Challenges for monitoring flexible work: trade-offs of formal and informal information systems use.

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Abstract. Flexible work has become a trend since the pandemic emergency. All around the world, governments have increased the number of civil servants working in hybrid or full-remote work settings. This new landscape of work practices has raised several new challenges to public administrations, including monitoring work activities. Some governments support the idea that flexible work requires new monitoring methods. Instead of controlling timesheets, a new trend towards results management has emerged. Accordingly, new management information systems have been developed to support the management methods. This paper discusses challenges from data use through the new information systems for flexible work monitoring. Based on a Brazilian Federal government case, we raise new questions regarding the levels of formality of the data and its use. We conclude that flexible work information systems can produce more data regarding work practices. However, the level of formality in the use of the information produced may reduce the data availability to improve decision-making.

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1. Introduction

A new wave of discussions regarding flexible work has emerged. It is known that during the pandemic emergency, businesses and governments were pushed to increase the number of employees working from home as much as possible (Bloom et al., 2024; Kisil, 2024). The need to reduce human contact to decrease the spread of the virus caused society to reorganize activities in many ways. After the emergency was gone, a debate started over the possibilities, benefits, and risks of keeping workers at home, working remotely, or in hybrid settings (Kothawala et al.; Marković, 2024). Though initially, such discussion focused on silver linings from the lessons learned during the hard times, it didn't take long for leaders in the public and private sectors to intervene, independently of evidence (Bloom et al., 2024; Marković, 2024). It has been more than 3 years since the end of the emergency, and there are still a lot of doubts and tensions regarding the topic of flexible work (Schuster, 2024).

On the one hand, the flexible work critiques list arguments that companies should face: remote work generates a lack of engagement, challenges corporate culture and values, creates onboarding issues, etc (Bloom et al., 2024; Marković, 2024). On the other hand, the flexible work supporters present reasons why the practice should be maintained, such as office and transportation costs, environmental impact, time management, etc (Kisil, 2024; Schuster, 2024). The topic has become another polarized discussion in public opinion about pros and cons, with little room for conversation.

However, work flexibility is not new, and research has focused on understanding challenges and opportunities regarding work flexibility (Klonek & Parker, 2021; Madureira & Rando, 2022; Madureira et al., 2020). Many remote and hybrid work aspects must be considered depending on the approach. For instance, organizational psychology has analyzed factors that enable or hinder the opportunities for flexible work practices. Discussions regarding work design have already suggested that it is key to focus less on individuals and more on teams when improving remote work experiences (Bell et al., 2023; Klonek & Parker, 2021). Research has indicated that work flexibility is a continuum ranging from full onsite work to plain remote, with diverse combinations for hybrid settings (Kisil, 2024; Kleiman et al., 2023).

The development of new work practices has involved adopting new management approaches. For instance, previous results-based management or delivery monitoring activities gained new space to support flexible work (Madureira et al., 2020; Weerakkody et al., 2021). Though it is possible to use regular timesheets to monitor work activities, several new approaches can unleash better performance management, such as results-based-management. The shift from formal control to dynamic performance measurements is challenging but rewarding (Madureira & Rando, 2022; Madureira et al., 2020; Rubin, 1979).

The Brazilian Federal Government has implemented a new way of work monitoring called the Management and Performance Program (Kleiman & Barbosa, 2024; Kleiman et al., 2023). Through this program, teams and individuals overcome strict time controls for outcome planning and delivery. And by doing so, a great load of new data is being produced regarding work in the government (Kleiman et al., 2023; Pojo et al., 2024; Rego, 2022).

Kleiman et al. (2023) has indicated that the new program appears to support better flexible work practices in the government. The possibilities of agreeing on deliveries and keeping track of performance in place of time or activities are promising to achieve improved results. The author suggested that three conditions for the program were (1) the legal framework, enabling civil servants' practices to be supported by law; (2) the cultural shift from individual timesheet control routines to team delivery plan management; and (3) the support of new information systems that facilitate registers and monitoring of the delivery process. Adopting these new registry systems generates great amounts of data that can be used for different purposes.

In this paper, our main research question is: How does the level of formality in using work management information systems influence the data availability to improve decision-making? As an exploratory study, we aim to discuss the consequences of increasing formality using the existing data. Our main hypothesis is that the more formal the use of the information systems, the more bureaucratic the registers are, reducing the systems' data availability that can be used to improve decision-making processes. With an exploratory approach based on the literature and a case study, this paper aims to explore the consequences of increasing levels of formality in information system use.

In the first section, we explain the background, and following, we present this study's methodology. Next, we discuss existing research on the formality of registers in information systems. In the fourth section, we explain the Brazilian Federal government case, giving some context about the changes in the management information systems specifically designed to manage flexible work arrangements. In the fifth section, we apply the concepts to the case, indicating trade-offs for increased formality levels using the existing registers. Lastly, based on the discussions, we present new hypotheses to be tested in future research about information systems to manage flexible work.

2. Background

Historically, the use of data in workforce management has varied through the years, with a direct relationship with technological developments. When only paper-based timesheets (or stamping cards) were available, the time needed for summarization and information production was much longer than the digital control systems that can produce real-time information (Eom et al., 2016; Galanti et al., 2021; Klonek & Parker, 2021). Though the founders of Industrial and Organizational Psychology had already advanced in studies about human behavior and human-machine interactions, so far, the digitalization of the workplace has brought an incredible amount of new data possibilities, together with improved data quality (By, 2007; Madureira & Rando, 2022; Pryor et al., 2008).

A short review of the topic of workplace data management indicates grounded references. Røed and Raaum (2003) defines administrative registers as the ones designed to serve the needs of public institutions (p. 261). In that regard, their research indicates that there tends to be a higher quality of essential information than secondary information, which has fewer checks and updates. The variables less important to the administration may contain errors or inaccuracies, especially concerning the timing of events. Additionally, Karimian et al. (2022) found that information is the basis of decision-making and information flow and that informal information sources are used more than formal information sources in decision-making by managers (p. 99).

On the one hand, management activities refer to tasks and actions for decision-making and usually have an urgency to enable fast choices; on the other hand, control activities check compliance with rules and norms, having data precision as their main priority, as they can implicate consequences. Notwithstanding that, decision-making data

also requires precision, as control data demands up-to-date registers. However, the role played by time and precision differs in each case. For the sake of this research, we consider monitoring activities as an action between management and control.

Shifting from a timesheet management mindset to managing work based on results adds another layer of complexity to information management systems. Still, some data characteristics should be discussed before moving forward. Back in 1986, Johnson (1986) stated that informal information compensates for the inadequacies of formal information, complementing it. Formal information systems are approved by senior management, contributing to organizational awareness. Formal performance evaluation information systems focus on accounting and represent performance numerically, while informal information systems are unofficial but may affect decisions.

On the one hand, informal information can be easier to use and understand, increasing confidentiality, timeliness, and qualitative details. Depending on the business nature, it can result in situational variability in decision-making. On the other hand, formal information may result in practical limits on the information systems' conditions to remain up-to-date and flexible for specific management needs (opus cit.., p. 121). The authors conclude that the dependence on formal information systems for decision-making will likely result in short-term and long-term dysfunctionalities, such as negatively affecting attitudes toward that information, especially when setting inadequate mandatory details.

From this perspective, the levels of formality in information systems will vary depending on the information system's objectives. And these levels of formality can also differ in different aspects of the information system. For instance, one dimension of information systems formality can be how people register data. This layer focuses on access levels, accountability for the provided information, and the alternatives for backchecking the register.

Another layer that can be analyzed is the different levels of access within the system. Whether to monitor registers, to adjust and correct them, or to exercise privileges of extraction, there are also levels of formality involved in the access to systems. One last layer is the formality of use applied to the data obtained in the system. Access levels may be connected to people's use of the available data. Once more, different levels of formality in using the registers implicate various objectives upon which the information system is built. The official system incorporates informal information indirectly as adjustments or modifications to formal information. Previous conclusions on informal information studies suggest challenges in variability and semantic definitions.

According to Altaee (2018) an informal information system constitutes a twin system of the formal information system. It supports formal communication and helps the administration with management activities. Additionally, they improve decision-making as decisions depend on the information that the existing systems can provide. In that sense, reducing informal sources of information to only formal channels can also limit the information available for decision-making and harnessing its quality. The content of the information system can also influence the formality possibilities on the register, access, and use of that system. For instance, stock management systems should have different requirements depending on the type of products they are related to. In this paper, we focus on work management systems in government.

Moreover, Pan Fagerlin and Lövstål (2020) define management control as techniques and procedures that foster employees' actions consistent with organizational goals (p.4). Formal and informal controls differ in how explicitly designed or planned they are. They suggest three uses of control systems: interactively, when managers participate directly in their teams' communication and decision-making activities; diagnostically, when used only for traditional feedback based on preset performance targets; and constraining, when used to increase predictability. These three different uses also relate to management styles: participative, facilitative, empowering, and authoritative, more related to command and control.

Lastly, Saundry et al. (2015) indicates a difference in how line managers perform work management, especially in preferring informal approaches to workplace issues. However, as their management responsibility increases, they tend to seek more rigid guidelines, given a lack of confidence and a fear of mishandling issues' repercussions (both legal and organizational). They suggest that "informality can result in inconsistencies in how employees are treated, which can damage employee morale, satisfaction, and trust" (p.430). Thus, formalization is wanted as guidance and a protective shield against criticism and litigation: "Managers can hide behind the formal procedure to justify a decision to discipline an employee and may move to formal sanctions very quickly" (p.431).

In short, the more advanced the methods to register work are, the greater the possibilities for its use. Workforce monitoring has been studied from different perspectives throughout the years. From an information systems approach, management, monitoring, and control are three different data-related activities that implicate requirements for workforce data production. Though this discussion can be extended to any economic sector, this paper focuses on the approach toward governmental activities.

Work management information systems have several peculiarities in their data structure: they deal with large amounts of personal data, they tend to register data according to law-regulated careers, they may refer to several different positions, and they tend to have bureaucratic language. Work registers may strongly impact their users' lives, given that they derive rights, benefits, or losses, given that they will result in a paycheck.

Besides the challenges of setting up the information systems is the register the system is specified for—different ways to monitor work requests that the system is prepared to collect multiple types of information. For instance, from a historical development perspective, work registers have evolved alongside technology. In a simplified view of such development are the different ways work monitoring was conceived: time, activities, and deliveries.

A system that registers only time can be very simple, adding only a few layers to control unplanned events such as leaves, nonattendance, or emergencies. A more sophisticated system can start to include some quality to such registers, i.e., connecting hours to financial sources (projects, budgets, etc.) or describing the time spent. This complexity increases as the registered data advances towards having structured silos to connect the data. Predefined budgets and projects can be defined to simplify the system's use. A common use of time can consist of categories of labelled time spent. Over time, the growing complexity of the details increases the requirements for the information system to work.

Adopting a results-based management approach depends on having an information system capable of collecting appropriate registers to the needed level of detail to make this methodology work and generate useful information for those using the system. A few characteristics can be mentioned in the system specification. A stable result-based management system must define its syntax and semantics so multiple users can understand. Simplifying language and how it can interact with different interpretations is one of the challenges in information system design. Another assumption, especially for governmental data systems, is finding ways to make the data interoperable so that various systems can use it. Work registers, moreover, when connected to deliveries, should be flexible enough that multiple enough to fit multiple purposes, including work effort distribution and performance assessment.

Especially in public service, each country, region, and local government can specify how these characteristics apply to work registers. In this paper, we will discuss the Brazilian Federal case. We will do so by understanding the underlying discussions resulting from a major change in the work management system caused by a new program called the Management and Performance Program, the PGD. Though the case is specific for the country, we expect the discussions and reflections to support new insights for other governments and organizations facing the same challenges regarding the implementation of new information systems to manage flexible work.

3. Methodology

This paper is based on two sources of information. As an exploratory study (Visser, 2015), it starts with a short review of the literature (Ghobadi, 2015; Kuipers et al., 2013; Offermann et al., 2010), aiming to define the main concepts to be discussed throughout the text. Following our main research question, we aim at understanding "how does the level of formality in using work management information systems influence the data availability to improve decision-making?".

This exploratory study discusses the consequences of formality levels, hypothesizing that increased formal use of information systems leads to more bureaucratic registering practices. We aim at understanding if, by having more bureaucratic use, the systems' data availability is reduced, hindering their usefulness for decision-making processes. Based on our research question, we look for discussions on the effects of levels of formality in work management information systems' data registries and the use of their availability for decision-making improvement.

Based on internal documents and previous publications, we present a case study about Brazil's Management and Performance Program (Kassen, 2013; Yin, 1989). We describe the case for analyzing the impact of decisions in its process and develop a Stakeholder Power-Interest grid to understand different perspectives for defining system requirements (Bryson, 2004). Though the case is still in its infancy, facing technical and governance challenges coming from the implementation process, we use it as a reference to reflect on the set of options available to the coming developments. The goal is to shed light on actual choices for designing information systems in practice from a data usage standpoint.

We use the concepts from the review and the insights from the case to discuss trade-offs present in information systems design. The idea is to explore benefits and risks within the available choices and indicate future research streams over the consequences of formal and informal registers and the use of work information systems.

4. Information systems in the Management and Performance program

The traditional way to monitor work in the Brazilian government has always been through timesheets. The goal was to register the amount of time each civil servant dedicated to working for the government, assuming that while they were in the office, they were working (Camões et al., 2023; Ferlie et al., 1996; Madureira et al., 2020). One of the innovations introduced by the New Public Management (NPM) approach in the 1980s was to challenge public administrations to move forward and focus on service delivery (Lane, 2002; Schedler & Proeller, 2000). Within its guidelines were the ideas of making work in governments more flexible. Besides flexibility, NPM focused on improving the efficiency and efficacy of public service, adopting private sector management practices. Those

referred to cost reduction and accountability principles that would be transposed to the public service. Though most of the discussions focused on flexible contracts, some authors still mentioned the concept of more efficient ways to manage work in public institutions.

One of the main barriers to changing timesheet management and implementing new workforce policies was the risk of switching from process control to results (Weerakkody et al., 2021). Processes can be easy to measure and monitor, while results can vary and require more complex management. The timesheet control over civil servants' work is a clear example. It is easier to check whether someone came to the office on a certain day and attest to their presence than to set clear outcomes that individuals and teams are supposed to deliver by the end of a defined period, and verify those results (Kleiman et al., 2023).

This was the context in which the Brazilian Federal Government started implementing its management by results policies. In the 1990s, Brazilian politics were shaken by the neoliberal wave. Besides cost reduction, the modernizing efforts were also targeted at improving service delivery by introducing new management methods (Abrucio, 2007; Bresser Pereira, 1998; Silva, 2001). A whole set of rules was designed to update the federal-level government, and one of these measures proposed ways to make work more flexible. Though the focus was on creating mechanisms to reduce the existing public workforce, one program was designed to enable exceptions to timesheet control. Named as the Management Program, it sought to allow workers (mostly researchers) to work based on predefined goals (Kleiman et al., 2023; Pojo et al., 2024; Rego, 2022). Those joining this program would not report the time spent in the office, but the results achieved by the end of the month. The legislation was approved, supplying the needed legal framework for such experiences; however, only a few cases have been reported in the coming years.

It is known that such approach has been adopted in several pilot experiences that happened in more technical or technological governmental fields, such as teams in the national controlling office, the income tax department, or agencies that had a more flexible structure since their start – the idea of having public bodies to regulate specific fields was also an innovation coming from the same legal framework. In parallel to these non-timesheet work registers, cases of remote work were reported in similar fields. Since the 2000s, Information and Technology teams have had experience in enabling their workers to work from home. The overlapping between results management schemes and remote work was not noted until the 2019 pandemic (Brazil, 2024a).

With the sanitary emergency and the push to send as many workers as possible to work from home, the National Human Resources Secretariat within the Ministry of Economy was required to issue legal guidelines for the whole government on how to proceed with work management in the new situation. With the scaled request to control the work of dozens of thousands of workers out of the office, keeping them under the timesheet control was not feasible. A team found the legislation from the 1990s and based their new regulations on the mechanisms previously created – they designed the Management and Performance Program (Programa de Gestão e Desempenho – PGD) (Kleiman et al., 2023).

There was little time for larger developments, and guidelines were issued as available. The first regulation issued, the Normative Instruction 65/2020 (Brazil, 2020) established new government workforce management rules. It defined concepts such as participants, objectives, and steps to be followed to implement the PGD in each unit. At this stage, the PGD was legally defined as a "management instrument that regulates the development and measurement of its participants' activities, focusing on results delivery, through office or teleworking, aiming to improve the public service delivery quality within the federal government". Next, Decree 11.072/22 (Brazil, 2022) was signed by the President, narrowing the PGD to focus on the services provided to society, ruling over how the Program could be adopted and maintained by units, and setting specific procedures for teleworking, such as workload limits. In December 2023, the Normative Instruction SGP-SRT-SEGES/MGI 52/23 (Brazil, 2023, December 21) set new guidelines and procedures over workforce management, adding to the existing legal framework, details on the accountability for workers' activities diverging from their workplans, such as penalties, fees, and other financial consequences of failing to comply with the agreed deliveries.

By that time, the idea of registering time had to be substituted by the register of activities, which the management teams could attest. Such a register had to be delivered in an electronic system, adapted from a previously existing system not specifically designed. Kleiman et al. (2023) has reported that many challenges arose from this transition phase, though registering activities was already more efficient than trying to control timesheets from home. The waiting time for a new software version resulted in challenges for units and teams to reference their registers differently. Spreadsheets and task management tools were temporarily used in a transition towards new unified systems, affecting the quality of the resulting registers.

In a nutshell, in the transition period, an existing management information system was adopted, focusing on individual task registers. The Federal Private Insurance Agency (Superintendência de Seguros Privados- SUSEP) implemented the Workforce Management System (Sistema de Gestão de Pessoas – SisGP), previously developed to monitor requests within the agency. The system's flexibility favoured the PGD program to enable the creation of an extensive list of activities that could be individually assigned to each civil servant. The system was login entry-based, which supported an initial level of confidentiality for the provided information.

However, as the system was designed to monitor individual tasks, it could only monitor activities at the individual level, making it difficult to analyse aggregated team deliveries or results. The pre-defined list of activities was also challenging. Each government department or unit had to be customized, increasing the complexity of analysing aggregated outcomes or connecting them to broader strategic goals or priorities. Lastly, as a transition system, the individual-level monitoring fostered micromanagement practices, reducing the program's potential to increase engagement. Moreover, the semantic limitation resulting from the predefined task list reduced the usefulness of the available information for decision-making.

A second phase was initiated after this transition stage with innovative procedures to plan, approve, perform, register, and monitor deliveries. In 2024, another legal instrument was issued (Brazil, 2023) to define the PGD as a program to improve the public service institutional performance, connecting individual work plans to the unit's delivery plan and the government's strategic priorities and planning, clarifying the unit's autonomy in starting its programs. These last definitions were aligned with the PGD new version, combining team delivery and individual assessment, creating transparency mechanisms. It also defined the Program's governance structure, creating an Executive Committee responsible for supporting units to implement their programs and issuing additional regulations needed for the Program's improvement. One specific unit was responsible for coordinating the Committee and maintaining the Program's webpage, which included information dashboards, enabling full transparency in the implementation progress by each governmental unit (Brazil, 2024a). An implementation index was defined to enhance such monitoring activity, allowing each unit to check its conformity with the requirements for a full Program implementation. Through such an index, each unit was requested to define their program webpage, containing full information on the program, such as the one from the National Aviation Agency, with full information on individual and team delivery plans (Brazil, 2024b).

Named PGD 2.0, this new phase would foster the units to focus more on team deliveries than individual performance, and to plan results with concrete characteristics (instead of individual activities). It would have a newly designed digital system following the program's logic, result-based-management. The previous information system limitations were converted into requirements to create a new PGD information system.

Though the regulations were flexible towards having various information systems to manage the program, the Ministry of Management and Innovation in the Public Service (MGI) engaged in developing an option for the units that lacked the conditions to produce their own. The main system feature was to enable the perspective of delivery management over the individual task monitoring perspective. Still, the new information system was required to allow individual work registers, which could support individual-level performance evaluations. The new system would focus on team delivery, as the sum of the efforts distributed among team members. Additionally, it would support inter-unit collaboration by allowing common deliveries to be tagged on different teams and team members. The pre-defined task list was replaced by customized deliveries, specified by each team. This new system architecture made interactions visible and enabled a broader analysis of workforce management.

As the government allowed each unit to use its information system, more than 30 information systems started operating. These systems were developed based on the same requirements, aiming to transfer the same mandatory data. Accordingly, the specific system offered by MGI was available to those units opting not to build their own. From an informational availability standpoint, what was observed is a combined process of cultural change and new practices. The inexistence of common ways to monitor work besides monitoring workload through timesheets fostered the development of several new systems. The initial strategy was to base the register on existing information systems, adapted to register work data regarding the new program. A diverse set of stakeholders was engaged to influence the definition of the new work information systems based on their requirements and needs. Using a Bryson (2004) Power-interest grid, we can visualize some of the tensions – Figure 1.

For instance, on the one hand, top management personnel found the opportunity to increase their strategic view of governmental management. In short, that was an opportunity to connect the mid-management layer to top government priorities with the new information produced. This meant improving decision-making in the government by using real-life information from the team´s work. With a high influence on decision-making, they were also interested in defining the system's data requirements, especially focusing on increasing the available data for decision-making.

HR managers, on the other hand, perceived the risk in changing the stabilized timesheet control routines to more dynamic delivery monitoring. Their main fear is explaining new contradictions and imprecisions from new data to the public or control and accountability units. However, with less influence, they were subject to top decision-makers (Brazil, 2024a). Conversely, control and accountability units were also interested in having more detailed information about the functioning of the public service, but from a formal perspective. They raised their eyes toward more sources for punishment, command, and control to increase their controlling capacity.

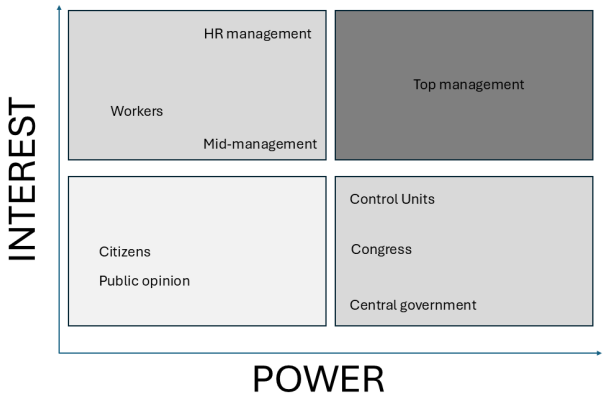

Fig.1 – PGD Power-interest grid, based on Bryson (2004)

Less influential mid-managers could feel the increased duties to fill in the systems. Besides working with their teams, registers would play an important part in their tasks and time. The less detailed or mandatory the register request is, the better. Workers found themselves in a contradictory situation of benefiting from more flexible systems to connect their actual work to public service deliveries. At the same time, they resisted the increase in control over their work and the risk of micromanagement from the top. Though with interests at stake, their influence on the system definition was low.

Since the beginning of data requirements and specifications, requests coming from command-and-control units have generated tensions with the decision-making requirements. While decision-makers' needs tend towards increasing data availability independently of their quality, the risk of the information leading to consequences in terms of conformity and formal analysis goes in the opposite direction. Evaluation and performance metrics can be developed in formal consequential ways, leading to risks in data quality, and informal trend analysis for decision-making can be more prone to imprecise information. The tension between formal and informal registers expands to the consequences of formal and informal use of the available data.

The resulting information systems were diverse, depending on the units they were related. However, the PGD set rules to enhance the benefits of monitoring deliveries. The first idea was to define the team as the unit´s reference for the deliveries. The unachievable idea of individually monitoring what each worker does could be addressed by understanding how teams work and connecting their activities to higher-level goals (Brazil, 2024a). The main outcome was strengthening the connection between governmental planning, strategic objectives, and the results expected from units and teams within the public service. Both managers, at different levels, and workers could benefit from gaining a better understanding of work and the contribution their actions have to the general government´s achievements. Lastly, increased engagement resulting from better comprehension of priorities and deliveries was expected.

The diverse set of information systems and information availability of the program resulted in many data registrations and uses. In the next session, we present some of the trade-offs of such complexity, indicating paths to follow next.

5. Trade-offs in the levels of formality in the use of PGD registers

The latest reported situation of the program is exemplary of the different trade-offs and contradictions regarding the next steps of the system development. Two different information systems are at work to receive information from each PGD unit. One is the central system of information related to the legal formalities, which is manually supplied with the actual situation of each unit. A team of civil servants needs to manually check whether the unit complies with all the six requirements to meet the formal conformity (published acts of institution and rules for having a functional program, system integration via API to transfer program information and a formal representative named to take part in the PGD network formal meetings).

In December 2024, out of 215 units allowed to join the PGD program, 191 actively participated. However, only 148 (77,94%) comply with all the formal requirements. The average compliance index is 94,33% among the 191 participating units. From the system integration perspective, 186 declares to have an operating system to manage its delivery and work plans. 97 institutions are adopting different versions of the PGD standard system, 53 have another publicly available system, and 36 units have declared to have developed their systems. The five units without a system do not comply with the program's requirements and should be disconnected if they cannot fulfill them in time (Brazil, 2024a). Only at the level of formality and conformity with the program regulations, even the objective of requirement compliance is questioned by some of the units.

The second information system is the one built upon API data transfer. The collection of the distributed data from all the program's compounding units into summarized information is the goal of the PGD team. Though system integration is ongoing, the data indicates several challenges. Besides the formality of the data, the PGD experience already indicates increasing complexities coming from the levels of aggregation to be used with this workforce management data source for decision-making.

The idea of offering decision-making dashboards with the program's indicators is still in its infancy. Aiming at going beyond the number of PGD participants, the systems should present data on the work plans, evaluations, and deliveries of the teams from each institution. However, as previously indicated, the perspective of developing management dashboards depends directly on the quality of this data. For instance, all PGD participants, regardless of the system chosen by their units, are expected to fill in their agreed work plans under their team's delivery plans. Mandatory data submission via API officially began in January 2025, and the governance structure of the PGD program has focused its efforts on analyzing the consistency of the data received via API. On the one hand, data transfer failures due to system issues result from bad system integration. On the other hand, due to a lack of data, team training and engagement are noticed due to poor liaison between the senior leadership of the institutions and the heads of the participating units.

Since August 2024, 159 units have sent more than 25,000 delivery plans, related to more than 240,000 work plans. It already sums up hundreds of thousands of individual contributions of the 70,000 PGD participants registered with the API (Brazil, 2024a). Given that evaluation deadlines and scores, defined in the legislation, should be followed, the focus comes back to information quality. As with the existing system, the differences in individual and collective performance, i.e., may result in different perspectives on the information systems. It is expected that the more the command-and-control individual perspective is adopted, the less prone civil servants will be to updating systems with real-life information. The risks of consequences increase their resistance to updating the system dynamically and their willingness to have a better stable picture to be assessed.

As discussed in the literature, what was observed in developing the PGD information system resembles the tensions within other requirements-setting processes for information systems. Consequently, this explorative analysis arrives at a final reflection regarding the new program implementation, the formality of the information use. Based on the insights coming from the literature, after the program reaches its maturity in terms of technology convergence, the API should be able to capture the amount of information needed for the dashboard consolidation. However, as in the literature, the more focused on results and evaluation the use of the information systems is, the less likely it tends to receive actual information from civil servants. The discussion indicates a risk that the PGD program information systems' official and formal use results in more bureaucratic, hence, outdated information. As a consequence, it is hypothesized that the information coming from the PGD information systems might become less realistic and useful for decision-making, by attending strictly to legal requirements or frameworks.

6. Conclusion and future research

Based on the main research question of "How does the level of formality in using work management information systems influence the data availability to improve decision-making?" we performed an exploratory study to discuss the consequences of increasing formality using the existing data. The Management and Performance Program (PGD) resulted from a policy transformation in the Brazilian public administration, which replaced the timesheet workforce management with a delivery-based system.

Driven by the guidelines of New Public Management (NPM) and accelerated by the 2019 pandemic, this shift brought higher levels of autonomy to public servants, empowering teams and managers in their management procedures. The focus on delivery indicates the potential to increase service delivery efficiency despite challenges such as the risk of micromanagement. Converging with the literature findings, the PGD case also indicates that a way to tackle the formal bureaucracy of inaccurate records could be to prioritize team performance based on concrete goals. The new management system shows a path to foster a new management culture in the public sector, more appropriate to support flexible ways to organize work than timesheets.

Though potential remedies to these challenges posed by formalization are not directly discussed, some examples can indicate an agenda for further research. For example, analysing whether increasing the use of informal data sources could improve data flexibility and lead to better decision-making. Or if enhancing system user design could nudge participants to improve their register practices, leading to increased trust in the system's information.

The discussions indicate that the immediate effect of strengthening the system through formality could be to reduce the system's availability of useful management data. Consequently, the data availability reduction would also decrease the new management program's potential to analyze trends, obtain accurate information, and improve decision-making processes. Further research should incorporate more empirical evidence and explore better ways to balance formal management and data availability to increase its importance to policymakers. More evidence is also needed to test the actual consequences of increasing levels of formality in the PGD information system use.

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