long-range transportation plans. A number of studies have been published that demonstrate the applicability of participatory MCDA for evaluating alternate policy and planning scenarios (Wilson & Howarth, 2002; Howarth & Wilson, 2006; Messner, Zwirner, & Karkuschke, 2006; Zia et al., 2011, 2013). This body of literature has emerged in parallel to the participatory value-focused decision-analytic models (Gregory & Keeney, 1994; Keeney, 1992, 1996, 1998; Keeney & McDaniels, 1999). Kiker, Bridges, Varghese, Seager, and Linkov (2005) present a broad review of studies that involve the application of MCDA for environmental decision-making. Major limitations of participatory MCDA are discussed by Hisschenmoller and Hoppe (1995); Pellizzoni (2001); Shim et al. (2002); Stirling (2006); and Wittmer, Rauschmayer, and Klauer (2006). While the use of state-of-the-art integrated land use and transportation models are ideal, restraints such as time, budget, and data limitations often prohibit their use. Ewing and Bartholomew (2009) report drastically different results when implementing Delphi-style expert opinion panel and simple spatial interaction models in transportation land use forecasting. Thus, they argue that the combination of expert panels with a simple spatial interaction model, an approach that is followed in this study, will yield the best results while drawing on the strengths and mitigating the weaknesses of each method.

The next section of this chapter describes research methods, especially participatory MCDA methodology that was implemented with the regional transportation governance network actor focus groups in the fall of 2010. A more detailed description of three MTP scenarios, twelve decision criteria, thirty-six impact functions, and stakeholder groups engaged in this participatory process is presented to elaborate our particular implementation methodology of MCDA. A presentation of the results generated through the multi-criteria evaluation of transportation planning scenarios follows. The effect of these recommendations on the most recent MTPs in the region is also discussed. The chapter concludes with a discussion of how the participatory MCDA approaches can be used in formal and informal planning processes to navigate value trade-offs and build consensus and collaboration on collective action problems among polycentric network actors.

## 9.2   Research Methodology

### 9.2.1   Analytical Methodology

MCDA enables the elicitation of value trade-offs as a structured participatory mechanism for groups of governance network actors to iteratively discuss incommensurate values and evaluate the weights on those values for choosing valuable actions. Building upon Norton and Noonan's (2007) idea of alternate development paths/scenarios, a multi-criteria expected value function $V_i$ for $i$th scenario/development path in a set of $m$ development paths is formally defined in Eq. 9.1, as implemented by Zia et al. (2011).

$$V_{ik} = \sum_{n}^{i=1} w_{jk} x_{ijk}$$
$$s.t. \sum_{m}^{j=1} w_{jk} = 1 \tag{9.1}$$

where $w_j$ is a constant-sum weighting or trade-off *function* for $j$th criterion in a set of $m$ criteria (by a group of $K$ stakeholders); and $x_{ijk}$ is an "outcome" or "impact" function for $i$th scenario on $j$th criterion as perceived by a $k$th stakeholder in a group of $K$ stakeholders and among N scenarios.For an individual or an institutional decision-maker, the most valued scenario is the one with the highest expected value $Vi$. The real challenge is how to integrate/aggregate expected value $Vi$ across groups of governance network actors for choosing a development path that reflects the pluralistic values of all affected stakeholders (More information on this can be found in Zia et al. (2011)). For this very reason, as argued by Martinez-Alier, Munda, and O'Neill (1998), we propose the deployment of participatory and softer versions of MCDA applications. In particular, we propose a continuous and iterative application of an open-ended eight-step participatory procedure, as shown in Table 9.1.

**Table 9.1** Procedural heuristic of participatory MCDA

| Steps | Procedures |
|-------|------------|
| 1. | Develop a group consensus on alternative scenarios/development paths |
| 2. | Develop a group consensus on criteria (mutually exclusive and typically incommensurate) |
| 3. | Individuals assign weights on criteria |
| 4. | Perceived outcomes/impacts are measured for each alternative by each criterion and normalized |
| 5. | Individuals participate in small-group discussion to develop consensus on weights and outcomes/impacts |
| 6. | Workshop level weights and impacts/outcomes are developed |
| 7. | Workshop level weights and normalized outcome/impact functions are multiplied to measure expected value for evaluating design alternatives |
| 8. | The evaluation process is repeated iteratively with different sets of stakeholder representatives |

### 9.2.2  Data Collection Procedures

For this project, we implemented the participatory MCDA protocol shown in Table 9.1 by organizing two 1-day focus groups on September 25 and 28, 2010, in Burlington, VT. UVM's Institutional Review Board approved the focus group protocols. For each workshop, we brought together eight to ten participants, representing different stakeholder groups in the regional transportation planning network (described by Zia and Koliba (2017) in more detail) who were engaged in short-, medium-, and long-range transportation planning processes. These stakeholders represented CCMPO board members and technical staff, Regional Planning Commission (RPC), Vermont Agency of Transportation (VTRANS), United States Department of Transportation (US DOT)/Federal Highway Administration (FHWA), Chittenden County Transit Administration (CCTA), and Civil Society Organizations (CSOs), such as Smart Growth Vermont and Local Motion.

Each workshop ran from 8:30 am to 4 pm at the CCMPO's conference room, and the eligible participants were paid a modest amount of compensation for devoting their time. Both workshops had different sets of participants. The proceedings of both the focus groups were audiotaped for postworkshop qualitative and quantitative data analysis. Most importantly, focus group participants were apprised of the three scenarios (described in Sect. 9.2.3 below) and participatory MCDA procedure, and constant-sum weights for the 12 criteria (Sect. 9.2.4 below) were elicited from them on an individual level in writing using a standard scoring sheet. The impact functions ($X_{ij}$) for three MTP scenarios vis-à-vis these 12 criteria were separately calculated either from the integrated transportation-land use models of the CCMPO (CCMPO, 2011) or through expert interviews. Section 9.2.5 below shows the proxy variables and their estimated values for impact functions. Finally, the limitations of this methodological approach are presented in Sect. 9.2.6.

### 9.2.3    MTP Scenarios: Business-as-Usual (BAU) and Alternate Sustainable Community Designs

The CCMPO developed three 2060/2035 MTP scenarios: loosely labeled as a (business-as-usual, BAU) trend scenario, a workshop scenario, and a core scenario. As shown in Fig. 9.1, the **BAU Trend Scenario** depicts a development pattern and density likely to be seen on the Chittenden County landscape should the current trends of the past 30 years persist 50 years into the future. The pattern could be described as single-family or low-density housing/commercial uses on large lots. This trend consumes land at a high rate by spreading uses such as buildings, driveways, and parking across large areas. The advantages of this type of development are solitude and elbowroom for residents and workers in these areas. Disadvantages with this type of development pattern are that it often requires more spending on public services like roads, water, sewer, and emergency services, which are costlier given the distances between houses/buildings as well as from town centers. Another disadvantage is the fragmentation of open land currently used for agriculture, forestry, and wildlife habitat (CCMPO, 2011).

In contrast, the **Workshop Scenario** is representative of the recommendations generated at the Fall 2008 CCMPO Scenario Planning workshops (which were implemented by CCMPO with stakeholder groups before our intervention). The workshops were held around the county and resulted in 12 separate maps that, when closely examined, were variations on the same theme—a diffused center pattern. Features include new clustered and higher density development assigned to areas adjacent to existing development, some additional build-up of existing centers, and very limited development in rural areas. The differences between the 12 workshop maps varied only in where, and at what densities, the clusters were placed. The
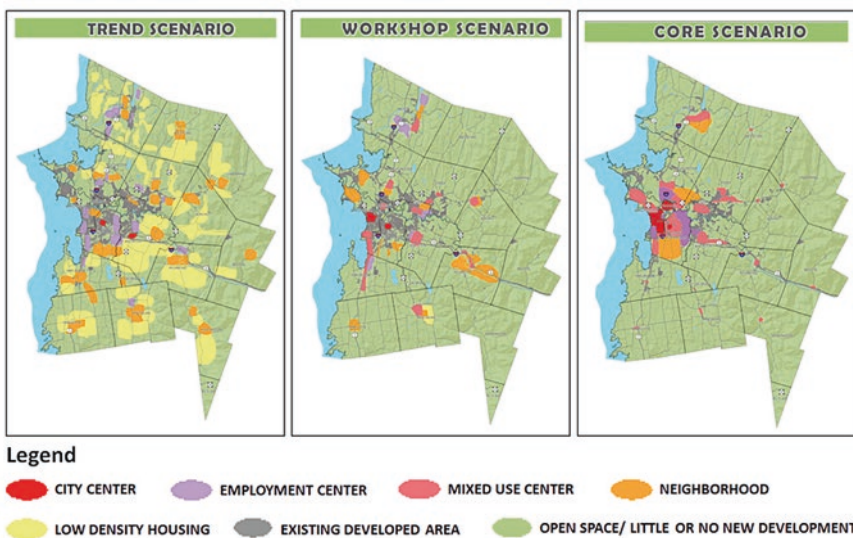


**Fig. 9.1** Trend, workshop, and core scenarios

intensity and location of these centers impact the provision of services to and within them. The advantages of this type of development include cost-efficiencies on services such as roads, water, sewer, and emergency services as well as the preservation of open space. This denser development and mixed-use concentrated in smaller clusters may create a more urban atmosphere with less privacy and may be seen as a disadvantage by some. This type of development could require revisions to local zoning regulations in order to allow higher densities (CCMPO, 2011).

Finally, the **Core Scenario** takes a radical departure from recent trends and concentrates growth in fewer places with a focus on sustainable community design. More specifically, it would result in locating 45% of all new households over the next 50 years into Burlington and another 5% in Winooski. These cities have grown slowly over the last several decades making this scenario a dramatic reversal in historical trends. Such intensity of development in what have been slow growing places would require significant revisions of existing development regulations and public acceptance of high-density zoning. This scenario would result in much denser neighborhoods in Burlington and Winooski, which may change the character of those municipalities and give them a more urban feel. The benefit of this type of development pattern would be significant cost savings in the provision of municipal services and contribute to more opportunities for taking buses or other public transportation and walking and bicycling. Areas outside the urban core would receive less growth and much of the rural areas would remain relatively open.

### 9.2.4   Elicitation of Multiple Decision Criteria and Their Weighting Functions for Different Stakeholder Groups

Stakeholder interviews, both individually and in a focus group format, were used to elicit 12 decision criteria (described in Table 9.2) for evaluating 2035 MTP scenarios. Earlier, in 2005, CCMPO had used the same 12 criteria as MTP steering committee goals to develop the 2025 MTP. Notably, some conflicting and complementary criteria emerged and are included in Table 9.2. Some participants in focus groups argued for simplifying the 12 criteria and reducing the list by half. However, a consensus emerged that each of these 12 criteria represents important MTP goals derived after longstanding negotiations and legal analysis. Given this consensus, we decided to elicit stakeholder weights on these 12 decision criteria.

Weights were elicited through a constant-sum weight elicitation methodology. Participants were told to play a resource allocation game (sometimes also called "penny game"), where a fixed number of resources (e.g., 100 pennies) are to be allocated across the 12 decision criteria. Higher resource allocation represents more importance for a decision criterion. Table 9.3 shows the means and standard deviations of weights elicited from 14 participants in the two focus groups. Two participants did not fill in their surveys completely. Sustainable land use is ranked highest, followed by energy efficiency and conservation. On the other hand, public education and cost-effective and inclusive criteria are ranked lowest, as shown in Table 9.3.

**Table 9.2** Decision criteria elicited from MTP steering committee goals compiled from planning documents, focus groups, and interviews

| Decision criteria ($C_j$) | MTP steering committee goal |
|---|---|
| 1.  Operational performance | Preserve and improve the physical condition and operational performance of the existing transportation system |
| 2.  Sustainable land use | Reinforce sustainable land use patterns, such as growth centers, as set forth in local and regional plans |
| 3.  Safety and accessibility | Create a transportation system that offers constantly improving safety, accessibility, flexibility, and comfort for everyone |
| 4.  Minimize time and total costs | Establish a transportation system that minimizes the time and total cost of moving people and goods, allowing the region's economy to thrive |
| 5.  Protect built and natural environs | Protect or enhance the region's built and natural environments |
| 6.  Community development | Create a transportation system that builds community, enhances neighborhood vitality, and minimizes noise, glare, and vibration |
| 7.  Access and mobility | Provide levels of access and mobility that ensure people and goods can travel when and where they need to go |
| 8.  Transportation system efficiency | Consider ways to improve transportation system efficiency before increasing transportation capacity |
| 9.  Energy efficiency and conservation | Establish a transportation system that uses diverse sources of power and maximizes energy efficiency and conservation |
| 10.  Improve alternate travel modes | Develop a transportation system that features a variety of travel modes and encourages the reduction of single-occupant vehicle use |
| 11.  Public education | Educate the public—from children to seniors—about the implications of different development patterns and mode choice decisions |
| 12.  Cost-effective and inclusive | Provide improvements to transportation facilities and services expeditiously through an inclusive and cost-effective process |

**Table 9.3** Elicited weights

| Variable (ranked in descending order) | N | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| 1. Sustainable land use | 14 | 13.30929 | 10.75414 | 0 | 40 |
| 2. Energy efficiency and conservation | 14 | 12.73786 | 9.694752 | 1 | 40 |
| 3. Protect built and natural environs | 14 | 10.52357 | 8.384744 | 3 | 30 |
| 4. Operational performance | 14 | 10.45214 | 7.092395 | 0 | 30 |
| 5. Safety and accessibility | 14 | 10.30929 | 8.187466 | 1 | 30 |
| 6. Improve alternate travel modes | 14 | 7.737857 | 4.533184 | 1 | 15 |
| 7. Access and mobility | 14 | 7.380714 | 4.785713 | 1 | 20 |
| 8. Community development | 14 | 7.095 | 2.877533 | 3 | 10 |
| 9. Transportation system efficiency | 14 | 6.452143 | 3.685385 | 1 | 10 |
| 10. Minimize time and total costs | 14 | 5.880714 | 3.835359 | 0 | 10 |
| 11. Public education | 14 | 4.880714 | 5.683239 | 0 | 20 |
| 12. Cost-effective and inclusive | 14 | 4.737857 | 3.649308 | 0 | 10 |

### 9.2.5   Imputation of Multiple Criteria Impact Functions

Table 9.4 presents impact functions imputed from the review of planning documents derived from the application of integrated transportation and land use models and expert interviews. These impact functions ($X_{ijk}$ from Eq. 9.1) represent the expected impact of pursuing scenario vis-à-vis 12 decision criteria. Each of the 12 impact functions was measured through a proxy variable, as shown in Table 9.4. Integrated land use and transportation models used by CCMPO and V-Trans were used to measure the values of these proxy variables. For MCDA, these impact functions were normalized using a linear normalization procedure (Yoon & Hwang, 1995). Normalized values are also presented in Table 9.4.

### 9.2.6   Methodological Limitations

While participatory MCDA is a powerful methodology in eliciting stakeholder expected value functions for alternative policy and planning designs that are contingent upon multiple weighted decision criteria, there are also significant limitations of such approaches that delimit the scope of findings of this study presented in the next section. Most importantly, we aimed for broader stakeholder *representation* in conducting focus groups that enabled us to estimate multi-criteria expected functions for diverse stakeholder groups. However, these findings could not be generalized to the entire population of citizens and policy-makers who are engaged in this planning process. Externally valid and generalizable MCDA study would require the implementation of surveys and additional focus groups, which was not undertaken for this study due to the limited resources made available by the sponsors. Further, an intractable limitation concerns how much weight should be allocated to each stakeholder group. There is no optimal solution for this problem; however, in the analysis below, we make a simplifying assumption that each stakeholder group that is represented in the focus groups is assigned equal weight. Practitioners in MPOs, who want to implement participatory MCDA for comparing alternate MTPs, could use sensitivity analysis to assess the robustness of the findings with unequal weights assigned to different stakeholder groups. Finally, a sensitivity analysis of estimated impact functions through more systematic approaches such as system dynamics models and agent-based models are warranted for this study and applications of this approach in other MPO contexts.

## 9.3   Results

The results from participatory MCDA are presented with emphasis on three aspects: In Sect. 9.3.1, findings on the expected value functions, generated for each of the three scenarios by estimating Eq. 9.1, are presented. In Sect. 9.3.2, we discuss the weighting function variability by stakeholder groups and its potential impact on

**Table 9.4** Impact functions for MTP criteria for three scenarios

| Criteria | Proxy variable | Trend scenario | Workshop scenario | Core scenario | Trend normalized | Workshop normalized | Core normalized |
|---|---|---|---|---|---|---|---|
| 1. Operational performance | Annual PM peak vehicle hours of delay | 15.4 | 13.6 | 10.4 | 0.6753 | 0.7647 | 1 |
| 2. Sustainable land use | Land consumed by development (sq. miles) | 124 | 25 | 25 | 0.2016 | 1 | 1 |
| 3. Safety and accessibility | Average projected congestion in 2035 (vehicle crashes/year) | 2883 | 2150 | 1994 | 0.6916 | 0.9274 | 1 |
| 4. Minimize time | Average commute time to work in 2035 (min/day) | 40 | 25 | 15 | 0.375 | 0.6 | 1 |
| 5. Protect built and natural environment | Weekday daily greenhouse gas emissions (tons of $CO_2$) | 3210 | 3050 | 2840 | 0.8847 | 0.9311 | 1 |
| 6. Community development | Population density (individuals per sq. mi) (539 sq. mi in CC) | 394.9610 | 789.9220 | 1579.8441 | 0.25 | 0.5 | 1 |
| 7. Access and mobility | Percent daily trip possible by public transit | 51% | 53% | 58% | 0.8793 | 0.9137 | 1 |
| 8. Transportation system efficiency | Transportation $s invested per capita in 2035 | 198 | 150 | 110 | 0.5555 | 0.7333 | 1 |
| 9. Energy efficiency | Gallons of oil needed per person per year in 2035 | 300 | 220 | 160 | 0.5333 | 0.5333 | 1 |
| 10. Improve alternate travel modes | Percent daily trips made by walking of bicycling | 4.30% | 5.00% | 8.30% | 0.5180 | 0.6024 | 1 |
| 11. Public education | Civic responsibility (constructed scale from 1 to 10) | 6 | 8 | 8 | 0.75 | 1 | 1 |
| 12. Cost-effective and inclusive | Projected budget shortfall | 1 | 116 | 261 | 1 | 0.0086 | 0.0038 |

expected values. In Sect. 9.3.3, we discuss the differences and similarities among the expected values estimated for different stakeholder groups represented in the focus groups.

### 9.3.1   Comparing Scenarios

Among the three scenarios, as shown in Fig. 9.2, the core scenario has the highest expected value of 94.87% points, followed by the workshop scenario at 74.16% points. The least preferred scenario is the trend scenario at 58.14% points. Figure 9.2 shows the box plots of expected values, demonstrating that the core scenario is significantly a preferred scenario at the aggregate level for the stakeholder groups represented in the focus groups. Further, the BAU trend scenario received the least expected value at the aggregate level, thus implying that the BAU trend is the least acceptable scenario for the focus group participants.

Despite the small sample size (N = 14) of this participatory study, this significant result shows the broader underlying consensus of the workshop participants for the core scenario. Two significant trade-offs appear to be made by the participants: First, the core scenario entails higher upfront costs (as shown in the cost-effective impact factor in Table 9.4), which are traded-off by assignment of higher weights for sustainable land-use criterion. Second, core scenario implementation through the planning process will require significant modifications in the current land-use and zoning practices in Chittenden County (especially Act 250 that governs the
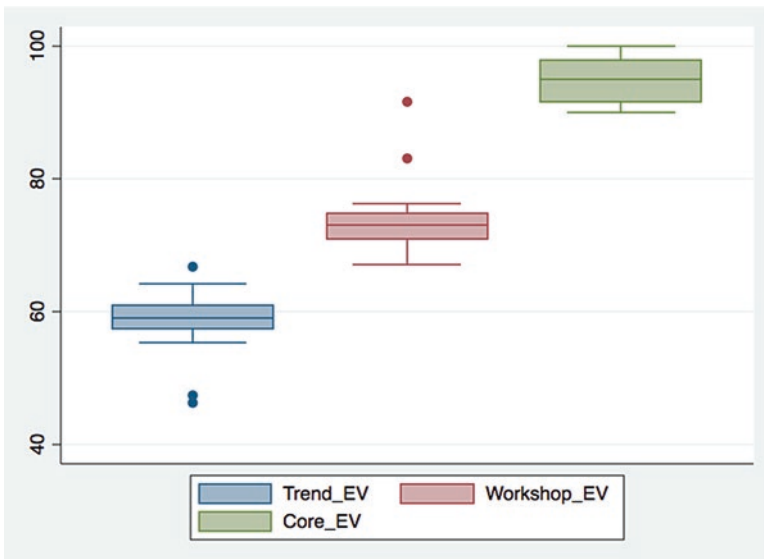


**Fig. 9.2** Boxplots of expected values from three scenarios

land-use and zoning practices in the state of Vermont). This second issue was explicitly raised by many participants during the focus group discussion and is further addressed in Sect. 9.4.

### 9.3.2 Sensitivity of Weighting Functions to Variability

Despite the clear preferences derived in the above analysis, many complex factors appear to reflect the variability in the assignment of weights on 12 decision criteria. Figure 9.3 shows box plots of assigned weights for these 12 decision criteria. Many criteria display large variability, which means that aggregate results will need to be further dissected by each stakeholder group for a deeper analysis of stakeholder preferences and weights.

To further assess this variability in the assignment of weights, analysis of variance between stakeholder groups was implemented. We found that the weights on the following five criteria have statistically non-constant variance across different stakeholder groups: sustainable land use, safety and accessibility, community development, access and mobility, and transportation system efficiency. This implies that the usage of mean weight values in estimating expected value functions could
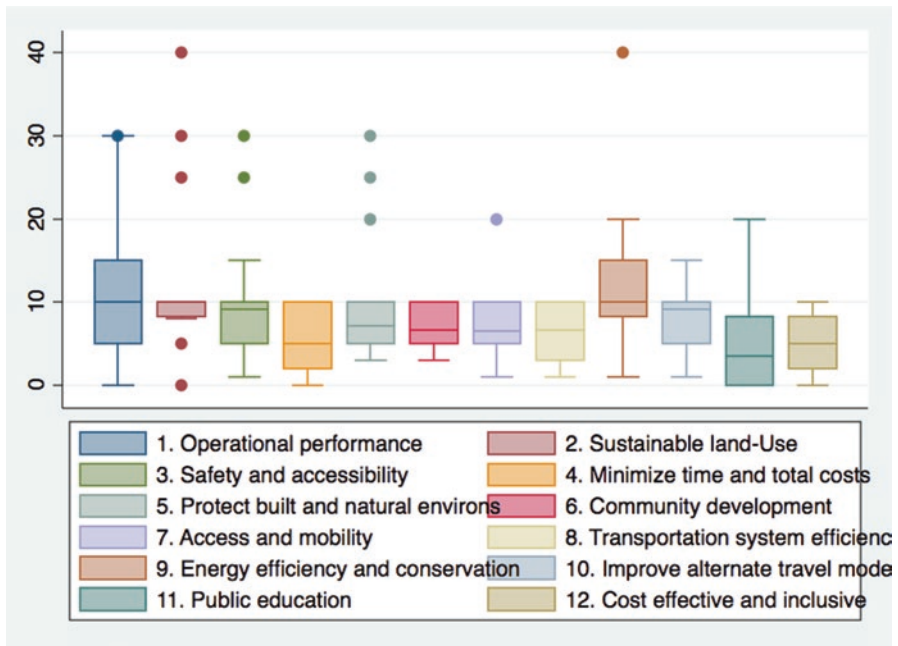


**Fig. 9.3** Boxplots of weights for decision criteria

**Fig. 9.4** Distributional functions of average weights by stakeholder groups. Note: The x-axis represents 12 decision criteria in the same order as Table 9.2 for each stakeholder group

ignore the uncertainty introduced by large variability in the relative importance attached by different stakeholder representatives.

Further, Fig. 9.4 shows the variability of these weights by different stakeholder groups represented in the focus groups. Each of these stakeholder groups appears to have different distributional functions for the 12 distribution criteria (represented on the x-axis in Fig. 9.4), which demonstrates large heterogeneity in underlying stakeholder values and goals.

### 9.3.3 Similarities and Differences Among Network Actors

We find that the expected value for almost all focus groups consistently displays higher expected value for the core scenario, followed by workshop and trend scenarios, respectively, as shown in Fig. 9.5.
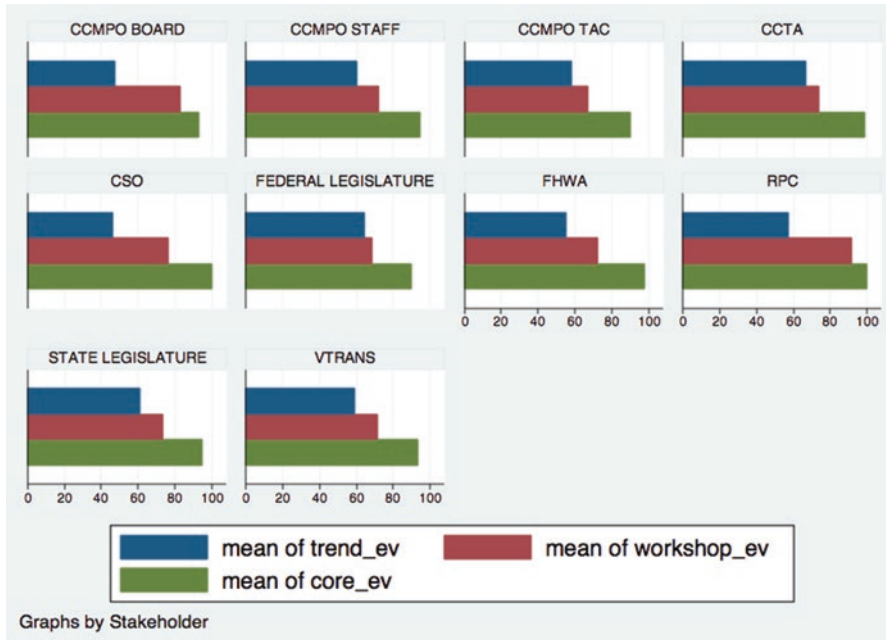
**Fig. 9.5** Mean expected values of network actors

## 9.4 Implications of the Findings and the Status of Current MTP

While the results of the participatory MCDA recommended **Core** (sustainable community design) scenario as the scenario with the highest expected value across almost all stakeholder groups, the implementation of this scenario will require overcoming serious legal, political, and economic challenges that were expressed by the focus group participants and interviewees. Although the **Trend** scenario assumed that "current trends of the past 30 years [will] persist 50 years into the future," this scenario imposed minimal (if any) additional strictures upon existing zoning and development, and for that reason imposed the least prohibitive capital costs. However, "this type of development pattern… requires more spending on public services like roads, water, sewer, and emergency services, which are costlier given the distances between houses/buildings as well as from town centers." Further, the Trend scenario assumed fossil-fuel driven land use growth pattern and accumulation of greenhouse gas emissions. In contrast, the **Workshop** scenario pivoted on the concept of a "diffused centers pattern" which is intended to concentrate "urban sprawl" through mixed-use centers, the renovation and upkeep of existing urban structures, and "very limited development in rural areas." The Workshop scenario addressed the overextension of public services by restricting growth to these diffuse centers, allowing public works to funnel federal funds into more concentrated areas,

leading to higher-quality development of those areas; such focused distribution of funding would likely defray capital costs incurred by bolstering public transit and renovating infrastructure. Also, less square mileage is lost to fragmented centers of population (as in the Trend scenario), and land is used more efficiently as a result. Several challenges arise, however: first, existing zoning and development regulations may not be amenable to higher density development and would, therefore, need revision to allow for the diffused centers scenario; second, decreasing the amount of space into which the metropolitan area can expand will naturally increase the population density of that area.

The **Core** scenario seeks to impose a rather radical structure upon the future growth of Chittenden County by "locating 45% of all new households over the next 50 years into Burlington and another 5% in Winooski," to create a dense, urban-style population center in Burlington. The advantages to such a scenario are many: municipal services are not overextended into rural areas and infrastructure can be maintained/upgraded in a more expedient manner; public transit, biking, and pedestrianism provide viable alternatives to automobile congestion; and rural areas are "relatively open" and undeveloped, preserving Vermont's natural resources. Under the Core scenario, high-density housing would require major alterations to current zoning and development regulations, and "may change the character of those municipalities" into which such concentrated growth would be funneled; additionally, the Core scenario represents a "dramatic reversal in historical trends", which could represent a high cost of imposition in the form of community opposition, redirection of capital funds away from suburban and rural areas, and which may necessitate major infrastructure overhauls.

Although participatory MCDA clearly supports the Core scenario as a planning template, the Core scenario's radical departure from historical growth in the Burlington area proved to be a hard sell to average Vermont residents, policy-makers, and developers (not explicitly included in the focus groups), all of whom would have to appreciably alter their present courses in order to realize such a scenario. On the other hand, participatory MCDA findings disfavored the Trend scenario, so, by the process of elimination, the alternative scenario best suited to collaborative action appeared to be the Workshop scenario in a 25-year planning horizon. In many ways, the Workshop scenario was the lowest common denominator between an undesirable lack of change (Trend) and a prohibitively rapid imposition of change (Core); the Workshop scenario also had the benefits of a ready-made support network, having been proposed by the CCMPO 2009 survey groups, and tangible, potentially data-rich implementation in the form of completed multi-use facilities. Although it did not promote idealized benefits on par with the Core scenario or cost virtually nothing in the short term like the Trend scenario, the Workshop scenario eliminated the need for transformative systematic reform while reducing urban sprawl; moreover, it had an inherent flexibility that would allow each diffuse center to retain its regional identity without compromising large landmasses to unfettered development or incurring massive public works costs.

After the 2010 workshops, CCMPO engaged in a broader public hearing process required under the applicable laws and eventually settled on 2035 MTP. Later,

CCMPO changed its designation to the Chittenden County Regional Planning Commission (CCRPC). In 2015, CCRPC announced 2040 MTP and linked it with their ECOS plan. The most current ECOS plan was adopted by CCRCP on June 20th, 2018 and is available at www.ecosproject.com/plan. Most notably, the ECOS plan integrates regional plan, 2040 MTP and comprehensive economic development strategy. Figure 9.6 shows the future land use map for the focal region. This future land use map most closely represents the "workshop scenario" that emerged in participatory MCDA with the greatest collaborative potential with the ability to change the status quo, but leave the greatest flexibility to the local towns for setting their land use, transportation, and environmental management priorities.

## 9.5   Conclusions

Metropolitan Planning Organizations (MPOs) in the US policy context represent an example of a polycentric governance innovation to mediate persistent conflict between the local and state government agencies. The MPOs are required by federal law to develop a long-range Metropolitan Transportation Plan (MTP), at least every 5 years, which empowers them to prioritize regional scale transportation, land use, infrastructure, and housing projects. Regional-scale priorities in MTP constrain economic growth and environmental sustainability options of local communities, setting up various synergies and trade-offs between regional, state, and federal transportation planning systems vis-a-vis local community goals. This chapter presents an example of a novel policy and planning tool inspired by participatory Multicriteria Decision Analysis (MCDA) approach that can be used to formally elicit value trade-offs for different MTP system-wide scenarios and enable stakeholders to navigate value trade-offs among different planning alternatives.

A participatory MCDA of the 2035 MTP planning process of CCMPO revealed that different stakeholder groups had different value trade-offs, yet the ranking of a sustainable community design core scenario emerged as the most desirable scenario. In retrospect, the second-ranked workshop scenario emerged as a consensus-based collaborative option, reflected in the most recent 2040 MTP. This chapter demonstrates that participatory MCDA could be effectively used to elicit stakeholder value trade-offs in polycentric governance networks. Furthermore, participatory MCDA enables estimation of multiple stakeholders expected value functions on multiple decision criteria, given the estimated impacts of alternate scenarios from integrated transportation land use models. This type of stakeholder participatory process enables transparent discussion about comparing the pros and cons of alternate sustainable community designs as they evolve through innovative technological and collaborative planning processes. Zia and Koliba (2015, 2017) have also demonstrated that complex systems inspired agent-based models could be coupled with participatory MCDA to simulate and visualize alternate governance and planning scenarios with the hope to ultimately build collaboration across vertical and horizontal governance network actors.
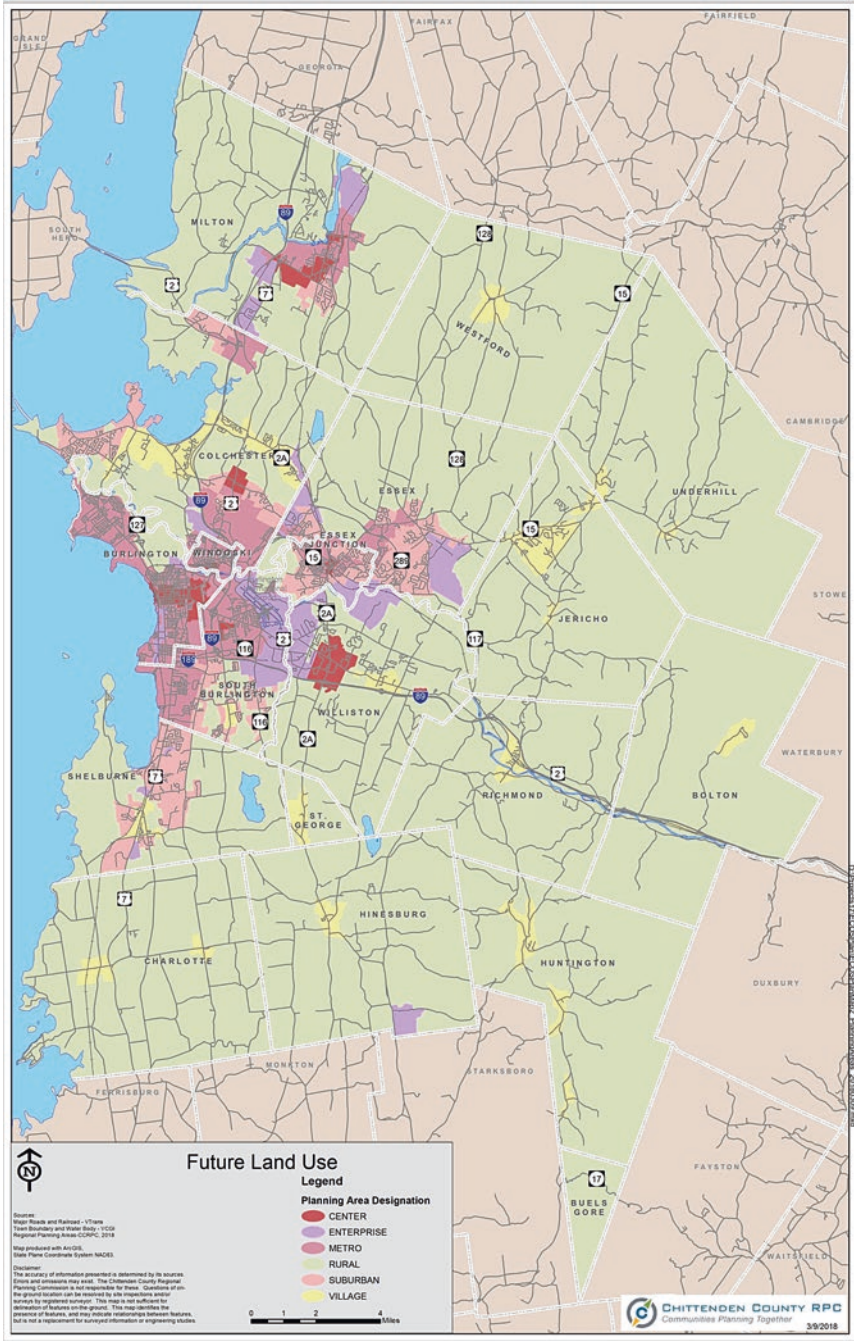
**Fig. 9.6** Future land use map adopted by CCRCP in its 2018 ECOS and 2040 MTP

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# Part III
# Collaborative Governance and Dynamic Performance Management

# Chapter 10
# Patronage and the Public Service: A Dynamic Performance Governance Perspective

**B. Guy Peters and Carmine Bianchi**

**Abstract** Patronage is one of the enduring issues in public administration. Although the virtues of merit-based recruitment and retention in the public service are extolled widely, patronage of some form persists in many, if not most, countries. By using system dynamics modeling applied to performance governance, this chapter provides an analysis of both the pathological and the eufunctional aspects of patronage appointments in the public sector. It also considers the potential virtues of using patronage appointments. In addition, using a dynamic performance governance model, we examine how patronage may actually improve the performance of public services.

**Keywords** Patronage · Performance · Public services · Public employment

## 10.1 Introduction

The selection and appointment of public servants has been and remains a central issue in the study of the public sector.[1] It is also a central issue for practitioners who want to make government function better. The guiding assumption, everything else being equal, is that the public service will perform better with a permanent career civil service selected based on merit. Going back to the appointment of mandarins in China, and now the standard form of civil service for developed democracies, the

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[1] In this chapter, we will use "public servants" as an inclusive term meaning individuals employed in the public sector, while "civil servants" will refer to those who are appointed and managed through a merit system.

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nonpartisan civil service is the standard for good governance (Dahlström, Lapuente, & Teorell, 2012).

The alternative to the merit system is selection by patronage. By patronage, we mean the selection of public servants based on political affiliations. Those affiliations may be partisan; they may reflect personal relationships with political leaders or may reflect both attributes. The formal definition of patronage is:

> [T]he power of political actors to appoint by discretion individuals to non-elective positions in the public sector, irrespectively of the legality or otherwise of the decision (Kopecky, Mair, & Spirova, 2012)

The familiar argument on behalf of a merit-based civil service is both normative and empirical. The normative argument itself has several components. The primary argument is that hiring public servants based on merit enables governments to create a career public service of high quality that will be able to serve any elected government with equal conviction. The permanence of that civil service enables it to develop expertise in its policy domains and also to develop an organizational memory that helps maintain the stability of policy and service delivery.

A second argument on behalf of a merit-based career public service is that a government should be able to interact with all its citizens *sine ira et studio.* Hiring individuals based on merit, rather than their political affiliations, means that the public servants should be better able to interact with citizens on a professional basis and provide those citizens with high-quality service than if they are selected more on ascriptive criteria. There may still be questions about the representativeness of the bureaucracy on other criteria such as language or gender, but there should not be any political bias in administration.

At a more general level, the public sector should be a model employer for society and should attempt to diffuse ideas of equality and quality in the performance of public tasks. This role as an exemplary employer may be less relevant in market-oriented and achievement-oriented societies but is certainly critical in societies in which ascriptive criteria are important in all aspects of economic and political activity. If the state can establish a pattern of behavior that represents "best practice," then it may have the capacity to influence personnel practices in the remainder of the economy.

## 10.2    The Place of Patronage into Political and Administrative Theory

The study of patronage transcends two major bodies of literature in the study of political systems—politicization of the public bureaucracy and clientelism—and to some extent, patronage can be seen as a subset of either. While this linkage to broader bodies of theory is important and attaches greater weight to our studies of patronage, the linkage may also create some confusion and some misunderstanding about the nature of patronage in the public service. This paper is intended in large

part to clarify some of the misconceptions about patronage and to make what we consider to be the appropriate linkages with social science theory without distorting the nature and role of patronage appointments.

The basic argument here is that patronage is one form of a broader concept of politicization of the public service. Governments have several options for imposing their political control over the bureaucracy, one of which–and the most intrusive—is directly appointing their loyal people to government. Likewise, patronage may be a form of clientelism, but only one version of patronage—mass patronage at low levels within an organization and especially at subnational levels—can be seen as clientelistic. In the world of clientelism, public sector jobs are awarded to solidify the electoral position of a politician, while most of the patronage we are concerned within this research is used to enhance the governance capacity of a government or a political leader.

This chapter will discuss both the pathological and the eufunctional aspects of patronage appointments in the public sector. Most studies of patronage emphasize the negative aspects of the practice and the extent to which it undermines the professionalization of the public sector. However, patronage can also contribute to performance by bringing highly qualified personnel in the public sector. Furthermore, patronage can even contribute to democracy by ensuring that the program of elected officials is implemented by a bureaucracy that might otherwise be reluctant to do so.

### 10.2.1   Politicization of the Public Bureaucracy

The first of the two bodies of literature within which the study of patronage can be nestled is the discussion of the politicization of the public sector (Neuhold, Vanhoonacker, & Verhey, 2013; Peters & Pierre, 2004; Rouban, 2003). This literature focuses primarily on public bureaucracies in the industrialized democracies and especially focuses on the alleged increasing level of political involvement in the appointment and management of public servants in those government positions. The assumption behind much of this literature is that the merit system is being subtly but effectively eroded and that there is substantially greater political influence than in the past.

In some of the literature on political appointments in the public sector, there is an assumption that patronage is about creating "jobs for the boys and girls" (Grindle, 2012). In our study of patronage, the typology upon which we are basing that study (Panizza, Ramos, & Peters, 2017) we are assuming that although providing employment for one's political supporters is important, for presidents and prime ministers and their ministers being able to control government and to make good policies may be of greater importance. Not all political appointees are equal, and our primary concern is with those occupying more significantly policy-making or policy influencing roles within government.

Politicization is a rather broad concept and includes a range of mechanisms through which political actors attempt to influence public administration (see Peters,

2013). Politicization can refer to the selection of appointees for positions in government on political grounds–patronage *per se*—but it also can refer to other, more subtle, ways in which political actors attempt to shape the behavior of public servants (Bach, Hammerschmid, & Löffler, 2015). For example, governments may create parallel structures in which political officials monitor the career officials, and attempt to impose control over those careerists. Performance management systems can also be used to impose political constraints on the actions of civil servants (see Aucoin, 2012)–good performance is agreeing with the government.

One attempt to classify forms of politicization and therefore most forms of patronage (Peters, 2013) include as follows:

1. *Direct Politicization:* This is the type of politicization that is the central concern of this research. By direct patronage, we mean the appointment of public servants on political grounds and possibly without regard to professional qualifications. Good examples include Italy, Mexico, Thailand, and several African countries (see Kopecky, 2011).

   The above being said, mass patronage involving creating hundreds if not thousands of jobs for electoral reasons is more in line with clientelism than with patronage as we are discussing it (see below).

2. *Professional Politicization:* In this version of politicization, or patronage, the individuals appointed to public positions may be political, but they are also professional. For example, in Germany, there are two teams of senior civil servants, each having not only expertise and experience as public servants but also party affiliation. When one party controls governments, its civil servants are working, while the other team is temporarily retired, waiting for the next time their party comes to elected office. Having two teams of senior public servants is expensive, but may provide a balance between professionalism and political commitment.

   In Italy, this kind of patronage is also diffused and legally authorized for only staff support positions. The law n. 145/2002 gave elected officials a quite wide authority to fill also line positions of governmental administrations with managers affiliated to them. However, in 2017, the Supreme Court has limited this possibility to only key positions, such as in the case of a department director. A typical example of this phenomenon is provided by the Italian public service broadcaster (RAI) (De Vitis, 2016, p. 26). To describe such phenomena, the concept of "democratic anchoring" has also been used. This is referred to as the "emergence, shaping, and adaptation of anchors that hook and bind, and consequently, may even control civil society in general or specific sectors" (Morlino, 2005, p. 745).

3. *Redundant Politicization:* The third version of politicization was labeled redundant, meaning that the politicization was the result of redundant organizations watching each other. The extreme version of this pattern has been found in communist countries in which the party and the government had redundant structures. A less extreme version could be found in prefectural systems in Napoleonic regimes (Oberdorff & Fromont, 1995), although this may involve more legal than political control over local governments. Finally, the Mulroney government

in Canada created a political structure in ministries that shadowed the civil service structure (Savoie, 1994).

Another standard example of redundant politicization is the use of ministerial cabinets. These cabinets function as political advisory and enforcement bodies for ministers in countries such as France, Belgium, and the European Union (see Eymeri-Douzans, Bioy, & Mouton, 2014). Ministerial cabinets allow ministers to make appointments that often mirror the expertise already existing within the ministry, but doing so with individuals personally loyal to the minister.

4. *Dual Politicization:* In this model of politicization, both the legislative and executive branches are involved in the process. This patronage model may take the form of the legislature having to approve appointments made by the executive. It can also include large numbers of political appointments within the legislature itself to serve as a counterbalance to the analytic capacity within the executive. To some extent, this is both institutional politics as well as partisan politics. The United States would be a good example of this form of patronage.

5. *Anticipatory Politicization:* This is a somewhat subtle form of politicization and reverse patronage. That is, the argument here is that when a new government is elected, then many public servants who do not agree with that government will choose to retire or will find alternative employment. Christensen (2004) noted the presence of this form of politicization in Denmark, a country often considered to be largely immune from patronage and politicization.

6. *Social Politicization:* In addition to the possibility of political parties and political executives influencing the appointment and careers of public servants, various interest groups may also influence the appointment of public servants and may seek to have their members appointed to positions in government. This type of patronage is especially important when political parties and interest groups are closely connected, as in the case of labor unions and social democratic parties. This can also be a reward for interest groups having supported particular candidates in elections.

The above demonstrates some of the complexity of politicization, and that patronage is only one possible means of politicizing the bureaucracy. Thus, patronage is a clear indicator of attempts to politicize the bureaucracy, but that is only one aspect of that broader concept. Therefore, when we consider the attempts of governments to impose their control over the public bureaucracy, we need to ask why a government would choose this mechanism rather than the other available mechanisms to create the control.

### 10.2.2   Clientelism

The second broad body of the literature to which patronage in the public sector is often linked is referred to as clientelism (Hicken, 2011; Stokes, Dunning, Nazareno, & Brusco, 2013) or perhaps neopatrimonialism (Erdmann & Engel, 2007). Both of

those concepts emphasize the importance of personal rule in government and are in Weberian terms, forms of legitimate domination. The terms clientelism and patronage are often used synonymously but should be discussed more as distinct, albeit-related phenomena. Thus, while political patronage tends to focus on the role of political parties, or perhaps political executives, in the selection of members of the public service, clientelism emphasizes symbiotic relationships between individuals occupying a variety of governance roles.

While the study of patronage begins with the appointment of the public servant as a reward for loyalty to an individual politician or a political party, clientelism focuses more on the relationship between political leaders and their voters. In patronage, individuals are rewarded with jobs, and often high ranking position in government, while the benefits of supporting the patron in clientelistic models is often more economical, with jobs at a lower level within government, or perhaps benefits for a local community.

Thus, patronage is more elite politics while clientelism is more mass politics. The purpose of patronage is to control the government, and especially the executive branch, while the purpose of clientelism is maintaining the political position of the patron by gaining the votes of the clients in exchange for rewards. In most clientelistic arrangements, the patron appears more interested in ensuring his or her election than in the control of the government, and most benefits provided are more in terms of "pork barrel" or economic benefits for an individual or perhaps a region. While "distributive politics" occurs in many if not most political systems, the clientelistic variant tends to be associated with Latin America, Africa, and Southern Europe (an analysis of the vicious feedback loops that clientelism generates is developed by Bianchi et al., 2010, pp. 398–402).

The above having been said, clientelistic politics may involve making appointments of personnel in the public sector. In particular, clientelism may involve more mass patronage, especially in the local communities controlled (politically) by an individual. A public job may be one reward for clients who provide political support to their patron. These public jobs are generally low-level positions, while the patronage jobs with which we are concerned in this paper are often at the highest levels of government. While some of the jobs at high levels may be provided through personal relationships, more commonly, they are related to party affiliation and perceived professional capacities to perform important tasks in the public sector.

Following from the above, we will need to make a sharp distinction between appointments made for patronage and clientelistic reasons. The distinction we use here is often glossed over in the existing literature, but we believe it is important for understanding how political patronage functions. For understanding patronage appointments, we are interested in those appointments which are made by political leaders in order to support their governments, or their careers, as policymakers within the government. Most patronage appointments, therefore, will be made at the higher levels of government service, and most appointees will be working in administrative positions.

Appointments made for clientelistic reasons, on the other hand, tend to be larger scale and are motivated more by individual ambition than by an ambition to govern

successfully. The patron in clientelism may not hold a position in the executive, but merely use his legislative powers, or his powers as a local official, to create public sector jobs. Many, if not most, will be low-level positions with little or no relevance for public policy. These positions are important for the participants in these symbiotic relationships, but not for governing, and hence, clientelistic arrangements tend to be pathological use of appointments.

A real example of clientelism and an analysis of its effects will be here illustrated.[2] ACQUA[3] is a joint stock company established in 2003. It is owned by a large number of small municipalities (about 128) located in Southern Italy and provides water supply and sewerage services to more than 450,000 users. Its Board consists of five people, who are appointed by municipalities. Since the public utility is owned by a large number of small municipalities, it is often difficult to achieve mutually agreed decisions on the appointment of Board members. Therefore, political parties are used to take a leading role in making these decisions, which are mainly based on political affiliation, and rarely on professional experience and skills.

The decision-making process is highly centralized. Each department head has bounded decision power and autonomy. The managing director makes most decisions, which are then approved by the Board. This holds the responsibility of all strategic decisions. Examples of decisions made by the managing director and authorized by the Board include procurement (e.g., supplier selection), and personnel (e.g., recruiting).

The company does not adopt any formal performance evaluation system for its employees. The formal respect for procedures is perceived as more important than meeting performance targets. In this context, customer orientation is not a strategic priority: rules on how to deal with customer complaints are not available. The same is for using performance targets and benchmarking. Although customer service charter formally exists, the utility does not carry on any market survey aimed at detecting the perception of the level of customer satisfaction.

Figure 10.1 shows how the hiring of unnecessary and unqualified staff, due to political interferences, decreases the motivation and skills of personnel, which leads to lower customer service and poor financial performance. To cope with accumulated financial losses, rising social pressures are generated on the Municipal administration to provide financial subsidies that may fix such problems. A hiring volume of municipal funding towards the utility further increases political interferences (loop "R1").

This policy also generates a decline in the level of empowerment of the management in the utility and, hence, motivation, leading to further performance reductions (loop "R2").

Overstaffing also produces an increase in personnel costs, which in turn generates a rise in the operating costs, leading to a decay in financial results, which further reinforces political interferences (loop R3).

[2]This analysis will be based on the case illustrated in: (Bianchi et al., 2010, pp. 397–402).

[3]The name of the public utility has been intentionally disguised.

**Fig. 10.1** Effects of clientelism on cost of service, staff motivation and skills, and management empowerment (adapted from: Bianchi et al., (2010), p. 400)



**Fig. 10.2** Effects of clientelism on purchasing policies (adapted from: Bianchi et al., (2010), p. 401)
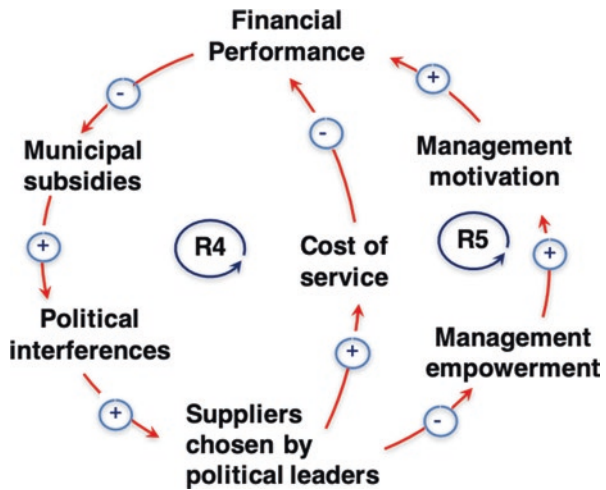
Another area of political interferences in the utility autonomy refers to the selection of suppliers, by the Board, only based on personal ties and political affiliation. This phenomenon increases operating costs (e.g., due to low-quality raw materials) and therefore reduces performance. A lower performance increases debts and the degree of external dependence and provides the basis for further clientelism (loop R4 in Fig. 10.2). It also reduces the public utility manager's autonomy, leading to a drastic drop in their motivation and performance (loop R5 in Fig. 10.2).

Figure 10.3 illustrates, through the balancing loop "B1", a possible successful exit strategy from clientelism in the analyzed case.

In order to neutralize the described political interferences, higher public sector transparency and accountability might be needed. This would require new or better rules to oblige elected officials to appoint public utility board members based on

**Fig. 10.3** The possible role of social pressure for political transparency/accountability and performance governance in getting out of clientelism

criteria that differ from political or personal affiliation and may rather consider their certified competence, skills, and reputation.

To sustain an effective implementation of such new rules, an improvement in the quality of the broader performance governance is also needed. This implies the use of methods that may better support political leaders to: (1) outline intended community outcomes, (2) design and implement policies for their attainment, (3) assess achieved outcomes, (4) report them to community members, and (5) learn from a facilitated participation of community stakeholders to the evaluation of achieved outcomes.

This, in turn, does not only require the use of better planning methods but also would primarily need a social pressure by the local community towards higher political transparency and outcome-based accountability. Such pressure might be the effect of low trust in government because of the accumulated financial losses and poor service quality. In the long run, it should also be sustained by a strong community culture for collaborative governance.

## 10.3   Explaining Patronage

All political leaders want to control the government and to ensure that the administrative system implements its policy priorities. They also want to have the best possible policy advice, especially if that advice corresponds to their political values. Given that patronage appointments in the public service may facilitate governments

achieving those goals, and in some instances perhaps governing better, why do not all governments have extensive levels of patronage appointments? Or conversely, given that there is strong evidence that Weberian bureaucracies are important for development (Evans & Rauch, 1999; see also Grindle, 2012, Chap. 1), why are there so many patronage-based systems?

The first answer to this question is that all governments do have some patronage positions. The differences are quantitative, not qualitative. For example, even countries such as the Scandinavians or the United Kingdom with long histories of professionalism in the civil service have patronage appointments, and an increasing number of patronage appointments by most accounts (Dahlström & Niklasson, 2013). Likewise, all governments appear to offer positions that are more clientelistic, having little real power over public policy but useful for rewarding their political supporters.

Leaving aside the apparent universality of political patronage, what explains different levels of patronage that we can observe? Even within the Latin American countries studied in our ongoing research project, there are differences in the intensity of patronage appointments in the public sector. Or phrased differently, what explains the institutionalization of a career public service when it may be in the interest of political leaders to maintain their possibilities of appointment for both governmental and clientelistic purposes? Furthermore, what can explain the failure of reform efforts that seek to create a more merit-based system of public employment (Geddes, 1991)?

### 10.3.1   Explaining Adoption of Patronage Model for Administration

Perhaps the simplest explanation of patronage is the dominant social and cultural model that argues that patronage arises because there are strong social norms that support providing support to members of a leader's group. Patronage (often in the broader, clientelistic sense) is expected, and failure to provide jobs would be considered, politically, and even morally wrong.[4] While that explanation assumes cultural patterns are stronger than perhaps they are, there does appear to be some cultural element involved in the acceptance and institutionalization of patronage in public administration.

The most obvious and almost trivial answer is that politicians want to control government and government policies. They may believe that the permanent bureaucracy they inherit when they assume office is biased, or incompetent, or both. That belief may be especially true when there are marked ideological differences with the preceding government, and hence a felt need to "clean house" or in Trump's term

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[4] One of the best explanations of this pattern is provided by Fred Riggs (1966) classic work on the Thai bureaucracy.

"drain the swamp." But even when the governments are more similar, there is generally a perceived need to shape government in a particular way and with a particular set of individuals.

However, it may not only be partisan control that political leaders desire from their use of patronage appointments. These leaders may find that the permanent civil service they inherit does not have the skills necessary to provide good policy advice, or good implementation of programs. This deficiency on the part of the career civil service may be a function of inadequate salaries for government jobs, or perhaps an absence of respect for public employees. Of course, bringing in political appointees at higher salaries and in more important positions may merely institutionalize the inadequacies of the civil service, but for any government taking office, the need to govern may outweigh concerns with the long-term consequences of their actions.

Patronage systems may also result from the perceived need to build political parties where they are weak or nonexistent (Shefter, 1977). That explanation of patronage may be more applicable with the mass patronage more akin to clientelism, but if the purpose is to build more of an elite caucus party, the more constrained vision of patronage we are working with may still be useful. Providing positions in government might be a means of bringing political elites into the party and would be especially useful if those elites had policy and administrative skills. Likewise, making patronage appointments may be a means of co-opting potential political opponents.

The development of patronage appointments in government may also reflect broader social and developmental movements. For example, Kenny (2013) argues that patterns of patronage reflect the distribution of powers at the time of independence in former colonial countries. When the center of power at that formative moment is weak, the tendency is to delegate powers to the periphery and that delegation leads to high levels of patronage. That patronage, however, tends to be more in the clientelistic form than the more governmental form we are concerned about within this project. Although more centralized, patronage was also a central activity in state-building in Central and Eastern Europe (O'Dwyer, 2006).

Patronage may also arise because of the low capacity of the career civil service and the need to build greater policy capacity within a government. That low capacity, in turn, may be a function of poor pay and low prestige for workers in the public sector. Even if governments cannot always hire "the best and brightest," they need to have capable people, but poor economic circumstances or a shortage of qualified personnel may produce a low-quality public service. The ability to hire outside the formal merit system and bring expertise into government can be essential for good governance. While much of the focus in the study of patronage is on Latin America, some of the same problems were experienced in Central and Eastern Europe after the end of communism. That connection tainted many of the trained professionals from the former government, so governments had to seek expertise elsewhere (Randma-Liiv, 2001).

Finally, although somewhat less relevant for the Latin American cases, the imposition of New Public Management (NPM) in public bureaucracies has had the effect of politicians seeking to reassert control over their governments (Peters & Pierre, 2004). One of the effects of NPM has been to "let the managers manage" and to

reduce the powers of politicians over their public service. While this may have produced some efficiency gains, it produced losses in "the primacy of politics." Politicization, in general, and patronage, more specifically, has been one means of restoring control.

### 10.3.2   Explaining Types of Patronage

In addition to developing the typology (Panizza et al., 2017) on the types of patronage, our paper attempts to provide some explanation for the appearance of the types of patronage we identify. This paper focuses on the importance of party institutionalization and the programmatic nature of parties as primary explanations for the choices being made. For example, we argue that in institutionalized parties and party systems, the party is the central actor in governing, and hence, partisan trust is more likely to play a role in the selection of patronage appointees. Likewise, more programmatic parties can be expected to focus on the policy roles of the appointees somewhat more than on their political roles.

It should be noted also that the relationships between party and patronage may be reciprocal. While more institutionalized parties will be more likely to utilized types of patronage depending upon partisan trust, that patronage may, in turn, create support for the party. That support is not necessarily the mass support expected in clientelism, but rather the support of policy professionals as well as political actors who are interested in governing.[5]

### 10.3.3   Explaining the Persistence of Patronage

Kenny's arguments about India and Ceylon (Sri Lanka) also point to the path dependence of patronage. Once the pattern of employment was established in the public sector, it is difficult to alter it. In the original argument from the historical institutionalists (Steinmo, Thelen, & Longstreth, 1992), an exogenous shock of some sort—punctuation in the equilibrium—would be required. While path dependence is not, at least in theoretical terms, not so difficult to overcome (see Mahoney & Thelen, 2010), still when an institution such as patronage has been established, it may be difficult to dislodge. Gradual methods of change, such as layering and displacement, may be more effective than direct confrontations with a full-blown merit system.

As Geddes (1991) argues, the movement away from patronage in the public sector is made more difficult by those officials who already have public jobs, as well as

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[5] The additional assumption is, of course, that success in making and implementing policies will lead to political success for the party, and hence its institutionalization is at least a very basic conception of that concept.

by politicians who see the value of retaining their appointment powers. While those politicians in office may want to make their appointees permanent, they may be prohibited from doing so by law and by the opposition of other parties that want to be able to make appointments in the same positions at a later date.[6] The incumbent party may be reluctant to begin a process in which their chances for appointments in the future may be limited. Patronage reform appears to be a game in which no one has an incentive to make the first move.

Merille Grindle (2012) takes a somewhat different perspective on movements away from patronage systems. Indeed, she uses a variety of concepts to explain the movement away from patronage systems (as well as their creation in the first instance). Perhaps crucial among these variables is the level of predictability faced by governments, with those with low predictability wanting a more institutionalized civil service to cope with those difficulties. Furthermore, she (to some extent, like the historical institutionalists) places a great deal of emphasis on the role of events as mechanisms for solidifying or creating a coalition for change.

Even if merit-based systems are created in former patronage systems, their stability and persistence are fragile. Institutionalizing an alternative to a system of personnel recruitment and management that has been in place for decades, if not centuries, is a difficult process; the chances for backsliding are significant. For example, Mendez (2010, 2016) demonstrated how civil service reforms in Mexico were undermined quickly by using a clause in the law intended only for emergencies or exceptional circumstances. Likewise, Ferraro (2006) demonstrated the same sort of subversion of the new system in Argentina.

## 10.4   Coping with Patronage

Given the prevalence of patronage around the world, the desire of many governments (as well as their international donors) to do something about patronage, what are the options for coping with high levels of patronage appointments? This discussion can lead to the development of a dynamic model for coping with patronage.

One means of coping would be to improve the quality of the civil service so that there is less reason to hire individuals from outside. This approach would be viable primarily when patronage is being used to improve the quality of governance and not in cases when patronage is used to reward friends and supporters. This can also be a long and difficult process. Hiring better civil servants will require more money for the public sector. It also changes the regard of public service by members of society, especially by its more talented members. Even without large scale

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[6] The merit system in the United States was built in part by "blanketing in" appointees by presidents. This process began soon after the Pendelton Act that established the civil service (but only covered about 10% of public employees) until at least the Eisenhower administration (Theriault, 2003; Cook, 2015).

injections of money, providing training and exercising greater care in recruitment can produce some improvements in the personnel within a government.

The improving quality of the civil service may have to be coupled with changes in the legal framework that regulates employment in the public sector. These changes will affect the rewards offered to the employees, how they are recruited and retained, and the degree of autonomy they have from political control. Those reforms may be difficult to pass, given that in any case, sweeping reforms are difficult, and incumbent political officials may have good reasons to maintain their options for appointing their friends and colleagues to positions in the public sector.

A second version of using the improvement of the civil service as a means of overcoming problems in governance, and specifically patronage, is to develop "islands of excellence" (Grindle, 2007). Rather than attempting to eliminate patronage and reform the civil service all at one time, the strategy is to focus on a limited number of organizations or policy domains. This strategy has been followed in cases such as Mexico, which created a career service in their electoral institute and then attempted to diffuse the model, albeit with limited success.

A third means of coping with patronage would be to contract out government services to actors in the private sector, whether in the market or the nonmarket sectors. Contracting out, however, could be a (thinly) disguised form of patronage. If the contracts are awarded to the friends and supporters of the political leadership then this is, in essence, patronage through another mechanism. If, however, the contracting is done through an open and competitive bidding system, then some gains in the quality of service provision may be possible. Nevertheless, contracting will be useful primarily for hiring personnel at the lower levels of the administrative system and is of much less use for the policy-making positions in the public sector.

A fourth means of coping with patronage may be to begin to "blanket in" patronage appointments and make their positions permanent. This can be an appealing strategy for political leaders who hold office at the time of making the appointees into civil servants because it means that their appointees will be in government long after the individual leader has left office. An official in office, therefore, would have an incentive to engage in such a process, while those outside and hoping to gain office would have an incentive to oppose this process of making permanent previously patronage positions blanketing in is especially likely to occur when there is substantial party competition, with the leaders of the incumbent party having a significant probability of being replaced at the next election.

We should also note that while "blanketing in" may be the easiest way to reduce the level of patronage in a political system, it may be a very slow way toward creating a merit-based system of civil service recruitment. The individuals being "blanketed in" are themselves political appointees and will be in office (if they wish) for some time after their patron leaves office. Only then will these positions be filled by merit selection. Moreover, if the appointees received their positions because of political criteria rather than merit criteria, the government will be employing less than fully qualified people for a significant period.

## 10.5   In Praise of Patronage: A Dynamic Performance Governance Approach

Much of the discussion of patronage in the public sector assumes that patronage is undesirable as a means of staffing the public sector. Before closing, we should consider for a moment that patronage may not be as completely negative a form of personnel management as usually portrayed. The conventional wisdom in public administration provides, as already discussed, several strong arguments on behalf of the merit system and career public services. Those arguments are based primarily on the desirability of having neutral public servants making decisions on the legal and technical merits of the cases they confront. This decision-making is expected to produce fair outcomes for all citizens, as well as high-quality policy choices. Furthermore, a career public service is assumed to contribute to the stability of political systems (Arriola, 2009), especially those which might be threatened by frequent extralegal regime change.

Those arguments on behalf of the merit system are important, but there are also significant arguments that can be made on behalf of a more patronage-based public sector. The possible contributions of patronage to governance can be forgotten in the pressures from donor organizations, and other reformers, to create a merit-based system. Perhaps most importantly, the advocacy of merit systems assumes that it is possible to create such a system readily with inadequate resources–both human and material–and with intense competition for talent from the private sector.

The first normative argument on behalf of patronage is that it places people in public office who are committed to the program of the government of the day. While career public servants may be technically competent, they may also be indifferent to, or even oppose, the programs of the current government (O'Leary, 2006). Those political leaders want to have individuals working with them who support their programs and who are anxious to make those programs work. Even if career public servants do not oppose the programs being implemented that may not produce the same level of activity found with patronage appointments.

Related to the first point, a more patronage-based public service may be perceived to be more democratic. Just as politicians want public servants who are committed to the policies on which they campaigned, so to do citizens want to see the policies for which they voted implemented as planned.[7] A career civil service may be seen as hijacking electoral promises as much by the public as by political leaders seeking to implement those promises. While democracy also involves the rule of law and should provide some stability, still patronage appointments may be seen as a means of ensuring that the public's preferences expressed in an election are put into practice.

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[7] We do need to recognize that a career civil service is only of a number of factors that may inhibit changes in policies after an election. See Rose (1976). But it is the one that is most commonly cited by politicians once they take office, especially in the contemporary period when "the administrative state" is seen as a major enemy of the people by populist politicians.

Furthermore, the use of patronage appointments enables public officials to create more representative public sectors than those that are created through merit systems (Peters, 2015). The potential to appoint whom political leaders want is especially relevant in societies in which some minorities may, because of inequalities in the education system or speaking different languages, have difficulties in passing formal merit examinations. There is no guarantee that the political leaders will utilize this facility for appointing members of minority groups, but there is the opportunity.

Following from the above, a patronage-based system of recruiting public servants may be more innovative than one dependent upon career public servants. A common, if generally overstated, complaint against the permanent career system is that it becomes entrenched and protects its positions and its policies. While organizational memory and predictability are important virtues in government, so too are innovation and adaptability (see Karo & Kattel, 2018). Therefore, some degree of patronage in an administrative system can reinvigorate the system and facilitate its adaptation to changing needs, both political- and policy-based.

In addition to the potential political advantages of making the public sector more diverse and more representative, representativeness may improve some aspects of performance in the public sector. This is especially true for the delivery of services by "street-level bureaucrats" (Hupe, Hill, & Buffat, 2015). These public employees meet face to face with the public, and these interactions may be facilitated if the clients are being served by public employees who are similar to them. That may not guarantee successful service delivery, but it may facilitate those activities.

Therefore, any simplistic rejection of patronage is likely to be counterproductive, but that said so too is an excessive attachment to the merit system. The task, therefore, is to find some balance between a patronage-based system with its responsiveness to political direction and its adaptability, and a merit-based system with its professionalism and its probity. All governments search for that balance, and each finds at least a temporary equilibrium that suits it. However, that equilibrium is indeed temporary.

From the analysis developed so far, a eufunctional view of patronage emerges. Several factors in favor of patronage, leading to possible community outcomes improvement, can be identified. The appointment, by elected officials, of trustful people to cover key governmental roles may both enhance horizontal and vertical coordination, and therefore governance capacity (Christensen et al., 2016). Patronage appointments may accelerate the pace and quality of implementation of change reforms. Also, a better vertical and horizontal coordination may improve the consistency of policy design, as an effect of the quality and speed of communication between elected officials and their appointees. Such a benefit would also result in better cascaded political goals and implemented actions at an administrative level.

In addition to improving capacity, increased levels of patronage may also increase the accountability of the public sector. Career public servants do have the virtues of being expert and experienced, but they are also protected from political influences by their tenure in office. If these civil servants are not good Weberians and do not follow the directions of their superiors, then there can be major accountability issues. Fortunately, these are relatively rare in the consolidated democracies (but see
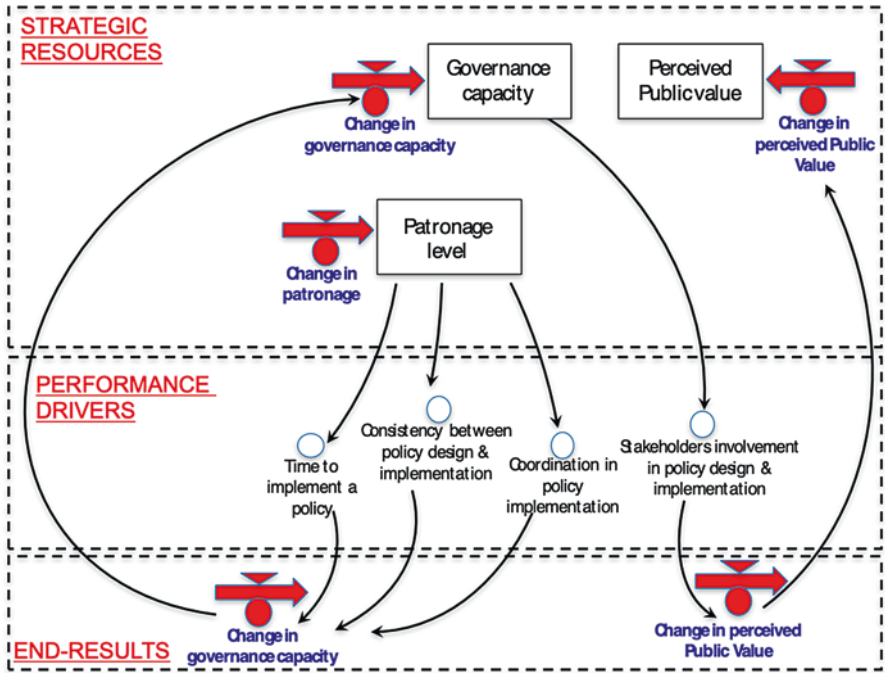
**Fig. 10.4** A "Dynamic Performance Governance" chart to model how patronage may affect community outcomes

O'Leary, 2006), but a more politically responsive set of public employees may enhance accountability.

These benefits arising from patronage appointments could be modeled through a "dynamic performance governance" approach. Such an approach is based on applying "Dynamic Performance Management" (DPM) to Performance Governance (Bianchi et al., 2019). DPM (Bianchi, 2016) may allow us to model the factors impacting on performance governance outcomes (Bouckaert & Halligan, 2008) and examine the interactions among numerous factors within the model.

Through DPM, alternative or complementary means (strategic resources) for improving performance drivers and end results can be identified. To affect performance drivers in a short-medium time horizon, decision-makers must build, preserve, and deploy strategic resources that are systemically linked to each other. Strategic resources are modeled as stocks of available tangible or intangible factors in a given time. Their dynamics depend on the value of corresponding inflows and outflows. Such flows are modeled as "valves" on which decision-makers can act through their policies, in order to influence the dynamics of each strategic resource, and, through them, performance.

As shown in Fig. 10.4, two main outcomes from patronage can be identified. A final outcome is the change in perceived public value. Such outcomes can be affected by a higher capability of government to involve different community stakeholders

in policy design and implementation (Bovaird & Loffler, 2003; Bryson, Crosby, & Middleton Stone, 2006; Emerson, Nabatchi, & Balogh, 2011). This capability can be measured as a medium-term driver of such an end result. It can also be fostered by government through the improvement of governance capacity. As said, a eufunctional approach to patronage can contribute to increasing governance capacity. Therefore, a change in governance capacity can be modeled as an intermediate outcome, i.e., as a "small win" (Ansell & Gash, 2007) for the pursuit of final outcomes.

To generate a positive change in governance capacity, three main performance drivers could be affected in a short-medium time horizon through patronage: (1) time to implement a policy, (2) consistency between policy design and policy implementation, and (3) coordination in policy implementation, at the administrative level. In these terms, an intensive patronage level may reduce the time for implementing policies, increase consistency between policy design and implementation, and improve coordination in policy implementation by government administration. Improvement of each performance driver (in relation to respective benchmarks) may generate an increase in the net change of governance capacity (intermediate outcome).

Therefore, the simplified model in Fig. 10.4 identifies three main strategic resources, from which performance governance can be affected. The ultimate resource is the stock of perceived public value. To improve such stock, the improvement of another strategic resource is necessary, i.e., governance capacity. Also, this stock cannot be purchased directly in the market by government. On the contrary, it could be built up through patronage. So, the patronage level (i.e., the intensiveness of patronage) is a strategic resource on which elected officials may act in order to affect a change in governance capacity and to contribute to improving public value for the benefit of voters.

It is important to observe, however, that nonlinear relationships exist between the mentioned variables. For instance, if an increase in the patronage level is likely to generate an improvement in the three previously described performance drivers impacting on the change in governance capacity, this can be true under at least two conditions. A first obvious condition is that more patronage should correspond to an improvement in the intellectual capital at the administrative level. A second condition is that a too high level of patronage—meaning a too intensive resort to contracts to hire trustful professionals by politicians—might become unsustainable (beyond a threshold level), not only in consideration of limitations imposed by law, but also even because of problems that might arise due to the loss of a stable professional bureaucracy. We do not yet have sufficient information to identify the threshold values, but we do need to consider the potential source of governance problems.

## 10.6   Moving Between Patronage and Merit

We have not rehearsed a set of arguments for and against patronage employment in the public sector. Despite the conventional wisdom favoring merit systems, we are arguing that patronage is neither completely undesirable, and that merit systems are

not completely virtuous. To some extent, the choice of one form of personnel recruitment or the other should be a function of circumstances rather than an ideology about public personnel management. Moreover, in addition to circumstances, the choice of personnel systems should recognize that not all forms of patronage are as potentially damaging as are others.

Patronage arrangements designed merely to reward political cronies or campaign donors are unlikely to produce effective governance. This is the image that most patronage arrangements have with the public and with many students of public administration. On the other hand, patronage designed to recruit talented individuals from the private sector and to supplement the personnel of the public sector with individuals who might not ordinarily take a public sector job can make major contributions to good governance. Thus, we need to be careful in assessing the nature of patronage and public personnel more generally.

We also need to consider patronage and merit employment in more dynamic terms. We have been discussing the forms of employment in static terms, but we are also concerned with how reformers might be able to move employment from one form to another, here including those who might want to increase patronage as reformers. Moreover, we should also consider processes that tend to reinforce existing patterns of employment, making it more difficult to move away from the *status quo.*

## 10.7   Summary and Conclusion

This paper represents an attempt to discuss some of the major issues in patronage and to locate this important phenomenon in public service in the literature on public administration and comparative politics. By necessity, this paper has been selective in the topics covered, as no single paper could hope to do justice to the extensive literature on patronage and the associated concepts of politicization and clientelism. Nevertheless, this paper tries to raise some of the principal issues that should be explored in a comparative study of patronage and its relationship to public administration.

Although patronage is often conceptualized in a rather undifferentiated manner, we have been attempting to distinguish the types of patronage that exist in a variety of political systems. This differentiation is important because not all forms of patronage may be as toxic as usually assumed in the reformist literature. While a well-functioning merit system can produce good governance in most instances, there are tasks within the public sector that are perhaps better performed by patronage appointees who are more committed to the goals of the party and the individual political leader. Thus, unlike most studies of patronage, we adopt a somewhat neutral normative stance and even find some virtues in patronage appointments, albeit within some bounds.

We also have developed a dynamic performance model to explain how patronage appointments may be reinforced over time if they do contribute to the performance

of the public sector. We identify the drivers of performance that may be related to patronage and look at potential feedbacks among the relevant variables. This model could also be used to explain why patronage appointments may be reduced if there is a reduction in public value if the appointees do not actually improve performance.

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# Chapter 11
# Blending Collaborative Governance and Dynamic Performance Management to Foster Policy Coordination in Renewable Energy Supply Chains

**Milton M. Herrera, Federico Cosenz, and Isaac Dyner**

**Abstract**  As the use of renewable energy is growing worldwide, the wind industry is being endorsed as a promising source for clean energy supply. In this context, the strategic management of the supply chain is fundamental to pursue a steady expansion of renewable energy. However, the fragmentation between energy policy design and implementation has been considered as a major cause threatening the effectiveness in managing the supply chain. This problem has been provoked mainly by an unsynchronized and uncoordinated decision-making process that involves public and private institutions.

This chapter proposes the adoption of a dynamic performance management approach for enhancing a collaborative governance perspective aimed at supporting the strategic coordination in designing and implementing wind energy policies in Brazil. Using lessons learned from simulating the supply chain, key performance drivers for mitigating inconsistencies in decision-making processes are identified and discussed. The chapter updates and improves the findings of a research project recently developed by the authors (Herrera and Cosenz, The Electricity Journal, 32(8), 106636, 2019).

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## 11.1   Introduction and Research Objectives

In the last decade, the prevailing literature on energy management and public gov-
ernance has increasingly highlighted the importance of supporting energy policy
design and implementation through robust coordination among stakeholders
(Laquimia & Eweje, 2014; Wee, Yang, Chou, & Padilan, 2012; Wüstemeyer,
Madlener, & Bunn, 2015). Public and private institutions are called to operate for
providing services to communities jointly. The coexistence of multiple stakeholders
interacting can intensify its complexity and fragmentation, thus leading to poor per-
formance levels (Bouckaert, Peters, & Verhoest, 2010). A higher complexity and
fragmented governance are likely to facilitate the outbreak of "wicked problems" in
the decision-making processes of these stakeholders. "Wicked problems" are meant
as public policy and management-related issues hard to define and manage, due to
the high complexity of the environment which they affect. This complexity often
leads to counter-intuitive implications when actions are taken to resolve them (Head
& Alford, 2015). In energy policymaking, for example, disagreements among stake-
holders can occur. These disagreements produce a paucity of strategic synchroniza-
tion and setbacks between the formulation and execution of policies influencing the
functioning of the renewable supply chains.

The energy supply chain performance is pushed by the actors' operational capac-
ity, which influences the reaction time whenever the energy demand changes
(Saavedra, Fontes, & Mendonça Freires, 2018). While the renewable energy indus-
try in recent times increased on a global scale, its logistic processes are coupled with
the delayed operation of wind farms affected by the lead times across the supply
chain. In this view, the bottlenecks associated with supply chain processes create a
negative influence on the energy supply security, in terms of high freight expendi-
tures and operational constraints (Nogueira De Oliveira et al., 2016; Prostean,
Badea, Vasar, & Octavian, 2014).

### 11.1.1   Objectives

Fragmentation in energy policy design and implementation creates delay in energy
supply operations, poor performances and lack of policy coordination. This chapter
aims to explore how to support decision-makers to foster policy coordination in
renewable energy supply chains. To this end, this chapter proposes the adoption of
a methodological approach based on the combination of "collaborative governance"
and "dynamic performance management". Such a combined approach aims at

boosting the cooperation among the numerous stakeholders interacting all over the renewable energy supply chain at a decisional level (Ansell & Gash, 2008; Wee et al., 2012). Collaborative governance is oriented to decrease breakups in policy-making as well as coordinate the different forces when wicked problems occur. The process involves public and private stakeholders in participatory roundtables with public institutions to join consensus-oriented decisional settings. Such a collaboration is further assisted by performance management tools based on system dynamics (SD) simulation modelling (Bianchi, 2016; Bianchi, Bovaird, & Loeffler, 2017; Cosenz, 2017; Cosenz & Noto, 2016; Torres, Kunc, & O'Brien, 2017). Known as dynamic performance management (DPM), such an approach applies a systemic viewpoint to define key performance drivers nurturing energy policy coordination across the wind power supply chain, and also exploits emerging simulation scenarios for enhancing the strategic learning processes of participants.

This mixed method has been used for analysing the Brazilian energy sector, which enables to evaluate its effectiveness in a market characterized by great growth potential, such as wind power production. In recent years, the increase in both population and economy implied a rise in energy utilization in Latin America. In this context, Brazil reinforced its role of major producer and consumer of hydroelectricity (Solarin & Ozturk, 2015). Nevertheless, the generation level of hydroelectricity changes based on climatic conditions, thus affecting the energy supply security (De Lucena et al., 2009; de Queiroz, Marangon Lima, Marangon Lima, da Silva, & Scianni, 2016; Herrera, Dyner, & Cosenz, 2017; Von Sperling, 2012). The production of wind power may represent an answer to such a complexity as it is an appropriate supplement for the conventional hydroelectricity production. Many experiences and analyses remark a robust complementarity between hydroelectricity and wind power in the seasonal routine of Brazil (Schmidt, Cancella, & Junior, 2016; Silva, Pimenta, Assireu, & Spyrides, 2016). Even if wind power may represent part of the solution to meet with an increasing power consumption, the electricity transmission capacity in Brazil still remains unsatisfactory (Herrera, Dyner, & Cosenz, 2019). The lack of transmission capacity provoked by delays in the transmission infrastructure construction can generate problems of congestion among the regions, which affects the security of energy supply (Herrera et al., 2019; Ochoa, Dyner, & Franco, 2013). As a result, the planning process along the renewable energy supply chain has been affected.

In the Brazilian context, the reliance on hydroelectricity and the susceptibility of renewable resources based on climate changes enhance this difficulty influencing the decisional process. Consequently, in recent times considerable political reforms have been introduced to regulate the Brazilian wind industry (for instance, the revocations of wind auctions by December 2016 based on dropping electricity demand). In such a background influenced by vagueness and dynamism, instead of optimization methods, simulation tools may play a significant role for long-term decision-making (Dyner & Larsen, 2001; Ghaffarzadegan, Lyneis, & Richardson, 2011; Torres et al., 2017; Wheat, 2010). All the above conditions heavily affect the performance of wind power supply chain, making this case study appropriate for our research purposes.

This chapter is divided into six sections. Section 11.2 discusses the theoretical background in two perspectives: the asynchronous decision-making effect on the performance of the Brazilian wind power supply chain, and the strategy development process with SD modelling. Section 11.3 explains the DPM model and its causalities. Section 11.4 illustrates the emerging simulations based on the effects of both unsynchronized and synchronized policies applied to the supply chain. The core findings associated with strategic learning and performance management of the wind power supply chain are discussed in Sect. 11.5. The concluding section includes final remarks and future research perspectives.

## 11.2   Background

This section illustrates two complementary views whose combination may contribute to manage wicked issues in the wind power supply. The first view highlights the necessity for adopting collaborative governance approaches to improve policy coordination along the wind power supply chain, whereas the second view proposes the adoption of DPM to enhance this collaborative governance and, consequently, policy coordination among the key actors interacting throughout the supply chain.

### 11.2.1   *Challenges of Wind Power Supply Chain*

The stakeholders' structure in the wind power supply chain is divided into two parts: upstream and downstream (Yuan, Sun, Shen, Xu, & Zhao, 2014). The upstream supply chain comprehends equipment manufacturing and wind farm development. Grid companies and customers compose the downstream supply chain of wind power. The wind power supply chain can be intended as a network of multiple actors with different objectives and complex systemic relations, which is likely to produce conflicts of interest that affect the performance along the supply chain. In this regard, relations among stakeholders have been one of the important themes of analysis in the energy supply chain management literature (de Gooyert, Rouwette, van Kranenburg, & Freeman, 2017; Matos & Silvestre, 2013). In the electricity sector, the collaboration among specific strategic choices depends on the level of policy coordination. Therefore, policies influencing the wind power supply chain generate performance dynamics which substantially and steadily differ from projected trends.

The paucity of coordination and synchronization among actors represents a key challenge and a chance for supplying wind power. A regular improvement of their cooperation along the supply chain enables to enhance the results through strategic planning tools (Rubiano & Crespo, 2003), whereas the synchronization among stakeholders permits to limit the difficulties related to the energy supply delays (Herrera, Dyner, & Cosenz, 2018). Wee et al. (2012) argue that the impediments in

the supply chain might be limited whether governments, scholars and other players coordinate their efforts to manage renewable energy growth.

In addition, the operations carried out across the supply chain are influenced by decision-makers by matching the standard operating conditions related to the resource distribution with the desired goals. The decisional process comprises the absorption of policies, as well as an evaluation of supply chain needs, e.g. the detection of essential skills and capabilities at the operational level. Since decision-makers deal with resource allocation, governmental bodies must formulate and apply policies oriented to nurture the accumulation and depletion of such assets. A dynamic evaluation of energy supply chains can facilitate a deeper understanding of how to coordinate policy design and desired goals of the electricity sector, and also to handle the system of strategic resources fuelling the wind power supply chain (Bianchi, 2016; Dyner & Larsen, 2001).

Although there is a remarkable growth of wind farms in Brazil, the transmission infrastructure is inadequate to sustain the development of wind power. The delays in the distribution of new transmission lines defer wind farm building capacity (Bayer, 2018; De Melo, Jannuzzi, & Bajay, 2016; Miranda, Soria, Schaeffer, Szklo, & Saporta, 2017). The value generation along wind power supply chains shows multiple levels associated with decision-making processes. For example, Wüstemeyer et al. (2015) examined the added value for the European onshore and offshore wind installations. These scholars proved that the more complex logistics and construction processes onshore wind installation produce a greater added value close to the consumers. In addition, Yuan et al. (2014) demonstrate the relevance of transmission firms to incorporate wind power into the system, thus fostering the added value to the consumers throughout the supply chain.

In the Brazilian system, the delays in electricity network building represented a limitation for the technological advance of the wind industry that significantly influenced value generation (Bayer, 2018; Hunt, Stilpen, & de Freitas, 2018; Matos & Silvestre, 2013). Such a condition is caused by the uncoordinated and asynchronous application of energy policies among the different stakeholders, thereby generating "wicked problems" in the energy supply security. This fact may be framed by virtue of the interdependencies between a micro-level—i.e. business-level learning (e.g. wind farms)—and a macro-level—i.e. societal learning (e.g. governments and public institutions). In such an environment, the possibility to use collaborative governance settings is affected by the speed and focus of these learning processes (Purdy, 2012; Zadek, 2006). Collaborative governance is intended as a process where different stakeholders (e.g. public and private organizations) work together and develop, apply and supervise guidelines offering long-term explanations to widespread challenges. Ansell and Gash (2008) maintain that collaborative governance provides a consensus-oriented answer to the breakdowns of downstream application and the significant expenditure and politicization of rules. Thus, collaborative governance is an alternative approach that allows improving the decision-making processes among actors.

The Brazilian case reports an early application of collaborative governance approaches (Laquimia & Eweje, 2014). During the 2002 elections, Luiz Inácio Lula

da Silva (leader of the Workers Party) suggested the implementation of collaborative governance programs seeking to placate a worried national business community and to reassure global financial markets (Peña, 2014). In the post-election, Lula's introduced a Commission including multiple private firm representatives and civil society leaders to support the design of economic policies, thus exposing his willingness towards a method involving business, labour and civil society into the governmental policymaking. In this setting, great importance was given to the adoption of a corporate responsibility perspective to induce a common feeling about the necessity and legitimacy of a broader involvement of businesses in the socioeconomic growth of Brazil (Zadek, 2008), in which during the past the business community played a significant role in overcoming the previous undemocratic conditions. That is, the promotion of collaborative vision brought an increase of corporative responsibility in Brazil.

Thus, based on these antecedents, the use of collaborative governance in the formulation/implementation of energy policies aims at facilitating both shared understandings and social interactions among policymaking governance agents around the formal conceptualization of action plans oriented to solve emergent wicked problems. The possibility to effectively use collaborative governance in the formulation/implementation of energy policies from multiple actors calls for the use of performance management mechanisms aimed to frame the different interrelated stages throughout the supply chain and corresponding responsibilities. On this concern, the adoption of DPM offers a reliable methodological support for involving and assisting the actors of the energy supply chain.

## 11.2.2 Using DPM to Boost Collaborative Governance and Policy Coordination

Establishing an effective collaborative governance approach is quite difficult due to the possible disagreements between individual and mutual objectives, as well as in resource negotiation and distribution, or a divergent strategic perspective among the actors. Therefore, implementing collaborative governance needs a common methodological method to govern supply chain results. Indeed, aiming at stimulating a shared perspective of the whole value generation mechanism, such a method entails to consider output indicators (i.e. short-term results produced by each stakeholder), as well as outcome indicators (i.e. long-term results produced by the combined impact of stakeholders). The use of performance indicators supports governance representatives in identifying shortages and loosely coupled interactions throughout the energy supply chain. As a result, a collective understanding of these actors might facilitate strategic decisions in terms of resource allocation and coordination systems, thus fostering the resolution of disagreements among involved actors.

Building a mechanism based on outcome and output indicators for supporting collaborative governance is a great challenge to adopt a wider view of performance

management implications, and also to offer growing advantages to the external environment in terms of quality of life conditions and energy supply security (Brannstrom et al., 2017; Juárez, Araújo, Rohatgi, & De Oliveira Filho, 2014; Pollitt & Bouckaert, 2004). The relevance to assess outcomes in the public domain is based on the circumstance that, differently from enterprises, there is no bottom line against which results can be evaluated. Whereas measuring short-term results of a specific organization is commonly believed possible (output), difficulties turn up when to assess the long-term effect generated by the combined impact—in terms of outputs—of several public/private institutions (e.g. the actors of the renewable energy supply chain) on the territorial area where they work (outcome). Indeed, the complex interaction between these actors, an idiosyncratic perspective of public performance management and the lack of "robust" coordination generate critical methodological issues to design and model outcome-based performance measurement systems.

From a collaborative governance perspective, with the intent to limit the above difficulties in assessing outcome, a strong coordination among multiple products and institutions (internal and external coordination) and a consistent method to design performance management are necessary. A outcome-based performance management approach can serve for this goal, as time disjunctions between operations and results, and non-linear feedback linkages influencing outcomes, obstacle decision-makers to comprehend the structure and behaviour of the system where emerging policies are adopted (Bianchi et al., 2017). Such a method enables to handle potential threats associated with unintended implications of policies that, even if they may appear consistent from a static and bounded view, may generate failures in the long term due to a paucity of coordination (Bianchi et al., 2017; Ghaffarzadegan et al., 2011).

Such a method aims at supporting policymakers in integrating performance measurement reporting and policy formulation. This coordination facilitates policymakers and other public sector operators to identify the sources and determinants which generate results over time. In addition, it supports the diagnostic mechanism to define corrective interventions and plans aimed to fill the gap between the actual and the expected performance.

This method entails the detection of end results (i.e. output and outcome) and the associated value drivers. To influence these drivers, decision-makers are called to build up, safeguard and use an endowment of strategic resources. Decisions made by multiple decision-makers on common resources must be coordinated with the other actors according to a systems perspective. Specifically, strategic resources must offer the ground to support and nurture others within the system. The feedback loops regulating the functioning of the strategic resources indicate that the flows influencing these resources are assessed over a time lag (Bianchi, 2016). Accordingly, recognizing how time delays affect strategic resources and related results is a core task for managing performance in complex public domains, such as the energy sector.

Figure 11.1 shows how end results offer an endogenous source for increasing and depleting the strategic resources which cannot be acquired from the market. These resources are created by management routines, e.g. reputation, organizational
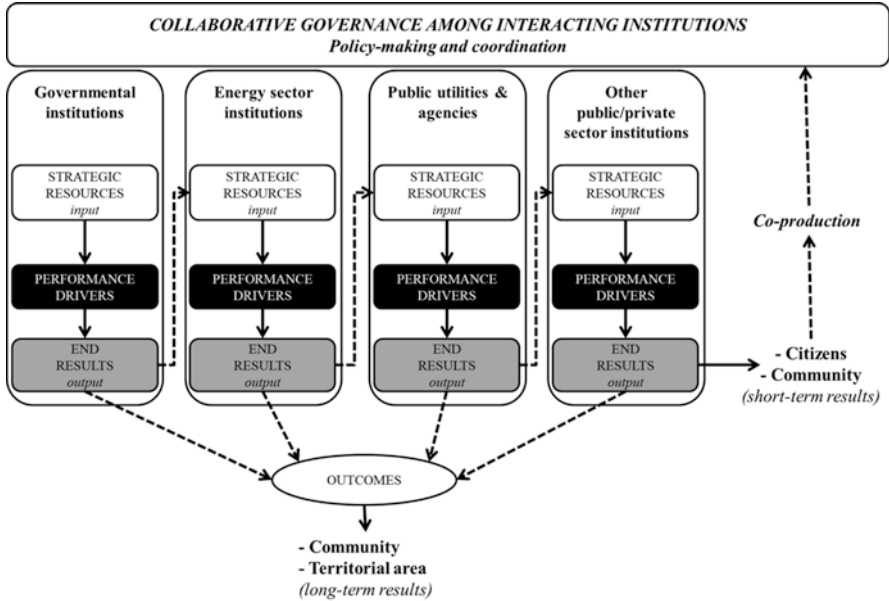
**Fig. 11.1** A collaborative governance approach supported by dynamic performance management framework. (Adapted from Bianchi (2016, p. 73))

climate, image and workers burnout (Bianchi, 2016). End results correspond to in- or outflows changing the stocks of the corresponding strategic resources over a given time horizon, as a consequence of operations or strategies adopted by decision-makers.

Performance drivers are related to those critical success factors which are specific for the public sector under observation. They are assessed in relative terms—as a ratio between the actual result and a target value. Such a denominator must be gauged concerning perceived past performances or users' expectations.

Using such a method enables to define the policy choices designed to influence those strategic resources which, in turn, produce an effect on performance drivers, and consequently the end results, that will fuel the strategic resources of the organization placed downward the supply chain (i.e. inputs). Such a performance management view is not limited to a specific organization. Instead, a single player operating in a broader system aims at using performance indicators evaluating the long-term impact of adopted policies. A system-wide perspective of performance also needs to be associated with an internal view by each institution, thus enhancing strategic coordination among the stakeholders aimed at improving their combined contribution to the whole system.

Eventually, the citizens and communities—who receive the outputs produced by the supply chain actors—may also participate in policymaking processes through *co-production* actions aimed to improve the offered products/services (Bianchi et al., 2017).

## 11.3   Energy Supply Chain Modelling

### 11.3.1   *SD Modelling for the Wind Power Supply Chain*

As previously mentioned, limiting uncoordinated and unsynchronized energy policies entails the use of a consistent methodological support to supply chain modelling. Modelling supply chains offers a more accurate assessment of significant elements interacting into the system (Campuzano, 2011). SD modelling improves the possibility to comprehend the assimilation of strategic proposals from different stakeholders during the model building process (Cosenz & Noto, 2017). In addition, this approach is adopted to experiment with different policies and strategies, thereby deepening the analysis through performances drivers within the energy supply system.

This research developed a stock-and-flow diagram to analyse decision-making affecting the wind power supply chain, as illustrated in Fig. 11.2. The stock-and-flow diagram aims to replicate the dynamic behaviour of the wind power supply chain in Brazil. This diagram shows the coupling between suppliers, the wind industry and wind farm developers. It has also related the supply chain with the electricity market dynamics and installed capacity of transmission. The stock-and-flow diagram may support decision-makers to simulate the behaviour of the wind power supply chain to assess alternative energy policies in Brazil, particularly regarding coordination among stakeholders under current conditions.

The feedback structure shows the decision rules of used inventory by the supply chain to develop the installed capacity of wind power. This feedback structure is based on structure diagrams included in earlier works (Dyner, 2000; Herrera et al., 2018; Sterman, 2000). The main addition in this work is the convergence of supply chain structure with the transmission component. The SD model includes five negative feedbacks (known as balancing loop). The inventory control loops, B1, B2 and B3, represent the decision structure of inventory management for the supply chain, including work in process (i.e. industry WIP). For instance, the balancing loop B1 adjust the production capacity of the *suppliers' inventory* (SI) according to their respective *desired parts inventory* (DI). The *inventory corrections* (IC) of delayed orders are determined by the *time delays* (TD), as shown in Eq. (11.1).

$$IC = \frac{(DI - SI)}{TD} \tag{11.1}$$

Given that the auction-based policy for wind power supply chain is determined by the changes in electricity demand, the electricity price can be affected; therefore, it generates an effect on the *installed capacity of wind power* (ICWP). Thus, the electricity price is determined by the capacity margin (i.e. reserve margin). The reserve margin is considered as the difference between the installed capacity of wind power and peak demand, divided by peak demand.
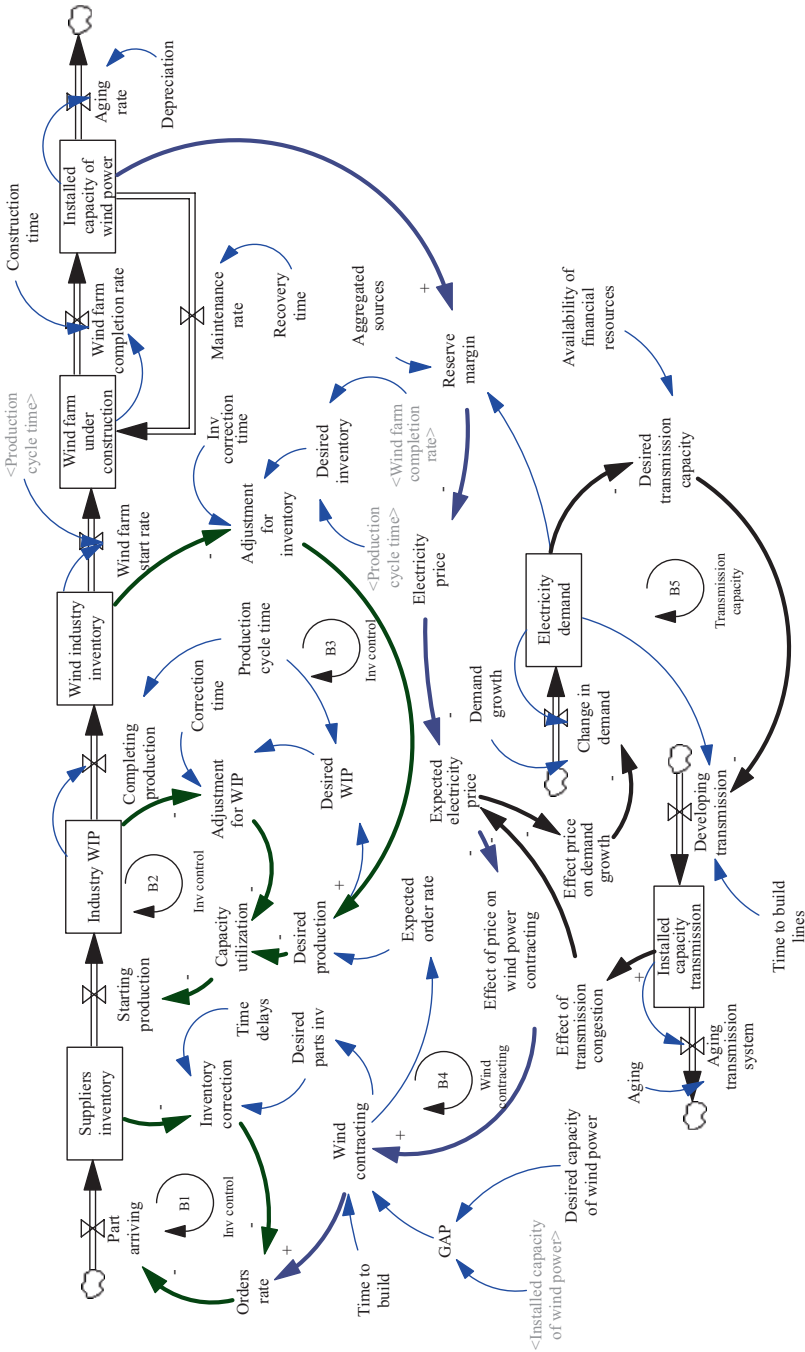
**Fig. 11.2** Stock-and-flow diagram of wind power supply chain in Brazil

The contracting loop (B4) represents the energy policy structure of the wind power supply chain. This structure depends on both auctions policy (i.e. wind contracting—WC) and *time to build* (TB) the installed capacity of wind power. Besides, changes in policies affect the goals of wind power expansion, which causes discrepancy. The discrepancy is formed by the GAP between the desired capacity of wind power and the current installed capacity. Equation (11.2) shows the contracting decision rule of wind power.

$$WC = MAX\left(0, ICWP * GAP / TB\right) \qquad (11.2)$$

The simulation model takes into account the values of average bids (1.8 GW) on wind power in the last 10 years (Agencia Nacional de Energía Eléctrica-ANEEL, 2017).

The balancing loop (B5) represents the decision rules that determine the capacity of transmission according to the electricity demand. The building of transmission (BT) was calculated considering the desired transmission capacity (KT), electricity demand (ED) and the time to build lines (TBL), as shown in Eq. (11.3).

$$BT = \frac{\left(KT - ED\right)}{TBL} \qquad (11.3)$$

### 11.3.2   Model Validation

The validation process generates the confidence to accept or reject the model outcomes (Campuzano, 2011; Oliva, 2003; Qudrat-Ullah & Seong, 2010). Thus, this ensures that the simulation model describes the structure which generates the dynamic behaviour of the system under observation. This section presents the results of the validation process for the Brazilian wind power supply chain. The forecasts used in the validation model of wind power and electricity demand was based on several sources (ANEEL, 2017; Ministerio de Minas e Energia, 2007).

The mean squared error (MSE) is a measure of the average squared difference between the estimator and outcomes. An excellent decomposition of MSE is the Theil inequality statistic that provides a measure of the error in the predicted values of simulation through the components of the mean ($U^m$), variance ($U^S$) and covariance ($U^C$). The error decomposition analysis for the variables installed capacity of wind power and electricity demand is presented in Table 11.1. Considering the UC is the major magnitude error, both installed capacity of wind power (71%) and elec-

**Table 11.1**  Error analysis of the simulation model

| Variable | MSE | $U^m$ (%) | $U^S$ (%) | $U^C$ (%) |
|---|---|---|---|---|
| Installed capacity of wind power | 0.004 | 28 | 1 | 71 |
| Electricity demand | 0.006 | 40 | 12 | 48 |

tricity demand (48%) in the simulation replicas the trend in the historical data almost perfectly but diverges point-by-point. The $U^m$ indicates closeness in the mean of actual and simulated values with similar dominant trends. Results of the variance ($U^S$) show that the error is due to little trend variation, so it is unsystematic. Thus, the fit between the model and historical trend is particularly strong for representing the behaviour of the system.

### 11.3.3    Limitations

The simulation model considers scenarios of policy coordination through combination DPM and SD. The scenarios analyse, in particular, how insufficient policy coordination affects the wind power supply chain in Brazil. To this end, this model does not conduct alternatives wind power as well as does not examine arguments against the use of wind power, issue addressed by other studies (Gorayeb, Brannstrom, de Andrade Meireles, & de Sousa, 2018).

### 11.3.4    Supporting SD Modelling Through DPM
###              for the Renewable Energy Supply Chains

To manage wind power supply chain performance and foster collaborative governance, a DPM approach is used. Figure 11.3 shows the DPM framework concentrating on policy coordination mechanisms across the supply chain. The upper section illustrates the key actors of the wind energy supply chain, and also those policies linked to the shared goal of expanding the wind power market share. To detect the end results of supply chain players, a dynamic relationship between a set of components was used through a DPM approach. Such a perspective aims at understanding how strategic resources may affect performance drivers and end results in the supply chain. Particularly, this perspective enables us to define a set of measures related to wind power to evaluate the effects of adopted policies along the supply chain.

The DPM framework shows the following end results: (1) change in parts and components for the wind industry, variation in production of the wind industry and change in the construction of wind farm and amount of developed transmission lines over time, as a results of the energy and industrial policies; (2) change in electricity demand growth, as a result of the market conditions.

Performance drivers have been designed by analysing those factors influencing the end results. As for industrial policy design, the difference between desired and current inventory affects the change in production cycle time for suppliers and the wind industry. This condition needs time to adapt production capacity, thus producing delays in the installed wind power capacity. Such an indicator measures the
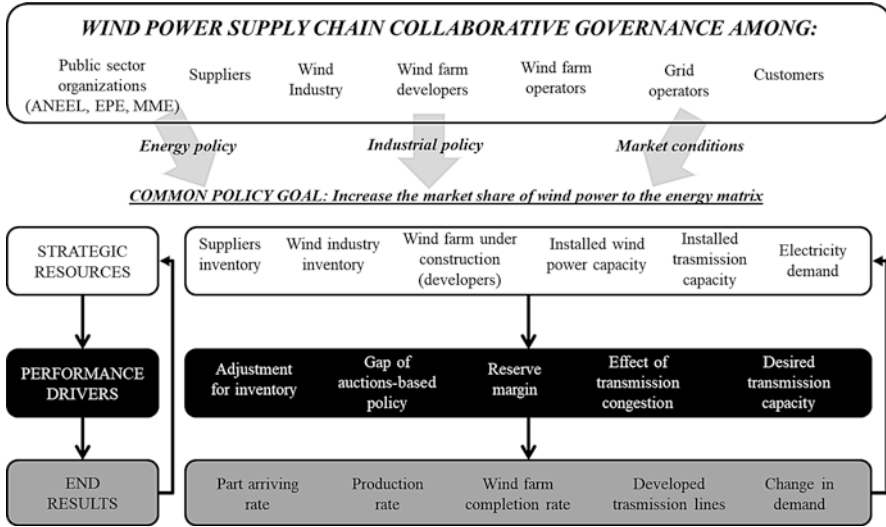
**Fig. 11.3** Employing a collaborative governance approach to the wind power supply chain

operational response capacity of the supply chain affecting the change in production plans.

Concerning the design of energy policies, the DPM chart identifies two key performance drivers. The first driver analyses the energy policy gap identified as the discrepancy between the current wind power installed capacity and the planned target value. The second one assesses the disposal of financial resources for building transmission capacity, which is affected by the electricity demand. Such indicators are likely to facilitate policymakers in proposing alternative strategic resource allocations.

Likewise, the DPM chart includes two performance drivers related to the market conditions, i.e. the reserve margin and the effect of transmission congestion. The first driver considers the gap between the installed capacity and the peak demand, divided by peak demand. Such an indicator influences the electricity price affecting the electricity demand. The second one is associated with the paucity of transmission lines (i.e. transmission congestion), which again affects the electricity price. Such drivers change the behaviour of the auctions market, thus affecting the wind power expansion in Brazil.

The allocation of strategic resources depends on the decision-making processes and influences the corresponding performance drivers. Examining the causal connections between resources and drivers helps management information and reporting for enhancing both strategic planning and policy coordination. In such a context, the strategic resources incorporate the inventories of the supply chain influencing the wind power installed capacity, and also its demand in the electricity market.

### 11.3.5  A System Dynamics Model of Wind Power Supply Chain

The use of the DPM framework may effectively facilitate policy formulation, coordination and application. SD modelling offers a supplementary methodological boost to the DPM chart. This section shows the integration of SD with DPM, thus allowing decision-makers to detect and understand the changes in energy and industrial policies. Figure 11.4 shows the emerging model of the wind power supply chain based on blending the DPM chart and the stock-and-flow diagram. This model, namely, highlights the relation between performance drivers and results, contributing to fuel associated strategic resources in the wind power supply chain.

## 11.4  Simulation Results

This section reports the main findings of the case study of wind power supply chain. By analysing two simulation scenarios, the results of the model show the effects that uncoordinated and coordinated policies might produce on the operational capacity of the supply chain. Table 11.2 describes both scenarios designed to evaluate the auction policy reform based on the model's Eqs. (11.2) and (11.3). The simulation scenarios exhibit the response capacity of the wind industry determined by the amount of electricity which it could generate in the long run. With the intent to coordinate transmission auctions and wind generation, the regulator may adopt arguments considering a collaborative governance coefficient and standard deviation of annual demand. These arguments contribute to the evaluation of coordination and synchrony in policy/decision-making.

### 11.4.1  Results Without a Coordinated Policy

With the intent to realize this scenario, the energy policy—in terms of bids of the wind power auction—has changed in the simulation settings. Such a scenario does not take into account a collaborative governance approach to construct generation and transmission capacity along the supply chain. Figure 11.5 illustrates the behaviours of the production rate and wind farm completion rate. These trajectories suggest that the wind farm response capacity to a 1.8 GW increase in the power auction bids produces a divergence between manufacturing and construction due to the delays in the bidding process influencing the expansion of wind power. This may involve a significant order backlog in the long run. Therefore, the correction of response capacity to align the supply chain actors generates a considerable increase.

Simulation results reveal that the wind farm completion rate grew up by 62% in the simulation interval (calculated as the peak wind farm completion rate divided by
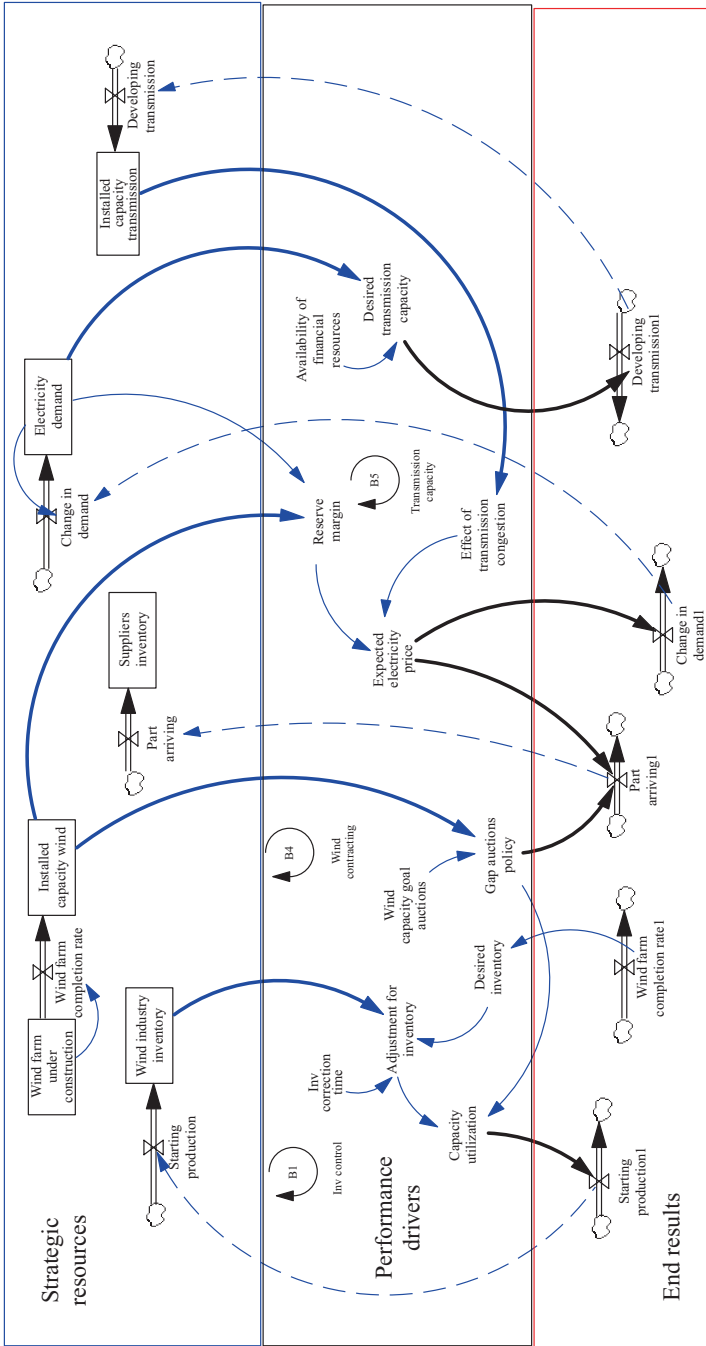
**Fig. 11.4** An SD-based DPM model showing the effects of auctions policy on the wind power supply chain performance

**Table 11.2** Scenarios for analysing coordination impact of policies on wind power supply chain

| Scenarios | Definition of scenarios | Policy |
|---|---|---|
| Scenario 1 | Uncoordinated policy | $BT = \dfrac{(KT - ED)}{TBL}$ $WC = MAX\left(0, \dfrac{EPWC * GAP}{TB}\right)$ |
| Scenario 2 | Coordinated policy | $BT = \dfrac{(KT - ED)}{TBL * \delta * S_{ED}}$ $WC = MAX\left(0, \dfrac{EPWC * GAP}{TB * \delta * S_{ED}}\right)$ |

$\delta$ Collaborative governance coefficient
$S_{ED}$ Standard deviation of annual demand
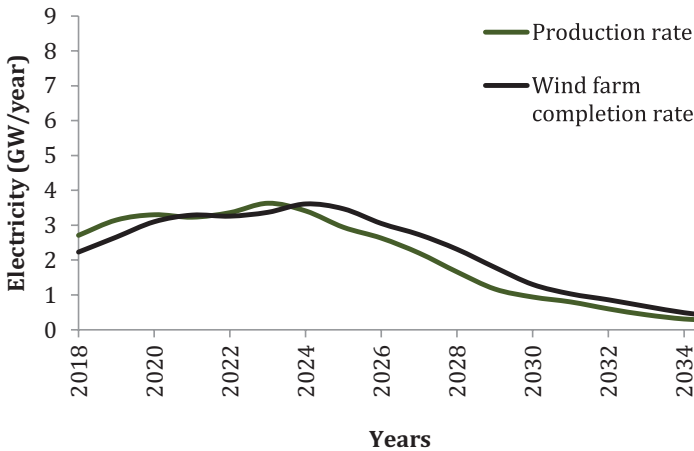


**Fig. 11.5** Behaviour of end results with uncoordinated policy due to change in the auctions

the initial value), whereas the production rate rises by 34%. Hence, the wind industry amplification ratio—corresponding to the fraction measuring the highest change in the output and input—is equal to 1.81%. This amplification ration is influenced by an increase in delays along the wind power supply chain. Delays in the reaction to changes in the industry by wind farms developers could influence the strategic resources. Such a circumstance underlines how an auction-based policy is likely to generate an effect on indicators due to the delays widening the amplification ratio.

The gap between actual and desired inventory may produce disadvantages to stakeholders throughout the supply chain, e.g. surplus and shortages. Figure 11.6 illustrates the gap in supply chain inventory in comparison with the desired inventory. Such a condition depends on the delays for constructing wind farms and unsatisfactory bids for wind auctions (i.e. fragmentation in energy policy formulation and
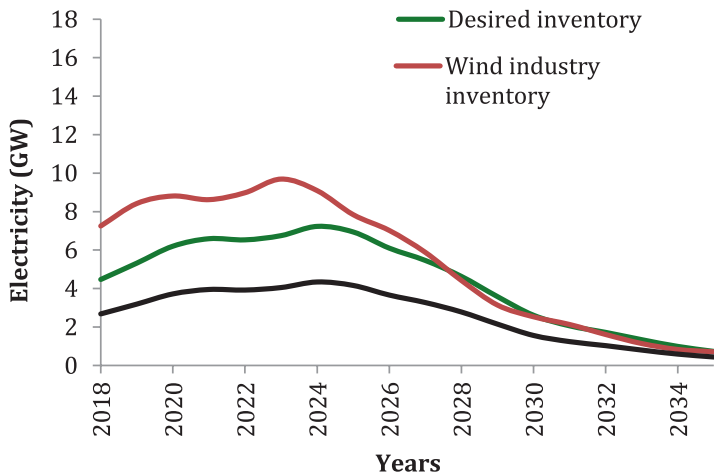
**Fig. 11.6**  Response of strategic resources to the uncoordinated policy in the supply chain

application). These results reveal that the delays between the adjustment time and their impacts on resource inventories cause a surplus in the supplier's inventory, whereas the developer's inventory reports deficiencies in comparison with the desired inventory. In addition, the firm's suppliers experience wider changes in inventory than the entire industry. Therefore, the supply chain capacity must be increased when changes in the energy policy occur, thus enhancing the agreement between the private and public sectors.

The desired inventory trend depends on the changes in wind power auctions, thereby influencing the decision-making of supply chain stakeholders. Based on the result of strategic resources to the uncoordinated policy, the supply chain amplification ratio for each stakeholder is equal to 60% of the desired inventory, 60% for developers and 34% for industry. This indicates that a lack of coordination among actors exists, and therefore, actions aimed to close the gap to reach the desired inventory are required.

### 11.4.2  Results With a Coordinated Policy

To introduce a coordination policy for wind energy, the wind power auction bids have been through an increase of 1.8 GW per year, since 2018 up to 2035. Figure 11.7 illustrates the trajectory of both wind farm completion and production rate with delayed wind auction bids equal to 6 months. Moreover, such a scenario assumes two coefficients related to the construction time; they are demand uncertainty and collaborative governance. Taking into account the auction policy adjustments, the behaviour predicts a rapid response capacity of the completion rate of wind farms to the changes in the wind industry production rate. Such a condition encourages a
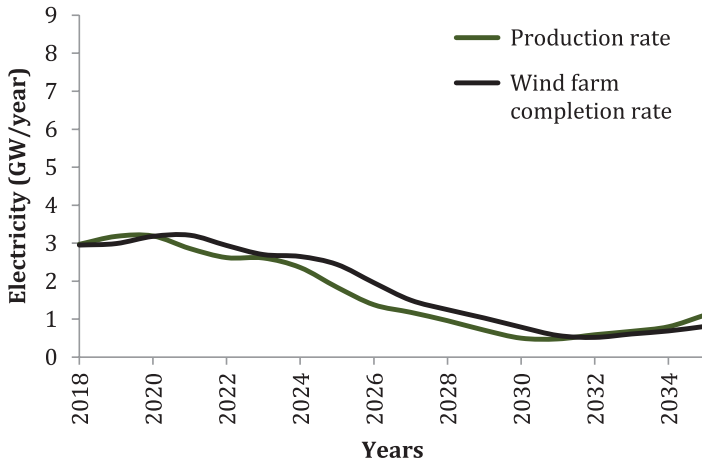
**Fig. 11.7** Behaviour of end results with coordinated policy due to change in the auctions

substantial expansion in the wind power installed capacity. As a consequence, limiting the delays in transmission line construction and the steady increase in wind auctions may nurture the coordination among supply chain stakeholders. Thus, the strategic dialogue among stakeholders can be achieved through the design and implementation of coordinated and synchronized energy policies as the effect of performance drivers on the supply chain outcomes shows up.

Looking at the simulation of the amplification ratio, they display an increase in the wind farm completion rate equal to 9%, whereas the production rate rises up to 7%. In addition, the coordinated policy affects the ratio of maximum change in the output and input for the wind industry reporting a value of 1.19%. This result differs from the one obtained through the adoption of an uncoordinated policy equal to 1.82. Such a remarkable discrepancy is associated with the response capacity, which, in turn, shows the results influencing strategic resources across the supply chain (Herrera et al., 2019).

As portrayed in Fig. 11.8, simulating the supply chain behaviour illustrates the reaction of strategic resources depending on the desired inventory changes. By virtue of the fact that a coordinated policy influences the desired inventory, the strategic resource response capacity to the inconsistency of the supply chain improves. Furthermore, the supply chain amplification ratio produces better results if compared with those emerging from the adoption of an uncoordinated policy (i.e. 8% to industry, 9% to desired inventory and 9% to developers). This condition is produced by a balance between the interest of each actor and the interdependency among them within the supply chain (i.e. collaborative governance), which contributes to providing a resilient response to uncertainties or perturbations.

Summing up, the wind power supply chain performance depends on the capability of the system to distribute energy as soon as the wind farms are constructed, meaning that all wind power supply chain stakeholders are synchronized, thus limiting the waste of time in building transmission lines.
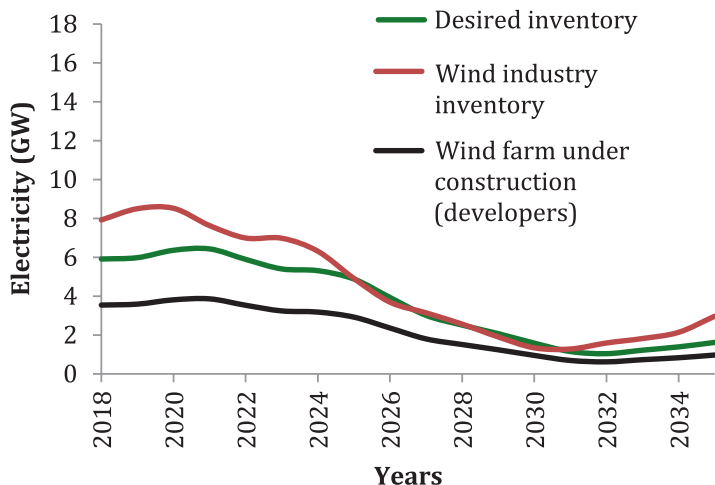
**Fig. 11.8** Response of strategic resources to the coordinated policy in the supply chain

## 11.5   Discussion

### 11.5.1   *Contributions to the Supply Chain Management*

Every organization requires learning as a precondition for its development (Bianchi, 2016). The use of policy modelling supports decision-makers to learn and understand the causes of policy application shortcomings hampering the system's improvement (Ghaffarzadegan et al., 2011; Wheat, 2010). The creation of interactive learning environments enables to experiment with alternative policies, thus offering an evaluation of the potential results achievable by implementing strategies oriented to reducing the constraints related to energy policy execution. This chapter show simulation scenarios which can be used for understanding how policy adoption and decision-making influence the wind power supply chain system. These scenarios facilitate the assessment of auction-based policy associated with the strategic choices of policymakers and stakeholders along the supply chain. On this regard, DPM and SD enable the design of performance drivers affecting the supply chain structure and its performance.

The challenges related to an irregular power generation caused by climate modifications and the complex interactions among the supply chain stakeholders call for the adoption of alternative strategies to limit and manage the uncertainty characterizing such a system. By virtue of this fast-changing conditions, the wind industry must use strategy design and assessment methods able to understand the impact of sustainable policies in the long run (Herrera et al., 2018). SD simulation models provide a fertile soil to explore and manage the uncertainty related to the electricity market, thus serving as a tool for policy evaluation (Aquila, Rotela Junior, de Oliveira, & de Queiroz, 2017; Dyner, 2000; Ford, 1997). Following this view, this

chapter examined simulation scenarios aimed at nurturing the supply chain coordination by blending DPM with collaborative governance.

Unlike the conventional economic model centred on fossil fuel, the green economy is a novel paradigm for sustainable growth since it focuses on renewable energies thereby attracting the interest of private and public stakeholders (Cucchiella & D'Adamo, 2013). Consequently, encouraging the use of renewable energy by improving the associated supply chain is the main concern in the agenda of policymakers. Nevertheless, the disagreement which may show up in promoting renewable energies emphasizes the necessity to identify the trade-offs of corresponding policies (Bayer, 2018). For example, the paucity of steady political involvement is a key constraint for the future of wind power generation in countries such as Canada and France (Feurtey, Ilinca, Sakout, & Saucier, 2016). Such a condition is also reported in Brazil where its electricity market suffers from a discrepancy between the expected and actual results of policies oriented to foster both the energy generation and transmission system (González, Gonçalves, & Vasconcelos, 2017). As a result, this research explored the assessment mechanisms related to energy policy impacts by analysing the delay between policy design and implementation.

### 11.5.2 Contributions to Performance Management

Even if supply chain collaboration might be searched in those strategic dialogue mechanisms among the stakeholders disclosing relevant information (Prostean et al., 2014), findings emerging from the adoption of the suggested approach reveal that coordinating policy design and implementation is valuable for limiting breakdowns in the collaborative governance setting of supply chain actors. The use of DPM enables to explore the behaviour of inventories along the supply chain, as well as how performance drivers related to the energy policy influence the corresponding outcomes. Moreover, the chapter highlights how policymakers may adopt the proposed approach for fostering policy design through a deeper exploration of the causal interactions among strategic results, performance drivers and end results.

As a consequence of blending SD modelling with DPM, the possible undesired effects emerging from the implementation of wind power supply chain policies are also investigated. The paucity of synchronization and coordination in the investment policy oriented to improve both the generation and transmission system influences the response capacity throughout the wind power supply chain. Such a complexity relates to the performance drivers which are influenced by the strategic resource allocation. On this regard, the DPM method improves the effectiveness of performance management systems by providing a deeper methodological support to decision-makers interacting in the collaborative governance setting, thus calling for facing new challenges for political and institutional actors (Bianchi, 2016).

Simulation results show why it is important to recognize the time delays produced by the uncoordinated policy and its effects on corrective actions. Understanding

these barriers is central for framing and analysing supply chain performance (Rahmandad, Repenning, & Sterman, 2009). The adoption of such approaches to supply chain performance management usually focuses on only specific objectives or single organizations, whereas the proposed method is oriented to frame the trade-offs in terms of performance indicators among energy suppliers, wind farm manufacturers and developers, thereby fostering an interinstitutional awareness for undertaking coordination-oriented actions along the wind power supply chain.

## 11.6  Concluding Remarks

Constructing an energy policy coordination model is a complex process (Bale, Varga, & Foxon, 2015; Wheat, 2010). The discrepancy between policy formulation and application—affected by those delays in its implementation—limits the achievement of planned goals for the supply chain stakeholders. To improve the coordination in energy policy design and application, the simulation scenarios show that the time to build capacity must take into account the uncertainty of the energy demand. Furthermore, the agreement and engagement of stakeholders in the wind power bids may enhance the outcomes emerging from the supply chain operations. Indeed, decreasing the delays by using a collaborative governance approach may contribute to improving the response capacity of the supply chain.

There are multiple complex institutional, political and managerial factors that influence energy policy governance, design and implementation (Feurtey et al., 2016). As a result, the implemented energy policy can appear unsuitable, keeping the discrepancy between policy design and application. With the intent to suggest solutions for facing such a complex issue, this chapter suggested the combination between performance management tools and collaborative governance that enables a deeper understanding of the outcomes of political choices applied to the renewable energy supply chain. Hence, the emergent simulation scenarios explored the discrepancy between the wind auctions implementation and the time to construct new transmission lines.

Aligning supply chain policies and decisions among supply chain stakeholders supports an improved response to electricity demand fluctuations. Following this perspective, the use of DPM for supporting collaborative governance settings facilitates the alignment of strategies throughout the supply chain. This chapter promotes the adoption of a model-based strategic framework which considers the response capacity of the wind power supply chain.

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# Chapter 12
# Applying Dynamic Performance Management to Public Emergency Management: An Analysis of the Wenchuan Earthquake

**Linlin Wang, Enzo Bivona, Haiyan Yan, and Jiayin Qi**

**Abstract** Previous studies in public emergency management confirm that collaboration assumes a relevant role in strengthening society's capacity to cope with complex phenomena, such as disasters. However, empirical researches on emergency management show problems in performance measurement, mainly in employing narrow measures focusing on the results of single organisations rather than the entire system. Starting from a Chinese earthquake (Wenchuan) case, as an example, we use the dynamic performance management approach to develop a performance framework. This framework aims at investigating the interrelationships of different actors involved in emergency management and designing appropriate public emergency management performance outcomes. Our study offers two significant findings. First, the use of dynamic performance management represents a novel approach to frame public emergency management performance outcomes. Second, such an approach, by making explicit how available strategic resources may impact on performance drivers, thereby influencing performance outcomes, offers a framework to support decision-makers in identifying key measures to monitor and designing effective policies to improve emergency management performance.

**Keywords** Emergency management · Disaster management · Dynamic performance management · Outcome measures · Network governance

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## 12.1 The Evolution of Emergency Management

In recent years, China, the Americas, the European Union and, particularly, developing countries were strongly affected by earthquakes, floods, cyclones, volcanic eruptions and other natural disasters. To understand the relevance of these phenomena, it is worth noting that only in 2010, the United Nations counted around the world more than 350 natural disasters, affecting about 208 million people, killing nearly 300 thousand people and generating US $110 billion in losses (UNDP, 2011). Such events did cause not only substantial economic loss but also endangered social harmony and stability.

Public organisations are often in the dominant position to cope with all aspects of emergency management, including losses in lives and property. Although studies focusing on emergency and disaster management are not new in the area of public management, only in the 1980s and, particularly, in 1990s, they became of greater interest for researchers and practitioners. Though in the 1980s, the growing number of research and practice in the emergency management made a substantial advancement (Comfort, Waugh, & Cigler, 2012), major disasters occurred in the 1990s actively contributed to generate a further evolution of the emergency management literature. New scholars oriented their works to understand and explain what conditions led to damaging consequences for communities exposed to risk (Schneider, 1995). Important initiatives, such as the National Science Foundation program titled "Enabling the Next Generation of Hazards Researchers" (Comfort et al., 2012), also raised the need to adopt a multidisciplinary approach to emergency management. Today, disaster research transcends its disciplinary borders and has become a relevant interdisciplinary field, ranging from urban planning, sociology, geography to public policy and management.

However, difficulties in effectively managing major events, such as 9/11 and Hurricane Katrina, highlighted gaps in emergency management theories and practices. Notably, the diffused emergency management approach focusing mainly on the response phase, as opposed to preparedness, mitigation and recovery, revealed its ineffectiveness. To overcome such limitations, researchers started exploring new issues of inter-governmental and inter-organisational collaboration, communication processes and information technology in the design and management of emergency operations (Comfort et al., 2012). The analysis of the above interrelationships made evident, more than in the past, the limits of stand-alone public sector interventions. Public, profit and non-profit organisations and the public have become more aware that to solve complex and difficult social problems, such as disasters, require active collaboration among actors.

This shift of research focus on understanding the relationships between the multiple institutions, profit and non-profit organizations in building productive capacity to mitigate risks and respond to damaging events, confirmed the critical role of collaboration in strengthening society's ability to cope with such extreme events (Boin & 't Hart, 2010; Kapucu, 2005; McGuire, 2006; Waugh & Streib, 2006; Wise, 2006).

To identify the key actors involved in these events and to examine the degree of centralisation/decentralisation of authority, researchers stressed the use of network analysis (Agranoff, 2006; Comfort et al., 2012; Head, 2007; Herranz, 2008; Imperial, 2005; Irvin & Stansbury, 2004; Maguire, 2006).

Despite the efforts to offer new methods and theories of collaborative performance (see, e.g. Public Management Review, 2008, Vol. 10, 6), there is still a lack of empirical works measuring outcomes (Kelman & Rauken, 2012; Nohrstedt, 2013). Such deficiencies appear more evident if we consider that previous studies often adopted a narrow perspective focusing on the performance of single organisations as opposed to measures of the network (Mandell & Keast, 2008).

Although applying network analysis in emergency management can make explicit the functional and dysfunctional links inside it, it shows multiple drawbacks. It does not effectively contribute to identifying those factors explaining variations in performance across collaboration; neither specify performance measures able to explain such differences (McConnell, 2011; Nohrstedt, 2013; Robinson & Gaddis, 2012). Also, it neglects how the dynamic interrelation between different actors intervening in the crisis management impacts on the overall performance (Kapucu & Demiroz, 2011).

Considering these limits, the contribution of this study is to offer a framework to make explicit the interrelationships between different actors involved in emergency management and appropriate performance outcomes. To this intent, we applied the dynamic performance management approach (Bianchi, 2016) to a Chinese earthquake (Wenchuan) case. This perspective makes explicit how available strategic resources may impact on performance drivers, thereby influencing outcomes. Therefore, it offers a framework to support decision-makers in identifying key measures to monitor and designing effective policies to improve emergency management performance. To the best of authors' knowledge, the use of the dynamics performance management represents a novel approach to frame public emergency management performance outcomes.

We divide the paper into four sections. The first section briefly introduces the background and relevance of this study. The second reviews the literature in emergency management and outlines the main limitations of performance measurement in this area of research. The third section, after introducing the dynamic performance management perspective, it clarifies the research strategy and analyses the Wenchuan earthquake case. Finally, it discusses the DPM framework to investigate the performance in public emergency management, based on the case mentioned above study. In the last section, we discuss our conclusions and limitations to the study.

## 12.2   Literature Review: Main Limitations of Performance Measurement in Emergency Management

There are multiple definitions of public emergency events (Lerbinger, 1997; Rosenthal & Kouzmin, 1997). According to article 4 of the International Covenant on Civil and Political Rights (The Office of the United Nations High Commissioner for Human Rights, 1976), "public emergency" is described as follows: "In time of public emergency which threatens the life of the nation and the existence of which is officially proclaimed, the States Parties to the present Covenant may take measures derogating from their obligations under the present Covenant to the extent strictly required by the exigencies of the situation".

Emergency and disaster management are often facilitated through plans, which aim to reduce communities' vulnerability to hazards and to cope with disasters (Drabek, 1991). However, in the last a few decades, changes in population, environment, technology and economic structure of developed and undeveloped countries led to radical modifications in the origins, mechanisms and effects generated by disasters (Boin, 2009; Missiroli, 2006). Therefore, emergency management performance must also adapt systematically. As discussed in the previous section, the use of the network perspective in emergency management performance did not always generate the desired results (Kapucu & Demiroz, 2011; McConnell, 2011; Nohrstedt, 2013; Robinson & Gaddis, 2012).

Several scholars remarked about the difficulties in measuring performance in public emergency management, especially when the problem is discussed from a network perspective (Kiefer & Montjoy, 2006; Nolte & Boenigk, 2013). Focusing on the operation of networks in preparing to evacuate residents in advance of a significant disaster, Kiefer and Montjoy (2006) argued the strengths and weaknesses of networks in the special circumstances. Nolte and Boenigk (2013) explored the enabling factors that have an impact on the performance of public networks during disaster response and outcome factors influenced by network performance. The analysis reveals that collaboration experience, mutuality and coordination have a substantial impact on the performance of networks. Scholars also proposed some methods to facilitate efficient analysis (Hu, Knox, & Kapucu, 2014; Kapucu & Demiroz, 2011). Subsequently, Hu et al. (2014) assessed the effectiveness of inter-organisational coordination and collaboration in response to the Boston Marathon bombing using affiliation networks. A recent study (Hu and Kapucu, 2014), using data from Florida emergency management networks, investigated whether the centrality of organisations in emergency management networks relates to the utilisation of information communication technology.

A first limitation in the literature is that network performance is seldom studied as a dependent variable. Instead, most of the studies focused on explaining the characteristics of networks and the measurement of the performance. The focus is typically to explain policy outcomes and service effectiveness at the level of the single organisation. Meier and O'Toole Jr. (2001), for example, used programme output as a measure of education network performance to assess the effectiveness of schools

and school districts. The performance in the network level is often ignored. To understand better why some networks perform better than others, we need studies where network performance is the dependent variable.

Another limitation is that most of the current researches only investigate the evaluation of single performance indicators. There are few investigations of the interrelationships and interaction among these indexes. Analysing the evaluation performance index system does not explain how the network evolves or how different participants take part in public crisis management. Using Hurricane Charley's coordination data, Abbasi and Kapucu (2012) analysed the evolution of inter-organisational response networks and the organisations' network structural changes over time. The results show that analysing static networks does not reflect how it evolves or how different organisations change their roles as the incident emerges.

The above-mentioned analysis illustrates the existing research gap in studying network emergency performance, adopting a single actor and static perspective. Therefore, this work aims to bridge such a gap. Based on the information collected from the Wenchuan case study and the use of the dynamic performance management approach, we built a framework aimed at investigating the interrelationships between different actors involved in emergency management and designing appropriate public emergency management performance outcomes. The DPM perspective explicates the impact of strategic resources on performance drivers. This impact influences performance outcomes and supports decision-makers in identifying key measures to monitor and designing effective policies to improve emergency management performance.

## 12.3    Applying the Dynamic Performance Management Framework to Public Emergency Management: The Wenchuan Earthquake Case Study

The dynamic performance management (Bianchi, 2016) approach investigates the interrelationships among actors and designs appropriate performance outcomes. This section first introduces the dynamic performance management perspective. Next, we apply it to emergency management through a research strategy and case analysis of the Chinese earthquake in Wenchuan. Finally, it discusses the framework to investigate the performance of public emergency management in a more general context.

### 12.3.1    The Dynamic Performance Management Perspective

The dynamic performance management (DPM) perspective (Bianchi, 2016) combines traditional performance management (PM) systems and system dynamics (SD) modelling. It aims to support the strategic learning processes of public sector

decision-makers with the intent to manage organisational performance (Bianchi, 2012, 2016; Bianchi & Tomaselli, 2015). It can be defined as a modelling approach to design and implement more reliable PM systems in public organisations.

Figure 12.1 depicts the "instrumental" dimensional of the DPM perspective. Such a framework illustrates how strategic resources allocation may affect performance drivers and end results. It also highlights how end results, in turn, are likely to influence strategic resources. While these changes on the strategic resources generated by the end results are indeed important, they only provide one limited snapshot. To understand the long-term results of the overall system, it is important also to focus on the performance drivers, i.e. the critical success factors for achieving these end results. To influence the achievement of the desired outcomes, performance drivers should be measured and monitored, and, where possible, changed to a more favourable state. Performance drivers are measured as ratios between the current strategic resource levels affecting performance and the desired levels (Bianchi, Bovaird, & Loeffler, 2017). For example, the performance of response time, as an essential factor to evaluate crisis management ability, can be assessed by the ratio of current response time and desired response time ratio. It is crucial also to outline the policy options which are believed to affect the strategic resources. Through the action on such policies, decision-makers can influence performance drivers, and—through them—end results, which in turn will feedback on the strategic resources.

Table 12.1 summarizes the symbols and related meaning in a typical system dynamics model (Sterman, 2000).
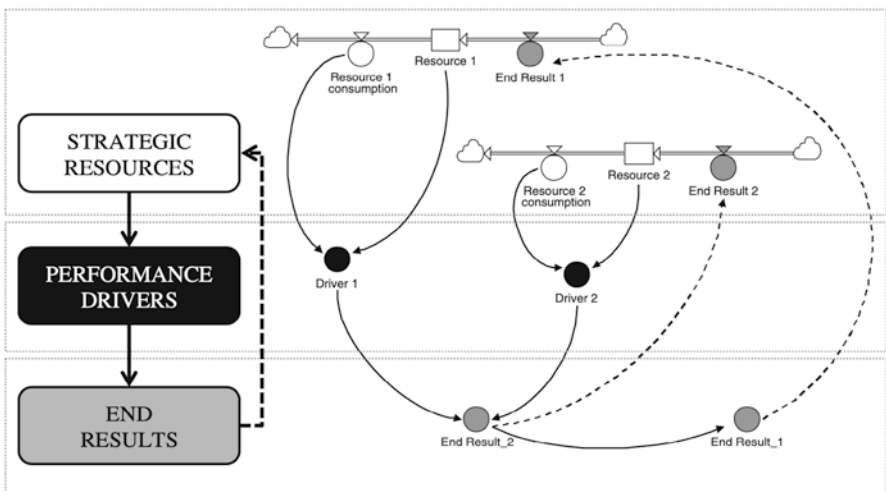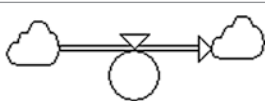


**Fig. 12.1** The dynamic performance management view (Bianchi, 2016)

**Table 12.1**  Summary of system dynamics symbols and explanation (Sterman, 2000)

| | |
|---|---|
| Stock | An element of a system that accumulates or drains over time. Stocks are the memory of a system and are only affected by flows |
| Flow | The movement of people or things between stocks within a system boundary or across the model boundary and thereby into out of the system (through sinks and sources). Changes in stock over time |
| Converter | A variable that is not a flow and is capable of changing its value instantaneously |
| Causal link | A relationship between two variables with the direction of casuality and the direction of impact |

This study aims to investigate the interrelationships of different actors involved in emergency management. Particularly, understanding how strategic resources affect performance drivers and end results, it becomes a key issue to manage the performance in such a dynamic and complex public sector (Oh & Bush, 2015). Such an approach allows us to make explicit performance outcomes both in the short and in the long run. Furthermore, it does not only focus on the perspective of a single organisation but the relevant system.

Since time disjunctions between actions and results, and non-linear feedback relationships affect policy outcomes, a DPM approach is particularly valuable in such contexts. It implies that decision-makers cannot easily understand the structure and behaviour of the systems in which they implement policy (Bianchi, 2016). Therefore, the use of system dynamics quantitative models is particularly encouraged (Sterman, 2000). At present, this study focuses only on the qualitative side of the analysis, e.g. it aims to capture and to make explicit the causal relationships inside the DPM in emergency management. At a later stage of this analysis, we plan to build a quantitative simulation model. Through such a dynamic model, we can outline changes over time in outcome measures, performance drivers and strategic resources, and investigate their influence in emergency management performance.

## 12.3.2    The Wenchuan Earthquake Case Study

### 12.3.2.1    Research Strategy Motivations

The use of case studies is widely accepted and recognised in emergency and disaster management research (Comfort et al., 2012; Haibo & Xing, 2016). We adopt this approach for two important reasons. First, disasters are very often unpredictable and do not allow continuous observation by researchers. Second, the consequences of disaster link strongly with the dimension of the event, the actors involved and the

response of the emergency system. All of these have a high degree of dynamism. The ability of the case study approach to offer a depth analysis in the investigated phenomenon (Yin, 2009) fits well with the level of complexity in emergency management.

The motivation underlying the selection of the Wenchuan is twofold. First, since the founding of new China, the Wenchuan earthquake exceeds any previous earthquake, with regard to magnitude and degree of destruction. Second, due to its strong impact, the Wenchuan earthquake has been intensely investigated (Cui et al., 2011; Guo & Kapucu, 2015; Kapucu, 2011; Kapucu & Özerdem, 2013). Information can be gathered easily for study.

### 12.3.2.2 Case Study Analysis

The Wenchuan earthquake occurred in 2008, in the Chinese province of Sichuan (Kapucu, 2011). The epicentre was 80 km west-northwest of Chengdu, the provincial capital, with a focal depth of 19 km. The earthquake was not only felt in nearby counties but as far away as Beijing and Shanghai. Strong aftershocks, some exceeding a magnitude of 6, continued to hit the area months after the main quake and caused new damages. Official figures stated 69,197 were confirmed dead, 374,176 injured and 18,222 listed as missing. The earthquake left about 4.8 million people homeless, though the number could be as high as 11 million (Guo & Kapucu, 2015). According to official statistics, Sichuan province suffered the collapse or severe damage of more than four million houses. The total loss has been estimated above the US $100 billion (Cui et al., 2011).

In addition to the Chinese Government, through the "Office of National Headquarter for Earthquake Resistance and Disaster Relief", the emergency management system included non-profit and non-governmental entities, profit organisations and single individuals. The government played a leading role. It set up multiple emergency working groups. These included activities for rescue relief work, monitoring of aftershocks, the services of daily life, health and disease prevention, productivity restoration and other aspects of disaster-hit areas. It also coordinated the work of network members to make sure they were able to accomplish their network goals. For example, various emergency plans were activated, with several organisations participating in disaster response (Kapucu & Özerdem, 2013). The promptness of the government to set specific emergency working groups and the active coordination of network members led to an enlargement in rescue capacity and a boost in saving lives. Such a positive change in saving lives contributed to improving public satisfaction and government credibility, which in turn attracted new network members.

Many non-profit organisations promptly responded after the earthquake happened. For instance, the Chinese Red Cross Society immediately allocated tents and other materials and contributed to the emergency rescue. The extraordinary amplitude of the earthquake and the fast response time of the emergency management helped to attract more than the US$5 billion of donations. Additionally, nearly

US$10 million of emergency supplies, including goods, were collected and distributed in the disaster areas.

Private sector enterprises also intervened supplying relief materials directly in the disaster areas to meet people's immediate needs. Special funds were created to financially support orphans who lost their parents in the earthquake to the age of 18. There was also great support from the public. Citizens used various means to alleviate people injured in the earthquake, ranging from direct financial aids to living goods. Many professionals were directly involved in disaster relief activities.

Despite government efforts to improve the response time and the quality of the response to save lives and restore proprieties, a lack of coordination of network members' actions led to robberies of rescue materials supplied by charitable organisations. Although these unintended occurrences were perceived as minor events during the disaster management, they negatively impact on government credibility, which was damaged indirectly. Emergency management performance measures should be designed to focus not only on output indicators, such as, for instance, the value of donors and the number of organisations involved in the rescue, but also (and primarily) on outcome measures, i.e., changes in saving lives.

According to the above analysis, we can assert that the governance model of the emergency network in the Wenchuan earthquake assumed a lead organisation form (Kenis & Provan, 2009). Lead organisation governance is common in a network where there are a single powerful actor and many weaker participants. There is no doubt that the government played a leading role in the emergency management of the Wenchuan earthquake. The non-profit organisations, the private sector and the public, worked under the formal guidance of the government (see full line in Fig. 12.2). To carry out the single responsibilities assigned in the disaster management, network members can also interact with each other informally and spontaneously (see dotted links in Fig. 12.2).

The above remarks raise the need to support public decision-makers to design a comprehensive framework to monitor the relationships between network members

**Fig. 12.2** The form of emergency network for the Wenchuan earthquake
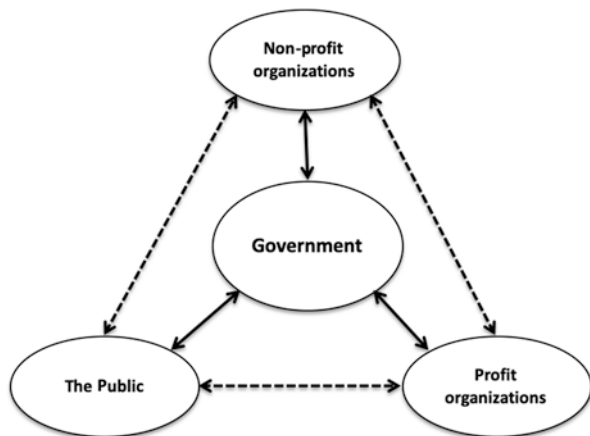
during all phases of emergency management. Such a framework should, therefore, focus not on the single organisation's performance instead of on the network outcomes. The next section, based on analysis of the Wenchuan earthquake case study, discusses a DPM framework aimed at investigating the interrelationships of different actors involved in emergency management and designing appropriate performance outcomes.

### 12.3.3 The Design of a DPM Framework to Investigate the Performance in Public Emergency Management: The Wenchuan Earthquake Case

The DPM framework is built using the "instrumental" view, which is the first step to designing and implementing a full DPM system. The next step would imply the building of a simulation model capturing the quantitative and dynamic interrelationships among the variables included in the DPM framework. Our plans include the development of the model as an extension of this research.

Figure 12.3 illustrates three main dimensions, interacting with each other: strategic resources, drivers and end results. Starting from the bottom, initially, we can identify five outcomes, namely, "changes in public satisfaction", "change in saving lives", "change in government credibility", "change profit and non-profit organisations" and "change in donors".

Through the framework, we depict the influence of corresponding performance drivers, such as response time, cost-effectiveness, quality of response ability and
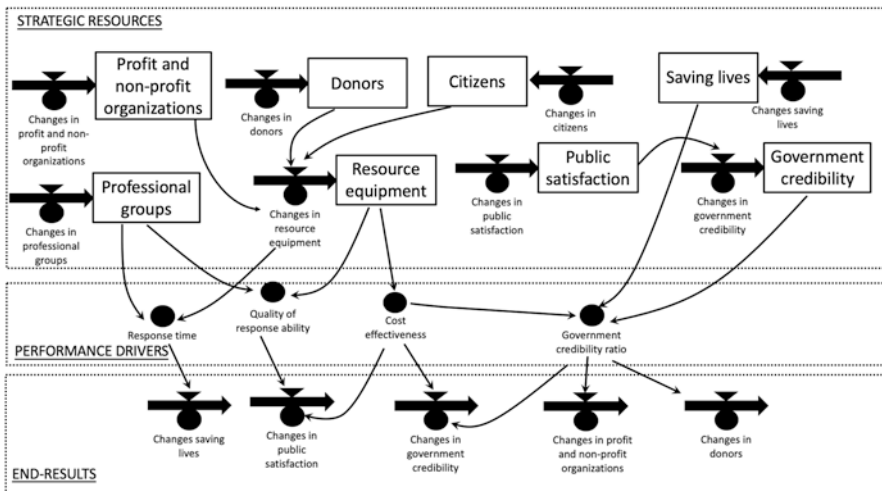


**Fig. 12.3** A simplified DPM framework to evaluate networked-based public emergency management performance in the Wenchuan earthquake

government credibility ratio on the end results. Take the end result "change in public satisfaction" as an example. This end result is influenced by the response time, cost-effectiveness and quality of response ability. The response time hurts the change in public satisfaction, while cost-effectiveness and quality of response ability have a positive effect on it. Consequently, a high response time generates an adverse change in public satisfaction (see, for instance, the undesired event discussed in the case study analysis section related to the robberies of rescue materials supplied by charitable organisations). This phenomenon is likely to lead to public satisfaction strategic resource decline. A low level of public satisfaction deteriorates network performance drivers, such as government credibility, which in turn generates a reduction in profit and non-profit organisations and donors. This deterioration leads to a vicious cycle. Beyond that, the change in government credibility is determined by the government credibility ratio. An increase in government credibility ratio impacts on the change in government credibility. This increase may generate a reinforcing loop leading to a positive change in strategic network resources. The same reasoning can be applied to explain the changes in profit and non-profit organisations and donors.

This framework aims to help public decision-makers to identify the endowment of strategic resources required to manage public crisis management properly. The acquired assets can then positively influence performance drivers, which may, in turn, generate a more significant impact on performance outcomes.

## 12.4   Conclusions

This chapter explores the different complexity factors underlining network cooperation in public emergency management performance. Very often performance systems are designed to capture results provided by the single actor inside the network, rather than approaching it through a holistic perspective. The use of a DPM approach is particularly effective in providing a systems view. The approach highlights the interaction among network stakeholders as well as the support of decision-makers to design a set of outcomes able to deal with such dynamic complexity.

Therefore, this study confirms the importance of key performance drivers and end results in the collaborative network of public emergency management. The DMP framework provided in this preliminary study aims to support decision-makers to gain an in-depth understanding, in terms of complexity and system interdependencies, of the network cooperation in public crisis management. Neglecting such a level of interactions among stakeholders engaged in the network may lead to the design of ineffective and short-term policies.

This study contributes both at a conceptual and a managerial level. At the first level, it explores the relationships between network participants in public emergency management from an outcome-based perspective. From a managerial point of view, the suggested framework outlines the key drivers affecting the overall disaster management performance. The framework may result in guiding public

decision-makers on how to improve system success and enhance its resilience. It also raises the critical role of collaboration between network participants in improving public emergency management performance.

This research has the following limitations, which require future research efforts. The first limitation is the lack of information on how the collaboration among network stakeholders evolved during the different stages of public emergency management. Collaboration among various network stakeholders is an expected outcome in emergency management, including crisis mitigation, preparedness, response and recovery, which needs to be addressed in future research. Another issue is the absence of a simulation model to explore how performance measures evolve once linked to a given set of policies.

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# Chapter 13
# Institutional Logics Analysis for Enabling Collaborative DPM Processes: Universities' Third Mission Performance as an Illustrative Example

**Francesca Ricciardi, Paola De Bernardi, Canio Forliano, and Mattia Franco**

**Abstract** The literature increasingly encourages public managers and policy-makers to develop recursive cycles of collective and collaborative mental model formalization for improved organizational learning, reporting and decision-making. Dynamic performance management (DPM) is a promising approach to address this challenge. However, the actors involved in the system under study often display different cultures, values and social expectations, which may hinder successful collaboration around a DPM modelling process. Our study develops a process for mapping the different institutional logics that are likely to influence the DPM modelling processes in a certain context, thus creating the conditions for a more systematic, inclusive and collaborative DPM modelling process. Also, this study provides an illustrative example of the proposed institutional logics-based approach to DPM by identifying the different public value resource stocks that are expected to result from universities' third mission.

**Keywords** Dynamic performance management · Institutional logics · System dynamics · Public value · Third mission · University performance

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## 13.1  Introduction

A performance management system is any system that generates performance information (through specific routines) for supporting reporting and decision-making processes (Moynihan, 2008). Dynamic performance management (DPM) is a particular form of performance management system based on the system dynamics approach (Sterman, 2000). As such, DPM is an adaptive, feedback-based, outcome-based and learning-oriented approach to performance management (Borgonovi, Bianchi, & Rivenbark, 2017). Besides, DPM enables to identify, map and operationalize feedback loops between variables, such as vicious and virtuous cycles (Sterman, 2000). The key purpose of DPM modelling is (collaborative, agile and adaptive) management, rather than prediction per se. DPM is specifically conceived to allow for collaborative, qualitative mapping and modelling, and sophisticated mathematical elaborations (although possible) are not required to use DPM. This focus on concrete management processes differentiates DPM from many other system modelling approaches, such as agent-based modelling (Macy & Willer, 2002).

Since it has been specifically developed to tackle complexity, DPM is considered particularly suited to support decision making when the public value is at stake, like in the case of government bodies or other institutions with (possibly) significant social and environmental impact (Cosenz, 2018). In this light, DPM may target not only a specific organization's efficiency, profitability and/or long-term survival but also that organization's impact on the common good (Deber & Schwartz, 2016) as well as the impact of policies, investments and other decisions.

DPM modelling can be conducted by experts, researchers or consultants, based on their expertise and understanding of a certain system's dynamics. However, it is becoming increasingly clear that DPM is more effective and powerful if adopted as a basis for collaborative, ever-evolving modelling on the part of a whole community of diverse stakeholders, rather than traditional top-down, once-forever expert modelling (Bianchi, 2016). DPM's main value resides in its ability to capture complexity and change, and it is substantially impossible to achieve this through a few experts' isolated efforts. It is not surprising, then, that the DPM literature increasingly encourages to leverage DPM conceptual tools to develop recursive cycles of collective and collaborative mental model formalization and fine-tuning for improved organizational learning and decision-making (Bianchi, 2016). This is in line with the important role of adaptive and collaborative governance and adaptive co-management, that is increasingly highlighted by the public management literature (Ansell, 2011; Ansell & Gash, 2008; Eversole, 2011).

However, this effort of recursive and collective (re)modelling is a tough challenge. If the generation of public value is at stake, the analysis of strategic resources and key performance drivers must be conducted at the system level, rather than at the single organization's level; and actors from different organizations or interest groups must be involved (Noto & Noto, 2018). In this situation, not only are actors sometimes influenced by interests that can be rationally identified as conflicting; in most cases, but actors also display different cultures, values and social expectations,

which may hinder successful collaboration at least as heavily as the so-called rational conflicts of interest (Negoita, 2018). As a consequence, the views of the actors participating in collaborative modelling may diverge dramatically as for what should be considered a strategic resource or a key performance driver in modelling their system through DPM. In other words, the identification of the key variables, far from being a neutral or rational process, is a social game requiring innovative management tools, since the traditional management solutions are likely to be of little help in collective DPM modelling. We still know very little about how we could understand and manage the dynamics that make the social process of DPM modelling so difficult (Sorci, 2017). This is surprising since these difficulties may hinder DPM from expressing its full potential in supporting organizations and institutions that address wicked societal problems (Bianchi, 2015).

This study leverages the literature on institutional logics (Wooten & Hoffman, 2008) to address this gap. The institutional logics lens is a powerful conceptual tool to identify the different clusters of internally consistent rules, roles and social expectations that shape the social fabric and then also the system to be modelled through DPM (Luna-Reyes & Gil-Garcia, 2011). Not surprisingly, institutional logics are at the centre of a growing stream of studies in the public management and e-government fields (Dover, 2010; Saz-Carranza & Longo, 2012; Wahid & Sein, 2013). This study develops a process for mapping the different institutional logics that are likely to influence the DPM modelling process in a certain context. Thanks to the identification of the relevant institutional logics and the actors holding them, the individual or team coordinating the collaborative DPM modelling process can develop specific solutions and techniques to manage the tensions between the actors participating in the process, thus creating the conditions for more effective collaboration.

In the final part of this study, we propose an illustrative case in which this institutional logics-based approach to the management of DPM collaborative modelling processes is adopted. In the proposed case, we address universities' third mission systems, that is, those systems through which universities co-create knowledge-based value by interacting with the external environment (the other two missions of universities consist in co-creating value with the students and the scholarly community: teaching and research, respectively) (Fuster, Padilla-Meléndez, Lockett, & Del-Águila-Obra, 2019; Sánchez-Barrioluengo & Benneworth, 2019; Secundo, Elena Perez, Martinaitis, & Leitner, 2017). This case is particularly interesting because the identification of key variables/indicators and cause-effect relationships is typically controversial in university ecosystems (De Bernardi, Azucar, Forliano, & Bertello, 2020; Garcia-Perez-de-Lema, Madrid-Guijarro, & Martin, 2017; Gür, Oylumlu, & Kunday, 2017; Kapetaniou & Lee, 2017; Mejlgaard & Ryan, 2017; Montesinos, Carot, Martinez, & Mora, 2008).

Through triangulated qualitative research, we find that universities' third mission systems are shaped by at least four different institutional logics, which we label as dissemination logic, engagement logic, translational logic and entrepreneurial logic, respectively. Then, we show how these four logics influence the identification of the key strategic resources (a critical step in DPM modelling), and how a full awareness of these four logics enables a more orderly and inclusive mapping of the key DPM

variables. Finally, the illustrative case suggests that thanks to this new approach to DPM variable mapping, a more constructive and creative process of collaborative DPM cause–effect relationship mapping is possible. Based on the results of this study, we argue that DPM modelling processes benefit from the active role of a focal (individual or collective) actor that takes care of understanding the different institutional logics at stake and manages the collaboration processes accordingly.

The contribution of this study is threefold. First, this study contributes to the literature on DPM by proposing a novel, institutional logics-based approach to DPM modelling that could be particularly useful in all those cases in which the (re)generation of relevant common resources and public value is at stake (Bianchi, 2015; Bianchi, Bovaird, & Loeffler, 2017; Borgonovi et al., 2017; Borgonovi, Anessi Pessina, & Bianchi, 2018; Luna-Reyes & Gil-Garcia, 2011).

Second, this study contributes to the emerging literature stream that investigates the role of institutional logics and organizational fields for the (re)generation of public value, particularly through feedback-based approaches that can become data-driven learning engines (Rossignoli, Ricciardi, & Bonomi, 2018).

Third, this study paves the way to further specific SD- and DPM-based studies on the universities' third mission and, more generally, on the governance of universities as engines of complex systems of public value co-creation (Cosenz, 2014; El-Jardali, Ataya, & Fadlallah, 2018; Raafat et al., 2013; Skribans, Lektauers, & Merkuryev, 2013). In particular, the adoption of the proposed approach as support for sense- and decision-making both by university managers and by policy-makers could be viewed as a contribution to practice, on the one side, and scientific experimentation of the model's effectiveness and accuracy, on the other side.

## 13.2   Background

### 13.2.1   *DPM Modelling*

DPM (Bianchi, 2015; Bianchi et al., 2017; Borgonovi et al., 2017; Borgonovi et al., 2018; Luna-Reyes & Gil-Garcia, 2011) identifies four types of key variables describing the system to be managed: *stocks* (i.e. key *strategic resources* that can be leveraged for pursuing the organization's goals and whose reduction under a critical threshold would result in system collapse: for example, customer base), *flows* (i.e. the rates through which resources are accumulated or depleted; flows include the organization's *results*, such as the number of new customers in a year), *performance drivers* (i.e. intermediate variables that can be usually expressed in terms of capabilities and may affect flows: for example, delivery time compared to expectations that may affect customer flows) and *input variables* (i.e. those variables that can be directly affected by decision-makers and directly affect action, including both operational constraints, such as the adopted software solution, and behavioural drivers, such as policies).
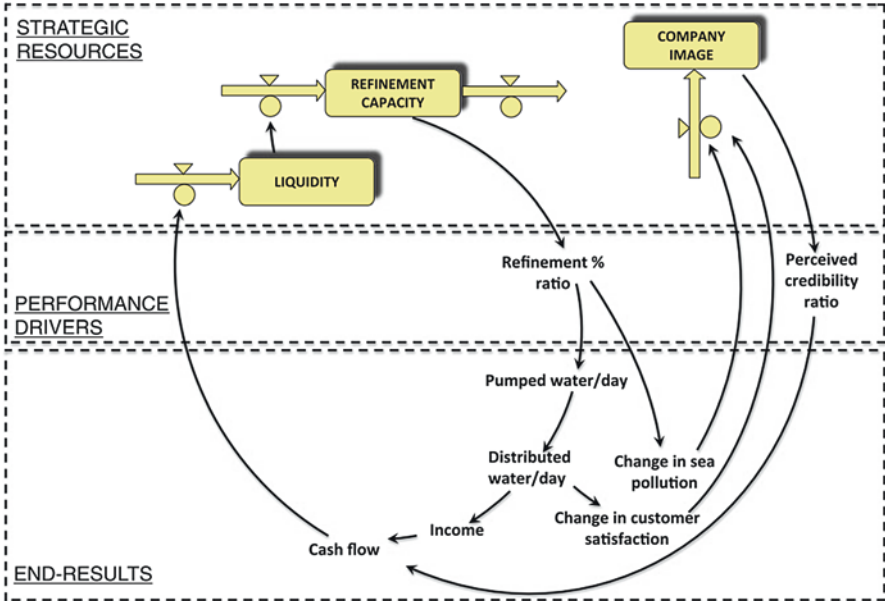
**Fig. 13.1** An instance of DPM modelling: a layer and arrow model of a water utility company. (Source: Bianchi, 2016)

The DPM modelling activities typically result in layer and arrow models like the instance depicted in Fig. 13.1. Rectangles typically represent resource stocks; large arrows entering/exiting the rectangles depict resource flows; while performance drivers and input variables can be distinguished using circles and diamond-shape symbols, respectively (Bianchi, 2016, p. 23). Thin arrows represent cause–effect relationships.

Interestingly, the DPM approach allows one to model the system around the key resource stocks. In many DPM models, only organizational-level resource stocks are considered, i.e. resource stocks for the exclusive benefit of the organization under study (e.g. liquidity) and/or depending (almost) exclusively on organizational-level capabilities/performance drivers (e.g. organization's credibility ratio). However, since there is growing attention on DPM as a tool for reporting and decision-making around the generation of public value and the common good, DPM modelling increasingly include also resource stocks for the collective or common benefit and depending on multiple actors' behaviours (such as people's employability or air quality).

Then, the first key step in developing DPM consists in identifying the strategic resource stocks, both those that are available for the organization's exclusive benefit (such as liquidity) and those that are available for collective use, including the organizations among the beneficiaries/contributors (such as the city's mobility capacity). Once the key resources are identified, the key results can be identified among the corresponding inflows and outflows; then, the DPM modeller has the proper basis for identifying the performance drivers (i.e. the key capabilities that can

influence flows) and inputs (i.e. the technological, infrastructural, institutional and organizational factors that can influence the performance drivers).

Therefore, the DPM modelling process implies an orderly top-down activity, in which the key management variables (i.e. results, performance drivers/capabilities and inputs/behavioural drivers) can be deduced based on the analysis of the key strategic resource stocks. On the one side, this strong focus on (private and common) resources is an important strength of the DPM approach, because it forces to restructure the measurement, organization and management activities around resource stocks and their fragilities, thus providing the basis for organization-level and system-level sustainability and resilience. On the other side, the DPM approach is vulnerable to poor resource stock identification: if the DPM modeller fails in identifying all of the system's key resource stocks, all the resulting mental model (including the identification of the key managerial variables, i.e. performance drivers and inputs) is likely poor.

Unfortunately, the initial phase of key resource stock identification is particularly difficult. When invited to identify the key resource stocks, people are strongly influenced not only by their perceived interests, but also, and maybe even more importantly, by their beliefs, habits and social environments. Therefore, if the identification of key resource stocks is left to few people, it will be likely incomplete; if it is entrusted to a group including numerous people with different views and social expectations, conflicts may arise that may lead to power-led decisions (the opinion of the weakest coalitions are discarded and not included in the DPM model) and/or watered-down compromise (only the variables that look acceptable to all the parties are included in the DPM model).

In other words, the very first and crucial phase of the DPM modelling process, that is, the identification of the key resource stocks needs clearer solutions for identifying who should be involved in the identification of variables and how the different ideas on key variables could be leveraged systematically and constructively.

### 13.2.2    Organizational Fields and Institutional Logics

The vast and viable literature on institutional logics (Thornton, Ocasio, & Lounsbury, 2012) provides conceptual tools that can be very useful for supporting the first, critical phase of the DPM modelling process, as described in the previous paragraph.

An institutional logic is a socially recognized system of rules, values, expectations and beliefs that are catalysed by and around societal institutions, such markets, universities or social movements (Sauermann & Stephan, 2013; Wooten & Hoffman, 2008). Institutional logics shape behaviours and make cooperation and reciprocal understanding possible. For instance, the family institutional logic is a societal-level system of laws, roles, expectations and assumptions prioritizing the nurturing and generative capabilities of the family, along with its safety and wellbeing (Fairclough & Micelotta, 2013). The family logic can be inflected in many ways: for example, a traditional patriarchal family logic is based on different assumptions and rules compared to those shaping contemporaneous cosmopolitan families of Western countries.

According to the most recent developments of institutional studies, institutional logics transform industrial sectors into organizational fields (Greenwood, Díaz, Li, & Lorente, 2010), that is, relational spaces governed by rules, values and cognitive assumptions rather than mere market forces and abstract rational choices.

Institutional logics coevolve dynamically through technological and scientific innovations, activism, political action, institutional entrepreneurship and bottom-up practice-driven changes (Ansari, Wijen, & Gray, 2013; Beckert, 2010; De Bernardi, Bertello, & Shams, 2019; Greenwood, Hinings, & Whetten, 2014; Zietsma & Lawrence, 2010). There is growing awareness on the role of entrepreneurs, managers and governance bodies in triggering, navigating and shaping the evolution of a certain organizational field's logic and in making this evolution sustainability oriented (or not) (Cantino, Devalle, Cortese, Ricciardi, & Longo, 2017).

In terms of DPM, we can have at least as many different views on the system under study as the number of different institutional logics shaping the relevant organizational field. For example, a smart city system is typically populated by several logics, such as the innovation logic and the equality logic (Pierce, Ricciardi, & Zardini, 2017). These logics may differ significantly as for the respective views on the city system. For example, the innovation logic values technology transfer, entrepreneurial initiatives, maximizing opportunities for start-ups and university spin-offs, entrepreneurial risk taking, creative destruction and innovation partnerships. Conversely, the equality logic values inclusion, participation, human rights and fights against power, selfish business and privilege (Pierce et al., 2017).

The different logics populating a field may be reciprocally reinforcing but conflicting (De Bernardi, Bertello, & Forliano, 2019), and DPM may provide useful tools to map the vicious and virtuous cycles within and across different logics. Therefore, the analysis of the organizational field and particularly of the logics shaping it is extremely useful to enable multi-faceted DPM modelling that takes into account different views in a generalizable way. In this light, each institutional logic can be viewed as a high-level input variable, which results in a logic-specific set of rules, roles and social expectations. Different logics likely lead to the identification of different resource stocks as relevant and legitimate targets and of different specific performance drivers as significant, acceptable and feasible means. For example, people following the innovation logic likely identifies the number of active entrepreneurial initiatives as a key stock of a certain city, while people following the equality logic likely focus on very different resource stocks, such as the funds available for helping the poor.

## 13.3   Managing DPM Modelling Processes Through Institutional Logic Mapping

If the analysis for DPM modelling is conducted at the organizational field level, rather than at the level of the individual organization, and has the purpose of mapping the dynamics that are relevant to the common good and public value, it is almost inevitable that the key actors of the system under analysis are influenced by different, and likely conflicting, institutional logics.
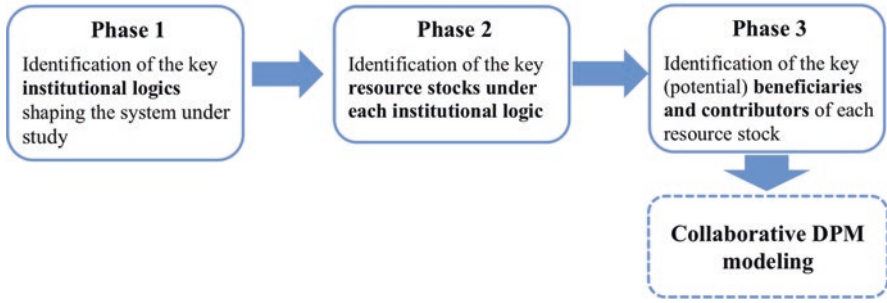
**Fig. 13.2** The proposed process of institutional logic mapping is preliminary and preparatory to the DPM modelling process. (Source: authors own elaboration)

Therefore, based on the theoretical background and considerations synthesized above, we propose that the management of the DPM modelling processes takes care of how different institutional logics express different views about the key resources of common interest, and consequently the relevant flows, performance drivers and inputs to be included in DPM models.

Our proposal implies an activity of institutional logics mapping that is preliminary to the DPM modelling process and also helps identify the different key views that should be invited to participate in collaborative modelling. The proposed process of preliminary institutional logics mapping and key actor identification is synthesized in Fig. 13.2.

In the first phase of the proposed process, an in-depth qualitative analysis of official documents, media and social media contents, and interviews is conducted, in order to identify the basic beliefs, assumptions, rules and social expectations shaping the organizational field(s) in which the system under study is immersed. Coding is likely a very effective technique to group the detected beliefs, assumptions, rules and social expectations into consistent logics (Bryman & Bell, 2011). The resulting list of institutional logics (with their respective attributes) can be validated, improved or updated through various techniques, such as experience surveys, focus groups and questionnaires (Molina-Azorín & López-Gamero, 2014).

In the second phase of the proposed process, the key resource stocks (and other DPM variables) for each institutional logic must be identified. Therefore, all the well-established indicators (KPIs) of the system under analysis can be reviewed and classified into the different institutional logics. Some indicators may correspond to variables that are relevant under more than one institutional logic: for example, a city's overall public transportation capacity is a relevant resource stock both under the environmental and the equality logic. The system dynamics approach underlying DPM provides a discipline to clearly distinguish the different types of variables: stocks, flows, performance drivers and inputs. In many cases, the existing and well-establish KPIs may not cover all of the variables that may be considered relevant under each logic. In this case, logic-specific expert surveys and focus groups may help complete the key stock mapping processes under each institutional logic.

The output of this phase is a systematic list of key resource stocks under each institutional logic.

In the third phase of the proposed process, (potential) beneficiaries and contributors/exploiters of each resource stock identified in phase two are identified. These subjects, be they individual or collective, are the system's (potential) stakeholders and actors. The recursive and collaborative process of DPM modelling cannot be successful if it does not consider these subjects. These subjects can be identified through qualitative research techniques, such as targeted interviews, and also computer-aided content analysis, based, for example, on social media contents. The output of this phase is a list of (potential) system actors under each institutional logic that is active in the relevant organizational field.

If DPM modellers follow the process synthesized in Fig. 13.2, they will be able to develop, before the proper modelling phase, a systematic and inclusive list of key resource stocks (and relating flows) and key actors/stakeholder to be engaged (or taken into account) in the modelling process. The proposed process is designed to help the DPM modeller take into consideration all of the views that are active in society as for the system under study. If the modeller overlooks some institutional logics while developing the DPM model, the model may fail to take into consideration all of the key forces that are active at the system level; besides, the subjects backing the neglected logics are likely to de-legitimate the model, independently from the model's potential for effective management.

In some cases, the models emerging from different logics can be integrated; in other cases, integration is too complex or frankly impossible, due to radical incompatibility between logics. In the latter cases, parallel modelling and model testing can be conducted, so that the decision of which model is better can emerge ex-post from data, rather than ex-ante from ideological biases.

## 13.4   An Illustrative Pilot Analysis: Institutional Logics-Based DPM Modelling of Universities' Third Mission Systems

### 13.4.1   Method

The pilot analysis of universities' third mission viewed as a dynamic system illustrates the proposed process as synthesized in Fig. 13.2. For the sake of concision, the study skips the analysis of organization-level variables (such as the university' liquidity), to allow the reader to focus on the innovative part of the analysis, that is, the analysis of those variables that, in the light of the active institutional logics, are relevant to the (re)generation of public value and the common good.

The DPM variables mapping universities' third mission systems have been identified through the in-depth qualitative analysis and coding of a set of representative documents on and around third mission (about 700 pages). Then, the resulting

model has been discussed, integrated, fine-tuned and enriched with details through qualitative research (Luna-Reyes & Andersen, 2003), by leveraging the results of 30 interviews to as many different people involved in the third mission activities of an important Italian university, which is considered as a national leader as for third mission engagement. The interviewees include people with several relevant roles in third mission activities from both within and outside the university's organizational boundaries. The interviews focus on discussing the model of the university's third mission as a dynamic system and eliciting ideas on how the model could be possibly improved. The results provide a fine-grained map of the key actors, resources, capabilities, constraints and behavioural triggers that can enable the third mission system to generate different forms of public value, or, on the contrary, hinder the system from those achievements.

### 13.4.2   Results: Phase One—Identification of Key Institutional Logics

Our analyses suggest that several different institutional logics populate universities' third mission systems. Some of them are idiosyncratic to single or few universities, such as discipline-specific logic and the regional development logic of the area in which the university is embedded. We focused on the institutional logics that are quite generalizable as possibly present in all universities. By leveraging axial coding (Bryman & Bell, 2011), we identified four third mission institutional logics, each including internally consistent groups of values, rules and expectations. These four logics are listed below.

1. *Dissemination logic*: The University is expected to spread well-established knowledge and best practices in the relevant communities and the larger public.
2. *Engagement logic*: The University is expected to directly flank and advice specific subjects (such as associations, government bodies, communities and firms) for pursuing specific common objectives.
3. *Translational logic*: The University is expected to translate the results of cutting-edge research into generalizable ready-to-use solutions (such as new procedures, new protocols and new software) that can be adopted by people, organizations and communities even without the direct engagement of the University.
4. *Entrepreneurial logic*: The University is expected to contribute to the creation of new ventures and value propositions.

These four logics offer four radically different views on a university's third mission. In the light of each logic, the key common good to be (re)generated by the system is different. According to the dissemination logic, the third mission system is expected to generate resources such as free MOOCs, TV broadcastings, exhibits; according to the engagement logics, the third mission system is expected to generate resources such as the stock of businesses that have been flanked and/or advised

by the University; according to the translational logics, the third mission system is expected to generate resources such as new healthcare protocols or new software solutions; according to the entrepreneurial logic, the third mission system is expected to generate resources such as patents or spin-offs.

Since these four logics focus on different variables and reflect possibly conflicting views on the university's role and mission, the DPM modeller can develop, at least in the first place, at least as many DPM models as the number of relevant logics identified. This allows the modellers to develop internally consistent models and avoid polarization and conflict among the different groups, possibly cooperating with the DPM mapping and modelling work. Once the different models (one for each logic) are ready, they can be tested in parallel and also integrated, for example by analysing the effect of a variable that has been identified as key under a certain logic on other logic's models. For example, funding and incentives for entrepreneurial work can be introduced to improve the system under the entrepreneurial logic's standpoint, but what is the effect of these input variables in the system model developed, say, from the translational logic's standpoint? May the entrepreneurial logic-based inputs backfire by discouraging too many faculties from engaging in translational activities? In other words, the preliminary differentiation in parallel modelling process enabled by institutional logic allows for successive, more comprehensive integration of the different views on the system under study.

### 13.4.3  Results: Phase Two—Identification of the Key Resource Stocks Under Each Institutional Logic

Through collaborative data coding and discussion with our interviewees, we developed the lists of the key common resources to be re-generated according to the four different logics identified above. The results are synthesized in Fig. 13.3.

The resource mapping displayed in Fig. 13.3 shows that the suggested approach based on institutional logics allows the development of an orderly, systematic identification of key resource stocks. Thanks to the systematic, comparative analysis across all institutional logics, it is possible to create a logical framework that helps develop a set of variables/indicators that is well-balanced across logics. A systematic analysis of the main European indicator sets for university performance reveals that while some resources, included in Fig. 13.2, are present in some or many indicator sets, others are often or always missing. For example, the "number of patents," a resource stock which is very important under the entrepreneurial logic, is present in many official indicator sets, while the "number of ready-to-use protocols," a resource stock that has similar importance under the translational logic, is almost always absent. Therefore, the logic-based mapping of key resource stocks may be a very useful process for overcoming the modellers' biases and systematically identifying all the relevant variables/indicators, including those that are not displayed in mainstream indicator lists.

| | Dissemination logic | Engagement logic | Translational logic | Entrepreneurial logic |
|---|---|---|---|---|
| N° of active [...] | [...] dissemination products (publications, exhibits, workshops, MOOCs, broadcasts, etc.) | [...] engagement initiatives, where the university supports partners' pursue of specific goals | [...] translational products (protocols, software, materials, tools, etc.) and relating publications | [...] entrepreneurial products, including service models and patents |
| N° of active agreeements / partnerships envisaging [...] | [...] dissemination activities | [...] engagement activities | [...] translational activities | [...] entrepreneurial activities (spin-offs, incubated ventures, etc.) |
| N° of faculty who contribute(d) to active [...] | [...] dissemination products | [...] engagement initiatives | [...] translational projects and (or) products | [...] entrepreneurial initiatives |
| N° of active competitive projects and grants [...] | [...] including relevant dissemination products | [...] including relevant engagement initiatives | [...] including relevant translational initiatives | [...] including relevant entrepreneurial initiatives |
| N° of people who [...] | [...] have used active dissemination products | [...] have been flanked and (or) advised through active engagement initiatives | [...] (could) benefit from the active projects of translational research and activities | [...] are employed in spin-offs, incubated ventures, and patent-related activities |
| N° of businesses or institutions that [...] | [...] have used active dissemination products | [...] have been flanked and (or) advised through active engagement initiatives | [...] (could) benefit from the active projects of translational research and activities | [...] actively use patents |
| N° of scientific publications reporting on the university's [...] | [...] dissemination activities | [...] engagement activities | [...] translational activities | [...] entrepreneurial activities (spin-offs and incubated ventures, etc.) |
| N° of media mentions and public discussion around [...] | [...] active dissemination products | [...] active engagement initiatives | [...] active projects, of translational research and activities | [...] active projects, patents, spin-offs, and incubated ventures |
| N° of usable feedbacks on [...] | [...] active dissemination products | [...] active engagement initiatives | [...] active projects, of translational research and activities | [...] active projects, patents, spin-offs, and incubated ventures |
| [...] that according to feedbacks, (may) significantly contribute to one or more SDGs* | N° of active dissemination products [...] | N° of active engagement initiatives [...] | N° of active translational projects [...] | N° of active service models, patents, spin-offs, and incubated ventures [...] |

*Specific measurements can be developed for each Sustainable Development Goal (SDG) identified by the United Nations: (1) No Poverty; (2) Zero Hunger; (3) Good Health and Well-being; (4) Quality Education; (5) Gender Equality; (6) Clean Water and Sanitation; (7) Affordable and Clean Energy; (8) Decent Work and Economic Growth; (9) Industry, Innovation and Infrastructure; (10) Reduced Inequality; (11) Sustainable Cities and Communities; (12) Responsible Consumption and Production; (13) Climate Action; (14) Life Below Water; (15) Life on Land; (16) Peace and Justice Strong Institutions; (17) Partnerships to achieve the Goals.

**Fig. 13.3** Output example of Phase Two of institutional logic mapping: The stocks of key common resources to be (re)generated, according to the four different third mission logics identified in Phase 1. (Source: authors own elaboration)

### 13.4.4 Results: Phase Three—Identification of the Key Actors According to Each Institutional Logic

In the third step of the institutional logics-based approach to DPM proposed above, all the actors that (may) benefit from common resources and contribute to common flows by influencing inputs and common performance drivers are identified. Through collaborative data coding and discussion with our interviewees, we developed the lists of (possible) benefitting and contributing actors. The results confirmed that the lists of relevant actors developed based on the four different institutional logics partially differ from each other, thus suggesting that the institutional logics-based approach to DPM proposed above is actually useful to achieve a more inclusive and systematic mapping of the (potential) stakeholders. The process of identifying the key (potential) actors, the (potential) benefits they enjoy from the system and their (possible) contribution can be carried on based on a working table like that shown in Table 13.1.

Once filled in, tables like those presented in Table 13.1 provide a useful basis for DPM modelling. In fact, the "benefitting from" column lists some resource stocks that are indirectly key to system functioning: for example, under the dissemination logic, the system needs to keep providing the university departments with funding stemming from dissemination activities, in order to give the departments good reasons to develop/keep sufficient internal incentives for faculties performing dissemination activities.

### 13.4.5 Results: Starting the Institutional Logics-based DPM Modelling Process

In this paragraph, we will give a synthetic illustrative example of how the results of Phases 1, 2 and 3 of the process synthesized in Fig. 13.2 can be leveraged to develop a DPM modelling process, that is more systematic, unbiased, inclusive and effective than the process that can be developed based on already-existing indicators and/or traditional stakeholder engagement processes only. Figure 13.4 illustrates the contents of this paragraph.

Phase 1 results in the identification of the institutional logics that are relevant to the system under study. In the exemplary case presented here, four institutional logics of a university's third mission are identified (dissemination, engagement, translational and entrepreneurial). Further "sister logics" may be identified that influence the system as well, such as the inclusion logic of teaching (based on including as many disadvantaged students as possible to university education) or the excellence logic of research (based on publish-or-perish on top journals). Thanks to Phase 1 results, the modeller can develop as many models as the different logics that are identified as relevant, for a preliminary parallel analysis (see Fig. 13.4).

**Table 13.1** Example of a working table for the identification of the actors involved around the dissemination logic of universities' third mission

|  | Actors | (Possibly) benefitting from the third mission system through (examples) | (Possibly) contributing to key resources through (examples of resources, performance drivers and inputs) |
|---|---|---|---|
| Dissemination logic | Core University | Reputation… | Technical support ratio (e.g. media production)… |
|  | Departments A, B, C… | Funding… | Internal incentives… |
|  | Faculty | Fame… | Faculty engagement ratio… |
|  | Businesses | Innovation stimuli… | Feedback… |
|  | City/Region | Attractiveness… | Infrastructural capability... |
|  | Social movements | Legitimation… | Legitimation… |
|  | University Partners A, B, C… | Legitimation… | Externalized work… |
|  | Other educational institutions | Orientation… | … |
|  | Other institutions (museums, trade associations…) | Enlarged value proposition… | … |
|  | Communities | Cohesion, stimuli… |  |
|  | National Government/ ministry | … | … |
|  | Citizens | … | … |
|  | Next generation's advocates | … | … |
|  | … | … | … |

Source: authors own elaboration

Phase 2 results in the identification of the key resource stocks from the standpoint of each institutional logic, like those listed in Fig. 13.3. These results can be used to fill in the "Resources" and "Results" sections of the DPM diagram, like in Fig. 13.4.

Phase 3 results in the identification of the resources (potentially) benefitting the (potential) contributors (of the system), as in Table 13.1. These can be considered key resources, to the extent they provide essential incentive/reason for contributing to the system. Also, in phase 3, some key capabilities of (potential) contributors are identified that can be included in the DPM diagram as performance drivers. Finally, also some key inputs influencing actors are identified in Phase 3 (see Table 13.1) that can be included in the DPM diagram.

Figure 13.4 provides an illustrative example (i.e. necessarily far from being exhaustive, due to space constraints) of the rich variable mapping results emerging from the institutional logics-based approach proposed by this study.
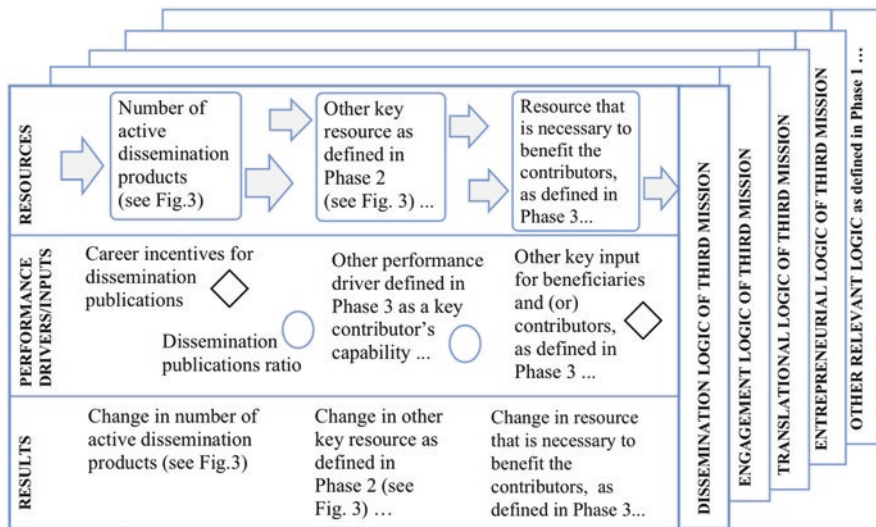
**Fig. 13.4** How the results of Phases 1, 2 and 3 of the Preliminary Logic Mapping process can help conduct effective DPM modelling: an example of ongoing identification of DPM variables based on the Preliminary Logic Mapping of universities' third mission. (Source: authors own elaboration)

## 13.5   Conclusions

The institutional logics view has proved particularly useful to map the common good variables under the different points of view that shape the organizational field. This significantly helps overcome the excessive focalization on the sole logic of economic sustainability that typically governs choices at the organizational level and take into consideration all the different sets of social expectations around the possible societal level impacts of the eco-socio-technical system under study.

Even if governance and strategy are based on the prioritization of some logics over others (for example, a specific University may decide to prioritize the dissemination logic over, say, the entrepreneurial logic), the different logics continue to exist at the societal level and dynamically influence the system. For this reason, it is particularly important to map all o DPM variables under all key institutional logics that are active in the system under study. Otherwise, the DPM analysis is likely to miss some key aspects of the dynamics that (may) generate public value.

The pilot study conducted on universities' third mission systems suggests that conducting a preliminary, in-depth analysis of the relevant institutional logics is important also because this gives the impression to all the people who collaborate to modelling that all the points of view are being taken into consideration and that the choice of indicators will be neutral and inclusive, rather than ideologically oriented and exclusive. This inclusiveness and neutrality proved very important to discourage counterproductive polarization into opposing coalitions in the phase of variable identification.

In this light, the pilot analysis conducted by this study suggests that the focal organization/institution that is at the core of the system under study (in this case, the university that is at the core of a third mission system) should play a pivotal role as an engine of dynamic integration and reconciliation within and across all of the relevant logics, in order to effectively manage the intertwining fragilities of the key common resources that the system is expected to (re)generate.

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# Chapter 14
# Fostering Collaborative Governance in Chronic Disease Management Programs: A Dynamic Performance Management Approach

**Enzo Bivona and Guido Noto**

**Abstract** Chronic diseases are the leading cause of disability and mortality in the world and represent a global health emergency due to the increase in frequency and complexity that has been occurring in recent years. The outcomes related to chronic care needs depend on the joint effort of a multi-provider, multi-disciplinary, and multi-professional service network, which operates along a clinical pathway. However, all the different players involved in the provision of services may have different interests and goals derived from their organizational structure and their role in the overall health system. This context of fragmented governance makes performance management of care services problematic. It requires the assessment of interorganizational relationships of the multiplicity of providers involved in the service delivery. This chapter aims to show how a dynamic performance-based perspective may effectively support chronic care management and help decision-makers focus on critical drivers impacting on desired results. For this purpose, the chronic disease management program implemented in the Lombardy Region (Italy) was used as a basis for developing a dynamic performance management framework. This approach is then used to address obstacles impeding the success of the chronic disease management program and to outline alternative policies the different decision-makers involved in the healthcare pathway delivery may implement to improve the whole program performance.

**Keywords** Collaborative governance · Chronic disease management programs · Dynamic performance management · Performance outcomes · System dynamics

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## 14.1  Introduction

Chronic diseases (such as heart disease, stroke, cancer, chronic respiratory diseases, and diabetes) are among the most important causes of mortality (Mackenbach & McKee, 2013). In 2008, of the 36 million people who died from chronic diseases, 27 million were over 60 years old (WHO, 2011). This phenomenon is growing in strength also due to the changes in epidemiological conditions—above all, the aging population—which are determining new chronic diseases care needs.

According to the social structure of European countries, this trend is likely to continue. Fernández, Forder, Trukeschitz, Rokosová, and McDaid (2009) forecast that in Europe, the percentage of 65-year-olds, which in 2007 was 17% of the population, would reach 28% by the year 2040. In the same period, according to the OECD, the percentage of the population over 80 years old would increase from 4.7 to 11% (OECD, 2013). Thus, more people will be suffering from chronic diseases. This phenomenon appears more exacerbated in the United States, where chronic disease affects nearly one in two adults, and it accounts for 75% of the nation's healthcare costs (IOM, 2012).

Though the prevention and management of chronic diseases have become a high priority in developed countries, health systems are facing a shrinking budget allocation for healthcare. Between 2007 and 2011, as recently revealed (Maresso et al., 2015), 44 over the 53 countries observed recorded sharp decreases in the health expenditure. Particularly, in the period 2009–2012, Italy recorded −1.1%, UK −1.3%, Denmark −1.2%, Ireland −3.7%, and Greece −9.0%.

The economic impact of the rising trend in chronic diseases is dramatic for regional economies both in terms of direct costs—i.e., delivering care—and indirect costs—e.g., absence and productivity of employees (Collins et al., 2005; Hoffman, Rice, & Sung, 1996; Verikios, Dixon, Rimmer, & Harris, 2015).

Differently from other diseases, chronic conditions are characteristically of long duration and slow progress in which each patient's care needs change over time. Given these characteristics, chronic diseases require long-term care and, at the same time, different prevention methods. While in acute care (e.g., femur fracture), the care service aims at solving the problem, and the outcome depends on the performance of the individual care provider; in chronic care the primary purpose is to maintain the best possible patient conditions and to avoid acute episodes (e.g., hospitalizations).

Although a broad range of different chronic disease management programs or prevention and early detection interventions have been widely implemented in European healthcare systems, these approaches fail to achieve expected results. Research highlights different obstacles to improve the care of patients with chronic diseases: financial incentives, information and communication technology, and pharmaceutical and medical innovations (Scheller-Kreinsen, Blümel, & Busse, 2009). However, one of the central barriers is the lack of coordination in healthcare provision. As the outcomes of chronic disease programs depend on the joint effort of a multi-provider, multi-disciplinary, and multi-professional service network,

operating along a clinical care pathway, a lack of coordination may lead to poor results (Nuti, Bini, Grillo Ruggieri, Piaggesi, & Ricci, 2016). This is particularly true in contexts characterized by fragmentation between the multiple tiers of highly specialized professionals, often involved in service provision over an extended period.

Due to chronic disease characteristics, their burden requires the adoption of new care management solutions and the structuring of specific care pathways consistently with the patients' needs (Nuti, Bini, et al., 2016). Care pathways can be defined as health services delivery chains to be followed to meet the needs of patients in everyday clinical conditions (Bivona & Cosenz, 2017).

In traditional settings of care (e.g., hospital, primary care, etc.), in which individual providers focus on volumes of services/treatments delivered, the design of performance measurement systems fits the setting. However, performance assessment of care pathways depends on the actions of various providers; therefore, it should consider the performance of the multiple health system stakeholders involved in the delivery of service (Homer & Hirsch, 2006; Nuti, Noto, Vola, & Vainieri, 2018). Indeed, especially in chronic care, the process of value[1] creation can only be effectively measured and fostered by assuming the value-delivery chain perspective, which involves a number of different professionals and providers. Due to that, several scholars (Kodner & Spreeuwenberg, 2002; Leutz, 1999; Nuti et al., 2018; Nuti, Bini, et al., 2016; Valentijn, Schepman, Opheij, & Bruijnzeels, 2013) have highlighted the need to implement strategies which involve coordination, integration, and continuity of care so as to deal with the institutional complexity characterizing care pathways.

Although the use of a collaborative governance approach (Ansell & Gash, 2008; McGuire, 2006) in healthcare has been particularly suggested to overcome the above obstacles, less efforts have been devoted to investigate the design of a dynamic performance management system able to capture the relationships between different actors involved in the path of chronic patients and how such interactions impact on the overall healthcare outcomes.

This work suggests the adoption of a dynamic performance-based perspective to identify barriers and opportunities arising from the implementation of a chronic care network model and help decision-makers focus on critical drivers impacting on desired results. Such a dynamic performance management framework is then used to investigate the chronic disease management program implemented in the Lombardy Region. Based on such analysis, the authors also highlight common barriers impeding successful chronic disease management programs and outline a series of actions policy-makers need to take to improve the conditions for effectively managing chronic diseases.

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[1] Value in health has been defined as multifaceted and multidimensional outcomes achieved with the available resources (Porter, 2010).

## 14.2  Collaborative Governance and Performance Management in Chronic Care

In the last two decades, public management literature and practices have been characterized by a strong focus toward networking and collaborative governance (Ansell & Gash, 2008; Provan & Milward, 1995, 2001; Turrini, Cristofoli, Frosini, & Nasi, 2010). This trend emerged in order to overcome the limitations of the previous organizational models of public administration (Bryson, Crosby, & Bloomberg, 2014; O'Flynn, 2007), namely, the Weberian bureaucratic administration model, first, and the New Public Management, second. Both organizational models are based on the breaking up of the production and service delivery processes, thus creating independent "silos" structures exclusively concerned about what is happening within the organizational/departmental boundaries (Head & Alford, 2015).

Networking and collaboration between different organizations have been then suggested as new strategies to deal with the "silos" logic characterizing the public sector (Christensen & Laegreid, 2007; Head & Alford, 2015; Pollitt, 2003).

As previously mentioned, consistently with the public administration evolution trend, also the healthcare sector is experiencing a push toward the adoption of policies aimed at fostering coordination and integration of activities between the different stakeholders involved in the service delivery chain (Leutz, 1999; Nuti et al., 2018; Nuti, Bini, et al., 2016).

An open challenge in the implementation of collaborative practices is related to the measurement and management of performance of the resulting networks.

Traditional performance management (PM) frameworks are mainly focused on the analysis of performance at the organizational level (Bianchi, 2016; Bianchi et al., 2010; Cuganesan, Jacobs, & Lacey, 2014; Dekker, 2016), e.g., the hospital. This limit is likely to shift managers' and professionals' attention to suboptimal performance, thus leading to performance distortions and strategic inconsistency (Meyer & Gupta, 1994; Van Thiel & Leeuw, 2002; Melnyk et al., 2014).

As previously mentioned, the delivery of chronic care services to patients relies upon the interplay of multiple professionals operating in different institutions. As such, a key role in the delivery of these services is played by the existing interorganizational relationships. Kurunmäki and Miller (2011) outlined the need to broaden the study of interorganizational relations and performance management to include not only organizational forms but the practices and processes through which they are made operable which, in the case of chronic care, are the care pathways. Dealing with care pathways entails the design of performance measures aimed to assess the value created by the network resulting from these horizontal interorganizational relationships and to support its governance.

In this context, the combination of PM with system dynamics (SD) modeling may support performance assessment at the system level and accounting for the interorganizational governance structure that characterizes the service delivery (Bianchi, 2016). SD is an approach for modeling and simulating complex physical and social systems, and experimenting with the models to design policies for man-

agement and change (Forrester, 1961). SD was extensively used to analyze public health issues related to chronic diseases. Homer, Hirsch, Minniti, and Pierson (2004) and Homer, Hirsch, and Milstein (2007) extensively analyzed chronic care management in the U.S. through SD models focused on understanding the trade-off between costs and health outcomes. Through their models, they aimed at supporting resource planning, determine critical success factors, and evaluate the differential impacts on decisions. Other SD publications and related applications to chronic disease, and particularly on the prevention of cardiovascular diseases, may be found in Hirsch, Homer, Evans, and Zielinski (2010), Hirsch, Homer, Trogdon, Wile, and Orenstein (2014), and Homer et al. (2014).

Combining PM and SD enables one both to capture causal relationships underlying the functioning of a social system and to simulate performance behavior over time allowing decision-makers and other stakeholders to evaluate the trade-offs between short- and long-term outcomes related to the adoption of a given strategy (Bianchi, 2010; Cosenz & Noto, 2014, 2016). This approach, named dynamic performance management (DPM), aims to make explicit the relationships between strategic resource accumulation and depletion processes, performance drivers, and end results impacting on the system performance (Bianchi, 2016; Bivona & Cosenz, 2017). Figure 14.1 displays a conceptual representation of the DPM approach.

A DPM approach is particularly valuable for dealing with dynamic complexity (e.g., change of needs over time), since time disjunctions between actions and results and nonlinear feedback relationships affecting outcomes limit organizations to understand the structure and behavior of the system in which their actions will be implemented (Bianchi, Bovaird, & Loeffler, 2017). This approach supports decision-makers in managing possible risks related to unintended effects of policies which, although they may look consistent from a static and sectorial perspective, may fail
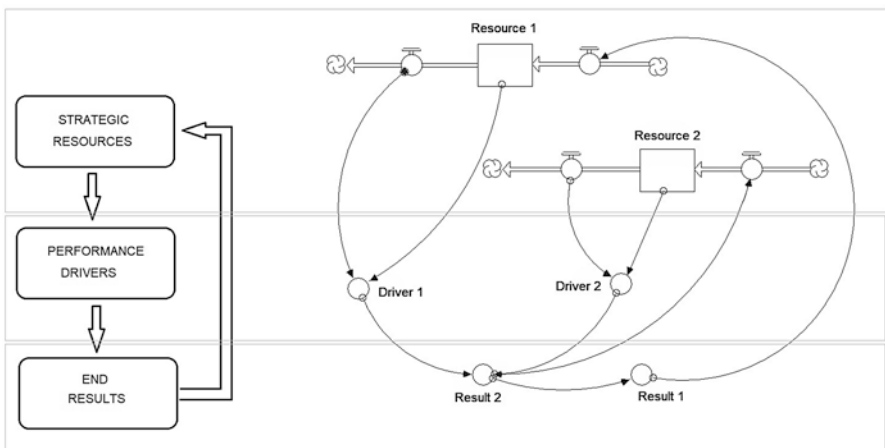


**Fig. 14.1** A dynamic performance management approach (adapted from Bianchi (2016))
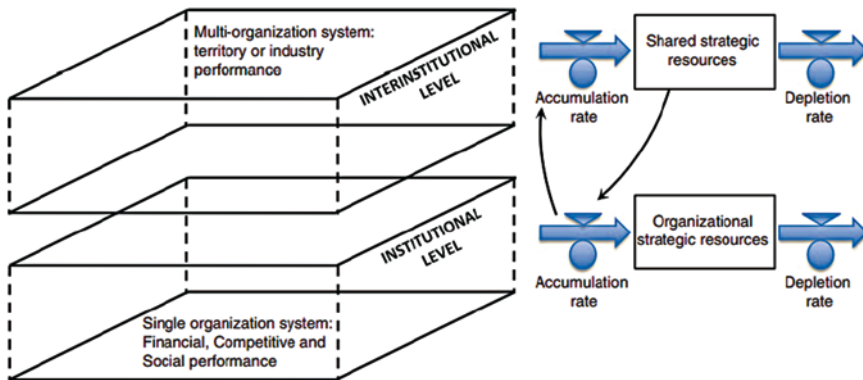
**Fig. 14.2** An interinstitutional view of DPM (from Bianchi (2012))

in the long term due to a lack of coordination (Bianchi et al., 2017; Ghaffarzadegan, Lyneis, & Richardson, 2011).

This approach is likely to support decision-makers in better coordinating performance measurement reporting and policy design. Such coordination helps decision-makers and organizations trace both causes and drivers that have led to a given performance level over time. It also contributes to the enhancement of the diagnosis process to put in place corrective actions and strategies oriented to fill the gap between the actual and the target performance (Bivona & Cosenz, 2017).

DPM approach requires the identification of both results (output and outcome) and their respective drivers. To affect such drivers, public organizations must build up, preserve, and deploy a proper endowment of strategic resources linked to each other. Decisions made by different decision-makers upon interdependent strategic resources should be coordinated with each other according to an interinstitutional view (see Fig. 14.2).

In the next section, the chronic care management program implemented in the Lombardy Region (Italy) is presented. This provides the basis to develop a DPM framework.

## 14.3 The Analysis of the Chronic Disease Management Program in the Lombardy Region

The Italian national health system follows the Beveridge model and provides universal coverage for comprehensive and essential health services through general taxation. This national health system is organized on a regional basis, where each regional government defines its health plans and governance structure, and allocates the budget to its health authorities which are in charge of delivering the related services. Regional governments provide health services through:

1. Local health authorities (LHAs) which are financed through a capitation formula and are responsible for the health status in a specific geographical area. Therefore, they are in charge of delivering or purchasing from other public or private organizations, health services for their reference population. General practitioners (GPs) are independent professionals who operate with LHAs through standard agreements based on the number of patients assigned to them.
2. Autonomous/university hospitals which are focused on acute care treatments. These could be public or private in convention with the region in which they operate.

Lombardy adopts a quasi-market health system where patients can choose providers, and the money follows the patients. This model splits purchasers and providers (including private institutions) in order to stress the role of patient choice to boost competition (Berta, Martini, Moscone, & Vittadini, 2016; Nuti, Vola, Bonini, & Vainieri, 2016)—i.e., LHAs are exclusively called to purchase services from providers.

Lombardy, the fourth largest region of Italy, with almost 23.9 thousand square kilometers, is situated in the north of the country. It accounts for about ten million inhabitants (i.e., 1/6 of Italy's population), and more than 30% of them are suffering from one or more chronic diseases, including diabetes, hypertension, cardiovascular disease, etc. (ISTAT, 2013). The expenditure related to the treatment of such diseases accounts for more than 75% of health expenditure of the region (Fait et al., 2016) estimated at around 18 billion euros a year.

As reported in Fig. 14.3, from 2005 to 2020, the regional healthcare system is expected to record a sharp increase, particularly in patients with multiple comorbidities. Comorbidity is the presence of one or more additional diseases or disorders co-occurring with a primary disease. On the patient perspective, comorbidities may result in behavior aimed at searching different treatments from different specialists and other care providers, which would imply a significant healthcare spending growth.

To face the challenges related to chronic care needs (i.e., support patients in receiving appropriate treatments and to keep under control the related expenditures), the Lombardy Region in 2011 implemented the Chronic Related Group (CReG), i.e., a system of classification of chronic pathologies linked to a remuneration system which represents the synthesis of the resources consumption, both economic and professional, necessary to remunerate a care pathway aligned with the prescriptions of the Italian essential level of care established at the national level (Amaducci et al., 2013; Nalin et al., 2015). Particularly, this system aims at i) identifying persons affected by chronic disease and ii) grouping them into homogeneous categories based on the expected consumption of financial resources. Initially, in 2012, the program was implemented only in five local health authorities (LHAs) and involved patients affected by hypertension, diabetes, cardiovascular diseases, and chronic obstructive pulmonary disease.

The CReG model is characterized by the interaction between a multiplicity of actors, i.e., the regional government, the LHA, the CReG managers (a newly intro-
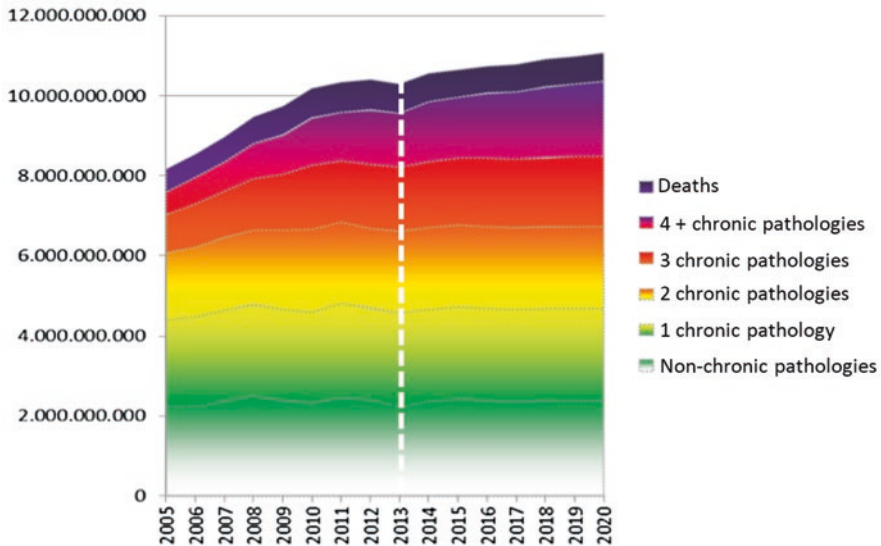
**Fig. 14.3** Historical total chronic healthcare costs 2005–2013 (pharmaceutical, outpatient, and hospital) and forecast 2014–2020 (from Resolution No. 4662 of 23/12/, 2015 of the Lombardy Region)

duced role in the Lombardy health system which is usually undertaken by GPs cooperatives), the providers, and the patients (see Fig. 14.3). The region and the LHAs are mainly responsible for:

- Identifying and classifying the chronic patients eligible for the program (CReG homogeneous classes).
- Developing healthcare plans, e.g., the Diagnostic and Therapeutic Care Pathway[2] for each CReG class, taking into account patient pathologies and comorbidities.
- Elaborating and reviewing the reimbursement scheme for each CReG class of patients in accordance with the current healthcare plan.[3]

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[2] The healthcare plans were set based on the national guidelines of care, Diagnostic and Therapeutic Care Pathways (Percorsi Diagnostici, Terapeutici e Assistenziali—PDTA) related to a certain pathology, and the data available on the treatments carried out in the past. Such data are collected by the patient's database (BDA—Banca Dati Assistito) managed by the region. The healthcare plan determines all the care activities (e.g., general practitioner consultations, laboratory examinations, consultations with specialists, medication, assistance from nurses, etc.) deemed necessary for appropriate management of the patients' chronic pathology. Since each patients' case is different, healthcare pathways are adopted by also taking into account the individual needs and conditions of the patient; as a result, a one-year individual healthcare plan (Piano Assistenziale Individuale—PAI) is defined by the provider chosen by the patient.

[3] For each CReG class, a fixed tariff is set. It is based on the previous resources consumed by patients with similar health needs as recorded in the patients' database (BDA). CReG classes related to patients with the most sever chronicity level 1 are assigned the highest tariff. The lowest tariffs are set to patients in the level 3 of chronicity. The BDA is particularly important for the

- Monitoring the quality of care supplied to patients by the selected providers.

CReG managers and providers play a critical role in the system since they are in charge of delivering the expected healthcare plan services along the predefined chronic patient's pathway. CReG managers represent a new institutional level which emerges as groups or networks of public and private professionals and their administrative staff.

The CReG mangers, usually the GPs or specialists, take over the responsibility of defining the *individual healthcare plan* (Percorso Assistenziale Individuale—PAI) for each chronic patient based on the guidelines coming from the Diagnostic and Therapeutic Care Pathway and the individual characteristics of their patients. The PAI details the necessary steps within the upcoming year in terms of GP or specialists consultations, laboratory exams, medication, and other services, which should be delivered by the other providers of the healthcare system. This requires implementing an integrated decision-making process between GPs, specialists, nurses, and the patient and/or his/her family members. The provider chosen by the patient in order to develop and implement the PAI holds a given endowment of tangible and intangible resources and assumes the responsibility of the successful implementation of the program.

A *case manager* also has to be identified to organize all the day-to-day operations related to the patient's progression through the CReG program, to monitor the delivery of assigned cares and the level of patients' satisfaction, and to support the elaboration of patients' reporting to the region.

The provider is required to provide a *call center* services for patient queries, and schedules and reminds about upcoming appointments in the PAI and to support *telemedicine* monitoring.

Finally, the use of a *software platform is also required to* support providers to collect and store patients' electronic files, to customize preloaded patient's healthcare plans based on effective needs and enable the provider to dialogue with the region generating the required periodic reporting of patient's cares provided. To meet such a program prerequisite, the provider often teamed up with a technological partner, which provides resources and expertise in creating and managing the software platform, telemedicine, and call center facilities.

As the tariff for each CReG class is fixed based on a given level of service provided (measured both in terms of qualitative and quantitative process outputs, which in turn may result in tariff incentives or penalties[4]), CReG managers have to cover all the additional costs sustained to deliver non-expected treatments (e.g., avoidable hospitalization) to chronic patients enrolled in the program. This may encourage providers to reduce improper or inappropriate care not required by the individual

region to track the usage of healthcare services as well as medication consumption of patients enrolled in the CReG program and to monitor and update CReG classes tariffs.

[4] The introduction of an incentive-penalty plan is stated in the regional act n° IX/1479 of the 2011 March 30.

patient's plan, to set effective telemedicine services, and to improve home-based services.

In 2013, more than 450 GPs associated with cooperatives participated in the role of CReG manager, enrolling about 65,000 patients in the region. In 2016, the program was extended to all LHAs in Lombardy Region, and enrollment reached more than 180,000 patients (Levato, 2016). Although preliminary results show an improvement of some indicators of clinical care for patients enrolled in CReG project (see, for instance, the study on cardiovascular risk conducted by Lauri, De Luca, & Levato, 2015), several limitations were still raised which also led to high pressure on the Lombardy Region to ensure the program's success. Due to that, in 2017–2018 the region started designing and implementing a new set of reforms, oriented at overcoming some of the critical issues that emerged during the first phase of the CReG program implementation and outlined in the following section.

Here, after briefly introducing the main challenges that may prevent the achievement of the desired outcomes of the chronic disease management program, a DPM framework is outlined, and potential policies that decision-makers may adopt to improve the performance of the program are discussed.

## 14.4 Designing a DPM Framework to Overcome Chronic Disease Management Program Challenges

### 14.4.1 Main Challenges Hampering Chronic Disease Management Program Outcomes

#### 14.4.1.1 System Actors' Fragmentation

The chronic disease management program involves multi-actors in delivering the expected level of care. Among them:

- GPs: serving as the first point of contact for the patient.
- Specialists: addressing specific needs of the patients' pathway.
- Laboratories: performing examinations and analysis requested by the GPs and specialists.
- Nurses: looking after the patients' needs, as prescribes by the GPs or specialists, during their stay in a healthcare facility or home visits.
- Pharmacies: providing medicine to the patient prescribed by GPs and specialists.
- Case managers: organizing all the activities related to the patient's pathway through the CReG program.
- Technological partner: enabling the provider to manage electronically patient's care pathway and to supply to the region the patient's periodic reporting.
- Region and LHAs: updating the list of chronic patients, defining healthcare plan and related CReG class tariff, and monitoring the quality of care provided.

- Patients and their families: requiring individual healthcare plan based on age and chronic pathologies and choosing their preferred provider.

Unless the abovementioned healthcare actors are aligned with the new chronic diseases management program and acknowledge the necessity of strictly following the individual patient's care pathway, the continuity and consistency of care in accordance with the program would be breached (Tolmachova, 2017). Furthermore, patients' health literacy and active participation in the healthcare program are also worth considering (Ishikawa & Yano, 2008) since they are in charge to choose their preferred provider. Experiences of some GP cooperatives involved in the CReG program show that appropriate informational support needs to be provided to patients in order to ensure their cooperation in the program. This is particularly critical in the elderly, who constitute the majority among chronic patients.

### 14.4.1.2  Lack of Coordination in Defining Patient Healthcare Plan Between GPs and Specialists

GPs and specialists are the two main actors who are defining the patient's pathway, together with nurses and the patient. The alignment of the first two is paramount since they are entitled to prescribe other services to the patient (such as medication, laboratory exams, etc.) and thus proliferate either compliance to the PAI or deferral from it. One recurrent challenge faced by CReG managers, particularly in the early stage of the program implementation, was the misalignment between GPs and its professionals. Some specialists to whom the patients referred in accordance with their PAI were not eager to follow the patient's individual healthcare plan and made medicine or laboratory exam prescriptions misaligned to PAI (Tolmachova, 2017). This phenomenon is twofold. It results in patient confusion and implies additional expenses to the healthcare system not included in the PAI, thereby increasing patient perceptions of uncertainty and preventing the main goal of the program (i.e., to align the care of the patient to the PAI and to keep expenses of the healthcare system in balance).

### 14.4.1.3  GPs Resilience

This program also represents a big challenge for GPs who are now asked to develop skills and abilities, which go beyond the boundaries of the traditional GP daily activities. GPs are now in charge of seeking for those patients to be enrolled in the program, taking care of chronic patients by designing a customized healthcare plan together with specialists, updating and frequently consulting the electronic patient record, etc. (Lauri et al., 2015). As specialists may be reluctant to act in accordance with a predefined care pathway, to some extent, GPs may also suffer the same phenomenon of losing autonomy in the patient care decision-making process.

#### 14.4.1.4   Absence of Shared Performance Outcomes

This program aims at offering a customized care service to match changing chronic patients' needs and to keep under control public healthcare expenditures. However, it does not provide a shared set of performance outcome measures to assess program results (typically with a medium/long-term horizon) and to support decision-makers to review their policies accordingly. It is mainly focused on short-term process outputs (e.g., patients taken effectively in charge within the program) and to monitor monetary flows of resources (Ricci & Longo, 2014).

### 14.4.2   How Can the DPM Overcome Chronic Disease Management Program Challenges?

To show how the DPM approach could support the implementation of the chronic disease management program analyzed in the Lombardy Region, Fig. 14.5 highlights the main relationships between strategic resources, performance divers, and end results.

Figure 14.5 is based on the building blocks offered by the DPM framework reported in Fig. 14.1 (strategic resources, performance drivers, and end results) and the specific characteristics of the case study hereby developed.

The framework is divided into three subsequent layers, although interconnected. From the bottom, it shows the end results the chronic disease management program is expected to achieve. For instance, the change in healthcare expenditures, patient's health, patients enrolled in the program, and patient's health literacy and participation in the program. As it is possible to observe, such end results cannot be achieved by the activities carried out by a single actor operating inside the chronic patient's pathway. For instance, the change in patient's health if on one side depends on the number of patient's visits (from both GP and specialists) and exams provided compared with the required prescriptions included in the PAI, on the other side it is strictly related to the ability of region and LHA to (a) frequently update the list of chronic patients to be enrolled in the program and, at the same time, (b) inform patients about the new chronic disease management program.

The intermediate level reports those performance drivers that lead to a change in end results. Such performance indicators compare the efforts (e.g., the level of service) generated by the endowment of tangible and intangible strategic resources made available by the multiple actors involved in the care pathway, with the level of care services predefined in the program. This is the case, for instance, of the ratio between the current level of healthcare service provided and the level of healthcare service expected, according to the individual healthcare plan. The higher the ratio, the higher the ability of the providers to comply with the PAI. In turn, this is expected to improve the patient's health and to generate a positive change in healthcare expenditures.
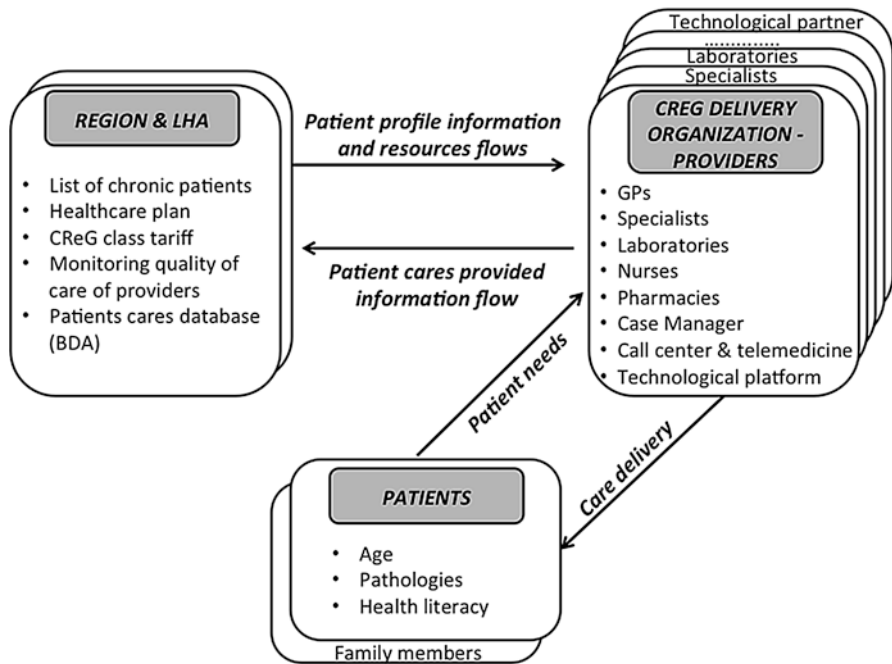
**Fig. 14.4** Main actors' interrelationships in the chronic disease management program of the Lombardy Region

Improving these intermediate performance indicators requires decision-makers to acquire and build up a coherent blend of tangible and intangible strategic assets. It is worth noting that some assets can be acquired/hired in the market, such as, for instance, GPs, specialists, and case managers. However, their desired level of knowledge cannot. Consequently, decision-makers have to identify those policy levers on which to act to strengthen the accumulation and to weaken the decline processes. Among the strategic resources reported in Fig. 14.4, it is possible to distinguish three main areas referring to region and LHAs (region and LHAs control and communication, healthcare expenditures, and adherence to PAI among providers), healthcare providers (GPs & GPs coordination abilities,[5] specialists & nurses knowledge, call center & telemedicine, case manager, and technological partner), and patients (patients enrolled in the program, patient's health and health literacy, and participation in the program).

In order to make more explicit the criteria beyond the design of the DPM framework portrayed in Fig. 14.5 and the interconnection between the variables involved

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[5] The double-layer portrayed in a strategic resource shows a multi-dimension asset. For instance, "GPs & GPs coordination abilities" indicate both the number and the level of coordination abilities of GP involved in the program.
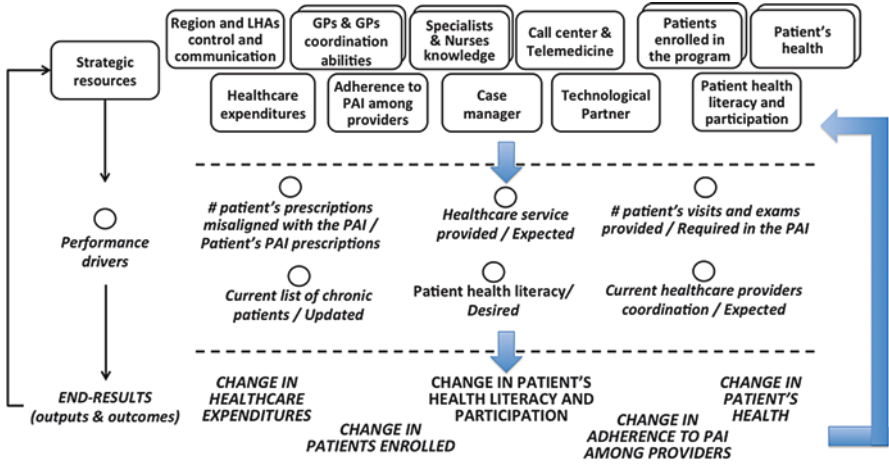
**Fig. 14.5** Applying the dynamic performance management approach to chronic patients' management program in Lombardy
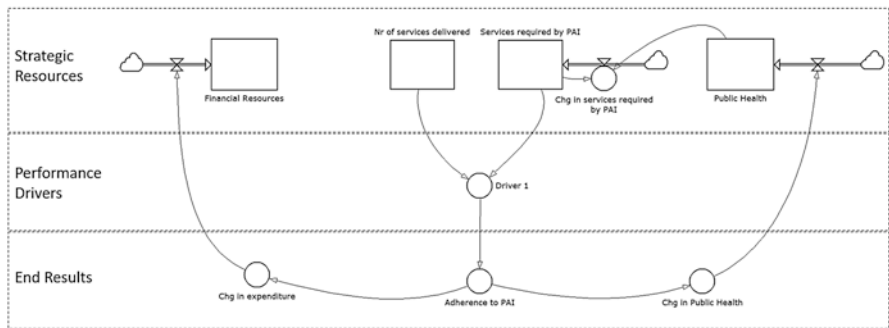


**Fig. 14.6** A simplified model to support chronic patients' management program

in the system, a simplified model related to one of the end results above described (change in adherence to PAI) is reported in Fig. 14.6.

The adherence to PAI depends on a performance driver (Driver 1 in Fig. 14.6) which is the ratio between the services delivered and the services required by the PAI. The effects of the increased adherence to PAI are twofold. It generates a positive effect in population health on the one side, and it reduces waste related to the delivery of inappropriate services. While the reduction of waste makes available more resources for the health system, the improved public health leads to a decline in the treatments and services required by chronic patients at the population level.

## 14.5   Discussion and Conclusions

At the beginning of the previous section, four main challenges that may prevent chronic patient management program outcomes realization have been outlined: system actors' fragmentation, GPs and specialists' coordination in defining patient healthcare plan, GPs resilience, and the absence of shared performance outcomes.

To overcome system actors' fragmentation, it requires both the intervention of region and LHA on one side and provider on the other side. Notably, the first two actors have to monitor and stimulate adherence to PAI among providers periodically. Discouraging this practice through financial penalties (e.g., reduction in patient's care remuneration) and communication initiatives aimed at diffusing the new program goals may achieve this result. The provider has to develop new coordination and communication abilities, not required in past practices, particularly for GPs, which may facilitate such aggregation. Additionally, case managers can be considered as primary contributors to ensure in practice this type of communication and coordination.

The lack of coordination in defining patient healthcare plan between GPs and specialists and GPs resilience are, to some extent, interconnected.

An individual healthcare plan (PAI) is one of the main pillars of the program, reflecting the new way of management of the patients by providing continuity of care and empowerment to the patient. Therefore, lack of coordination between GPs and specialists may weaken the increase of the outcome related to the adherence to PAI among the chronic patients. To achieve such a goal, GPs and specialists are asked to abandon the old and often occasional way to treat chronic patients and to merge their respective knowledge to diagnose and jointly design a continuous individual care plan. This requires an active role taken by LHA to offer training opportunities to GPs and specialists to communicate the goals of the new chronic patients' management program and the peculiar role played by the PAI.

This lack of coordination between GPs and specialists in defining patient healthcare plan may also be affected by GPs resilience, which can be overcome through the acquisition of leadership skills not required in the traditional GP daily activities. However, this shift in GP mind would imply delays and a learning time lag before GPs act accordingly. This, in turn, may lead in the short term to poor performance both in terms of adherence to PAI and healthcare expenditures. Finally, to cope with the absence of shared performance outcomes, the DPM framework offers a set of end results, both outputs and outcomes, to which decision-makers involved in the healthcare pathway may refer to measure program performance. By monitoring such results over time, they can also design alternative policies to improve chronic disease management.

In conclusion, mapping the chronic care disease according to the patient pathway aging chain allows us to understand which the drivers of performance at the system level are, i.e., the levers on which to act in order to limit the disease progress. In the case of Lombardy Region, one of the major elements of the new management of chronic patients is the individual healthcare plan (PAI) that delivers the appropriate

standard of care according to the patient's condition as well as keeps the healthcare costs in balance. Understanding the strategic resources that allow the delivery of adherence to PAI is crucial for the success of the program. DPM has been applied to identify such strategic resources and performance drivers that facilitate the desired end results of the program of the region. Such analysis allowed us to identify the key levers on which the different decision-makers can act to enhance the achievement of desired outcomes. Once performance drivers are identified, the next step of the analysis is related to the identification of the stakeholder having the power to influence them, i.e., the players that own/control the strategic resources needed to put in place policy and management actions. Linking performance drivers to the system players (e.g., region, LHAs, and healthcare providers) represents a key step to coordinate their action toward the achievement of desired outcomes for the investigated community (Noto & Noto, 2018). In fact, according to Casalini, Seghieri, Emdin, and Nuti (2017), in order to improve care in chronic disease management, it is pivotal to implement an accountability system in which each actor is made responsible for its contribution to the emerging network performance.

Based on the real experience of an Italian regional health system, this chapter analyzed the opportunity given by the adoption of a systemic and dynamic performance management approach to foster the holistic view on the delivery of the program that encompasses collaborative governance among stakeholders in chronic care management.

Future developments of this study may integrate a "running" simulation model to allow us the possibility of put in place scenario analysis and sensitivity tests. Simulation may increase the added value of DPM, enabling the exploration of potential unintended consequences of policy actions and, thus, challenging mental models of the stakeholders involved in the chronic patient service delivery chain.

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# Chapter 15
# Applying Dynamic Performance Management to Foster Collaborative Governance in Higher Education: A Conceptual Framework

**Zhenping Zhang, Enzo Bivona, Jiayin Qi, and Haiyan Yan**

**Abstract** Higher education is characterized by growing complexity and uncertainty, which highlight how wicked issues cannot be addressed by one organization acting alone. A collaborative governance approach is here proposed to tackle these issues. Such a perspective has been implemented widely, from public services design and delivery to infrastructure development and environmental protection. Although higher education is not less critical than the above areas, less attention has been paid to collaborative governance in this field. To foster collaborative governance in higher education, based on a literature review, we develop a conceptual framework using the dynamic performance management approach. This study aims to contribute to the literature and to support decision-makers to implement collaborative governance strategies to achieve the three university missions. Future research is required to test the validity of the proposed framework. The use of a system dynamics simulation model could offer an effective environment to simulate alternative collaborative governance strategies in higher education institutions.

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## 15.1   Introduction

Nowadays, our society is facing a growing number of changes and challenges. Problems are very often referred to as wicked (Weber & Khademian, 2008), particularly in the public sector. For example, governments often struggle to properly manage shared resources preventing the tragedy of commons (Dietz, Ostrom, & Stern, 2003). From social and economic development to environmental and ecological protection, not any single organization can address problems in such areas independently. Such a level of complexity is related to the variety of stakeholders involved, on the one hand, and their different interests, on the other hand.

Therefore, the partnership among different stakeholders becomes critical for solving such wicked issues. Generally, it is possible to identify four different approaches actors can adapt to build up a relationship to jointly address common issues (Himmelman, 2002): networking, coordination, cooperation, and collaboration. Networking is an informal relationship in which the exchange of information generates mutual benefits. Coordination, instead, promotes a more formal linkage. In fact, to pursue mutual benefits and to foster the achievement of a common purpose, partnering activities are altered accordingly. Cooperation consists of an exchange of information, developing businesses and promoting resource sharing for mutual benefit in the quest for a common goal. Finally, collaboration is distinctive as it includes a willingness of the organizations to enhance one another's capacity— helping the other to "be the best they can be"—for mutual benefits and common purposes. In collaboration, organizations usually share risks, responsibilities, and rewards.

Based on the concept of collaboration, collaborative governance (Gray & Wood, 1991) promotes partnerships between different stakeholders toward the achievement of a common goal by collective actions. Such a partnership can benefit from the contribution of various stakeholders. As it can facilitate the interaction among all involved members, this can enable them to gain a comprehensive view of the addressed problem. It also can contribute to balance different stakeholders' interests and reduce policy resistance.

More recently, collaborative governance is gaining growing popularity and implementation in different fields. Ansell and Gash (2008) reviewed 137 examples of collaborative governance in various sectors to determine what organizational features lead to productive collaborations. Other applications refer to common resource issues (Conley & Moote, 2003), public policymaking (Agranoff & McGuire, 2004), and environmental protection (Bodin, 2017).

Although higher education is no less complex and no less important than the above areas (Bienkowski, Feng, & Means, 2012), it appears under-investigated (Hunter, 2008). The continuous changes in society lead to increasing pressure on higher education institutions (HEIs). HEIs need to adapt knowledge and innovation development processes and education systems timely. Furthermore, it has been observed that the achievement of the three missions of HEIs (Etzkowitz & Carvalho de Mello, 2004; Larédo, 2007; Mejlgaard & Ryan, 2017; Scott, 2006; Zhang, Yan, Qi, & Bivona, 2018), i.e., teaching, research, and third mission (i.e., transferring of

knowledge generated within the university to society), strongly depends on the ability of HEIs to build a mutual and long-term partnership with external organizations (e.g., profit and nonprofit organizations, public institutions, and citizens), in other words to adopt a collaborative governance approach.

In this paper, we try to shed some light by reviewing the literature on collaborative governance, discussing the challenges of higher education, and finally proposing a theoretical framework based on the dynamic performance management (DPM) approach (Bianchi, 2016) to foster collaborative governance in HEIs.

## 15.2 Literature Review

### 15.2.1 Collaborative Governance

Gray and Wood (1991) define collaboration as "a process through which organizations who can see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their limited vision of what is possible." Among the most important features of the collaboration are the dynamism of the process, the organizations involved, the duration of the cooperation, and the shared responsibility. Typical outcomes of collaborative approaches include solved problems, achieved shared norms, and the ultimate survival of the partnership itself. Gray and Wood (1991) conclude that because of the broad nature of collaborative governance, no one single perspective, either preconditions, the process, or outcomes, can fully conceptualize it precisely.

Amsler (2016) argues that collaboration is a value itself, and a legal framework must be considered to govern public managers' actions. Law provides a set of decision rules, while management and politics shape decision-making arrangements.

The development of collaborative governance originates from the decline of the New Public Management (NPM) and the rising of the New Public Governance (NPG). While NPM emphasizes the accountability of different silos, NPG promotes achieving public value collectively (Hood, 1991; Osborne & Gaebler, 1992; Bryson, Crosby & Bloomberg, 2014).

Thomson and Perry (2006) remark the interactive process of collaboration. They highlight the continuous partners' interaction and attitude to work together toward participative decision-making. While reciprocity and trust are necessary for collective actions, various self-interests must also be aggregated into mutual understanding for common choices and decisions. Therefore, the outcome of the collaboration may not necessarily represent the best possible solution. Instead, it may consist of the achievement of a shared vision among all involved actors.

Hardy, Lawrence, and Grant (2005) investigate the causal relationship between the dialogue among collaborative participants and the success of these partnerships. The authors emphasize the role of tension among actors in strengthening partnerships because this allows for a balanced relationship between cooperative and assertive conversations among members. Finding an accepted construction is also crucial,

where participants come to a general agreement by discussing the causes, solutions, and goals relating to the issues the collaboration is attempting to address. As participants both begin and continue to interact, this creates a collective identity, legitimizing the partnership.

Similarly, O'Flynn and Wanna (2008) and Thomson, Perry, and Miller (2007) summarize four distinctive characteristics of collaboration:

– Multiple purposes. It can be seen as a means of pooling existing resources or leveraging new ones, a strategy to reduce risk or to enter new markets, an attempt to reduce transaction costs, a reaction to complexity or turbulent environments and, finally, as a way for (re)integration in a fragmented domain (Bryson, Crosby, & Stone, 2006; Lawrence, 1999; Lowndes & Skelcher, 1998).
– Multiple dimensions of success. It can be referred to the achievement of outcomes, getting processes to work, reaching milestones, gaining external recognition, and also a personal pride that develops from successfully championing a project.
– Trade-offs between efforts (e.g., resources and time) and rewards, which may undermine cooperation. Recognizing the specific capabilities and strategic assets owned by the different organizations is particularly important in setting effective collaborative operations.
– Dynamic process. It implies that organizations' incentives for working together needed to be carefully thought out, particularly when the players' power relations change over time.

Ansell and Gash (2008), through the analysis of a relevant sample of collaborative governance applications in various sectors, outline organizational features leading to productive collaborations. Notably, they remark that time, trust, and actors' interdependence play a crucial role in a successful partnership, as well as in resource governance.

Bryson et al. (2006) investigate the conditions and necessities for collaboration by examining the difficulties and challenges associated with the processes and outcomes of cross-sector collaboration. Through a review of the literature, the authors find that cross-sectoral collaboration takes shape when single ventures in addressing a problem fail. Therefore, both self-interest and interdependences lead to cooperation between multiple stakeholders. The design of a cross-sectoral partnership must include accountability, leadership, trust, and mutual gain. The literature review provides propositions that would help stakeholders to understand the plan, composition, and implementation of successful cross-sectoral collaborations.

Emerson, Nabatchi, and Balogh (2012) synthesized and extended a suite of conceptual frameworks, research findings, and practice-based knowledge into an integrative framework for collaborative governance, which specifies a set of nested dimensions that encompass a more extensive system context, a collaborative governance regime, and its internal cooperative dynamism. As Fig. 15.1 shows, Emerson et al. (2012) remark the role played by actors' engagement, the capacity to joint action, and shared motivation as those internal collaboration engines, which lead to actions that can generate impacts and adaptations across the system.
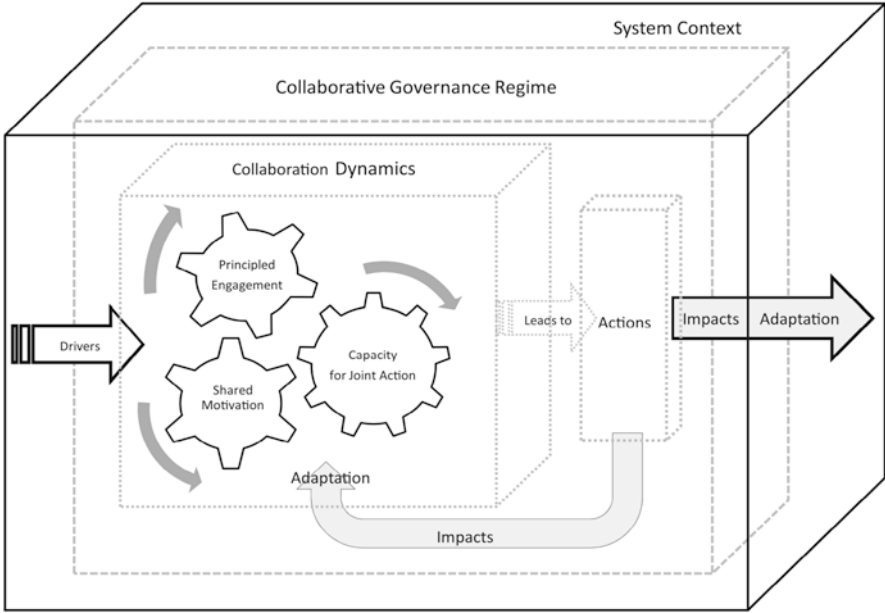
**Fig. 15.1** The integrative framework for collaborative governance (Emerson et al., 2012)

**Table 15.1** Summary of collaborative governance dimensions

| | |
|---|---|
| Motivations | Resource interdependencies, pooling existing resources, leveraging new resources, complexity, turbulent environments, and crisis |
| Organizational features | Reciprocity and trust, balancing different interests, mutual understanding, dialogue, a joint construction, collective identity, time, leadership, mutual gain, accountability, and initial success |
| Expected results | Solved problems, shared norms, partnership, and shared vision |

Based on the above literature review on collaborative governance, it is possible to outline three main dimensions: *motivations, organizational features, and expected results*. Motivations are the prerequisites for collaboration, and organizational features are the critical success factors, while expected results are the goals for collaborative governance. As summarized in Table 15.1, collaborative governance emerges in a complex system context in which a single organization cannot solve the problem alone. It begins with the identification of resources interdependence and different interests of broad stakeholders. Then trust and a sense of collective identity are built to promote collaboration among partners. Successful collaborative governance contributes to solving the wicked problems, on the one hand, and building shared norms, visions, and partnerships for future collaborations, on the other hand. Although collaborative governance long-term value is recognized among partners, it is a complex and dynamic process with a lot of risks and uncertainty, which needs careful examination.

### 15.2.2  The Challenges of Modern Higher Education Institutions

The continuous changes in modern society make it difficult to define the role of HEIs precisely. Since its foundation, the university is considered the center of great minds, which creates and diffuses knowledge, and delivers both knowledge and skilled students to society. With the booming of the knowledge economy and the increase of global competition, HEIs need to reposition and restructure themselves to respond more effectively to the changing social, economic, and political systems.

Investigating critical attributes of world-class universities, Salmi summaries three sets of factors playing a pivotal role in top universities:

1. A high concentration of talent.
2. Abundant resources to offer a productive learning environment and to conduct advanced research.
3. Favorable governance features that encourage strategic vision, innovation, and flexibility and that enable institutions to make decisions and to manage resources without being encumbered by bureaucracy.

Three critical performance indicators are evaluated: graduates, research output, and technology transfer.

Traditionally, HEIs are responsible for two missions (Etzkowitz & Carvalho de Mello, 2004). The first mission is research, whether fundamental or applied, without which it cannot play a leading role in higher education and knowledge creation. The other one is teaching, which is dedicated to training skilled students for the industry and society. With the booming of the knowledge economy, compared to the traditional twin missions of teaching and research, nowadays more and more emphasis has been put on the third mission, which involves transferring and commercializing knowledge generated within the university and contributing widely to economic development (Larédo, 2007; Mejlgaard & Ryan, 2017).

These three missions interplay and interact with each other. As shown in Fig. 15.2, research offers new findings and tools for continuously updating teaching courses (see link a). At the same time, teaching activities provide new ideas and experience to support research goals and to review research plans (see link b). Teaching, as well as research, interacts with the third mission. Teaching activities deliver qualified graduate students to the society (see link c), who may find job opportunities in organizations or may decide to launch their ventures (third mission). Universities also get feedback from stakeholders, who supply inputs to redesign teaching courses (see link d). Research provides innovative processes, techniques, patents, and products to satisfy stakeholders' needs (see link e). Simultaneously, the third mission gives feedbacks by proposing new research ideas, projects, and training programs (see link f). Ideally, these three missions lead to multiple reinforcing feedback loops, which can foster the achievement of university missions. However, as suggested by Zaini et al. (2017), there are multiple delays caused by the time needed to recruit faculty members to train students and to generate new knowledge and technology. As a consequence of these delays, the rate at
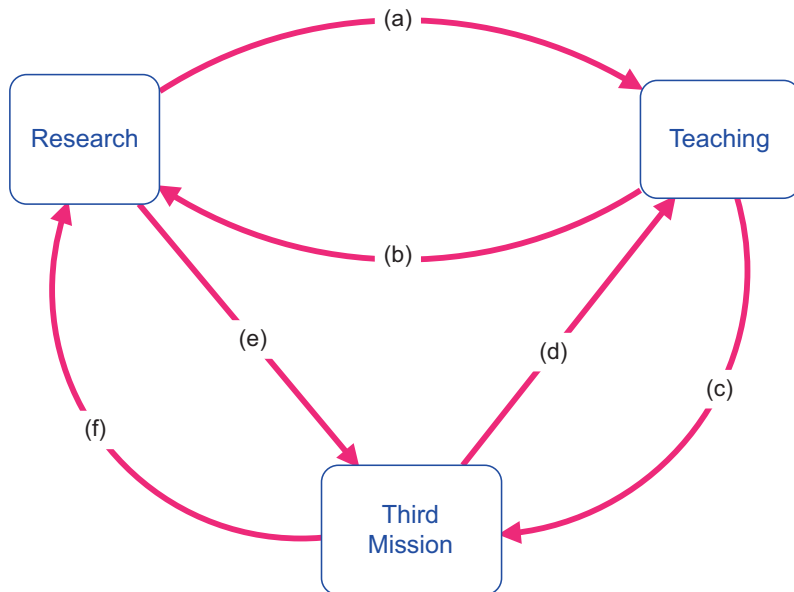
**Fig. 15.2** An ideal framework of university growth (Zhang et al., 2018). (a) New tools, evidences, (b) ideas, teaching experiences, (c) delivery of skilled students, (d) improving teaching, program redesign, (e) innovative techniques, patents and products, (f) new corporations, projects and training

which education and social services are delivered to the society is affected. Furthermore, there are also trade-offs between the three missions as they are competing for the same pool of financial resources, leading to balancing loops, which would undermine the achievement of the missions without active intervention.

However, HEIs cannot face the above challenge alone. In the World Bank report titled "The challenge of establishing world-class universities," Salmi emphasized the role of both government and private sectors to support the development of the university in terms of funding and active participation. Zaini et al. (2017) also suggested that due to the enormous time delays needed for anchoring entrepreneurial activities and having it flourish and cause a measurable change, the trust and continuing support from the government is of great importance. To generate advanced knowledge needed by society and to provide high-quality education services, HEIs have to promote partnerships and interactions with different stakeholders, including profit and nonprofit enterprises, public organizations, and citizens.

### 15.2.3  Collaborative Governance in Higher Education

Economic growth and global competitiveness are increasingly driven by knowledge and that universities play a crucial role in that context. Due to the importance of HEIs in our society, several scholars investigated the governance dimension. Amaral

and Magalhaes (2002) and Kennedy (2003) emphasize the critical role external stakeholders may play in university governance. They argue that external stakeholders are assuming a growing prominence relative to internal stakeholders in the rhetoric of change, and their presence is designed to make HEIs more responsive to environmental needs and changes.

Paradeise, Reale, Bleiklie, and Ferlie (2009) show that changes in higher education follow the same trends recorded in other public sectors such as health, social care, security, and justice, in which formalized tools are developed, such as plans, budgeting, and reporting, to improve performance. They also remark that the current situation displays, with a different degree (depending upon the country and the sector), all three possible types of regulation: by substantive rules, by markets or quasi-markets as described by in the NPM narrative, and by the institutionalization of collective action, as in the NPG model.

All the above researches focus on university governance from the perspective of the government or outside stakeholders. They highlight the managed relation between government and HEIs, shifting the focus from internal to external. However, few have paid attention to the collaborative governance in HEIs and the role played by external stakeholders.

There are only a few collaborative governance practices in the education area (Hunter, 2008). Some examples are an aerospace project in Australia, involving industry stakeholders to train students for the aviation industry, and the joined collaboration at Queensland Health to provide emotional, therapeutic, and educational support to meet the complex needs of the child.

Current researches very often focus on the governance of HEIs rather than on collaborative governance, and only a few cases are reported. As multiple and a wide variety of organizations collaborate with HEIs to support the achievement of the three missions, a comprehensive framework to foster collaborative governance in higher education is desirable. Therefore, the use of a DPM perspective is here suggested to develop a collaborative governance framework in higher education.
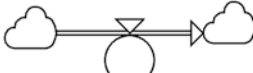
## 15.3  Applying Dynamic Performance Management to Foster Collaborative Governance in Higher Education

### 15.3.1  The Dynamic Performance Management Perspective

The dynamic performance management (DPM) perspective can help organizations to manage sustainable growth and restructuring processes (Bianchi, 2016), which is developed based on system dynamics. Table 15.2 summarizes the symbols and related meaning in a typical system dynamics model (Sterman, 2000).

This perspective suggests identifying the causes affecting the desired objects through the chain of end results, performance drivers, and strategic resources. This instrumental view begins by framing the critical performance factors of the overall

**Table 15.2** Summary of system dynamics symbols and explanation

| | |
|---|---|
| **Stock** | An element of a system that accumulates or drains over time. Stocks are the memory of a system and are only affected by flows. |
| **Flow** | The movement of people or things between stocks within a system boundary or across the model boundary and thereby into or out of the system (through sinks and sources); changes in stocks over time. |
| **Converter** | A variable that is not a flow and is capable of changing its value instantaneously. |
| **Causal link** | A relationship between two variables with the direction of causality and the direction of impact. |

organization. Then alternative means for improving performance can be made explicit. After identifying both end results and their respective drivers, each responsibility area must build up, preserve, and deploy a proper endowment of strategic resources that are systemically linked to each other. Figure 15.3 shows how the end results provide an endogenous source inside an organization for the accumulation and depletion processes that affect strategic resources. End results can be modeled as in- and outflows, which over a given period change the corresponding stocks of strategic resources, as a result of actions implemented by decision-makers.

### 15.3.2 Fostering Collaborative Governance in Higher Education

The DPM perspective is consistent with the collaborative governance framework proposed by Emerson et al. (2012), in which system context is first specified and then the drivers, collaboration dynamics, and impacts are articulated.

As we discussed in Sect. 15.2.2, three missions can be identified in HEIs: teaching, research, and the third mission, which interact with each other. Consequently, we develop a DPM chart related to each mission to foster collaborative governance in HEIs. The development of such a framework consists of two steps. First, output, performance driver, and strategic resources are identified based on the instrumental view of the DPM approach. Then collaborative governance is examined to support the achievement of the three missions.
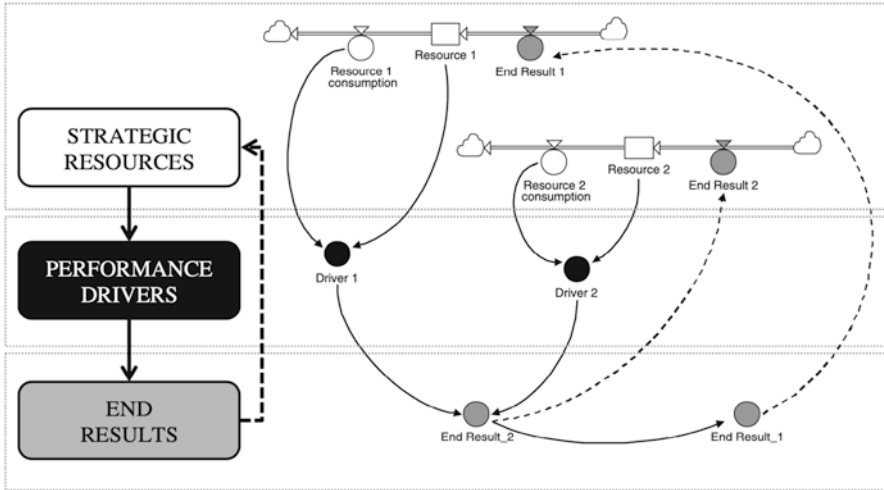
**Fig. 15.3** The instrumental view of performance (Bianchi, 2016)

### 15.3.2.1 Fostering Collaborative Governance in Higher Education: Teaching Mission

Teaching is the traditional mission and central part of HEIs' responsibility. However, the links and transition points from education to employment are weakly articulated (Altbach & Peterson, 1999). Thus, the relative employment rate is taken into account as an outcome measure of teaching, while the number of graduate students is an output. It is worth noting that the employment rate is not measured in absolute terms, but relative terms. For this reason, employed graduates are compared with the number of available employment positions that may fit with the knowledge and skills acquired by the HEIs graduates.

Performance drivers are critical success factors that determine the achievement of end results. In this case, the performance driver of the relative employment rate is course quality, which enables students' ability to be qualified to work. Such a driver also impacts on the fit between students' knowledge and skill offered by HEIs and those requested by the market (measured, for instance, through the number of available employment positions with the same typology of knowledge and skill). To develop high-quality courses, an appropriate bundle of strategic resources is required, i.e., faculty, facilities, and financial resources.

According to Table 15.1, the motivation for collaborative governance for teaching is resource interdependency, pooling existing resources, and leveraging new resources. First, HEIs and external organizations are interdependent. External organizations hire students who graduated from HEIs, and HEIs need to find job opportunities for their students. Second, the teaching resources provided by HEIs and practical experience from external organizations can be pooled to offer high-quality
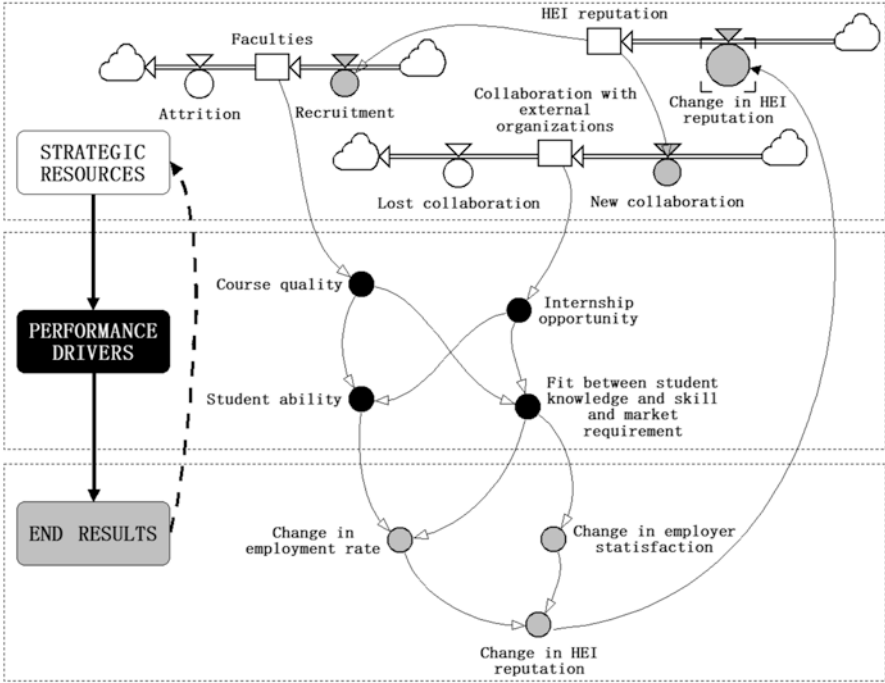
**Fig. 15.4**  Fostering collaborative governance in the teaching of HEIs

courses. Finally, the agreements between HEIs and external organizations can provide internship opportunities for students.

The DPM framework reported in Fig. 15.4 also helps to examine the effect of collaborative governance on teaching. Collaborative governance contributes to the increase in course quality and provision in internship opportunities. When the reputation of HEIs improves, further collaboration will be implemented. In this case, the evaluation of the change in course quality and students' ability can be gauged to guide the direction of further collaboration.

### 15.3.2.2  Fostering Collaborative Governance in Higher Education: Research Mission

The principal goals for HEIs have generally associated with the generation of both basic and applied knowledge from research. Basic research aims at expanding the existing base of knowledge, thereby increasing the actual level of knowledge. On the contrary, applied research puts to practical use the current level of knowledge to unsolved problems. The performance of research can be measured by the results produced over time. Nowadays, a high emphasis is played by research citations and journals with a high impact factor (Diem & Wolter, 2013). High citation often

means being well recognized by the research community. Thus, citations can be assumed as one outcome of the research, while the number of published papers is the output of research. The performance driver, which may contribute to improving the number of citations, is the relative quality of papers, compared to those contributions offered by other HEIs' faculty members operating in the same research area. Top qualified researchers are required to improve such a driver, as well as publication opportunities and sufficient support and funding (for instance, to present research results at conferences).

Similar to teaching, a research collaboration between HEIs and external organizations shows mutual gains. External organizations cannot conduct all the research inside the organization, especially basic research, which is expensive in both cost and time. This may represent a proper motivation to support joint research centers and to share the latest research from HEIs. At the same time, HEIs also benefit from field research, advanced facilities, and external funding.

Figure 15.5 shows the conceptual framework to foster collaborative governance in higher education, focusing on research. The effect of collaboration can be evaluated in two aspects, research productivity and relevance of research, which are critical factors impacting on paper quality. Highly qualified faculty members, on the one side, and field research opportunities provided by external organizations, on the other side, can contribute to increasing research productivity. Besides, as suggested by the triple helix of university–industry–government relations, the participation of external organizations in research activities is likely to influence the quality of the study and to make the research more advanced in the academic and in the business context. Therefore, HEIs' research performance improvement can lead to positive change in end results, such as citations, HEIs' reputation, and external organizations' satisfaction, which in turn can foster further collaborations with external organizations.

### 15.3.2.3   Fostering Collaborative Governance in Higher Education: The Third Mission

The third mission is about the implication of generated knowledge, either by commercialization or provision of services to the society, including governments, public, private, and nonprofit organizations and citizens. The performance of the third mission can be evaluated by the social and economic benefits provided by HEIs to the society at large. In this case, social and economic benefits appear as outcomes, while the amount of services provided is the output. The service capability of HEIs to respond to the requests and needs of the society positively can be considered as one key performance driver. Advanced research, qualified faculties, students, and innovative facility are needed to improve service capability.

The delivery of the third mission can also benefit from the adoption of collaborative governance. Similar to the concept of coproduction of new products and codesign of new public services (Voorberg, Bekkers, & Tummers, 2015), a partnership
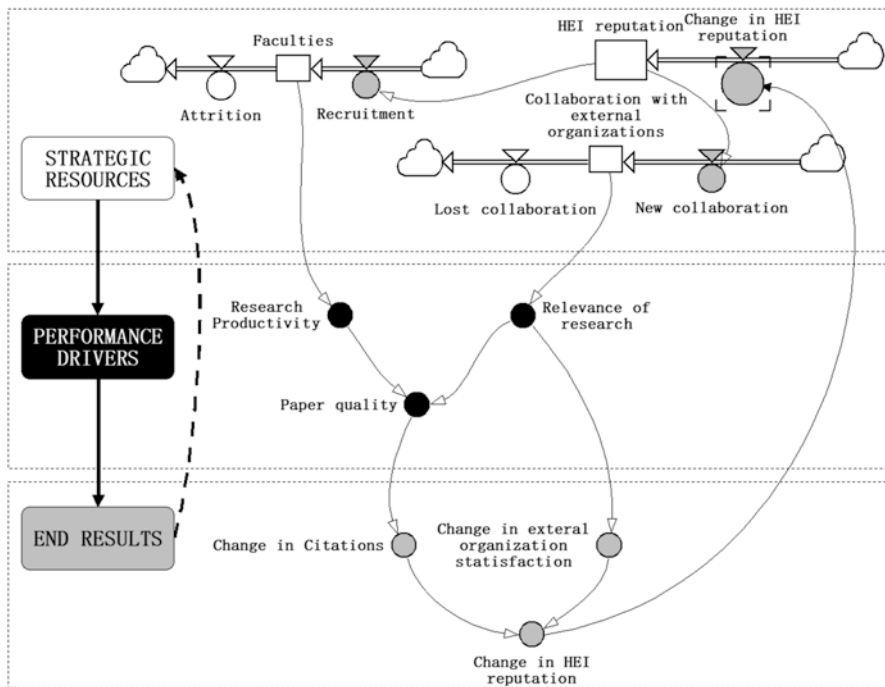
**Fig. 15.5**  Fostering collaborative governance in the research of HEIs

with external organizations can facilitate the process of delivering new products and services and improve the achievement of the third mission goals.

As it is possible to observe from Fig. 15.6, the collaboration with external organizations enables faculty members to be more productive. Moreover, the participation of external organizations helps HEIs to deliver social services more efficiently. The higher the service capability, the higher the social and economic benefits result. The increase in external organizations' satisfaction also contributes to the improvement of reputation, which tightens the collaboration with external organizations in turn.

## 15.4  Discussion and Conclusion

The adoption of a collaborative governance approach in higher education can contribute to promoting the achievement of a higher shared public value rather than silo accountability, as suggested by the NPM. As this approach is rooted in resource pool sharing, a joint effort of multiple stakeholders allows all engaged partners to search for common solutions beyond their single vision and competences.
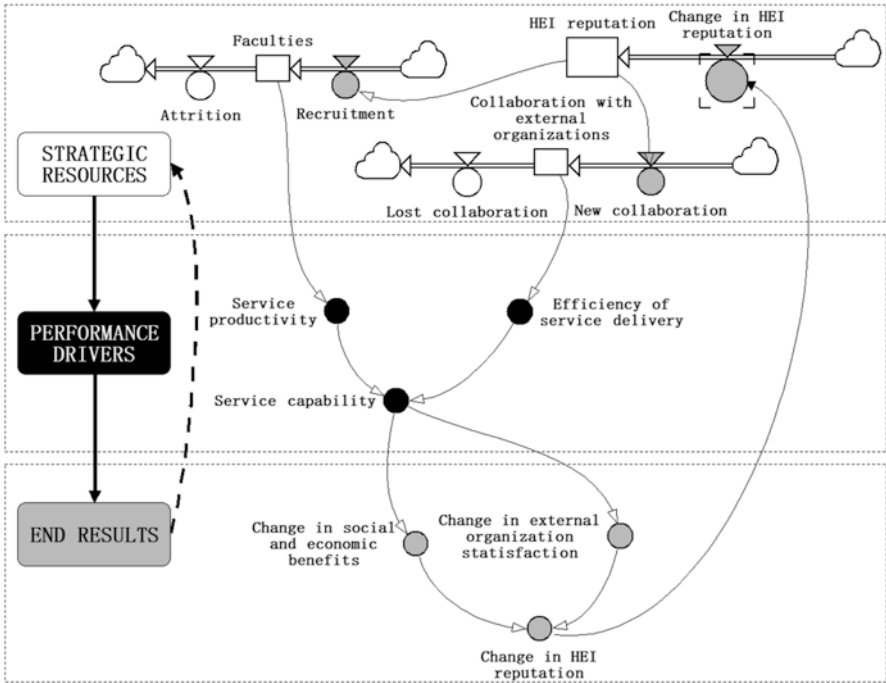
**Fig. 15.6** Fostering collaborative governance in the third mission of HEIs

To fully achieve the three missions under dynamic complexity, HEIs cannot act alone. Based on the DPM approach, we propose a conceptual framework to support decision-makers to pursue collaborative governance in HEIs successfully. This framework contributes to identifying new strategic resources needed, how to increase performance drivers, and, finally, how the improvement of such drivers is likely to impact teaching, research, and the third mission's outputs and outcomes.

The contribution offered by this research is twofold. First, it aims to close the gap in the literature as current studies rarely apply collaborative governance to higher education compared to other research fields, such as environmental protection, public resources use, and infrastructural development. Moreover, research about university often focuses on the internal performance of HEIs and emphasizes the relationship between government and HEIs. Second, through the use of the DPM approach, this work identifies strategic resources, related performance drivers, and the outputs and outcomes of the three missions, through which decision-makers can assess collaborative governance strategies in HEIs.

However, as the suggested framework does not offer a detailed analysis of the underlined processes, future researches are required. First, the three missions' goals are interconnected with dynamic interplays. Second, to successfully implement collaborative governance, the internal governance of HEIs needs to be taken into consideration. Third, the time delays and trade-offs among the three missions are not

examined in our study, although they raise a high pressure to HEIs decision-makers to promptly meet stakeholders' expectations. To overcome such limitations, we aim to develop further this study by applying the subjective view of DPM (Bianchi, 2016). Such a perspective would allow us to examine intermediate products and internal processes, and their interrelations, and how different responsibility areas impact on HEIs governance. Finally, these findings could also offer the basis to build a system dynamics model, customized on a real case study, through which test and simulate alternative collaborative governance strategies in HEIs.

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