

The Impact of ICT on Policies, Politics, and Politics—An Evolutionary Economics Approach to Information and Communication Technologies (ICT)



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1 Introduction

Information and communication technologies (ICT) are not new. For some decades now, they have been shaping our everyday lives both as consumers as well as in the work place. ICT provided us—and are still doing so—with new goods and services as well as with new ways of producing them. But it is of a rather recent date that ICT also show a more than trivial impact on the political sphere which is characterized not by market relations, but by political and that is, collective decision-making.

During the so-called “Arab Spring” in 2011, Twitter proved very prominent in mobilizing people in autocratic regimes, thus furthering processes of democratization in the Arab world. It raised a lot of hopes and fuelled a lot of optimism as to the direct democratic potential of applying ICT in politics. But since then, a lot happened. For example, the widespread collection of information by secret services from democratic states like the UK and the US on other democracies like Germany, France and the EU show quite the opposite face of ICT. ICT open up new ways of endangering data privacy, thus also putting civil liberties at risk. In this way, eventually, it also jeopardizes political rights and thus the basis of democracy.

Assessing the potential influence of ICT on policies, politics and politics is a complex endeavour because ICT are not a set of uniform technologies, but consist of a number of separate technological components. To make things even more complicated, these single components are still also in a process of ongoing modifications. ICT are still not mature technologies, but such that are characterized by ongoing innovations. Since such innovation processes are in turn shaped by economic factors, any attempt to make a prediction of the overall impact of ICT on politics is doomed to failure.

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Said that, how then can we proceed? Of course, there is an obvious need to assess the potential impact of ICT on the political system. Therefore, this paper provides a clear conceptual approach that assists in analysing and evaluating the on-going processes of change at the different levels ICT bring about. To this end, we apply an evolutionary economics approach which enables one to deal with open-ended innovation processes. Section 2 introduces this approach and applies it to ICT. In Sect. 3 we discuss ICT in more detail in regard to policies, politics and polities. We firstly ask what impact ICT have in this respect on policies as the outcome of the policy-making process under given political institutions. Secondly, we analyse what influence ICT have on the policy-making process itself, again assuming given political institutions defining this process. Finally, we also touch the question what impact ICT have on the underlying constitutional institutions, defining the polity. Section 4 summarizes and provides an outlook on further research questions.

2 ICT from an Evolutionary Economics Perspective

Evolutionary Economics explicitly deals with the generation and diffusion of innovations (Fagerberg, 2005; Nelson, 1995). As Schumpeter (1952) stated, innovations include both novel or improved *products* and *services*, novel or improved *production processes* (incl. technologies/material), novel or improved forms of *organization* and novel *markets*. Carrying out any of such kind of innovation is part of entrepreneurial activity. This is not confined to “entrepreneurs” as leaders or managers of companies, but takes place whenever someone (re-)combines known elements in a novel way. This might be the outcome of a deliberative process, but can also result from chance—due to the creativity inherent in any human action. Accordingly, innovations are ubiquitous, leading to the permanent generation of new varieties of products and services in the economic sphere, but also to new varieties of policies and even to the permanent generation of novel legal rules generated, for example, in the course of jurisdiction. Besides this permanent stream of gradual change, there are also more radical innovations leading to breaks with traditional paths. However, evolutionary economics shows that even with a radical new technology it takes time until people have learned how to utilize its potential to its fullest.

In evolutionary economics, often a variation-selection-retention approach is applied (Fagerberg, 2005; Metcalfe, 1998). It enables one to make statements about the potential results of such on-going innovation processes, which are characterized both by chance and intention. With respect to the underlying variation processes one analyses what impact different forms of innovation systems, for example, have on generating innovations. But not all innovations are viable. Whether they are adopted depends on the relevant selection environment. The selection mechanisms in place decide on which novel varieties “survive”. However, the latter are not superior in any absolute sense, but only relatively that is, with respect to the selection mechanisms in place at a given time and for a given selection environment. But even for

such a “successful” innovation to be replicated over time, some kind of retention mechanism must be in place preventing that its characteristics are “forgotten”.

When applying this approach to markets, companies are the actors generating innovations in the form stated above by competing for consumers’ buying power. The relevant market delimits the selection environment, with the kind and intensity of competition defining the selection mechanism. Depending on the market cycle, market structure and the respective goods and services supplied, competition can take different forms, like for example competition for price, quantity or quality, with different outcomes on monopolistic or oligopolistic markets. Consumers finally decide which goods and services are successful by at the same time rewarding and punishing companies by (not) purchasing their products. Successful products “survive” over time in markets, because companies react to the incentives set by consumers. Companies which make money with their products keep on offering them over time. In contrast to that, less successful companies change their behaviour. They might either adopt a variant of the successful products, thus imitating other companies, or generate novel types themselves. In this way, a process of innovation and imitation takes place, leading to a steady change in the composition of the products, but also of the companies in the relevant market.

Technological change proved most important for economic development over the last 200 years. According to Dosi (1982, 151f.), a technology consists of “a set of pieces of knowledge, both directly ‘practical’ (related to concrete problems and devices) and ‘theoretical’ (but practically applicable although not necessarily already applied), know-how, methods, procedures, experience of successes and failures and also ... physical devices and equipment. ... (T)echnology, in this view, includes the ‘perception’ of a limited set of possible technological alternatives and of notional future developments.” The different forms a technology can take are, however, not arbitrary, but constrained by the underlying technological paradigm (Dosi & Nelson, 2020). It “embodies strong prescriptions on the directions of technical change to pursue and those to neglect” (Dosi, 1982, 152). Within a given technological paradigm the actually realized technical solutions constitute a trajectory as time passes. This is “the pattern of ‘normal’ problem solving activity ... on the ground of a paradigm” (ibid.). This whole evolutionary process again is characterized by innovations where “(a)n innovation is typically one step in a sequence of innovations within a particular technological regime. Post-innovative improvements play a vital role in increasing the rate of diffusion within existing applications, and extending the technology to new applications” (Metcalf, 1988, 562).

When analysing in more detail such processes of technological change, one finds that there are a lot of different actors and institutions which cooperate (Cimoli et al., 2020). Complex technologies are the outcome of national systems of innovation (Chaminade et al., 2018). These are “(t)he network of institutions in the public- and private-sectors whose activities and interactions initiate, import, modify and diffuse new technologies” (Freeman, 1987 according to OECD 1997, 10). As a consequence, there are strong interdependences between technological, economic and political/institutional change over time.

Such co-evolution also plays an important role in regard to information and communication technologies (ICT) (Freeman & Louca, 2002). Fransman (2010, 21ff.), perceives the whole ICT sector as an ecosystem, thus allowing for complex interactions between a number of heterogeneous agents. According to him, reference to six functional layers are best suited to describe the current structure of the ICT sector (see Table 1). The basic layer consists of networked elements which provide telecommunication equipment as well as computer hard- and software. They feed into the networks of layer 2 which are increasingly substitutable. With the Transmission Control Protocol/Internet Protocol (*TCP/IP*) connection between hitherto separate networks became possible, leading to the emergence of new firms offering new services (layer 3–5). But only with the supply of easy to navigate software (browsers) (layer 4) the possibility to use different networks over the *TCP/IP*-interface became widespread. There is still no sign that the potential of ICT are exhausted, with an ongoing dynamic generating innovations at each layer on and on. Currently, they relate to the speed of data processing, innovations in storing and accessing data (cloud computing and blockchain technologies), novel ways of analysing data (Big Data, machine learning, artificial intelligence) or gaining and using data (Internet of Things), to name just a few of the more recent developments. The actors on all these layers differ. However, there is permanent interaction between them, with market processes and thus economic incentives dominating.

Although the origin of the ICT system goes back to the emergence of the telegraph and telephone in the late nineteenth century, it was not until after the Second World War that important innovations in a number of quite different and back then separate industries were made. This shaped the ICT trajectory that we experience these days. But only from 1995 on, a new era started characterized by the widespread use of the internet (see Appendix 1 in Fransman (2010) for a concise overview of the main

Table 1 The six-layer ICT system

Layer	Function with selected sectors
Layer 1	Networked elements (1) Devices: microprocessors, memories; others (2) Systems: telecoms equipment incl. routers and servers, computer hardware and system software, consumer electronics incl. mobile phones, etc.
Layer 2	Network operating (1) Core network operators: telecom operators (fixed and mobile), TV cable operators, broadcasters (terrestrial, satellite), others (electricity firms, e.g.) (2) Access network operators: fixed, cellular mobile, other wireless
<i>TCP/IP</i>	<i>Layer</i>
Layer 3	Internet connectivity: internet access and service providers
Layer 4	Middleware, navigation (browsers), search and innovation platforms
Layer 5	Content, applications and services
Layer 6	Final consumption

Source Own composition according to Fransman (2010, 32, exhibit 2.4)

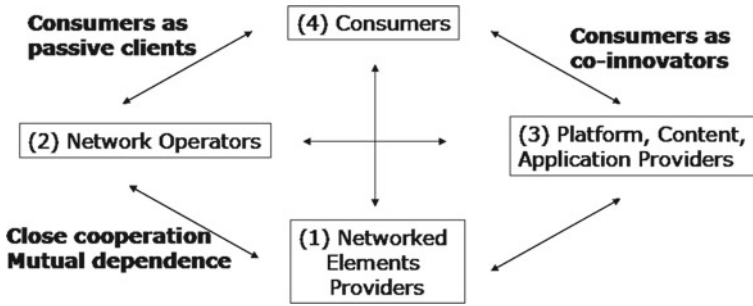


Fig. 1 Consumers’ role in the ICT system. *Source* Own composition according to Fransman (2010, 39, exhibit 3.4)

technological innovations underlying the ICT sector). In addition, in the current period consumers acquire a new function as “co-evolving innovators” with respect to content, applications and services (Fransman, 2010, 50 and Fig. 1). This is quite in contrast to the traditional role of consumers as passive clients (Fransman, 2010, 50f.).

Traditionally, consumers are primarily a source of revenue for companies, finally deciding on the success of firms through their decisions on which goods and services to buy. With ICT consumers assume more and more additional functions. They become co-producers by providing knowledge and information to suppliers and finally even assume the function as co-innovators by creating content (see Table 2). “Through its aggregative and interactive properties, its widespread availability and its low cost and ease of use, the internet has incorporated final consumers as never before into the innovation process, not only in the ICT ecosystem but in the economy as a whole” (Fransman, 2010, 51). In the following section we take a closer look what implications these developments have in regard to the application of ICT in the political system.

Table 2 The changing role of final consumers

1	As sources of revenue
2	As user-feedback providers (e.g. von Hippel, 1998)
3	As sources of knowledge (e.g. open source software, Wikipedia)
4	As sources of information (e.g. Web 2.0)
5	As content creators
6	As conversers (e.g. social networking, blogging)
7	As activist citizens

Source Fransman (2010, 51, exhibit 3.7) (original emphasis)

3 The Impact of ICT on Policies, Politics, Polities

Collective decision-making on what goods and services to produce by the state as opposed to individual decision-making between consumers and producers on markets is the decisive characteristic of the political system in contrast to the economic system. While Sect. 2 has shown the complexity of ICT, matters become even more complicated when analysing the impact of ICT on the political system. Therefore, we proceed as follows. First we ask what impact ICT has on the outcome of the political system that is on public policies (3.1). In the next step, we analyse its influence on the political decision-making process, while still taking the underlying political institutions as given (3.2). Finally, we take a short look also at its potential impact on the constitutional dimension that is, on the polity (3.3).

3.1 *ICT and Policies—From eGovernment to Smart Government*

The public provision of goods and services including regulations (= policies) is the main output of the political decision-making process. As in regard to goods and services produced by private companies (eCommerce), ICT are also used by public bureaucracies. Over the last years the term eGovernment came in use to characterize this (Promberger et al., 2010). With the ongoing digitalization it is now also referred to as “digital government” or as “smart government” taking into account the latest developments (Breier et al., 2017; Kneuer, 2019; World Bank, n.d.); in regard to the by now widespread use of mobile devices one also finds the term “mGovernment” (OECD/International Telecommunications Union, 2011).

There exist numerous definitions of eGovernment. According to the EU Commission (2003, 7) it “is defined (...) as the use of information and communication technologies in public administrations combined with organisational change and new skills in order to improve public services and democratic processes and strengthen support to public policies.” A more recent definition by the World Bank (2015) states that it “refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government.”

As in the economic sphere, ICT are applied to the interaction between government agencies (G2G) as well as between government agencies and the citizens (G2C), or government agencies and businesses (G2B). ICT assist in supplying public goods and services and regulations. (One way-) *Information* is provided, for example, by websites of cities or public agencies. (Two way-) *Communication* enables citizens or business to use email or other online communication services for directly interacting with public bureaucracies. Finally, ICT can be used for *transactions*, too, that is for complete *services delivery* (Promberger et al., 2010, 10ff.). A necessary prerequisite for this is investment in both adequate hardware and software by public

administrations. This entails the adaptation of given ICT solutions provided by the industry to the special needs of public actors as compared to private businesses. As a consequence, innovations are generated which encompass not only content, applications and services but also require adaptations in the other layers as stated in Table 1. Besides, to successfully implement new technologies in an organization, complementary organizational changes must take place. Accordingly, organizational change and skill development are a necessary supplement. Such innovation processes are not freely available; they consume resources and take time. As with all innovation, there is no guarantee for them of being successfully implemented.

Moreover, there is co-evolution of ICT applications in public administrations and its impact on the public service provision. In the course of implementing ICT to provide public goods and services, the special needs and restrictions given by public administrations and their tasks have to be taken into account. Since the same holds for the technical restrictions provided by ICT, their implementation also has feedback effects on how to carry out public policies in the future. Accordingly, by adopting ICT both the technology evolves as well as the way in which public goods and services are provided. In addition, ICT also enable to provide new ways of how the public goods and services are supplied. Thus, innovation occurs both in the production process as well as in regard to the public goods and services. The trajectory of ICT application in public administration is characterized by four stages (Table 3).

Like in the private sphere, ICT in public services also evolves from a more supply-side perspective to one focussing more and more on the needs and preferences of the demand-side. Anderson et al. (2015, 30–34) classify this path as going from government-centric to a fully citizen-centric use of ICT (for more on this see Saeed et al., 2019).

What impact has ICT when applied to the supply of public goods and services? One of the main effects of ICT is the resulting strong reduction in information and transaction costs. This also holds in applying it to public policies. As a consequence, ICT enables the provision of tailor-made public goods and services which better match the preferences of the citizens. However, to assess the impact of ICT on public goods and services, additional criteria both from economics and political sciences are available. The former refer to the costs for and the quality of producing public goods with the help of ICT as well as to the rate of innovations generated by adopting ICT. In regard to the latter, access to the goods and services thus provided (‘digital divide’), accountability and legitimacy are most important. Implementing ICT in public policies entail both positive and negative effects, which differ among different

Table 3 Stages of implementing ICT in public administrations

1	Billboard stage
2	Partial service-delivery stage
3	Portal stage with fully executable and integrated service delivery
4	Interactive democracy stage

Source Own composition according to West (2005, 8f.)

policies, but also for the same policy over the short- and the long-term. Therefore, no clear-cut overall assessment is possible (For a recent analysis see Stember et al., 2018).

So far, ICT in public administrations is still mainly used to realize efficiency effects by substituting analogous modes of providing public goods and services. However, the newest technological developments like the blockchain technology, the availability of “big data” for evaluating public policies and artificial intelligence (including machine learning and cognitive computing) may enable a quite novel way of producing public goods. It has the potential to fundamentally overhaul the way public administration works. This includes also a number of profound challenges not only in regard to data security, privacy issues, but also for how democracy will work in the future (Demaj, 2018; Guckelberger, 2019; Szostek, 2019).

While these latest technological developments open up the possibility of radically changing the way public administration works in the future, the application of eGovernment still shows a very slow rate of diffusion. The current COVID-19 pandemic gives a very pointed picture on the working of ICT applications in Europe (EU Commission, 2019; United Nations, 2020). Therefore, in the near future, we will find a simultaneity of efforts to catch-up with mainstream ICT solutions in public bureaucracies and of experiments with the latest ICT-based developments, like Open Government Data (Charalabidis et al., 2018). As a result, the unsolved problems regarding data security, privacy aspects etc. will come to the foreground showing how interlinked the technological, economic and political evolution of ICT is (Dwyer, 2020). In developing countries, eGovernment poses additional challenges, but opens also further opportunities to increase transparency, strengthen accountability and reduce corruption, for example (see the contributions in Alcaide Muñoz & Rodríguez Bolívar, 2018).

3.2 ICT and Politics—From eGovernance to eDemocracy to eParticipation

ICT not only affects public policies, which are one of the main outcomes of the political process, but this very process of policy-making itself. Governments elected by the public for a limited time period are the main agent in putting forward legislation in representative democracies. Accordingly, getting elected is one of the main goals of political parties.

However, politics cannot be reduced to regular election campaigns. According to Fig. 2, politics is a process of policy formation in which individual preferences are aggregated by means of collective decision-making. Only after successfully mobilizing for one’s individually perceived problem, this enters the legislative level. There it competes with other issues for attention in parliament. Only if its supporters are

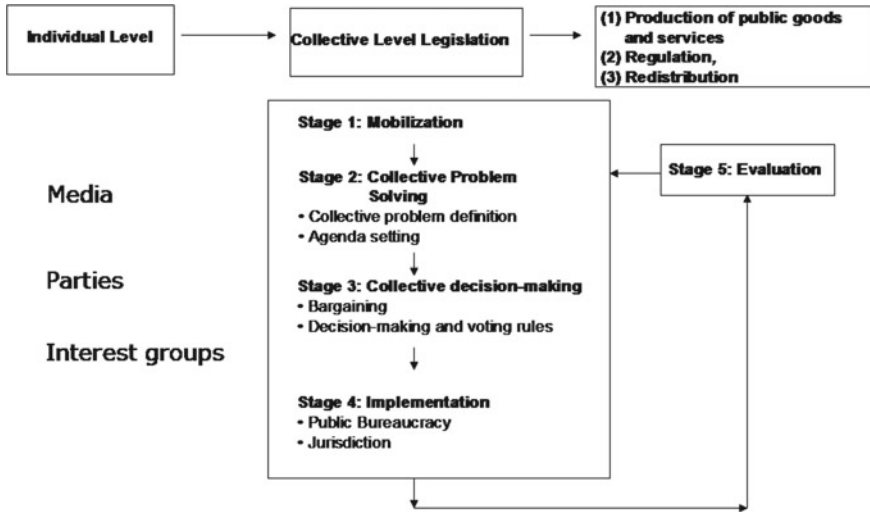


Fig. 2 The process of policy formation. *Source* Own composition according to Meier and Slembeck (1998)

successful in putting it on the collective agenda, legislation will be enacted and implemented eventually. For this to happen, not only political parties, but interest groups and the media play a decisive role, too.

Collective problems differ in regard to the number of people affected and the degree to which they might raise concerns among voters and/ or the public. When taking these two dimensions into account, the—simplified—classification in Table 4 holds. Chances are best to be successful in the policy formation process for interest-group problems with only a rather small group of people being affected, however, to a high degree, like e.g. trade unions. In contrast to that, chances are poorest for structural problems where a huge number of people are affected, but only to a low degree, like e.g. consumer protection or environmental issues.

To analyse innovation and change in politics, the evolutionary economics approach is useful, too. Like in markets, political entrepreneurs play an important role

Table 4 Classification of collective problems

	Degree of concern	
	Low	High
Number of people affected		
Few	Elite problem	Interest-group problem
Many	Structural problem	Crisis problem

Source According to Meier and Slembeck (1998, 74) (emphasis added by the author, M.E.)

in creating innovations. These also refer both to the outcome of the policy-formation process (policy innovations as compared to product innovations) as well as to the process itself of how politics takes place (process innovations). What innovations are successful depend on the respective selection environment and the resulting selection mechanisms. In regard to the former, constitutions set the ultimate restrictions under which the process of normal policy-making takes place. According to Persson and Tabellini (2002, 481), “(p)olitical constitutions are viewed as incomplete contracts laying down the rules for how to appoint political decision makers on behalf of the voters and how to allocate decision-making authority, or control rights, among them.” Within the scope thus given by a particular constitution, the rules evolve over time, resulting in the set of selection mechanism in place which define the outer bounds on how politics is carried out under a given constitution. Both the particular way in which politics takes place as well as its outcome that is, the different policies it generates, are characterized by strong path dependences. These ensure a certain kind of stability over time despite the on-going generation of innovations produced by political entrepreneurs in the course of policy formation.

Terms like eGovernance or eDemocracy are in use in regard to the impact of ICT on politics, referring to different effects of ICT on collective decision-making. According to the UNESCO, eGovernance is characterized by “the public sector’s use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective” (UNESCO, 2013). Following Lindner and Aichholzer (2020, 18) eDemocracy is “the practice of democracy with the support of digital media in political communication and participation”, while eParticipation “encompasses all forms of political participation, making use of digital media, including both formally institutionalised mechanisms and informal civic engagement”.

ICT affect politics in different ways over its whole cycle (Frissen et al., 2007). For one thing, ICT are used by already established political parties, interest groups, or media to support their activities. Thus, ICT are just another means to communicate with supporters and potential voters to increase mobilization (for the evolving views on how ICT affects political communication see Coleman, 2009; Neumayer, 2020; Wei, 2020). To this end applications, content and services are developed to fulfil the respective tasks in the policy formation process. In this way, ICT is used by parties also to reach additional voters (i.e. usually younger voters with higher educational background). Twitter and Facebook, along with the websites of party candidates and politicians are well-known examples. Besides, electoral campaigns also rely increasingly on ICT assistance, thus supplementing advertising campaigns in the traditional print as well as radio and television media. There are some signs that ICT are favourable for oppositional parties in election campaigns since it is a low cost instrument for reaching large groups of the electorate. This also seems to hold in regard to more extremist parties, which are rather at the margin of the political spectrum. While access to print and TV media seems to be more restricted for them, ICT provide a low cost alternative for disseminating their points of view (see for

example Barlai, 2013 on the use of the internet by the extremist right-wing Austrian FPÖ and Hungarian Jobbik).

In addition to that, ICT also give way of new actors entering the political arena. The most prominent example are the Pirate parties. Currently Pirate parties are active in more than 40 countries, the first was founded in Sweden in 2006 (Wikipedia, 2013a). Pirate parties' programmes focus on issues directly linked to ICT like "civil rights, direct democracy and participation, reform of copyright and patent law, free sharing of knowledge (open content), information privacy, transparency, freedom of information and network neutrality" (Wikipedia, 2013b). Besides, Pirate parties not only apply ICT for externally mobilizing support (i.e. voters) for their subjects, but for internal collective decision-making as well. To this end "Liquid feedback" has been developed, which provides a tool to combine direct and representative democracy in novel ways for decision-making within the party (Interaktive Demokratie, 2013). Although Pirate parties had been very successful in some countries and elections, they realized a sharp decline in popularity among voters, resulting in a loss of representation in parliaments as well as active party members (for Germany see Biselli, 2017). The problems they encounter on their way to party formation are a good example of the limitations of ICT when applied to policy-making.

Many representative democracies also know direct democratic elements, often at different jurisdictional levels. ICT also lead to a decrease of the costs for mobilizing people to take part in such activities, like direct democratic referenda or initiatives. Through the impact on reducing information costs, ICT are, again, a means to improve transparency and the knowledge base for people taking part in such votes. By this, ICT do not have a different effect in regard to direct democratic activities when compared with representative democratic activities. Aichholzer and Rose (2020) provide a profound discussion of the different options, ICT tools and digitalization opens for eParticipation, along the following three functions of political participation: monitoring, agenda-setting and decision-making. They find that eParticipation is still most successful regarding monitoring and agenda-setting activities, while less important in the final decision-making stage (for a prescriptive analysis of eGovernance see Suri & Sushil, 2017). All in all, the former utopian hopes according to which ICT should enable more comprehensive participation of citizens in politics has now given way to a more differentiated view both at the opportunities as well as challenges and risks associated with it (Hintz, 2020; Kneuer & Datts, 2020; Ronchi, 2019; Schradie, 2019; Smith et al. 2019).

3.3 ICT, Polities and Regime Shifts

So far, we have assumed the underlying constitution, which defines the basic rules under which policy-making takes place, both to be democratic and given. However, in 2021, Freedom House reported the 15th year in series a decline in political rights and civil liberties including also Western democracies like the U.S. (Freedom

House, 2021). Shifts between different political systems are a widespread experience. Usually they entail also changes in the underlying constitutional rules. This holds in particular when there is a shift from authoritarian to democratic regimes and vice versa.

With the so-called Arab Spring a wave of protest and a number of regime shifts took place in the Arab region from the end of 2010 on. The online communication service ‘Twitter’ gained particular importance in the protests in Moldavia (2009), Iran (2009/20), Tunisia (2010/11) and Egypt (2011). We are far from fully understanding the dynamics of revolutionary regime shifts. However, ICT played an important role in mobilizing the opposition and feeding the resulting dynamics (for an interesting analysis see Lang and de Sterck 2014). Again, the properties of ICT in reducing information costs and in providing low-cost communication made it so effective. However, 10 years later, the outcome of these protests are more than disillusioning regarding the liberating effects and the potential of ICT to help establish a stable democratic polity.

In addition to its effects on regime shifts, ICT allow more profound changes in policy-making in democratic political systems, too. For example, ICT makes available a much broader set of direct democratic elements. Instead of applying a (qualified) majority rule in referenda or initiatives, more sophisticated decision rules could be used at low costs. They could capture individual preferences much better than it is the case with the rules currently in place. Again, creating such genuinely new democratic regime variants requires modifications of the underlying constitutional rules. While the Pirate parties had been agents aiming for such a change, so far, there are no majorities for such profound constitutional reforms in sight.

Finally, one has to keep in mind that ICT also entail risks for both political rights and civil liberties. Due to the decrease in information costs, ICT also reduce the costs of collecting large volumes of information. This, in turn, increases the risk that some form of authoritarian states might develop or persist, leading to the generation of novel dependencies and a reduction of civic freedom and liberties. In addition to questions of data privacy already addressed above, the issue of state surveillance comes on the agenda. In particular China’s Social Credit Rating program seems to be an example of the possibilities of how to restrict personal freedom by ICT led tools (for an overview see von Bloomberg, 2020 as well as the contributions in Everling, 2020; see Dencik et al., 2019 who analyse the working of data-driven governance for the UK).

4 Conclusion

The main feature of ICT is to provide information and to communicate it at much higher speed and at much lower costs over time and space than it was possible with mere analogous modes of communication. Accordingly, the resulting information and communication costs decrease enormously in the areas where ICT are used,

leading to a decrease in search and transaction costs. Besides, with ICT digital production technologies can be used substituting analogous technologies, both manual work as well as brain-work. Thus, like in the economic sphere, the use of ICT in providing public goods and services reduces production and transaction costs which may lead to efficiency gains. Moreover, ICT also influence the political transaction costs of public policy-making. In addition, ICT could also result in changing the underlying institutions shaping the political process so as to make further improvements possible.

As Sect. 2 shows, the development of ICT is a complex one, including a number of different technologies. The exploration of the underlying technological paradigm seems to be far from being exhausted. Therefore, also in the near future further innovations are to be expected which might change the current state of ICT completely, adding additional services and applications to the already existing ones. Accordingly, it would be misleading to speak about a “digital revolution”. The developments we experience are the result of an on-going process of gradual modifications and changes (‘recombinations of already known elements’ in the Schumpeterian sense), while at the same time being of a very profound nature, too.

The same holds when it comes to the application of ICT in the political system. Both in regard to policies, politics and polities the application of ICT lags behind its use for commercial purposes. This is not surprising when taking into account that in markets competition between large numbers of companies for consumers’ purchasing power pushes companies’ efforts to use ICT for generating product and process innovations. In contrast to that, a state has a monopoly when it comes to supplying public goods and services to its citizens. This is the more so, as there are only few substitutes available for citizens. Accordingly, the lower rate of innovations generated by ICT which are applied in the public sphere is not surprising. But since further innovations in ICT are driven mainly by economic incentives resulting from its application in the commercial sphere, the resulting spill-overs to ICT application in the political system ensure an on-going evolution there, too.

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