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Information and innovation in the public sector

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Faced with limited resources and many pressing demands, bureaucrats make difficult policy choices. Incentives and better access to quality information could transform decision making and help support innovations that lead to growth.

Through its civil service, a capable state raises revenues and provides key public goods and services, using these capabilities to foster economic growth and enhance welfare. To make better informed decisions, the use of information is evidently crucial. This brief seeks to understand the defining characteristics of information use in the public sector and considers potential policy options for navigating the constraints associated with that information use.

It is well-established that civil service effectiveness is a key driver of economic development (Besley and Persson 2011, Acemoglu and Robinson 2012, Pepinsky et al. 2017). As resources are scarce in developing countries, efficient allocation is vital for providing effective public services. A significant movement towards 'evidence-based policy' is founded on the belief that policymakers should hold accurate information to inform their decisions. More informed public officials tend to make better decisions (Callen et al. 2018, Dal Bó et al. 2018, Hjort et al. 2019). However, we have relatively little empirical evidence on what public officials know and how they absorb new information (Rogger and Somani 2018).

In building a better understanding of how information is used, and the incentives that encourage its effective use, recent research in this area offers recommendations that have the potential to transform the quality of policymaking in civil services across the world. In this brief we present the defining characteristics of information use in the public sector and potential policy options for navigating the constraints associated with that information use. We look at recent research that focuses on: (i) how can we ensure better quality information is provided to public sector agents, and, (ii) how can we incentivise good use of this information?

KEY MESSAGES:

1 The structure of the public sector hinders the access and sharing of information by bureaucrats.

Governments are typically organised into sectoral monoliths across which there is little incentive to share information. This is partly due to the fact that much work is team based, so that civil servants can 'free ride' on colleague's efforts to acquire information. These tendencies are reinforced by cultural norms.

2 Reducing the cost of acquiring information increases access and use of data.

Opportunities made accessible by information and communication technologies (ICT) and other data-sharing innovations reduce the costs of acquiring and absorbing information. This reduces monopolistic power, the incentive to free ride, and the importance of cultural norms.

3 The right incentives are required for information to be used by policymakers.

The existence of information alone does not necessarily lead to better decision-making. Determined by their institutional environment, management practices and incentives are crucial to whether public servants acquire, share, and act on good information.

4 Information is an input to reform, but not an innovation in its own right.

Reforming the public sector's institutional environment depends on the pre-existing incentives to acquire and act on information. This creates a potential 'reform trap' in which public officials do not have the incentive to empirically identify needed reforms.

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The structure of the public sector hinders the access and sharing of information by bureaucrats.

What information currently underlies decision-making by public officials across the world? An IGC-funded study by Rogger and Somani (2018) has shown that bureaucrats in Ethiopia predominantly rely on their ‘tacit’ knowledge – their subjective beliefs over the characteristics of citizens, for operational decision-making. Their findings showed that officials misunderstand the basic conditions of their local jurisdictions with half of public officials making errors that were at least 50% of the true underlying data. As an example, 50% of officials claimed that they served a population at least 50% smaller or 50% larger than it actually was. Tacit knowledge can be a positive input to policymaking, but the potential for errors can lead to significant operational mistakes and misallocation of resources when it is the primary source of information.

IGC research in Zambia (see Box 1) indicates that even when administrative data is available, it is of low quality and under-utilised. It shows that better administrative data would allow scarce human resources to be better targeted across the public service.

Why have many public sectors not therefore developed comprehensive information management systems to inform public officials? They have tried. The World Development Report 2016 presents data that indicates governments across the world have invested more in the intensive use of digital technologies than comparable private sector firms. However, the report notes that these investments have not had corresponding impacts, arguing that “digital technologies have not significantly improved service provider management in government bureaucracies” (World Bank 2016).

On-going reliance on tacit knowledge is not a consequence of officials not recognising access to other information sources but is consistent with findings where public officials fail to capitalise on the existing information available (World Bank 2012, 2016, Masaki et al. 2017).

The question is therefore under what conditions will public officials acquire and absorb information for improved policymaking? We highlight three defining characteristics of the economics of information use in the public sector and why these might hinder absorption of information:

1. As natural monopolies, governments face little competitive market pressure to encourage information sharing.
2. An individual official acquires information in the public sector based not only on her own circumstances, but also on the decisions of others (Aghion and Tirole 1997). If another member of your team undertakes the costly effort to learn and organise information for the project you are working on, why should you? Given how much the public sector relies on teamwork, opportunities for such free-riding limits an individual’s incentive to actively access and interrogate data.

Similarly, if the rules are such that your manager can simply overrule your decisions, what incentive do you have to become informed? The distribution of information in public sector hierarchies is therefore determined by the system of incentives for acquiring information and in the interaction of these incentives between managers, subordinates, and colleagues.

BOX 1: THE IMPACT OF POOR DATA ON TEACHER ALLOCATION IN ZAMBIA

Research in Zambia investigated the impact of payroll mismatch on teacher allocation in schools (Walter 2018). Zambia’s Ministry of General Education stated in its 2015 guidelines that Pupil-Teacher Ratios (PTR) should not be greater than 40 students per teacher, a ratio exceeded by 73% of public primary schools. On the other hand, 21% of schools had more teachers

than required to meet the standard. This problem can be resolved by intra-school transfer of teachers. But IGC research found at least 40% of teachers do not work at the location they are paid. This payroll mismatch makes it difficult to identify where teachers are based and deploying new teachers to where they are needed most.

3. Cultural norms and structures present challenges around bureaucratic conservatism and the influence of mission-orientated officials. Besley and Ghatak (2005) conceptualise organisations that provide public goods as mission-orientated, providing an impetus for them to recruit mission-motivated employees as this is more likely to improve productivity. However, by definition,

such employees are less likely to respond to new information or adopt new practices because they have a pre-defined set of missions or beliefs. This increases the conservatism of the public sector, making policy or organisational change more challenging. Viewing the world through a pre-defined set of beliefs can even bias the interpretation of new data (Banuri, Dercon and Gauri, 2017).

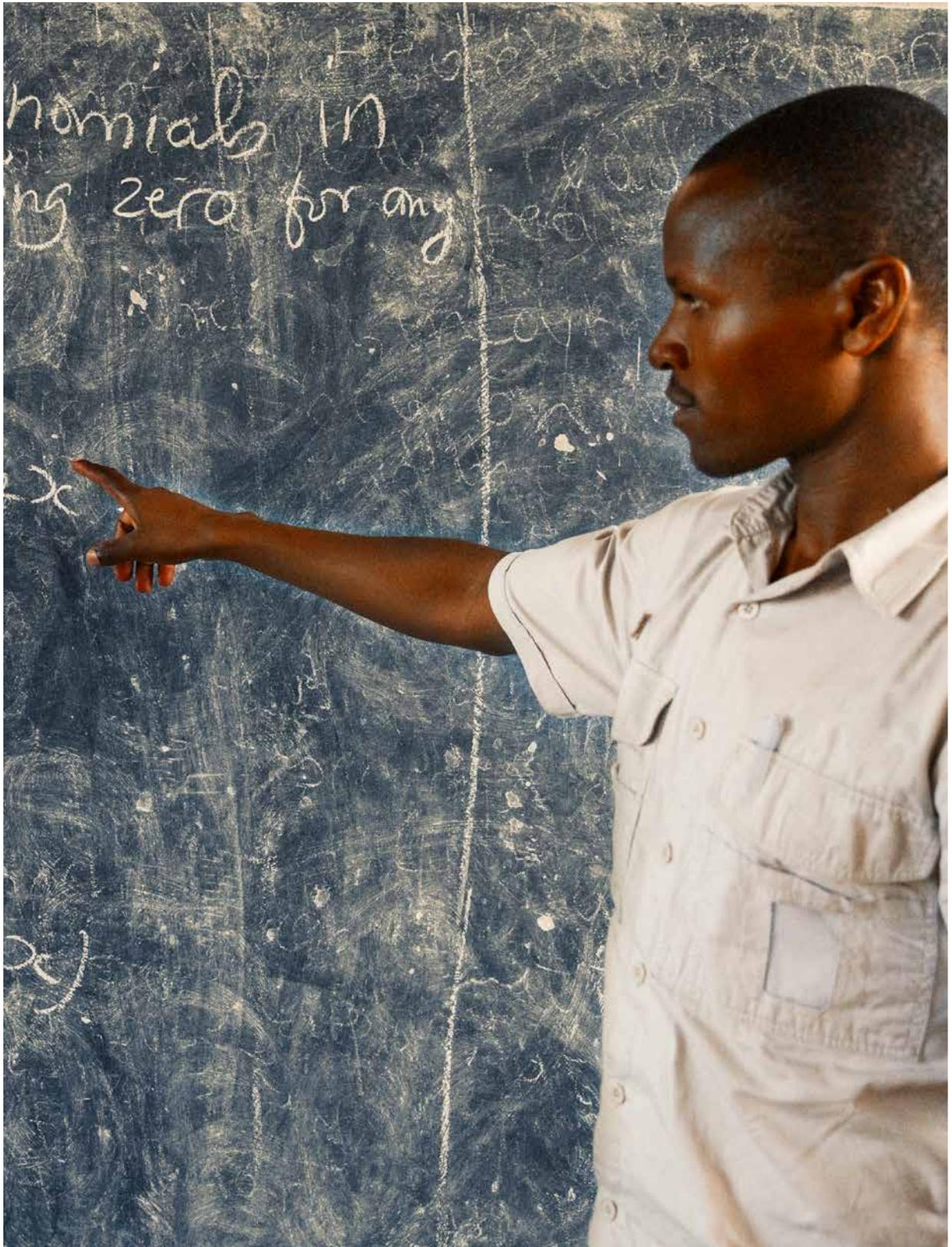


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Reducing the cost of acquiring information increases access and use of data.

Recent technological developments and falling ICT costs have greatly increased the information available for bureaucrats, with reduced information acquisition costs contributing to higher uptake. If the costs of acquisition are lower, the constraints created by the public sector's monopolies, free-riding, and cultural norms are weakened.

The public sector's experimentation with ICT has been most prominent in the areas of public financial management, with budgets and procurement systems increasingly electronic in the last two decades, improving fiscal efficiency (World Bank 2016). The use of technology has consequently expanded across public administration, demonstrating how information in the public service has fiscal implications.

An IGC pilot study by Callen et al. (2019) in Afghanistan trialled the use of mobile money salary payments and found that this has significant potential to reduce leakages by identifying ghost workers – those who receive a salary but do not work. As compared to cash-based payments, government saw improved transparency, accountability, efficiency, and improved employees' savings rates with mobile payments. The production of accurate employee information through the programme will result in a reduction of the payroll by roughly 7%.

Public officials have also steadily been granted access to 'information dashboards' that provide a substantial volume of information at lower

costs. In Punjab, Pakistan, an IGC study (Callen et al. 2017) demonstrated how the rapid collection and centralisation of facility-level data, and the communication of that data to relevant government managers, can improve information flows in public bureaucracies. Here, the traditional paper-based monitoring systems were replaced with a smartphone application which centralises data in real time. Monitors reported geotagged and time-stamped data on assigned smartphones, along with authenticating photographs. Underperforming facilities were flagged to senior health professionals in real time through an online dashboard. This nearly doubled health facility inspection rates and reduced doctor absences by 20%.

At the same time, many research agencies (such as the IGC) have provided public officials with easy access to frontier research in the form of briefs (like this one). Such briefs, like policy dashboards, aggregate policy-relevant information and make it salient to officials at low costs. Recent research by Hjort et al (2019) investigated whether research findings changed the beliefs of political leaders' in Brazilian municipalities. The study found that mayors altered their beliefs based on the evidence presented and were more likely to introduce related policies in their constituencies over the next 15-24 months.

However, the public sector often deals with tasks that are context specific and can't be fully measured. Thus, the tacit knowledge of public officials will always play a substantive role in a nation's governance and should be used together with empirical evidence.

For example, an IGC study (Dal Bo et al, 2018) in Paraguay highlights the power of combining ICT with tacit knowledge. It studied the impact of distributing mobile phones to agricultural extension workers, which allowed for regular updates on location, movement, and digitised reporting of activities to their managers. Farmers working with extension workers assigned with phones were 6% more likely to have received a visit. The research design allowed for supervisor to choose which agents got mobile phones. Supervisors selected extension agents who were more likely to be more responsive to the monitoring technology, which had substantive impacts on the effects of the intervention when compared to randomly allocating the mobile phones.

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The right incentives are required for information to be used by policymakers.

Since information is often not easily or freely available, individual public officials must undertake costly effort to acquire, share, and act on good information. Whether or not they undertake this effort is determined by the incentives under which public officials operate (Aghion and Tirole, 1997). Officials will be disincentivised from investing in acquiring information if they believe their manager has the power to simply over-rule them, or if they believe their manager will not reward them appropriately for their investments. Similarly, officials want their colleagues to undertake the costly investment of acquiring information so long as they benefit from the improved accuracy of their team's activities.

This is demonstrated by Rogger and Somani (2018). They mimicked a standard Ethiopian government internal communicate to provide official administrative data to a randomised set of regional officials. By reducing the marginal information acquisition costs, the researchers identified that the size of the impact of the intervention was determined by the organisation's management practices. Indeed, some officials did not respond at all to the intervention, whilst others became substantially more informed.

There is a large body of work that shows, these management practices should provide employees with the autonomy that incentivises their own acquisition of information. IGC research in Nigeria, Ghana, and Pakistan demonstrated that bureaucratic autonomy is correlated with improved service delivery (Rasul and Rogger 2018, Rasul et al. 2018,

Bandiera et al. 2019). In Pakistan, Bandiera et al. (2019, see Box 2) find that procurement officers with autonomy achieve sustainably lower prices for goods and services.

Empowerment practices do not inherently encourage innovative behaviour, but must be part of a multifaceted approach to encouraging innovation (Fernandez and Moldogaziev 2012). This is particularly salient in hierarchical bureaucracies, with public official surveys finding low scores for staff involvement and the flexibility of the policy process (Hasnain et al. 2019). IGC research by Williams and Yecaló-Teclé (2018) in Ghana has shown that a key bottleneck to innovation is managerial resistance to novel ideas that might threaten the existing power equilibrium. They find that there is significant potential for bottom-up innovation to improve work processes, but that harnessing this potential requires changes to managerial practices and organisational processes. Autonomy matched with a culture of empirics can be a powerful combination for public sector performance.

As technology makes information more accessible, the use of this information will depend on officials' incentives – both management practices and cultural norms. Information interventions should be carefully calibrated to the organisational incentives under which officials are operating. On top of this, public service incentives should be designed to encourage teams of officials to absorb increasingly available information.

BOX 2: ELECTRONIC PROCUREMENT FOR IMPROVED GOVERNANCE

Governments spend billions on public procurement and yet processes and procedures often function poorly. In order to reduce costs, electronic procurement ('e-procurement') has become a significant focus for policymakers and the subject of a number of pivotal IGC research projects. Research in India, Indonesia, and Pakistan has started to show the benefits and impacts of these systems. Faupel et al. (2016) show that the quality of public works increases after e-procurement is introduced, leading to improved road quality in India and

reduced delays in awarding contracts in Indonesia. In Pakistan, research by Bandiera et al. (2017) looks to remove obstacles associated with inefficient procurement by introducing the Punjab Online Procurement System (POPS). Early results suggest the new system and approaches tested under the research have directly decreased the prices being paid by government. Mediating the introduction of POPS with more autonomy for procurement officers was an important factor to these results.

Information is an input to reform, but not an innovation in its own right.

ICT interventions and associated data collection and management systems can have a catalytic impact on public service delivery. Not only can they inform public policy decisions but also reform the structure of the public sector. By providing managers with information on their own staff and organisations, they can base their management decisions on more rigorous analytical foundations.

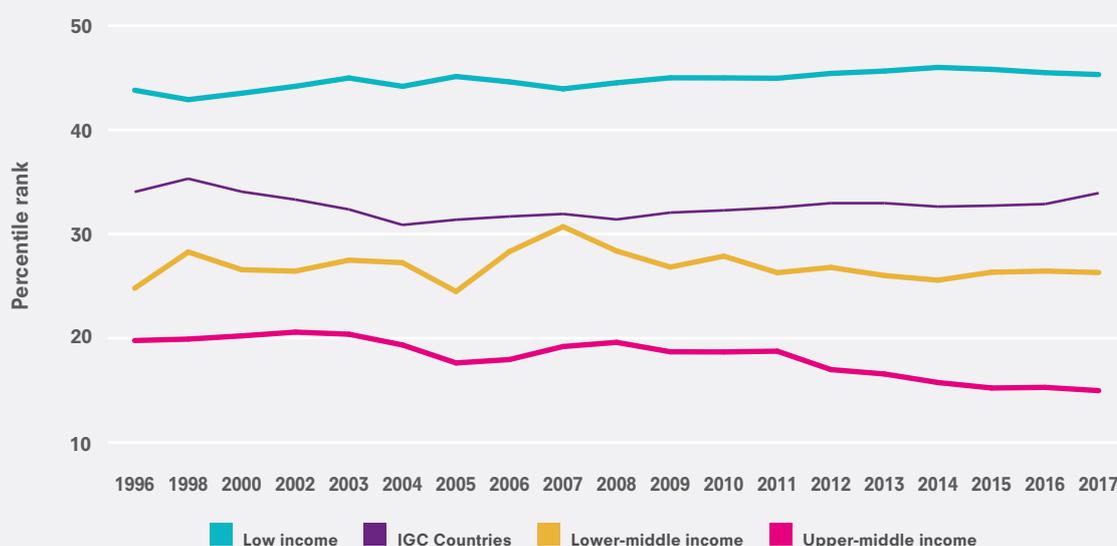
However, while ICT prices have fallen and technological innovations to improve information flows have increased, corresponding productivity improvements in the public sector have not uniformly occurred. Figure 1 shows the evolution of the 'government effectiveness' indicator of the Worldwide Governance Indicators (World Bank 2017) indicating stagnant perceptions of government capabilities over the past two decades across the world.

A reason for this stagnation is that information interventions have not always targeted the capabilities of the public administration. For example, though public finance management reforms have often been successful in creating a common budgeting platform, they have not always provided information that helps public sector officials improve the productivity of spending those funds (Hashim and Piatti-Fünfkirchen 2018).

Moreover, even when basic information on the quality of public officials or their organisations exists, it is not always been utilised. Competitive pressures for reform do not generally exist in the public service and reform is frequently constrained by the need for it to occur simultaneously across public agencies, with adoption of reforms in one setting dependent on another (Moore and Hartley 2008). Thus, where reformers have responded to information interventions and improved the public service, they have overcome the incentive to free ride on the efforts of their colleagues, circumvented resistance by their managers and co-ordinated across disparate agencies.

The large number of constraints to evidence-based reform can lead governments to become stuck in a 'reform trap'. If managers do not have information on the poor state of information in their agencies, they will not enact reforms to improve the information acquisition capabilities in their organisation. However, by the same logic, the effective use of data on bottlenecks in public administration can improve government institutions and nudge them towards greater use of evidence.

FIGURE 1: EVOLUTION OF THE 'GOVERNMENT EFFECTIVENESS' INDICATOR



Source: Worldwide Governance Indicators (World Bank 2017)

POLICY RECOMMENDATIONS

In this brief, we have outlined findings from new research assessing the use of information across the public sector. Recent evidence has highlighted ways in which the economics of information might differ in hierarchical institutions in the public sector, how information can improve service delivery, and what role external players might have in increasing the state's use of evidence.

A key area of innovation has resulted from the reduced costs of information associated with technological interventions. However, the most important factor enabling these innovations to have impacts on service delivery are the incentive structures in place for public officials to acquire, absorb, and use that information and analysis for decision-making.

This brief therefore makes a series of policy recommendations stemming from our discussion:

- Investing in ICT innovations can effectively improve flows of information in bureaucracies: Reducing the marginal cost of acquisition makes information easier to access for motivated bureaucrats.
- However, information absorption in the public sector is as much about fixing institutional processes and incentives: Information interventions must be accompanied by appropriate incentives

for bureaucrats to acquire information and use it for innovative outcomes.

- For example, monitoring interventions must be accompanied by effective accountability mechanisms: Interventions improving flows of information up the bureaucratic hierarchy must be complemented by measures to ensure information is acted upon.
- Effective use of information is not all about top-down monitoring. Delegating some decision-making authority to individual bureaucrats can often improve performance: Combined with a culture of using data for decision-making, granting greater discretion can be more efficient than current levels of autonomy given to many public officials. Delegating authority can increase officials' incentives to hold information and identify innovative processes. Managers should be rewarded for their staff's innovation.
- External actors can help nudge public services towards evidence-based decision-making. Working with public administrations to build first generation data systems on the capabilities of their institutions will generate the incentives for them to make greater use of empirical data in their decisions, in a self-reinforcing cycle.

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