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Algorithmic Decision-Making and Harmonization in Multi-Level Governance Welfare Practices: Empirical Evidence From Belgium

Janne Petroons [1,2], Périne Brotcorne [3], Martin Wagener [3], Koen Hermans [1,4], and Wim Van Lancker [1]

[1] ReSPOND, KU Leuven, Belgium
[2] Centre for IT & IP Law (CiTiP), KU Leuven, Belgium
[3] Centre Interdisciplinaire de Recherche Travail, État et Société, UCLouvain, Belgium
[4] LUCAS—Centre for Care Research & Consultancy, KU Leuven, Belgium

Correspondence: Janne Petroons (janne.petroons@kuleuven.be)

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Abstract

Algorithmic decision-making (ADM) is increasingly used by public organizations to allocate social benefits. However, it remains unclear whether ADM leads to more harmonized decisions, especially in multi-level governance contexts like Belgium. Therefore, we ask whether, and to what extent, ADM is linked to the harmonization of welfare decisions across local social agencies. More specifically, we analyze decisions related to additional financial support in terms of (a) the likelihood of granting monthly financial support compared to other types of support, and (b) the amount of monthly support granted. In doing so, we focus on REDI, a digital rule-based algorithmic system designed to assess families' financial needs in Belgium. We draw on an online survey with respondents from 344 public centers for social welfare (PCSW), 40 interviews with respondents from 20 PCSWs, and policy guidelines from 86 PCSWs. Our findings demonstrate that the adoption of REDI can be linked to harmonization, yet only regarding the *form* and height of support, with users being more inclined to grant support monthly and provide a higher amount. Nonetheless, variance in welfare decisions persists, indicating a half-hearted harmonization. With both financial and normative considerations at the local level playing a significant role in how the ADM system is shaped and implemented, this study highlights the importance of examining the organizational and political context in which ADM systems are deployed to understand their influence on welfare decisions.

Keywords

algorithmic decision-making; harmonization; policy implementation; social assistance; social welfare; standardization; street-level bureaucracy

1. Introduction

Algorithms are nothing new. In fact, evidence for the first algorithm dates from 2500 BC (Chabert, 1999), and the first algorithm to operate a computer stems from the 19th century (Bolter, 1984). Yet, since the fourth industrial revolution, the scale and extent to which digital algorithms are used to support human decision-making have rapidly increased, and welfare practices are no exception. Digital algorithmic decision-making (ADM; for a conceptualization, see European Parliamentary Research Service, 2019) is an increasingly common feature of public organizations involved in the allocation of benefits or the provision of services (Bovens & Zouridis, 2002; Van Gerven, 2022). In Norway, for instance, applications for social security benefits (such as child benefits or unemployment benefits) are automatically processed, sometimes even "without a person having been involved" (Nav, 2024). Another example is Finland, where the decision to assess eligibility for social assistance was centralized to address unequal treatment across municipalities and was later supported by ADM (Algorithm Watch, 2020; Varjonen, 2020).

This evolution brings about opportunities and risks for our welfare states. For instance, some argue that digital ADM can decrease the non-take-up of social rights, as it enables the automatic allocation of welfare benefits and minimizes shame and stigma linked to applying for such benefits in face-to-face contact (Madsen et al., 2022; Van Lancker, 2020). In contrast, it is demonstrated that the rise of ADM and digital technologies broadens the digital divide and creates administrative burdens, especially for people who are already vulnerable (Algorithm Watch, 2020; Eubanks, 2018). A further illustration of the ambivalent effects of ADM concerns the role of discretion. Discretion can be defined as the freedom public officials have when interpreting and implementing regulations (see Evans & Hupe, 2020; Lipsky, 1980 for commonly used definitions and conceptualizations). On the one hand, ADM may decrease the number of arbitrary or discriminatory decisions caused by public officials' large discretionary powers (Arvidsson & Noll, 2023). On the other hand, empirical evidence suggests the opposite since practices of discrimination can become embedded within ADM systems, or systems running on or being trained by biased data (Larson et al., 2016). Furthermore, it is argued that the diminished capacity for case-by-case policy implementation due to ADM systems disproportionately affects those who are already vulnerable (Germundsson & Stranz, 2023).

In this article, we zoom in on what seems to be another puzzle: the harmonization of policy outcomes across local social agencies when ADM is used to assess eligibility for welfare benefits. Some authors expect ADM systems to harmonize policy implementation since they might reduce the discretion of public officials (Bovens & Zouridis, 2002), make public officials adhere to regulation, whilst focusing on routines in their enforcement style (de Boer & Raaphorst, 2023), and streamline decision-making processes (Germundsson & Stranz, 2023). Other scholars emphasize that professionals' willingness to adopt ADM, along with the organizational context and culture in which they operate, significantly influences how such technologies are accepted and implemented in practice (Venkatesh et al., 2003). Indeed, public officials are reported to deliberately oppose the digital systems they are requested to use, sometimes precisely to provide individual assistance to clients (Jørgensen & Schou, 2020). And so, the extent to which ADM leads to harmonization of welfare decisions across local social agencies, as well as the conditions under which such decisions materialize, remain open questions. Additionally, the impact of ADM on the autonomy of lower-level governments is still under-examined. This is, however, crucial, since in the majority of welfare states, social assistance policies are executed at the municipal level (Kazepov & Barberis, 2013). Understanding the

harmonizing effects of ADM is key to designing socially just and sustainable welfare states, as it affects both citizens' social rights and the multi-layered governance of social policies directly.

In Belgium, a digital system called REDI (shorthand for References Budgets for a Decent Income; Frederickx et al., 2022) was implemented at the local level on a large scale. REDI is a rule-based algorithm that allows for evaluating and calculating the need for additional financial support of welfare clients, based on a fine-grained assessment of their household and employment situation. The responsibility to determine whether, and if so, how much, additional financial support is provided to clients lies fully within the discretion of the public centers for social welfare (PCSW). In contrast, legislation governing social assistance benefits is determined at the national level. REDI is meant to evaluate clients' living standards and calculate the resources they need to sustain a decent minimum, running counter to the usually idiosyncratic rules and guidelines of local social agencies. In 2023, the Belgian federal government encouraged local governments to adopt REDI through a full, but temporary, reimbursement of the financial support given, with the only requirement being that social agencies use REDI for the specific clients to whom they decide to grant additional financial support. In doing so, they expected an increase in equal treatment of clients across local social agencies (PSS Social Integration, n.d.-a, n.d.-b). Local governments still had the autonomy to determine how they incorporated various factors into the system, such as savings, debts, or the income of children. And so, while the implementation of REDI at a large scale was meant to streamline local policies to grant additional financial support to welfare clients, at the same time, it did not change the autonomy of local authorities regarding additional financial support and allowed them to use REDI in line with local practices.

The Belgian case is a prime example of how ADM is used with the expectation of harmonizing welfare decision-making in a multi-level governance context. Using unique data to evaluate the implementation of REDI at the local level, we ask whether, and to what extent, the use of ADM in welfare decision-making is linked to the harmonization of welfare decisions across local social agencies. An online survey including five vignettes with responses from 344 local governments allows us to assess welfare decisions in specific cases with and without REDI, and before and after REDI was implemented. To contextualize these decisions, we draw on qualitative analysis of 40 semi-structured interviews with frontline workers and managers from 20 PCSWs, along with an assessment of policy guidelines from REDI-users from 86 PCSWs, allowing us to explore why harmonization might (not) be linked to REDI.

2. Literature Review

Previous research shows contradicting findings and perspectives on whether ADM harmonizes welfare practices, and various perspectives on how technology brings about societal change.

Applied to public administrations and welfare states, the impact of ADM on discretion is often framed as a shift from street-level bureaucracies, where street-level bureaucrats have degrees of freedom when implementing regulation in their direct interactions with citizens (Lipsky, 1980), to system-level bureaucracies, where discretion is completely abolished or shifted to the designers of ADM systems (Bovens & Zouridis, 2002). Zouridis et al. (2020) highlight how this shift not only occurs by directly replacing human decisions with ADM but also by the mere use of software programs as they prestructure processes. Empirical evidence is found to support the claim that ADM *can* limit discretion and streamline practices (e.g., de Boer & Raaphorst, 2023; Ranerup & Henriksen, 2022). Buffat (2015) refers to this stance, reflecting

the expectation that ADM limits human discretion, as the "curtailment thesis." Such technological determinism expects technology, by itself, to bring social or behavioral change (although various variants and nuances exist; for that, see Lauwaert & Chomanski, 2025). In legal philosophy, this argument is derived from the idea that both computational code and law regulate and affect human behavior—e.g., Lessig's (1999) "code is law" stance or Diver's (2021a, 2021b) concept of "digiprudence." Furthermore, policy outcomes are framed as inherently present in, or directly caused by ADM (Diver, 2021b; Grimmelmann, 2005). These studies articulate a clear causal relationship (Kling et al., 2000): As code regulates, the discretion of public officials decreases, with more harmonized policy outcomes as a result.

Technological determinism is challenged both in theory and by empirical evidence. Social scientists especially criticize a deterministic approach to technology, as it neglects the human and societal influence in both the design of ADM systems and their practical effects. Social construction of technology, in particular, questions digital ADM systems as external objective realities by framing them as human constructs, shaped through social actions (Berger & Luckmann, 1966). Actor-network theory also highlights the interactions between technology and humans, expecting a two-way relationship (Michael, 2017; Orlikowski, 2000). In line with this, Venkatesh et al. (2003) developed a unified theory of acceptance and use of technology, describing how individual characteristics and social contexts influence how technologies are accepted and used in practice. With humans shaping technology, and thus ADM systems, they are also expected to influence the effects ADM might bring to society. Consequently, authors call into question whether ADM in itself will ensure policy harmonization. Indeed, empirical evidence shows how public officials working with digitalized systems oppose them (Baines et al., 2010; Devlieghere & Roose, 2018, 2020) and develop parallel ways of working to still be able to individually assist clients (Jørgensen & Schou, 2020) or keep the relational aspects of social work practices (De Witte et al., 2016). In the literature, these ideas are reflected in the "enablement thesis" (Buffat, 2015) or the "continuation thesis" (Marienfeldt, 2024), showing ADM systems do not *automatically* or *just* curtail human discretion, but can bring about new ways for public officials to use discretion. Adding to that, it is contested that the creation of more rules (Evans & Harris, 2004)—for example, through code (Diver, 2021a, 2021b; Lessig, 1999)—or the standardization of practices (as shown by Nordesjö et al., 2020; even though this study did not cover standardization through ADM), actually lead to public officials having less discretion in practice.

Not only is there disagreement in the literature concerning the harmonizing effects of ADM, but the desirable extent of harmonization versus discretion also remains a subject of debate. Stances about (limiting) discretion in welfare practices are often based on normative assumptions about what public officials should be or do and what desired levels of discretion might be (Brodkin, 2016). For instance, Molander et al. (2012) frame discretion as a threat to equal treatment in welfare states, whereas Lipsky (1980, p. 161) underlines the importance of discretion in service provision. The same goes for the desired level of (de)centralization in multi-level governance welfare states. Where Frederickx et al. (2022), for instance, mention the risk of the fulfillment of social rights becoming dependent on the place of residence when local practices differ, Sellers and Lidström (2007) highlight the importance of strong local governments to counter spatial inequalities. Yet, Evans and Harris (2004) underline that discretion is neither "good" nor "bad." Whatever the desired amount of discretion in welfare decisions, when discretion becomes systematized to decide "who gets what, when [and] how," it becomes political (Brodkin, 2020, p. 64). This is particularly salient in multi-level governance contexts, where the authority to design anti-poverty policies is distributed across various layers of policymaking and political institutions, as in the case of Belgium. Moreover, given the diverse policy

challenges and political dynamics at the local level, the federal government and local social agencies may pursue different interests when designing and implementing supplementary support measures. As a result, they may aim for divergent objectives in the deployment of ADM systems. In sum, the extent to which ADM leads to harmonized decisions across different organizations, especially in a multi-level government context, invites further examination. Moreover, the expected outcomes of ADM in welfare practices are often normatively framed, driven by a tension between local autonomy and centralized legislation. In what follows, we discuss the Belgian case in which an ADM system is implemented to streamline local decisions on additional financial support in a multi-level governance context.

3. Additional Financial Support in Belgium: The Role of ADM

In Belgium's multi-level governance system, local PCSWs serve as the final safety net. Each municipality has a PCSW that provides financial support in the form of social assistance benefits on the one hand, and can provide additional cash and in-kind support on the other hand. While the first task is subject to federal legislation in terms of entitlement conditions and amounts, PCSWs are fully responsible for defining the type of additional support as well as its conditions. For example, local social agencies can autonomously decide on the type of support they provide for each client, ranging from rent allowances and medical bill contributions to food bank vouchers and cultural activity discounts. Given the full autonomy of local authorities to determine who is financially in need, various practices exist (Van Mechelen & Bogaerts, 2008). Examples derived from our interviews include using standardized Excel files to calculate financial needs, whereas other PCSWs do not adhere to such quantifications and discuss cases at team meetings.

In Belgium, some PCSWs use the digitalized rule-based algorithmic system REDI to assess the needs of vulnerable clients. REDI was developed by scientists of the Centre for Budget and Financial Well-Being (CEBUD) and is based on the reference budget method. Reference budgets are developed to determine the minimum household income necessary for social participation in a given context. Theoretically and conceptually, they are based on the theory of human need (Doyal & Gough, 1991; Goedemé et al., 2019). While reference budgets are based on "model family types" and assumptions about health and housing, REDI draws on the reference budget method to allow social professionals working in PCSWs to determine whether a *specific* client's household has sufficient financial resources to live a decent life (Frederickx et al., 2022). Reference budgets represent the minimum costs to fulfil 12 basic needs, including elements as having access to healthy food, basic hygiene, sufficient relaxation, and being able to maintain social relationships. Different parameters influence the height of the reference budget. On the one hand, they are based on (inter)national guidelines, focus groups with citizens, and budget checking in stores. Every six months, the budgets are indexed. Every two and a half years, budgets are re-evaluated. On the other hand, personal characteristics, such as age and gender of family members, and socio-financial elements, such as renting on the private or social market and the source of income (work or social security), influence the height of the reference budgets (CEBUD, n.d.-a, n.d.-b).

In encouraging PCSWs to adopt REDI, the federal government aimed to ensure "equal treatment of client situations across PCSWs and social professionals" (PSS Social Integration, n.d.-a, n.d.-b). The federal government provided a temporary subsidy—fully reimbursing REDI-based financial support—from 2023 until the end of 2024. In turn, 424 of 581 PCSWs (73%) started using it in 2023 and 45 (8%) were already using REDI before.

When using REDI, social workers start by inputting the personal information of their client, such as their national registration number, sex, and date of birth. Next, information about financial needs and household budget is added. This information is structured in four different categories of expenses: fixed costs, living expenses, savings for future expenses, and additional costs. For each of these categories, social workers can choose to use reference budgets as calculated in REDI or enter the real expenses of clients. Different types of income, stemming from both work and social security, can be registered as well. REDI then calculates a monthly amount by comparing the family income to the (adapted) reference budgets. If the result is negative, the household income is insufficient to live a dignified life (Frederickx et al., 2022). REDI provides an overview of the incomes and expenses of the household, which may prompt a response to reduce expenses that are (much) larger than the reference budgets, and reveal potential sources of income, such as allowances that are not yet claimed. Most importantly, it provides a benchmark of clients' financial needs, which can be used to determine the type and level of additional support. According to the REDI-philosophy, the entire negative balance should ideally be granted to the client every month if the budget allows, replacing other ad hoc additional types of support (CEBUD, 2024, p. 28).

Importantly, the federal government did not impose strict regulations on local governments regarding the use of REDI. The only requirement for reimbursement was that social assistance agencies use REDI for the specific clients they support with financial aid. As a result, local governments retained autonomy to determine how they incorporated various income and expense factors into the calculation, such as savings, debts, or the income of children, and hence could easily deviate from the REDI calculations. Yet, while there was no formal change in the local authority to provide additional financial support, the implementation of REDI still meant to streamline how client cases were evaluated by different PCSWs. This provides an excellent case to assess the competing expectations about the harmonization effect of ADM systems in a context of almost full discretion at the local level. Given the objective of the federal government, we will test whether the implementation of REDI in local social welfare agencies has led to harmonization in terms of the decision to grant monthly financial support and the amount of support provided.

4. Data and Methodology

To answer our research question, we used both quantitative and qualitative methods. We draw on an online survey filled in by 344 representatives of PCSWs, 40 semi-structured interviews with frontline workers and managers across 20 PCSWs, and policy guidelines from 86 PCSWs. Data were gathered in a project funded by the Belgian federal government (no. MIIS2023 06) to evaluate how PCSWs have implemented and used REDI and how their experience and decisions compared with non-users.

4.1. Quantifying Case Variation and Harmonization

All 581 PCSWs were invited to take part in the research. Each participating PCSW delegated one respondent to fill in the online survey, someone who is aware of the local policies that apply in the PCSW regarding granting additional (financial) support, and knows how these policies are applied in specific cases. Of 344 participants, 320 observations without missing values on the variable indicating the type of support for all client cases (vignettes) were retained.

To evaluate whether the use of REDI would lead to harmonization in client case assessment, we included five vignettes in the online survey. For each of these vignettes, we asked respondents if and how additional support would be granted in their PCSW. What follows is a short description of these client cases. A detailed overview of how the vignettes were presented to the respondents in their original languages (Dutch and French) can be found in the Supplementary File.

Vignette 1 (Jens): Jens, a single homeless man in his 30s, stays either at a friend's place or at his brother's. He has children, but does not have contact with them. Jens works as a bartender, which grants him a low and fluctuating income of approximately €1,220 a month. Jens contacted a PCSW because of his accumulating debts. His monthly costs include a limited compensation to cover board and lodging (€250), child support (€280), and repaying his debts. He has monthly repayment plans for a telecom provider (€50), lawyer's fees (€100), and bailiff fees (€100).

Vignette 2 (Anne): Anne is a young female student who has a history in youth care. Due to traumatic events in the past, she no longer has contact with her parents. She contacts the PCSW because she can't pay her medical bills. Anne receives a social assistance benefit. Her monthly costs include rent for a studio (€500), water and energy bills (€145), and psychiatric therapy (€300). She has unpaid hospital bills accumulating up to €1,500.

Vignette 3 (Fatima): Fatima is 40 years old and a single mother of three kids. She has no contact with the father of her children, who she believes to be in jail. She has two minor children, who are twins, and one son who is 19 years old. Her oldest son just started a handyman business, from which he receives an irregular income. Fatima became unemployed six months ago due to cut-offs at her previous job. Fatima contacts the PCSW because her savings are running out, and she wants to avoid being unable to pay her monthly costs. Her income includes an unemployment benefit and child support (€2,095). Her savings are €6,504. The fluctuating income of her son is approximately €700. Her monthly costs include a loan for her home (€844), water and energy bills (€216), her car (€410), and a fitness subscription for one of her twins (€30).

Vignette 4 (Valerie): Valerie is a woman in her 30s. She has a partner, Tuur, who is in his 30s as well. The couple has four children, all of whom are minors. Valerie is a stay-at-home mom and volunteers by taking in stray cats. Tuur is employed and has an income. Valerie is contacting the PCSW because they report having insufficient means. The couple flags that their relationship suffers from their financial situation. Their monthly income is €2,190, including Tuur's salary, child support, and Valerie's volunteer allowance. Their monthly costs include rent (€925), water and energy bills (€230), and pets (€120). They also pay a monthly rental deposit (€100). Apart from his deposit, they have no debts.

Vignette 5 (Marc): Marc is a single middle-aged man. After quitting his job due to excessive stress, he has been receiving a social assistance benefit. Marc contacted the PCSW again because he is still unable to make ends meet. Marc is reported to give the impression of being very stressed or under the influence of drugs. His monthly costs include rent (€612), water and energy bills (€161), smoking (€70), and a subscription to his favorite football team (€34).

All respondents were asked to assess these vignettes as they would do today, with REDI for the users and without for the non-users. Respondents of the user group were asked how they would have assessed these client cases before they adopted REDI. Respondents could indicate whether they would grant additional support and also which types they would grant. They were allowed to indicate multiple responses and we provided open text fields in which respondents could give more details on the specifics of the support on offer. We operationalized the responses into four categories: (a) no additional support; (b) in-kind support; (c) non-recurring financial support; and (d) monthly financial support. While respondents opting for financial support could also include material support, the category *in-kind support* excludes financial support.

In order to evaluate whether client decisions are more harmonized linked to the adoption of REDI, we define harmonization as an increase in similar outcomes of welfare decisions for similar cases across PCSWs. Note that we focus on harmonization, which we define as the reduction in variation, compared to standardization, which is related to the removal of variation altogether. We first focus on the type of additional support provided for each case, with a particular focus on monthly financial support. For those respondents, we subsequently assessed the amount of monthly financial support proposed. In doing so, we compare these outcomes for REDI-users and non-users and users before and after the implementation of REDI.

Given the literature review and the explicit expectations of the federal government, we hypothesize that harmonization will occur in two ways. The first is what is commonly referred to as sigma-convergence, a reduction in the cross-sectional dispersion of outcomes. Sigma-convergence is usually measured by a statistical measure of dispersion, such as the coefficient of variation. In our analysis, we assume harmonization if the coefficient of variation in the outcomes of the different vignettes is lower in the users compared to the non-user group, and becomes smaller after the adoption of REDI compared to before the adoption of REDI. A reduction in the coefficient of variation means that the variation in the decisions of respondents declines. Since REDI imposes an explicit standard, we also expect decisions to be more in line with the REDI norm. In this specific case, this would entail that (a) respondents are more likely to provide monthly financial support and (b) the amount of the benefits moves upward (also known as an anchoring effect; Tversky & Kahneman, 1974). We measure upward convergence through delta convergence, a concept capturing changes in the distance between the outcome and an exemplary model (Starke et al., 2008). In doing so, we ran our five vignettes through REDI to have a benchmark of how these client cases are assessed using the budget standard method (Table 1). We will analyze to what extent the amounts of additional financial support proposed by respondents are closer to the standard set by REDI.

Table 1. Overview of the client cases and their corresponding calculation in REDI.

	Case description	Monthly income	Monthly costs	Savings	Debts	REDI's output
Vignette 1: Jens	Single man 34 years old Homeless	Wage: €1,220	Drinking fee subtracted from wage: €80 Living cost: €250 Child allowance: €280	None	Payment plans for debts: • bailiff fee: €100 (€2,430 in total) • telecom: €50 (€2,00 in total) • lawyer fee: €100 (€1,720.16 in total)	€519.90
Vignette 2: Anne	Single girl Student 20 years old No contact with parents	Social assistance benefit: €1,263.17 Child benefit: €168.96	Rent: €500 Train and bus subscription: €30 Utilities: €180 Psychiatrist: €300	€407.30	Hospital debts without payment plan: €1,500	€417
Vignette 3: Fatima	Single mother of three kids, two minors 40 years old	Unemployment benefit: €1,705. 08 Child benefit: €389.57 Income of son: €700	Mortgage: €844 Fitness subscription: €30 Utilities: €216 Car: €410	€6,504.12	None	€1,571. 69
Vignette 4: Valerie	Mother of four minor kids Has a partner 32 years old	Wage of partner: €1,880 Child benefit: €1,210 Volunteering fee: €100	Rent: €925 Utilities: €230 Pets: €120	€54	Payment plan for rental deposit: €100	€1,423.94
Vignette 5: Marc	Single man 52 years old	Social assistance benefit: €1,263.17	Rent: €612 Utilities: €161 Smoking: €70 Football subscription: €34	None	None	€260

4.2. Contextualizing and Explaining Case Variation and Harmonization

Besides measuring harmonization in welfare decisions quantitatively, we draw on a qualitative analysis of policy documents and in-depth interviews to contextualize these findings and explain the remaining variation that our quantitative data show. The online survey included questions about how additional financial support is granted in PSCWs, with or without REDI. Adding to that, we analyzed policy documents of 86 PSCWs that use REDI to assess similarities and differences in rules regarding how additional support should be granted. To do so, we compared policy documents and the recommendations of the developers of REDI (CEBUD, 2024), focusing on rules stipulating eligibility criteria for additional financial support and rules indicating the amount of financial support. An overview of the specific parameters used can be found in Table A1 in the Supplementary File. Finally, we conducted semi-structured interviews with 40 respondents from 20 PSCWs in Brussels, Flanders, and Wallonia. More information about the respondents and interview conditions can be found in Table A2 in the Supplementary File. All agencies were selected to ensure geographical representation, based on a socio-economic typology of Belgian municipalities (Belfius-indicators). In each PCSW, we aimed to select one case manager responsible for assessing eligibility for additional support and one respondent at the management level of the organization. In these interviews, we discussed local policies regarding additional support with or without REDI and client vignette 3 (Fatima) in depth, as it was reported to show the most variation in our preliminary results. The interviews were analyzed thematically, according to the staged process of Braun and Clarke (2006). After familiarization with the data, the qualitative researchers jointly identified key topics. Relevant topics include ways of granting additional support and perceived advantages and disadvantages of REDI. All topics are included in Table A3 in the Supplementary File. Next, they summarized the main findings in a thematic grid. This process allows for structuring similarities and differences between PCSWs in how they allocate additional support and why, allowing the researchers to agree on findings that represent all cases and finally identify arguments explaining variation. During that process, additional insights emerged about the different normative assumptions about welfare support, which are discussed in Section 5.3.2. This research was approved by the ethical commission of the KU Leuven with references G-2023–7204-R4(MAR) and G-2023–7204-R6(AMD).

5. Results

We examine whether the use of REDI in welfare decision-making is associated with greater harmonization in case assessments among PCSWs. We structure our results by first discussing harmonization in case assessment between REDI-users and non-users, and second, by comparing case assessment before and after the implementation of REDI. We first examine differences between REDI users and non-users regarding the decision to provide support. Next, we look at harmonization by means of the coefficient of variance to assess whether users are more likely to provide monthly financial support (sigma-convergence). Finally, for those PCSWs who provide monthly financial support, we evaluate whether the level of support is closer to the benchmark amount provided by REDI (Table 1; delta-convergence).

5.1. Comparing Users and Non-Users

5.1.1. Variation and Harmonization in the Type of Additional Support

In Table 2, we compare the responses of REDI-users and non-users on the question of what type of additional support they would grant for the different client cases. Generally speaking, we find similar degrees

Table 2. Frequency of the choice between granting no support, in natura support, one-off support, and monthly recurrent support for each client situation.

	Non-users		Users	
	N	%	*N*	%
Vignette 1: Jens				
No support	16	28.1	97	36.9
In kind	23	40.1	68	25.9
Financial support, once	14	24.6	49	18.6
Financial support, monthly	4	7.0	49	18.6
X^2 (3, N = 320) = 9.1433, p = .027				
Vignette 2: Anne				
No support	4	7.0	12	4.6
In kind	1	1.8	5	1.9
Financial support, once	16	28.1	42	16.0
Financial support, monthly	36	63.2	204	77.6
X^2 (3, N = 320) = 5.6513, p = .130				
Vignette 3: Fatima				
No support	31	54.4	131	49.8
In kind	7	12.3	18	6.8
Financial support, once	7	12.3	34	12.9
Financial support, monthly	12	21.1	80	30.4
X^2 (3, N = 320) = 3.3027, p = .347				
Vignette 4: Valerie				
No support	12	21.1	48	18.3
In kind	15	26.3	48	18.3
Financial support, once	16	28.1	47	17.9
Financial support, monthly	14	24.6	120	45.6
X^2 (3, N = 320) = 9.1838, p = .027				
Vignette 5: Marc				
No support	12	21.1	45	17.1
In kind	10	17.5	38	14.5
Financial support, once	10	17.5	49	18.6
Financial support, monthly	25	43.9	131	49.8
X^2 (3, N = 320) = 1.078, p = .782				

of consensus in the type of support chosen by respondents. Across users and non-users, we see that Fatima (vignette 3) is least likely to get any support at all, while Jens (vignette 1) is least likely to get financial support. In contrast, Anne (vignette 2), Valerie (vignette 4), and Marc (vignette 5) are most likely to receive financial support. Only in the cases of Jens and Valerie, a significant difference in the proportion of the response categories is observed. In the case of Jens, a homeless man with debt, REDI users are *more* inclined to forego any support, but among those who provide support, the type of support differs. For Valerie, we see substantial shifts in the categories of in-kind support and monthly financial support. However the adoption of REDI did not lead to a substantially different pattern of decisions to provide additional support or not.

In Table 3, we focus specifically on differences between users and non-users in the probability of providing monthly financial support for each vignette, for those who opted to provide additional support. While Table 2 indicated that there are significant shifts in the type of support in only one out of five cases, here we ask a different question: if PCSWs decide to grant support, are they more likely to provide monthly financial support? The results provide evidence for sigma convergence since the coefficient of variation across all vignettes is lower for REDI users than for non-users. For all cases, a higher share of users opts for monthly financial support, with substantial and significant differences for the vignettes of Jens, Anne, and Valerie. For Jens, for instance, the share of respondents increases by 20 p.p., and the coefficient of variation declines by 50% from 3.08 to 1.55. While REDI-users are more likely to opt for no support for Jens, at the same time, they opt much more often for monthly financial support when they do choose to provide support. For Anne and Valerie, respondents were more likely to provide monthly financial support to begin with, but here too we see substantial differences between users and non-users of 15 and 25 p.p., respectively, with a strong decline in the coefficient of variation. For Fatima, the decline in the coefficient of variation is smaller, and the difference between users and non-users in the probability of providing support is not significant. For Marc, differences are negligible.

Table 3. Variation in the decision to grant monthly financial support for users and non-users.

Case	Share of respondents granting monthly financial support		*t*-value	*p*-value	Δp.p.	Coefficient of variation	
	Non-users (*n*)	Users (*n*)	*t*	*p*		Non-users	Users
Jens	10% (41)	30% (166)	−2,6269	0.0093	20	3.08	1.55
Anne	68% (53)	81% (251)	−2,1760	0.0303	13	0.69	0.48
Fatima	46% (26)	61% (132)	−1,3652	0.174	15	1.10	0.81
Valerie	31% (45)	56% (215)	−3,0576	0.0025	25	1.50	0.89
Marc	56% (45)	60% (218)	−0,5745	0.5622	4	0.90	0.82

5.1.2. Variation and Harmonization in the Amount of Support Granted

In Table 4, we show the level of monthly financial support provided by non-users and REDI-users. For vignettes 1 (Jens) and 3 (Fatima), the sample was too small to provide meaningful results since not all respondents filled in the question about the amounts. Notably, we only observe a decline in the coefficient of variation for the case of Marc, indicating sigma convergence and a more similar evaluation of client cases. In the case of Marc, however, mean amounts of support are lower amongst users than amongst non-users. This is in line with the results in Table 3, where Marc was less likely to receive monthly financial support. In this case, there is sigma convergence but no delta convergence. The differences in the amounts are not

significant, except for the case of Valerie ($p = 0.02$). Here we see a much higher mean amount in the users group, but also an increase in the coefficient of variation, meaning that there is less agreement amongst REDI users on the amount provided compared to non-users. In the cases of Anne and Valerie, we do see some evidence for delta convergence, since monthly amounts are closer to the norm set by REDI. At the same time, the levels of support remain (far)below the REDI benchmark. For instance, while the mean amount of support for Valerie is over twice as high in the users group, it still only covers 30% of the financial need identified through the REDI tool. Where REDI proposes to grant most support to Valerie (€1423.94), she receives proportionally less compared to Marc and Anne. For them, the differences between users and non-users are small, however. This indicates harmonization with the REDI norm regarding the height of support, but not regarding its assumptions about neediness.

Table 4. Variation in the amount of monthly financial support for users and non-users.

Case	Mean amount of monthly financial support		REDI-benchmark	Support as % of REDI benchmark		*t*-value	*p*-value	Δ€	Coefficient of variation	
	Non-users (*n*)	Users (*n*)		Non-users	Users	*t*	*p*		Non-users	Users
Jens			€519.90							
Anne	€238 (31)	€251 (188)	€416.97	57%	60%	–0,5300	0,55966	€13	0.47	0.49
Fatima			€1571.69							
Valerie	€197 (12)	€428 (105)	€1423.94	14%	30%	–2,3258	0,0218	€231	0.61	0.80
Marc	€173 (21)	€166 (118)	€260	67%	64%	0,2822	0,7782	€–7	0.73	0.53

Notes: The monthly amount of monthly financial support includes the amounts indicated by local social welfare agencies as monthly additional financial support, plus specific recurring amounts for rent and utilities; for Jens and Fatima, the number of respondents in the non-users group is too small to make any meaningful comparison.

5.2. Variation and Harmonization Before and After Adopting REDI

To make a comparison on the levels of variation and harmonization before and after the implementation of REDI, we compare case assessments of REDI users before and after they started using REDI. Here, we include only respondents who provided information about how they assess clients' needs before the adoption of REDI (with a smaller number of observations across cases as a result). To gauge the situation before adopting REDI, we asked respondents to assess these cases a second time, taking into account the practices and guidelines in place before the implementation of REDI. Table 5 shows the share of respondents granting monthly financial support compared to all decisions (including no support), while Table 6 shows the mean level of monthly financial support for those who opted for monthly financial support.

For the subsample of PCSWs who use REDI and provided full information on their decisions before adopting REDI, we see a reduction in the coefficient of variation across all cases, suggesting sigma convergence. For all cases, we also notice an increase in the probability of support, although the differences are small and insignificant in the case of Jens and Fatima. For Anne, we see a substantial increase in the probability of granting monthly financial support (22 p.p.) and a large reduction of the coefficient of variation (–40%). Across cases, we observe that the patterns of agreement remain similar before and after adopting REDI, with most agreement on the type of support in the case of Anne, and least agreement in the cases of Jens and Fatima.

Table 5. Variation in the decision to grant monthly financial support, before and after REDI.

Case	Share of agencies granting monthly financial support			*t*-value	*p*-value	Δp.p.	Coefficient of variation	
	Before	After	*n*	*t*	*p*		Before	After
Jens	13%	17%	159	−1,6140	0,1085	4	2,64	2,22
Anne	56%	78%	154	−5,0798	0,0000	22	0,88	0,53
Fatima	28%	32%	133	−1,0919	0,2769	4	1,62	1,48
Valerie	37%	49%	150	−2,7827	0,0061	12	1,30	1,03
Marc	43%	52%	153	−3,0656	0,0026	9	1,15	0,96

Note: Only includes local social welfare agencies that adopted REDI and provided full information on how they evaluated requests for additional financial support before, including agencies that provided no support.

Table 6. Variation in the amount of monthly financial support, before and after REDI.

Case	Mean amount of monthly financial support			*t*-value	*p*-value	Δ€	Coefficient of variation	
	Before	After	*n*	*t*	*p*		Before	After
Jens								
Anne	€211	€258	77	−1.2988	0.0025	€47	0.70	0.54
Fatima	€243	€318	28	−1.2659	0.2164	€75	1.11	1.01
Valerie	€272	€369	43	−2.4778	0.0173	€97	0.84	0.84
Marc	€161	€176	59	−0.8961	0.3739	€15	0.78	0.61

Notes: Only includes local social welfare agencies that adopted REDI and provided full information on how they evaluated requests for additional financial support before; the amount of monthly financial support includes the amounts indicated by local social welfare agencies as monthly additional financial support plus specific recurring amounts for rent and utilities; for Jens, the number of respondents is too small to make any meaningful comparison.

Finally, regarding the level of monthly support, our data shows significant and substantial upward changes for Anne (with on average €47 more support granted) and Valerie (with on average €97 more support granted) after the adoption of REDI, moving closer to the benchmark set by REDI (Table 4). Across all cases, we observe that mean amounts tend to be higher after adopting REDI (delta convergence), while in most cases the coefficient of variation decreases (sigma convergence). However, in the case of Mark, the difference in mean amounts is small, and the disagreement in the amount given to Valerie is similar before and after the adoption of REDI.

5.3. Qualitative Contextualization Explaining Half-Hearted Harmonization

5.3.1. (Variation in) Making Rules About Using ADM

While our quantitative analyses do suggest that the use of ADM harmonizes outcomes in welfare decisions to a certain extent, at the same time, it is clear that there is still substantial variation within and across cases. How can we understand such half-hearted harmonization? In this section, we provide more evidence on this, drawing on policy documents of REDI users, and interviews with managers and frontline workers.

Once PCSWs decided to use REDI, most of them (79%, $n = 288$) made agreements on how to do so. Written agreements often stipulate detailed rules regarding (a) the target audience of the policy measure, (b) how the

REDI-benchmark should be calculated, i.e., what kind of expenses should be included, and (c) the amount of support to grant when REDI indicates clients have insufficient means. Whereas differences in the second type of rules result in differences in how the REDI-benchmark is computed, differences regarding the third type of rules result in what support is provided when the REDI-benchmark indicates a client does not have sufficient means at their disposal.

In the agreements we analyzed ($n = 86$), many PCSWs deviate from the recommendations provided by REDI's developer. For example, the recommendation of granting the full negative result generated by REDI was only found in 15% of the analyzed policy documents. In fact, none of the recommendations were adopted as rules in the majority of our sample, and, more importantly, a wide range of different practices were found regarding all three types of rules. Some policy documents even explicitly mention the (continued) use of alternative tools or calculations to decide whether a specific client has sufficient means.

5.3.2. Reasons to Use Local Autonomy When Deploying ADM in Welfare Practices

The policy documents revealed substantial variation among PCSWs concerning the formal rules governing the use of REDI. During the interviews, respondents in management positions elaborated on the reasons why they chose to diverge from the developers' guidelines and use their local autonomy, either by introducing locally adapted practices or by maintaining pre-existing procedures. Two primary lines of argumentation can be identified.

First and foremost, respondents report that financial uncertainty and the financial position of local PCSWs play a crucial role in deciding whether or not to use REDI in the first place, and second, how to use the tool. In fact, the subsidy was the reason most reported (80%, $n = 290$) by REDI-users to implement the system. Because of the link with government subsidies, respondents reported feeling "forced" to use the tool, even though they did not always want to integrate this new way of working into their local practice. This was especially mentioned in municipalities facing debts or having financial problems. Adding to that, interviewees mentioned it was unclear whether—and if so, how long—the federal subsidy would continue, which is why they were hesitant to increase the amount of support with REDI, as it would be "unjust" to later cut back financial support. This argument was also used to restrict the target group for REDI support in the early stage, with the possibility of enlarging it when more clarity was provided about the continuation of the project. Adding to that, respondents mentioned not only uncertainty about the financial aspects of the policy initiative, but also about the policy aims of the central government. More specifically, respondents from multiple PCSWs stated it was not clear whether the federal government wanted to strengthen control over the local practices and reduce local autonomy.

The second argument is linked to normative assumptions of local PCSWs on how welfare support should be organized. For example, some respondents mentioned they consider the amount proposed by REDI too high to be "fair." They refer to the fact that they believe a high amount of support would disincentivize people from participating in the labor market and that there should be a (larger) difference between the minimum wage and the amount of financial welfare support. Respondents also stated that they do not agree with "granting a blank check," without additional conditions for clients or ways to control how clients spend their money. This way, respondents refer directly to the "philosophy" underpinning REDI: instead of granting different additional (financial) benefits that are linked to specific costs, such as access to food stamps or paying pharmaceutical

bills, REDI advises granting the entire negative sum that stems from its calculation of a client's family neediness. Yet, as one respondent states, "because of the financial situation of the PCSWs, this philosophy cannot always be realized."

6. Discussion

In line with the technological deterministic approach, it was expected that an ADM system as REDI would increase harmonization in welfare decisions across PCSWs. However, in our case, characterized by strong local autonomy, REDI appears to foster a partial, half-hearted harmonization. REDI users are not more likely than non-users to provide support, but when they do provide support, they are more likely to provide monthly financial support (sigma conversion). In other words, harmonization is primarily observed regarding the *form* of support. When PCSWs provide monthly financial support, the amounts tend to be higher for those who adopted REDI, and there is some evidence for delta-convergence towards the REDI benchmark. At the same time, dispersion within the group of users sometimes increases, and the amounts are still far off from the benchmark.

The qualitative part of the study reveals why harmonization appears to be half-hearted. Local welfare agencies use their autonomy to shape welfare decisions at the organizational level, also when ADM is used. In our case, this resulted in PCSWs both adhering to previous practices and deriving from the system's philosophy. Two arguments were mentioned to do so: (financial) uncertainty about the federal policy initiative and normative considerations about welfare support. While the federal subsidy incentivized many PCSWs to adopt the tool, its unclear continuity led to reluctance, particularly in financially constrained municipalities. Aside from REDI not being in line with the financial reality of the local organizations, the system was also opposed by local governments due to normative considerations, including the adequacy of the proposed support amounts and the lack of conditionality. In line with other studies (e.g., Baines et al., 2010; Devlieghere et al., 2020), we found that REDI was implemented corresponding to the goals and normative beliefs of the organization. While other studies identify the relational aspects of social work to be a driving factor to circumvent standardization (e.g., De Witte et al., 2016; Jørgensen & Schou, 2020), our qualitative findings suggest that normative beliefs of who should get what at the organizational level are equally important to understand why ADM does not lead by default to harmonization. Our study shows that ADM systems used to allocate welfare benefits, as REDI, are not just tools used to implement regulations; they contain normative assumptions on how additional financial support should be provided. Thus, the deployment of ADM cannot be separated from normative discussions about welfare and the political power dynamics involved, showing ADM systems are indeed political (Brodkin, 2020). Consequently, our findings problematize notions of technological determinism, demonstrating that ADM does not impose uniformity by design but is instead mediated by organizational dynamics, financial constraints, and normative interpretations of welfare provision. Our findings thus support the continuation and enablement thesis and are in contrast with the curtailment thesis (Buffat, 2015; Marienfeldt, 2024). In addition, our study illustrates how ADM does not necessarily lead to system-level bureaucracies (Bovens & Zouridis, 2002), highlighting the importance of contextualizing both the modalities of the digital systems and their policy implementation to fully understand their impact.

Despite showing some evidence for partial harmonization, we only studied REDI after its implementation, which brings two limitations. First, this might prevent us from measuring policy changes, as these take time.

Moreover, respondents were hesitant to implement policy changes due to uncertainty regarding the program's continuation. Second, this inhibits causal interpretation. Harmonization might stem not directly from REDI but from the introduction of the subsidy, the policy guidelines, or the exposure to information about REDI. We relied on respondents' memory to compare welfare decisions before and after the adoption of REDI, introducing risks of recall and expectation bias. Adding to that, since local social welfare agencies were free to opt in on the policy initiative, REDI users might already favor generous, aligned interpretations of financial need.

7. Conclusion

We present evidence of partial, half-hearted harmonization in case assessment between local agencies linked to the adoption of an ADM system. Yet, substantial variation in local practices remains firmly in place as local governments still use their autonomy to shape welfare decisions. They do so by either adhering to their local practices as before the introduction of the system or by adapting the system to the financial and normative reality of their organization. In sum, in a multi-level governance context in which a federal government aims to streamline the autonomy of local organizations, our results suggest that the implementation of an ADM system to standardize practices will not, by itself, lead to a harmonization of welfare decisions. This way, we show the added value of approaching ADM systems from a socio-constructivist angle to understand the effects of ADM on welfare decisions in a multi-level government context.

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Conflict of Interests

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Data Availability

The authors can provide a replication package for the quantitative analysis upon request.

LLMs Disclosure

LLM tools (such as Grammarly, ChatGPT, and DeepL) were only used as a way of editing original text and writing code.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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About the Authors

Janne Petroons is a doctoral researcher at KU Leuven. She is affiliated with ReSPOND at the Faculty of Social Sciences and with CiTiP at the Faculty of Law and Criminology. In her work, she focuses on digital welfare states from a socio-legal perspective.

Périne Brotcorne is a postdoctoral researcher at the Centre Interdisciplinaire de Recherche Travail, État, Société at the Faculté Ouverte de Politique Economique et Sociale at UCLouvain.

Martin Wagener is an associate professor in sociology at the Centre Interdisciplinaire de Recherche Travail, État, Société at the Faculté Ouverte de Politique Economique et Sociale at UCLouvain.

Koen Hermans is an associate professor in social work and social policy at ReSPOND, as well as the head of LUCAS—Centre for Care Research & Consultancy at KU Leuven.

Wim Van Lancker is an associate professor in social work and social policy at ReSPOND at KU Leuven.