

# Innovation and the State: Thinking of Government as "Technology Maker" and Implications for Public Administration Research

*Erkki Karo and Rainer Kattel*

## ABSTRACT

In this essay we summarize the historical roots and development of public sector innovation research and discuss its main current weakness – lack of an explicit evolutionary perspective. To remedy this weakness, we develop further the co-evolutionary perspective on public administration, technological development and innovation. Relying on Christopher Pollitt's framework of government as "placemaker", we propose a complementary framework of government as "technology maker". In the concluding section, we discuss the implications of the proposed framework for PA research.

**Keywords:** public administration; public sector innovation; technological innovation; co-evolution; government as technology maker.

## 1. Introduction

Although concepts such as *public sector innovation* and *social innovation* have entered the basic vocabulary of public administration (PA) research and practice (see de Vries et al. 2015 for a thorough overview), the theoretical premises of these concepts and related research are still somewhat ambivalent (Kattel 2015). While the question of how such innovations can be best delivered – e.g. through public-private partnerships, co-design and co-production between the state and social actors, public procurement of innovations, or through policy entrepreneurship of single individuals and organizations – is a crucial and already widely debated issue in PA, we still need deeper theoretical insights and frameworks for understanding the complex and co-evolutionary interactions between PA and innovation, especially if one shifts the focus from social and organizational innovations towards technological innovations, and the implications of the latter on PA and governance.

From the co-evolutionary perspective, PA, technology and innovation may be linked in several ways. Most obviously, governments support the development of broader innovation capabilities of societies by designing and implementing educa-

tion, research and development, entrepreneurship and other related policies (see Karo and Kattel 2015). But governments are involved in innovation processes also more directly. On the one hand, governments can “innovate” by *adopting existing technologies* and related organizational and procedural modalities in new contexts and as novel solutions to persistent or new policy problems. On the other hand, governments can also “innovate” by *“creating” new technologies* and related organizational and procedural modalities (that do not even exist in the private sector) through the demand and “search” activities by different organizations (and policy fields) and, as a result, affect the direction and speed of technological development and innovation in society in general.

Such broader thinking of state-technology-innovation interactions is increasingly popular among leading innovation scholars, and especially in the context of tackling “societal challenges” of modern societies (see Fagerberg et al. 2013; Mazzucato 2013). Innovation scholars seem to agree that especially “green revolution” (shift towards more sustainable production and consumption paradigms in terms of energy production and utilization, environmental and social concerns) requires the state to carry out the dual roles of technology creation and adoption to break the entrenched interests of established “legacy sectors” (Bonvillian and Weiss 2015) and create pathways for new markets and needed technological developments (Perez 2015). At the same time, such ambidexterity has received almost no explicit and systemic discussion by PA scholars. For example, Pollitt (2016) has recently linked PA to modern “societal challenges” but he does not discuss how technological developments and public sector innovation in general – i.e. how government creating or adopting new technological solutions and innovations – could help PA and governments tackle these challenges.

In this short essay we develop further the co-evolutionary perspective on public administration, technological development and innovation (see also Karo et al. 2012; Karo and Kattel 2016). We will briefly summarize the historical roots and development of public sector innovation research and discuss its main current weakness – lack of an explicit evolutionary perspective. To remedy this weakness, we rely on Pollitt’s (2012) framework of government as “placemaker” and propose a complementary framework of government as “technology maker”. In the concluding section, we discuss the implications of this framework for PA research.

## 2. Public sector and social innovation: old concepts back in fashion?

By and large we can divide scholarly efforts to delineate and conceptualize public sector innovation into three periods with key characteristics (see in more detail in Kattel 2015).

*Entrepreneurial/Schumpeterian period.* Innovations and the public sector are related to a larger theory of how evolutionary change takes place in societies, mainly associated with Schumpeter (1912; 1939) and his work on how exceptional individuals – entrepreneurs – drive innovation (in this sense, also Weber’s work on charismatic and other forms of authority should be considered a key contribution – Weber 1922), and also how the public sector has had a dual character vis-à-vis innovation: it itself can be changed by innovators and innovations, but the state can play

a crucial role for business innovations, as well (either by directly leading or indirectly supporting entrepreneurial activity).

*Organizational theory period.* Growing complexities of industrial societies make organizations (as opposed to entrepreneurs) and their specific routines and capacities the key drivers of innovation (as was noted already also by Schumpeter 1942). Overall, organizational theory literature (e.g. Thompson 1965; Wilson 1989) uses a more or less varied Schumpeterian notion of innovation, but it almost does not differentiate at all between the private and public sectors. Thus, innovations in any organization can be defined as significant and enduring changes in core tasks, and therefore innovation should be different from incremental changes in organizations (public or private); this interpretation is similar to the concept of (technological) “break-throughs” familiar from the private sector evolutionary literature (see Lynn 1997).

*Autochthonous theory period.* From the 2000s onwards, research dealing with public sector innovation has tried to move away both from these two perspectives. The aim has been to conceptualize and study innovation as genuinely attributable to the public sector and discuss explicitly innovations in public services and governance (see, e.g. Moore and Hartley 2008; Verhoest et al. 2006; Pollitt 2011). However, while there is a distinct attempt to discuss public sector phenomena (i.e. decentralization of agencies or regions) and move away from the private-sector categorization and concepts (such as product, service and other types of innovations; concepts of life cycles and trajectories), there is hardly any substantial change in terms of conceptually differentiating public sector innovations from the private sector ones. Further, in contrast to earlier periods, and with the exception of Lynn (1997; 2013), this line of scholarship has paid much less attention to the *evolutionary* character of changes described as innovations. This is not to say that there is not an acute awareness that one has to differentiate ordinary change from innovation (see Osborne and Brown 2013). Yet, how this transformative change in fact works in the public sector – and differs from typical private sector dynamics – remains almost always unpacked. Even the most advanced concepts of public sector innovation do not address in detail how selection mechanisms and other processes take place that would enable us to distinguish innovations from ordinary changes. Thus, in most interpretations innovations are still changes that are new to the organization and that are large and durable enough. And often there also seem to be normative connotations involved in distinguishing innovation from change: as innovation is good, a successful reform must be innovative.

### 3. The evolutionary nature of public sector innovation

Modern innovation research in the private sector is all about evolutionary change and about trying to understand how and why certain products, services, technologies, technology systems, but also organizational forms and institutional frameworks become dominant over others that in turn become obsolete or vanish altogether (Nelson and Winter 1982; Perez 2002). The role of technology, particularly large-scale shifts following technological revolutions that lead to whole new paradigms (of production, consumption, and organization of other social activities), is difficult to underestimate here. Freeman (1987) has argued explicitly that radical/systemic techno-economic changes emerge together with institutional and social innovations. Nelson (1994; also

Nelson and Nelson 2002) argues that technologies, industries and supporting institutions (including policies) co-evolve. In other words, significant technological and public policy and institutional changes (innovations) are two sides of the same coin.

Based on this understanding we can conjecture that technology-related evolutionary changes in markets, society and the public sector are often more profound, persistent and systemic than, for example, ideological preferences and other exogenous variables often used in PA research as key explanatory variables for public sector changes and reforms. For example, much-criticized NPM reforms have often been linked to certain ideologies, fashions, policy learning dynamics. Yet, by now some elements of these same NPM reforms are treated as innovations (e.g. contracting-out and public-private partnerships as “innovations” – see Moore and Hartley 2008), or even more crucially as sources of public sector innovation (e.g. autonomous agencies as centers of innovation, the impact of performance management on innovation culture – see Wynen et al. 2014). Even if the adoption of these NPM reform elements by some or most governments has been driven by ideological reasons or fashion-based emulation, it is worth remembering that these approaches to management were originally made feasible and “useful” by progress in information and communication technologies and/or were introduced to the broader management toolbox by (often private sector) organizational reactions to the constraints and opportunities created by ICT developments (see also Karo and Kattel 2015).

Our point in this essay is that in the case of public sector such evolutionary processes of technological and related institutional and organizational innovations are simply much less evident – or mediated by much more complex context and feedback linkages than in markets – and therefore much more difficult to research. Moreover, many evolutionary processes of markets would also not be desirable in the context of public organizations, such as monopoly rents garnered by first movers. Also, in most situations there is hardly any competition within the public sector (or, we prefer coordination and consensus over competition and conflict) that crucially drives evolutionary processes in markets.

That is not to say there is no evolutionary change in the public sector. As we have seen above, almost all literature on public sector innovation *assumes* that there is evolutionary change, but conceptualizing the evolutionary changes in the public sector seems to have been lost in private sector concepts and terminology. The key lesson from previous literature, accordingly, seems to be that we should not attempt to look for similar processes to take place within the public sector. Rather, we should try to focus on evolutionary processes within the public sector that originate from *intrinsic public sector features* (i.e. unique characteristics and role of power, legitimacy, trust, etc.) that act simultaneously as *constraints and enablers* and engender *punctuated evolutionary processes* (or punctuated positive feedback) in the public sector that affect also the trajectories of innovation both *in* government (policies, institutions, organizations of policy design and implementation) and *through* government policies and institutions in markets and society.<sup>1</sup>

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<sup>1</sup> This is arguably exactly the topic of perhaps the earliest “discussion” on public-sector innovation, namely between Tocqueville and Weber on the state-level public administrations in the US (see more in Kattel 2015).

Based on this line of thinking, *public sector innovations* are such technological, institutional and organizational changes in the public sector (they are often also co-evolutionary, as in markets) that realign key enablers and constraints and in one way or another influence the authority and legitimacy of the given public sector actor.

This dimension of authority and legitimacy seems to be almost completely missing in all historical and contemporary debates on public sector innovation. The recently emerging literature on *social innovation* (e.g. Voorberg et al. 2015) tries to fill the gap in public sector innovation literature by looking at values and social relevance and thus moves the discussions towards issues of authority and trust. As mentioned in the introduction, this approach seems to be validated also by parallel moves in the traditional innovation research (and policy practice) to think of innovation not only in terms of markets and economic competitiveness, but also in terms of tackling “societal challenges” through technological and social innovations where the state has an explicitly pro-active role in technology and innovation creation and diffusion.

#### 4. Conceptualizing government as technology maker

Looking at the future of PA research and assuming that technology and innovation – not only within the public sector, but as part of the evolutionary changes in society – remain one of the key focuses of public policies and consequently in PA research as well, we propose that PA research can benefit from a more systemic and proactive approach to studying and understanding the co-evolutionary interactions between PA and technology/innovation. In other words, PA is not only the context where policies are designed and implemented, and technologies to support such policies are adopted, but also where technologies can be created and new techno-economic development trajectories can be triggered. In this context, what is important are not the differences (which exist almost by definition), but rather *complementarities* between private and public sectors (both in functions and modalities), or the collective intelligence to guide societies and solve societal challenges. Equally important are mismatches and misalignments between these sectors, as private and public sectors are influenced by evolutionary, but punctuated, feedback mechanisms that drive changes in both sectors.

In order to understand and conceptualize these processes we propose to adapt Christopher Pollitt’s analytical framework of government as “placemaker” into the arena of technology and innovation. We call this analytical framework government as “technology maker”. In his 2012 book *Place and Technology* Pollitt develops a framework to understand how governments and administrations relate to place and technology. His attention is foremost related to space: “to make the point rather crudely, one might say as citizens we live and work in *places*, not in policies” (2012, vii). He is interested in how public services shape places and, conversely, how particular characteristics of places shape public services. Technology is closely related to place (transport, communication), and thus Pollitt’s interest in technology is defined by the lenses of place as well (2012, ix). While his discussion of government and places is strongly two-dimensional and interested in feedback mechanisms, he looks at how technology influences governments and administrations, but not vice

versa, and accordingly his analysis of technology and public services remains largely one-dimensional and focused on ICT.

In order to understand government's relations to place, Pollitt devises an analytical framework he calls government as placemaker. This framework consists essentially of eight different modalities of how governments make places, thus government:

- Claims territory and establishes border – external and internal;
- Locates its 'own things': schools, offices, military bases, etc;
- Directly regulates through planning mechanisms, environmental standards, etc;
- Constructs or finances infrastructure – roads, railways, airports;
- Negotiates and bargains with other placemakers (other governments, companies, professional and civil groups);
- Reduces spatial disadvantages by policies favouring the universal provision of services;
- Uses symbols and rhetoric to reinforce the affective dimensions of certain places;
- Creates (or denies) access to virtual spaces (by the design of its own websites, subsidizing broadband connections, etc. (2012, 72, see also 73-100).

Pollitt does not claim that this framework constitutes a theory, "neither does it advance a specific set of hypothesis ... it is a kind of checklist combined with a suggestive but not exhaustive set of summaries of some typical dynamic processes and effects" (2012, 99). Indeed, his discussion of various examples shows how such a framework can enrich our understanding of why some public services fail and others do not – to put simply, the framework widens our analytical view and tools. While most of PA is centered around public organizations and policies, Pollitt shows how spatial dimensions in fact create or re-enforce specific features of these organizations and policies. We argue that there is in fact a theoretical claim in Pollitt's framework, although he seems to deny it: within government as placemaker there is an assumption that change in the public sector (policies, services, institutions, organizations) is in fact evolutionary, change happens because of the interaction of various agents and contexts and it leads to prevailing sets of activities and modalities (and dissolution of other sets).

For example, when a local government decides to build a new kindergarten, its decision-making processes of where the new building will physically be will be influenced by the location and its characteristics (politics, transportation access, existing zoning rules, business interests, etc). In other words, while deciding for the place, the place itself plays a key role in decision-making. However, as we discussed before, and given the punctuated feedback linkages in the public sector, these influences and conflicts do not need to play out fully on their evolutionary pathway – there are

numerous constraints within the public sector from political processes (opposition to initiatives) to legal constraints (rule of law and universal provision of services), among many others.

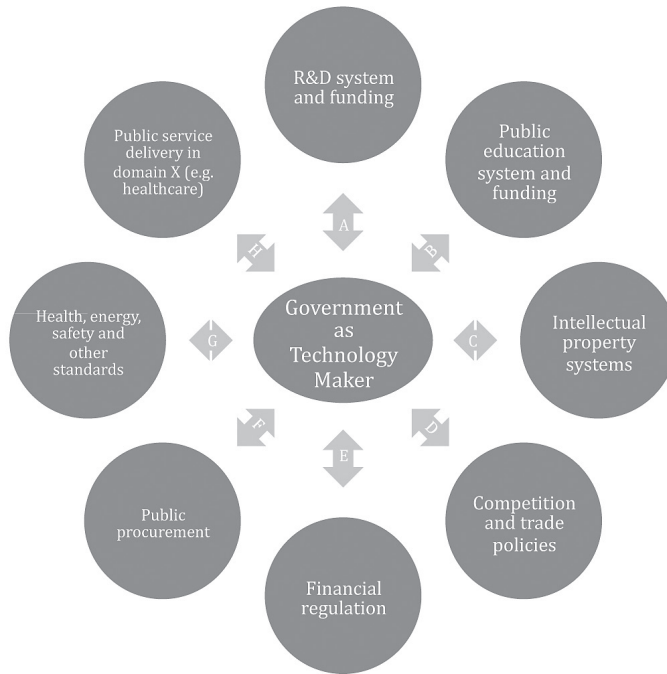
If we look at how evolutionary changes happen in the private sector where companies compete for customers and market shares, the evolutionary processes tend to have an enormous impact in a way that alternative products and services tend to be marginalized (e.g. there is essentially no market for three-wheeled cars, not for the lack of trying, remember Reliant Robin?). Often product and technological standards (e.g. VHS technology's triumph over Betamax), or network effects (Microsoft's long standing near monopoly in computer-operating systems) and other similar evolutionary processes help companies dominate, if not outright destroy, others. This is not what we can see in the public sector.

However, Pollitt's government as placemaker framework offers a very good way to describe and discuss evolutionary processes and their constraints within a concrete context, i.e. a concrete place as this is where people actually live, and not in abstract policies. In fact, in our reading, Pollitt's government as placemaker is less about the geographical or spatial dimension of government (e.g. where to build new kindergarten) and more about physical embodiment and physical structure of government that, however, have political (negotiations), cultural (from landscape to city planning) and technological (infrastructure and communications) features as well, in sum: *context of government*.

As Pollitt sees technology as essentially an extension of government as placemaker it still comes as a surprise that he does not use, or create, a similar framework in discussing government's relation to technology. It is rather obvious that governments play an enormous role in technology: from outright demand for some technologies to supporting R&D and education, setting regulatory standards in health, energy and other sectors and designing competition policies and trade treaties (which essentially "create" new markets or grant market access to different technologies and related products and services).

We propose to use Pollitt's government as placemaker framework also for understanding government's relationship to technology creation and diffusion. As government as placemaker helps us to both describe and understand *context* of government's activities, government as technology maker helps to describe and understand how public and private sectors complement each other, or not, regarding technological development. We can essentially copy Pollitt's structure of government as placemaker, but instead of looking at modalities of how government relates to place, we can draw a similar diagram of how government relates to technology creation and diffusion (see Figure 1).

Figure 1. **Government as Technology Maker**



Source: Authors.

Linkages A through H symbolize some of the key (not exhaustive list) institutional frameworks of functionalities and modalities where policy elaboration, implementation, evaluation and various feedback mechanisms (from business to mass publics and formal policy evaluation exercises) take place and where crucially both public and private sector organizations participate given their specific capacities or capabilities. Innovation (policy) scholars consider these to be the key “activities” or social functions (i.e. activities that produce intellectual capabilities, financial systems, regulatory and demand contexts) enabling technological emergence and diffusion (see Edquist 2011; Karo and Kattel 2015). Note that some of these listed activities are generic innovation supporting activities while others are related to specific public services or government core tasks (to simplify, we summarize the latter through linkage H “public service delivery in domain X” that could imply provision of healthcare, transport services, energy etc). While the former create the general context of broader technology creation and innovation (i.e. providing basic capabilities, setting rules and standards) the latter may include both adoption and creation of new technologies and related organizational and functional modalities.

Within all these frameworks specific divisions of labor and complementarities between public and private organizations are negotiated, regulated and maintained. Within each framework, these divisions of labor results in, as argued above, distinct policy and administrative routines (styles) or capacities and private sector capabilities (technological, production, managerial) that tend to prevail at any given point in

time. On the one hand, the governments have different roles in delivering different public services (e.g. regulation of privatized energy systems vs direct delivery of public education). On the other hand, governments have also different roles in the generic innovation supporting activities. For example, modern governments tend to take more pro-active roles in setting health standards and financing education and basic research (and they create and maintain relevant organizations and capacities for carrying out these tasks) while private organizations finance and/or carry out in-house most applied research and development activities. In addition, many frameworks from A to H have interdependencies that complement or conflict with other institutional frameworks (e.g. trade or competition policies may not necessarily support R&D policies; e-health solutions might conflict with privacy concerns) and each modality also has domestic and international dimensions (see also Karo and Kattel 2014; 2016). Thus, these institutional frameworks offer us a possibility to describe both how private sector evolutionary processes (and resulting capabilities) evolve and how within the same framework public sector punctuated evolutionary processes (and policy capacities and styles) evolve as well.

What the reader hopefully picks up from this framework is that there is neither such a thing as coherent public policy (as also implied by Pollitt's focus on place) nor a single coherent form of PA (even in specific "places", as discussed Pollitt) for tackling complex public policy issues from innovation and technology creation to "real" societal challenges. As the punctuated evolutionary processes are likely to vary in the different institutional frameworks, especially as feedback from different societal sectors varies (suffice it here to mention the "moon and the ghetto" paradox, as discussed by Nelson 1977), we are likely to find a variety of policy and administrative routines (or, styles, capacities) across these frameworks.

## 5. Conclusion: Future avenues for PA research

Crucially, this focus should also lead our thinking away from universal institutional analysis (of PA and governance as such) towards focusing also on *domain* and *organizational-level analysis* (and on systems of diverse organizations), as is also prevalent in classic private sector innovation research (Nelson and Winter 1982). In sum, both Pollitt's government as placemaker framework and proposed government as technology maker framework give us a wider context of government and PA functioning. They also highlight the everlasting conflict in PA research: the tendency towards building common universal models vs. the reality of domain (e.g. policy field, task, place) varieties.

Further, looking at PA both as technology adopter and maker and taking into consideration related authority and legitimacy questions may help us to better grasp how technologies and their evolution may be crucial determinants of the evolution of both the tasks carried out by bureaucracies and of related policy and administrative capacities (as first hypothesized by Litwak and Figueira 1968). In other words, behind the "choices" of public delivery vs. co-production vs. deregulation and privatization of specific services, there seem to be not only political/ideological factors but also new opportunities and constraints (new authority and legitimacy dynamics) created by technological developments.

Further, such a framework makes the classic paradox posed by Baumol (1967) a timely research question again: if public services are different from private services in their technological structure and logic (can be less standardized, computerized and automated), then given technological and related productivity developments in markets, the costs of these services are bound to increase regardless of attempts to reform the specific functions of PA. Thus, while the rhetoric and legitimacy of public sector innovation is often related to austerity and cost efficiency, and if Baumol's paradox holds, we might need totally new fundamentals for understanding why governments should use their authority to take risks and innovate. Or, conversely, we should think of PA explicitly from a technology-making perspective, e.g., would blockchain-based "placeless" public services coordinated and delivered through co-production-based mobile apps that predict our needs and proactively deliver services (i.e. more automated and artificial-intelligence-based services) overcome Baumol's paradox?

To conclude, given that our discussion of PA and innovation seems to lead us back, one way or another, to early- and mid-20<sup>th</sup>-century social-science analyses and if innovation and technology are to remain some of the key buzzwords influencing PA research and practice, the future of PA research might be based on pursuing traditional Staatswissenschaften-type scholarly work (see Drechsler 2001) on the broader implications of government- and market-created technologies and innovations that also create new contexts for public policies and PA.

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## REFERENCES

- Baumol, W.J. 1967. "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis." *The American Economic Review* 57(3), 415-426.
- Bonvillian, W.B. and C. Weiss. 2015. *Technological Innovation in Legacy Sectors*. Oxford: Oxford University Press.
- De Vries, H., V.J.J.M. Bekkers and L.G. Tummers. 2015. "Innovation in the Public Sector: A Systematic Review and Future Research Agenda." *Public Administration*, doi: 10.1111/padm.12209.
- Drechsler, W.J.M. 2001. "On the Viability of the Concept of Staatswissenschaften." *European Journal of Law and Economics* 12(2), 105-111.
- Edquist, C. 2011. "Design of Innovation Policy through Diagnostic Analysis: Identification of Systemic Problems (or Failures)." *Industrial and Corporate Change*, doi: 10.1093/icc/dtr06.
- Fagerberg, J., B.R. Martin and E.S. Andersen (eds). 2013. *Innovation Studies: Evolution and Future Challenges*. Oxford: Oxford University Press.
- Freeman, C. 1987. *Technology Policy and Economic Performance: Lessons from Japan*. London: Pinter Publishers.
- Karo, E., W.J.M. Drechsler, C. Stillings and R. Kattel. 2012. "Introduction to the Special Issue: Public Administration, Technology & Innovation." *Administrative Culture* 13(1), 4-9.
- Karo, E. and R. Kattel. 2016. "Innovation and the State: Towards an Evolutionary Theory of Policy Capacity." In X. Wu, M. Howlett, and M. Ramesh (eds). *Policy Capacity: State and Societal Perspectives*. Basingstoke: Palgrave, forthcoming.
- Karo, E. and R. Kattel. 2015. "Innovation Bureaucracy: Does the Organization of Government Matter when Promoting Innovation?" *Papers in Innovation Studies* 38.
- Karo, E. and R. Kattel. 2014. "Public Management, Policy Capacity, Innovation and Development." *Revista de Economia Política* 34(1), 80-102.
- Kattel, R. 2015. "What would Max Weber Say about Public-Sector Innovation?" *NISPACE Journal of Public Administration and Policy* 8(1), 9-19.
- Litwak, E. and J. Figueira. 1968. "Technological Innovation and Theoretical Functions of Primary Groups and Bureaucratic Structures." *American Journal of Sociology* 73(4), 468-481.
- Lynn, L. 2013. "Innovation and Reform in Public Administration: One Subject or Two?" In S.P. Osborne and L. Brown (eds). *Handbook of Innovation in Public Services*. Cheltenham: Elgar, 29-43.
- Lynn, L. 1997. "Innovation and the Public Interest: Insights from the Private Sector." In A.A. Altshuler and R.D. Behn (eds). *Innovation in American Government: Challenges, Opportunities, and Dilemmas*. Washington, DC: The Brookings Institution, 84-103.
- Mazzucato, M. 2013. *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. London: Anthem Press.
- Moore, M. and J. Hartley. 2008. "Innovations in Governance." *Public Management Review* 10(1), 3-20.

- Nelson, R.R. 1994. "The Co-Evolution of Technology, Industrial Structure, and Supporting Institutions." *Industrial and Corporate Change* 3(1), 47-63.
- Nelson, R.R. 1977. *The Moon and the Ghetto: An Essays on Public Policy Analysis*. New York: W.W. Norton & Company.
- Nelson, R.R. and K. Nelson. 2002. "Technology, Institutions, and Innovation Systems." *Research Policy* 31(2), 265-272.
- Nelson, R.R. and S. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge: The Belknap Press of Harvard University Press.
- Osborne, S.P. and L. Brown. 2013. "Introduction: Innovation in Public Services." In S.P. Osborne and L. Brown (eds). *Handbook of Innovation in Public Services*. Cheltenham: Elgar, 1-11.
- Perez, C. 2015. "Capitalism, Technology and a Green Global Golden Age: The Role of History in Helping to Shape the Future." *The Political Quarterly* 86(S1), 191-217.
- Perez, C. 2002. *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*. Cheltenham: Elgar.
- Pollitt, C. 2016. "Be Prepared? An outside-in Perspective on the Future Public Sector in Europe." *Public Policy and Administration* 31(1), 3-28.
- Pollitt, C. 2012. *New Perspectives on Public Services: Place and Technology*. Oxford: Oxford University Press.
- Pollitt, C. 2011. "Innovation in the Public Sector: An Introductory Overview." In V.J.J.M. Bekkers, J. Edelenbos and B. Steijn (eds). *Innovation in the Public Sector: Linking Capacity and Leadership*. Basingstoke: Palgrave/Macmillan, 35-43.
- Schumpeter, J.A. 1942. *Capitalism, Socialism and Democracy*. Harper and Brothers.
- Schumpeter, J.A. 1939. *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*, Vol. 1. New York: McGraw-Hill.
- Schumpeter, J.A. 1912. *Theorie der Wirtschaftlichen Entwicklung*. Berlin: Duncker & Humblot.
- Thompson, V.A. 1965. "Bureaucracy and Innovation." *Administrative Science Quarterly* 10(1), 1-20.
- Verhoest, K., B. Verschuere, G. Bouckaert and G.B. Peters. 2006. "Innovative Public Sector Organizations." In C. Campbell et al. (eds). *Comparative Trends in Public Management: Smart Practices toward Blending Policy and Administration*. Ottawa: Canada School of Public Service, 106-118.
- Voorberg, W.H., V.J.J.M Bekkers and L.G. Tummers. 2015. "A Systematic Review of Co-creation and Co-production: Embarking on the Social Innovation Journey." *Public Management Review* 17(9), 1333-1357.
- Weber, M. (1922/2013) *Economy and Society*, University of California Press.
- Wilson, J.Q. 1989. *Bureaucracy: What Government Agencies Do and Why They Do It*. New York: Basic Books.
- Wynen, J., K. Verhoest, K.E. Ongaro, S. Van Thiel and in cooperation with the COBRA network. 2014. "Innovation-Oriented Culture in the Public Sector: Do Managerial Autonomy and Result Control Lead to Innovation?" *Public Management Review* 16(1), 45-66.

**ERKKI KARO** is Senior Research Fellow at the Ragnar Nurkse School of Innovation and Governance, Tallinn University of Technology and JSPS Postdoctoral Fellow at National Graduate Institute for Policy Studies (GRIPS), Tokyo. His research focuses on policy and administrative capacities for innovation and governance and public management of research and innovation policies in both developing and developed economies. Correspondence: Erkki Karo, Ragnar Nurkse School of Innovation and Governance, Tallinn University of Technology, Akadeemia tee 3, 12618 Tallinn, Estonia; E-mail: [erkki.karo@ttu.ee](mailto:erkki.karo@ttu.ee).

**RAINER KATTEL** is Professor and Chair of Innovation Policy and Technology Governance, Ragnar Nurkse School of Innovation and Governance, Tallinn University of Technology (RNS). He has published extensively on innovation policy, its governance and specific management issues. His research interests include also financial policy and financialization. Correspondence: Rainer Kattel, Ragnar Nurkse School of Innovation and Governance, Tallinn University of Technology, Akadeemia tee 3, 12618 Tallinn, Estonia; E-mail: [rainer.kattel@ttu.ee](mailto:rainer.kattel@ttu.ee).