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Linking active labour market policies to digitalisation–a review between remote and automated possibilities

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Abstract

Purpose – The purpose of this article is to develop a conceptual framework that sets out the linkages that exist between digitalisation and active labour market policies (ALMPs).

Design/methodology/approach – Based on a narrative literature review, this article seeks to connect two research streams, namely that relating to ALMPs and that relating to digitalisation in the public sector. This exercise requires an understanding of both how the context of digitalisation in the public sector has evolved in relation to technological change and the identification of specific ALMPs that are more sensitive to digitalisation.

Findings – Starting from the identification of ideal-types of ALMPs, "employment assistance" can be considered the type of policies most sensitive to digitalisation, looking at main forms of interventions as career guidance, profiling and job-matching tools. The first tool is closer to a technological domain of "remotisation", while the second is closer to that of "automatisation".

Practical implications – Achieving an understanding of the different degrees of sensitivity to digitalisation for various types of ALMPs is relevant for policy-making purposes to identify potential priority areas of strategic investment to enhance this sector.

Originality/value – The authors present an understanding of the current state of the digitalisation of public employment services. The literature review itself allowed the authors to conclude that, despite the interests in the public and academic debate, the existing research relating to the digitalisation of public employment services remains scant. At the same time, the article points towards fertile areas for further analysis.

Keywords Information technology, Activation policies, Digitalisation, Unemployment

Paper type Research paper

1. Introduction

Over recent years, available sources of data have grown markedly while the ability to analyse and manage data continues to improve all the time. It is clear that technological change carries a large transformative potential for the ways that public services are organised and

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delivered. Recent technological advancements can enable faster decision-making and reduced complexities for citizens while simultaneously enabling businesses and governments to provide real-time services and support for customers and service-users. Such issues were since the 1970s almost of exclusive concern to scholars in computer science, and became relevant for organisational studies researchers only in the past two decades.

The rapid development of new technologies over recent decades, particularly the Internet, has increasingly affected the interactions that occur between public administrations and citizens. Conceptual and empirical research nowadays focuses on the emergent phenomenon of digital transformations within the public sector (Terlizzi, 2021) following the implications of the so-called "fourth industrial revolution" (Schwab, 2016). However, the adoption of data-driven decision-making practices and procedures for the delivery of public services has not yet received considerable critical attention. In addition to this, digital tools have been central to the short- and medium-term responses mobilised by public service providers across high-income countries in the wake of the COVID-19 pandemic. This includes with respect to the design of public employment services (PES), considered the governments' most important delivery branches of active labour market policies (ALMPs) (Weishaupt, 2011).

Indeed, PES might represent a paradigmatic example of the adoption of digital tools within public administrations. This has two main implications for the delivery of public services more generally. Firstly, PES has seen the strengthening of remote channels for the delivery of services that had traditionally been offered entirely or partly in-person. Secondly, innovations in PES delivery have seen increasing rates of automation of some processes for service-users and some back-office activities.

Based on a narrative review of the literature, this study aims to develop a conceptual framework that sets out the linkages that exist between digitalisation and ALMPs. To this end, this study seeks to connect two research streams: research on ALMPs and research on digitalisation in the public sector. The purpose of this study was to ground previous studies in the literature at the intersection between the two research streams. In particular, references were selected by focussing on previous studies that have a bearing on technological applications involving the main types of ALMPs (Ferrari, 2015; Jennex, 2015).

This synthesis requires firstly an understanding of both how the context of digitalisation in the public sector has evolved in relation to technological change and the identification of specific ALMPs that are more sensitive to digitalisation. In this regard, we refer to the "sensitivity to digitalisation" as the degree to which ALMPs – and the relative organisational apparatuses relating to PES – are capable of responding to technological inputs that tend to change the ways in which policies are currently projected, managed and delivered.

Because of the nature and organisational configurations of ALMPs, they are not equally susceptible to or appropriate for digitalisation. By integrating and exploring core concepts and theories in these strands of the literature, the authors present an understanding of the current state of the digitalisation of PES while considering how it may evolve in the near future. In so doing, the authors highlight gaps in the literature that could be filled by future research, especially in the context of post-pandemic debates, and they offer criteria for prioritising areas of strategic policy-making based on the results of the present study.

In what follows, the first section sets out the context of digitalisation in the public sector to date. The second section sets out some key definitions and classifications related to ALMPs in order to identify the policies that are most sensitive to digitalisation. Final section sets out the extant studies that focus on the digitalisation of these policies and presents the conceptual framework.

2. Digitalisation in the public sector: from e-government to data-driven decision-making

Since the introduction of innovations in information and communication technology (ICT), which emerged in the late 1990s, the conceptual and operational definitions of e-government

have been hotly debated. The early literature on the use of IT by governments can be traced back to the 1970s (Kraemer *et al.*, 1978; Danziger and Andersen, 2002). The more recent e-government literature concerns the external usage of IT, such as public services, which emerged from the Internet boom (Ho, 2002; Grönlund and Horan, 2005).

Based on the definition provided by Lau *et al.* (2008), e-government can be described as a process that digitally connects citizens with their government to access information and services offered by governmental bodies. However, the meaning and interpretation of this concept are wide-ranging and complex, including various approaches and categories. E-government implementation takes various forms, from simple websites with contact information to integrated and interactive services (Rorissa *et al.*, 2011; Myeong *et al.*, 2014). An OECD (2003) report identifies three potential overlapping forms of e-government. Firstly, e-government is defined as the delivery of public services via the Internet and other online activities. Secondly, e-government is equated with the use of ICT in all aspects of government activity. Thirdly, e-government is defined as the "process" through which public administration is transformed through the use of ICT.

This debate has stressed the purported advantages of e-government, including its heightened potential for cost efficiency, improved effectiveness, greater transparency and public access to information (Moon, 2003; Asgarkhani, 2005). From that perspective, such improvements may help governments restore the public's trust, by potentially increasing the frequency of interactions between citizens and governments (Welch *et al.*, 2005; Tolbert and Mossberger, 2006; McNeal *et al.*, 2008).

However, as highlighted by Heeks and Bailur (2007), e-government-specific research might often be considered dominated by overly optimistic views. Hur *et al.* (2019) challenged the idea that ICT-enabled reforms necessarily increase governmental efficiency, pointing out that different forms of "organisational inertia" create resistance and may reinforce face-to-face communication rather than digital communication. These forms of inertia might be the result of psychological resistance (i.e. anxiety about learning new technologies), technological legacies, cognitive/cultural bias (i.e. the digital divide) and resource bias.

Furthermore, much extant literature shows that e-government has primarily been used as a tool to enforce the economic values of market-oriented reforms in public administration associated with New Public Management (NPM) (Homburg and Bekkers, 2005; Heeks, 2006; Homburg, 2008; Giritli Nygren, 2009). E-government is often considered to build on principles of de-bureaucratisation, decentralisation and marketisation which are quite similar to NPM. Thus, by providing a solution to what has been regarded as the inefficient, bureaucratic structures of public administration, e-government is considered by many to follow in the footsteps of NPM (Cordella, 2007).

The recent debate on the supposed "Fourth Industrial Revolution" has seen more attention placed on the public sector and on those processes that are generally referred to as "data-driven decision-making" where available options are assessed more on the basis of the analysis of data rather than intuition (Provost and Fawcett, 2013). In recent years, increasing numbers of organisations and businesses have sought to improve the effectiveness and efficiency of tasks and processes by relying on data-driven decision-making. This is particularly important when organisations – as PES – have access to (or own) large datasets that are interconnected and that include time-series data that reflect past, current and subsequent performance (Morrel-Samuels *et al.*, 2009). A data-driven decision-making process model could be intended as a continuous process that includes the collection of data and the translation of data into information and ultimately knowledge that can be used to make and inform decisions, to monitor the implementation of decisions that have been reached, and to provide discrete feedback for different processes (Mandinach *et al.*, 2008; Easton, 2009; Jia *et al.*, 2015).

The supposed advantages of automated, administrative decision-making in public administration have been defined by Wihlborg *et al.* (2016) as entailing: increased efficiency, speedier administration, lower costs, as well as possible improved impartiality and equality in

decision-making. Meanwhile, several scholars cast light on specific issues of which privacy (Forgó *et al.*, 2017), the reduction of bias (Lepri *et al.*, 2018; Veale *et al.*, 2018) and matters of transparency and the so-called "explainability" of algorithmic technologies (Buiten, 2019; Olsen *et al.*, 2019) are among the most dominant. As billions of online sensors passively collect data, often without individuals being fully aware, understanding how data is generated and how engaged the individual is in its creation and collection becomes essential to balance the interests of all stakeholders and to promote effective data governance (WEF, 2015; Zuboff, 2019).

However, research on the implications of the digitalisation of public services in welfare state development is still lacking (Terlizzi, 2021). In particular, there has been a lack of comprehensive studies that focus on new digital applications experienced by PES.

3. Which ALMPs to consider?

Digitalisation and related phenomena have had a great impact on the most recent processes of change in the operational models of PES and on the ways that ALMPs are delivered. In this context, digitalisation reflects two main technological domains, namely: "remotisation" and "automatisation". The first is borrowed from business studies and typically relates to the service economy and tends to refer to the implementation of the Internet-based provision of technology-mediated service elements that are disaggregated from geographical proximity to the service object (Wünderlich, 2009; Krikken, 2016). In the context of PES, remotisation refers to the possibility to create alternatives to physical interactions between caseworkers and clients by means of digital layers which direct clients towards online services. Automatisation refers to recent advancements in data and analytics which allows for the generation of knowledge and intelligence from data to support decision-making (Benroider *et al.*, 2014; Goes, 2014). In the context of PES, this primarily refers to the implementation of data-driven optimisation tools that are designed to anticipate clients' needs and to suggest potential treatments and courses of action to caseworkers. However, as noted previously, ALMPs encompass several distinct types of intervention, and the same degree of digitalisation cannot be achieved for each of them.

In their review, Crepon and Van der Berg (2016) draw a distinction between ALMPs that are intended to improve the processes of matching individual jobseekers to individual jobs and those that are supposed to improve individual productivity. The dichotomy between "human investment" and "incentive-based" policies (Bonoli, 2010) is one of the most recurrent in the literature: the former seeks to promote improvements in human capital essentially by financing vocational training programmes (Swenson, 2002), while the latter refers to an approach which combines placement services with stronger work incentives or sanctions including time-limits on benefit eligibility and the tapering of entitlements) to move people from unemployment assistance into employment (King, 1995; Peck, 2001).

Other scholars rely on broader classifications of ALMPs in order to mitigate the risk of oversimplification of the real world. Bonoli (2010) suggests distinguishing between four different ideal-types of ALMPs, namely: "incentive reinforcement", "employment assistance", "occupation" (public-work schemes) and "human capital investment". It is possible to identify the core objective for each type of ALMP, along with several distinct tools that can be deployed by PES when delivering them. The authors expand this categorisation by setting out the sensitivity to digitalisation for each type of ALMP.

These ALMPs are sensitive to digitalisation to varying degrees. ALMPs in the "incentive reinforcement" category involve interventions that are intended to direct the behaviour of benefit recipients – predictably – through incentives, for example by making benefit payments conditional on certain actions or requirements. However, that is typically a consequence of non-compliance by the benefit recipient or the failure to observe the requirements of the terms agreed with PES operators under the terms of a jobseeker's individual activation plan. Therefore, such interventions manifest more often at the

procedural level rather than within the core processes of PES operating models. At the same time, ALMPs in the "occupation" category could be set aside from the point of view of digitalisation, as in such cases the intervention is ultimately represented by the signing of a regular contract of employment. Notably, ALMPs in the "human capital development" category traditionally leave little room for any alternative to face-to-face training. PES may offer training by posting videos, reading materials and practice tests that jobseekers can access directly via the PES website or self-service portals or by following links to external websites and affiliated providers. On the other hand, more specific training needs may involve access to trainers through live webinars and online meetings or via recordings made available on demand. Clearly, the availability of online solutions can allow PES to increase their training provision and to support larger amounts of jobseekers to obtain new skills. However, the intuitive limitation is that this may occur only for a selected set of skills that are possible to disseminate online.

From the perspective of "employment assistance", digitizalisation results in the adoption of tools that increase the amount of information needed by caseworkers to support service-users. Indeed, the most significant implications of digitalisation for ALMPs fall into this category. It is thus possible to consider this the area of ALMP where we can identify the tools that are the most sensitive to digitalisation, namely those that relate to career guidance, candidate profiling, and job-matching. Career guidance involves counselling services to support career choices, development and reorientation. Profiling corresponds to the processes through which PES "segment" jobseekers into groups with similar risk profiles and needs and in turn determine their likelihood of obtaining employment by themselves, and thus the appropriate level of treatment and support the candidate may need. Job-matching refers to the traditional core PES function of placing jobseekers into the labour market.

Clearly, with each of these kinds of tools, it is possible to identify the potential for digitalisation, while distinguishing between "remotisation" and "automatisation". The next section sets out the state of the art of the literature that has emerged in these areas, and points towards the most fertile areas for further analysis.

4. Sensitivity to digitalisation

4.1 Career guidance

Research into career guidance provision mostly follows the approach of e-government research, whereby the focus is typically on how online tools enable counselling to be delivered remotely and flexibly via a diverse range of channels in order to increase the accessibility of services. By moving guidance online, new modes of delivery can be opened up which can replace aspects of what was previously done face-to-face by human professionals (Hooley *et al.*, 2010a, b). Online technologies can be initially used for standardised but essential procedures such as the initial registration of service-users in the PES system. The jobseeker is usually a benefit recipient whose eligibility typically requires them to register with PES via websites or portals by setting up and maintaining a personal account. This usually involves the jobseeker uploading personal details manually or alternatively this information can be gathered automatically from other electronic administrative and data sources; frequently PES system exchange and gather data with other welfare institutions and public bodies. This is usually followed by the intervention of a caseworker online or by phone to set up an interview.

Despite the potential benefits afforded by online technologies for the delivery of careers services, the evidence is mixed. Following the advent of the Internet, several studies concentrated on the relationship between online career support and face-to-face and professional interventions, questioning whether this should be framed in adversarial or integrative terms (Watts, 1996; Sampson, 1999; Hooley *et al.*, 2010a, 2010b; Richards and Viganó, 2013). According

to research that focused on online supports, technologies can be seen either as providing an alternative to face-to-face services or as a means to enhance the quality of services while avoiding the risk of diminishing the role of caseworkers (Watts, 2002).

Bimrose *et al.* (2015) argues that successful integration of ICT into career practice depends on three key factors: policy support at both the macro and micro levels; workforce development to ensure that career practitioners feel confident and competent in this aspect of their work; and an ICT system design that is fit for purpose. Policy-makers may argue that this would help to focus resources on those jobseekers most in need of intensive support, given that the operationalisation of ICT in career guidance delivery would have meant that those who have the necessary digital literacy could avail of such services while those who do not would be easier to identify. However, as Barnes *et al.* (2020) have shown, in relation to life-long guidance policy and practices in the EU, the successful integration of existing and emerging technologies into career guidance services is dependent not only on the clients' skills and the available technical facilities, but also on practitioners' and caseworkers' willingness to accept the changes that the adoption of any new technology inevitably entails for service delivery and a certain amount of resistance from PES operatives can be expected.

Bakke *et al.* (2018), in the context of debates surrounding the development of the Norwegian national online career guidance service, have posited that the integration of different modes of provision depend mainly on the changing role of career operators in the context of technology and the centrality acquired by "instructional designs". Here, instructional design refers to the practice of developing learning experiences and environments that promote the acquisition of skills (Merrill *et al.*, 1996). Staker and Horn (2012) offer some examples of instructional designs that could be reworked to provide integrated guidance. Among these it is possible to distinguish the "self-blend model", where clients access core materials face-to-face but supplement this with additional learning opportunities online via an "enriched-virtual model", where guidance primarily takes place online but with the existence of strategically positioned physical face-to-face contact points.

4.2 Profiling

Much of the literature relating to the digitalisation of PES is concerned with the use of profiling models that rely on data-intensive and statistical approaches that inform decision-making. Profiling models should enable PES to segment jobseekers into groups with similar risk and needs, and in turn to determine their suitability for different levels of treatment (Loxha and Morgandi, 2014). An overview of the recent developments in profiling tools is provided by Desiere *et al.* (2019), starting with the distinction of three different types of profiling models, which can also exist in combination, namely: rule-based profiling; forms of profiling where caseworker discretion is steered by qualitative guidelines; and data-intensive approaches involving statistical tools.

Exploiting jobseeker data to determine the probability of work-resumption on the basis of statistical modelling can avoid the misapplication of caseworker discretion, which is considered by some scholars to have a direct negative impact on the expected duration of unemployment in certain cases and more generally on post-treatment life conditions. In this regard, statistical profiling has been shown to achieve higher accuracy and consistency than caseworkers in some instances (Peck and Scott, 2005; Lechner and Smith, 2007; Staghøi *et al.*, 2007). Focussing on statistical approaches, Desiere *et al.* (2019) underline the importance of new data sources such as "click data" from job searches, as well as advanced machine-learning techniques which are increasingly used in profiling tools in addition to administrative and survey data.

Boskoski and Boshkoska (2020) focus on four characteristics that they argue must be taken into consideration in order to achieve good model accuracy, namely: the quality of input

data, the usage of administrative data, the usage of survey data, and the regular updating of model parameters. The quality of the input data refers to what bearing the input data has on the model's output and accuracy. These variables may be arranged into four groups, namely: socio-economic characteristics (e.g. age and gender), and the three leading barriers to employment that have been identified as: motivation, job readiness (or capability) and available opportunities (Immervoll and Scarpetta, 2012). Data concerning socio-economic characteristics and labour market history can (theoretically) be extracted from administrative sources, while data related to information on jobseekers' expectations, motivations and job search behaviour should come primarily by surveying jobseekers. In general, data and parameters derived from these sources require regular updates in order for the model to maintain an acceptable level of accuracy.

Indeed, much of the debate focuses on whether it is necessary to include behavioural variables in addition to details relating to hard skills to maximise the accuracy of profiling models (Caliendo *et al.*, 2017). In particular, a vast academic literature has examined the influence of behavioural variables on job prospects, including how factors such as: personal adaptability, career identity and human and social capital can shape employability (Fugate *et al.*, 2004); how different job search strategies and job expectations can affect the likelihood of resuming work following a period of unemployment (Weber and Mahringer, 2008); and how personality traits can influence labour market performance (Judge *et al.*, 1999; Arni *et al.*, 2014). What these factors have in common is that they are typically not captured in administrative data and are generally more difficult to measure than "hard" skills such as educational attainment and qualifications. However, behavioural factors might be strongly correlated with other factors such as a jobseeker's labour market history (Desiere *et al.*, 2019). In order to take these factors into account, some systems have chosen to rely on self-reported information.

Increasing interest in profiling tools has also emerged in the wake of the global economic crisis post-2008 in relation to the need to achieve cost-effectiveness in public spending under austerity and fiscal constraints and given the dramatic increase in new jobseekers that needed to be "activated" that the crisis had created. Allhutter *et al.* (2020) investigated the socio-technical implications of an Austrian profiling tool. In their investigation of policy documents, the authors showed that the design of the Austrian profiling instrument was critically influenced not only by technical affordances but also by the values and social norms associated with austerity policies, which could have potentially biased the objectivity and neutrality of the data, claimed by policy-makers. Much criticism emerges regarding the allegedly higher concentration of negative scores in relation to the employment prospects of the most disadvantaged social groups (Henman and Marston, 2008).

Certainly, the study of profiling tools is gaining increasing interest in terms of the recent and ongoing developments in AI and machine-learning technologies. Clearly, the development of user profiles based on the analysis of big-data and inference techniques can open the way for the provision of new, highly customised and personalised services. Nevertheless, this should also raise concerns when it comes to privacy and individual autonomy, as such processes clearly have an impact on the balance between participants' individual freedoms and the capacity of public services to put users under surveillance. By virtue of these considerations, critics point out how algorithmic technologies can produce perverse effects, whereby the original goals of objectivity and standardisation give way to new forms of unfairness in the treatment of users.

4.3 Job-matching

PES frequently maintain public vacancy databases on dedicated webpages, which often represent the most used vacancy platform in a national or regional context. Such databases

are also key for identifying the sectors that face the biggest labour shortages which can in turn shape PES training strategies (OECD, 2021). Big data analytics and related technologies may further develop these platforms, thus allowing for the analysis of the competences that occur together with vacancies and jobseeker profiles. In this way, once a vacancy is uploaded on a platform, matching tools can generate an automatic potential match between a vacancy and a jobseeker. This may or may not involve the intervention of a caseworker, who can refer the jobseeker to a given vacancy or who may invite the jobseeker to a meeting in order to discuss a vacancy that has been identified (Bollens and Cockx, 2017).

The growing use of the Internet for employment matchmaking, including through online job boards and social networking, has drawn some scholars to assess whether online matching is improving the functioning of labour markets (Mortensen, 2000; Khun and Skuterud, 2000; Autor, 2001; Kroft and Pope, 2014). Job-boards in particular are emerging as important for the analysis of labour markets, while yielding data for firms, jobseekers and policymakers alike (Kuhn, 2014). Notably, there is a gap in the literature when it comes to the role of PES in online job markets, especially when it comes to Internet-based labour market intermediation and the role of PES in coordinating jobseeker - employer interactions.

Marchal *et al.* (2007) develop a comparative analysis of France and the UK that demonstrates the institutional context that influences the actions taken by jobseekers when using job boards. The study presents a quantitative assessment on the basis of three samples of French Internet adverts, British Internet adverts and French newspaper adverts. One of the main implications for PES from this study derives from the consideration that the introduction of the appropriate pre-selection and screening tools may lead job boards to contribute to a reduction in information asymmetries.

In recent years, AI technologies and big data have presented new ways to process and disclose the information embedded in online labour markets to support PES decision-making activities. In particular, the availability of large databases, together with the improvement of machine-learning technologies, can create grounds for new tools that can allow for automatic referrals for vacancies to be made which gives rise to the related debate of whether this can improve matching services.

Bollens and Heylen (2009) studied the effectiveness of notification procedures for new entrants to unemployment. After controlling for the selection of observables in a propensity-score matching approach, the notification procedure was found to have no effect on the transition rate from unemployment to employment. This might be the result of the high rate of standardisation of notification procedures which can lead to low-quality matches. Meanwhile, caseworkers may intervene on the adequacy of the match when there is a lower rate of standardisation when the notification procedure is not compulsory, so that the positive "threat" effect of a sanction, which is present in the case of non-compliance in a mandatory scheme, is lacking.

Bollens and Cockx (2017) use data from the unemployment register of the Flemish VDAB to evaluate the causal impact of different types of vacancy referrals (i.e. referral, invitation, and automatic referrals) on the transition rate for jobseekers from unemployment to employment in Flanders. Automatic referrals tend to show a positive impact, albeit one that is lower compared to referrals induced by caseworkers, implying that automated referrals may be of a lower quality than those involving human intervention.

However, further research into automated referrals may need to wait for further developments to play out, as many such tools are still in the process of being designed, piloted and refined. It should be noted also that extant studies on the impact of the Internet on labour markets have been few in number and those that exist present little evidence of the friction-reducing effects or any significant impact on the unemployment rate resulting from the use of online tools (Kuhn and Skuterud, 2004; Kuhn and Mansour, 2011; Kroft and Pope, 2014).

5. Discussion and conclusion

This study aimed to show that not all ALMPs are capable of responding in the same manner to technological inputs that tend to change the ways in which policies are currently projected, managed and delivered. Because of the nature and organisational configurations of ALMPs, they are not equally susceptible to or appropriate for digitalisation.

In this study, we drew on the literature on both ALMPs and digitalisation in the public sector to deconstruct emerging trends pertaining to the digitalisation of PES by focussing on several key elements. To synthesise the key elements that emerged from this review, we developed a conceptual framework (Figure 1) in which employment assistance was identified as the type of active labour market policy that is the most sensitive to digitalisation. Our framework then linked its main tools of career guidance, profiling and matching with the main technological domain of remotisation versus automatisation. Our results showed that career guidance was closer to remotisation, while profiling and matching were closer to automatisation.

This framework is intended to provide a valuable reference for both existing and future research aimed at understanding the trajectories of digitalisation in PES. In particular, the framework can be used as a guide for positioning existing research on ALMPs and digitalisation, as well as helping to identify the relationship, inconsistencies and research gaps between these two areas. In addition, the framework could support future meta-analyses of research so that by comparing multiple empirical studies investigating the same tool (i.e. profiling), it would be possible to obtain an overview of the implications of technology adoption (Errichiello and Pianese, 2016).

The integrated analysis of the literature conducted in the present study enabled us to consider complementarities in substantive findings, expectations based on previous studies and further research opportunities.

Approaches to career guidance reflect traditional e-government studies and the development of technology following the advent of the Internet. In particular, studies on online career services involve factors that influence the successful integration of emerging technologies with existing ones. Their effectiveness was evaluated by comparing services delivered by remote means or a blended approach. In this context, successful integration is considered in terms of kinds of policy supports, workforce development and caseworkers' willingness (Bimrose *et al.*, 2015; Bakke *et al.*, 2018; Barnes *et al.*, 2020). However, there is a lack of research on the potential limits of career guidance in employment services, such as forms of organisational inertia, concerning both counsellors and jobseekers, which may still reinforce face-to-face rather than digital interactions (Hur *et al.*, 2019). Furthermore, there has been no discussion regarding whether a potential increase in the frequency of interactions between clients and operators could help the government strengthen citizens' trust, which has been pointed out in previous studies on e-government (Welch *et al.*, 2005; Tolbert and Mossberger, 2006; McNeal *et al.*, 2008).

The research on automated job-matching is scant and limited to studies that have considered the role of PES job boards. Research has been conducted on experimental instruments that perform automatic matching, questioning the effectiveness of such systems and shedding light on the poor quality of these matches to the degree that they require the intervention of a social worker (Bollens and Heylen, 2009; Bollens and Cockx, 2017). However, this type of assessment does not take into account equality and impartiality. Surely, this is a consequence of the fact that these instruments are still limited in scope and thus have not triggered similar considerations in public debate.

Another case in the context of applications in the technological domain of automation is the use of profiling tools. In general, because profiling is the greatest application of data-driven optimising technologies in PES, most previous studies have focused on this area. These studies have focused on issues concerning the construction and predictive accuracy of

TYPES OF ACTIVE LABOUR MARKET POLICIES	Incentive reinforcement	Employment assistance	Occupation	Human capital investment
Objective	Strengthen positive and negative work incentives for people in receipt of benefits	Removing obstacles to employment and facilitating (re-)entry to the labour market	Keeping jobless people occupied; limit human capital depletion during unemployment.	Improve the chances of finding employment by upskilling jobless people
Tools	- tax credits, in-work benefits - benefit conditionality	- career guidance - profiling - job-matching	job creation schemes in the public sector	training
Sensitivity to digitalization	Low	**High**	Not applicable	Limited to e-learning

	Career guidance	**Profiling**	**Job-matching**
Main technological domain	*Remotization*	*Automatization*	
Themes addressed	Factors influencing the successful integration of emerging technologies with existing ones. [Bimrose *et al.*, 2015; Barnes *et al.*, 2020; Bakke *et al.*, 2018]	Data-intensive models: factors to be taken into account in model accuracy. [Desiere *et al.*, 2019; Boskoski and Boshkoska, 2020)] Social implications in terms of transparency and neutrality of data. [Allhutter *et al.*, 2020]	Role of PES job-boards and scope of experimental tools in automated referrals. [Bollens and Heylen, 2009; Bollens and Cockx, 2017]
Themes uncovered	Potential limits in terms of 'organisational inertia', which may reinforce face-to-face rather than digital interaction. Assessment of if the frequency of interactions between clients and operators could help the government to strengthen citizens' trust.	Scarce assessment in terms of the potential for efficiency, speedier administration and lowering costs.	Issues related to impartiality and equality of treatment.

Figure 1.
Conceptual framework

these systems (Desiere *et al.*, 2019; Boskoski and Boshkoska, 2020). However, these studies have not aimed to show that data-intensive profiling results in speedier processes and/or lower costs, which has been envisaged in recent studies on automated administrative decision-making in public administration (Wihlborg *et al.*, 2016).

In addition, only a few studies have considered matters of accountability in profiling. In public debate, data-intensive profiling approaches are frequently called into question because of the large amount of information needed to guarantee the accuracy of these tools, identify the risk of fostering a climate of surveillance and question the effective neutrality of data (Allhutter *et al.*, 2020).

In summary, this review study has aimed to reconstruct a topic that has become increasingly important in the public debate, namely, the implications of the increasing use of digital technologies in PES. It is reasonable to expect that this area of research will receive more attention in the near future, particularly in relation to post-pandemic discourses. Indeed, ALMPs have been crucial elements in the emergency measures implemented by countries to support jobseekers in the context of the COVID-19 pandemic (Cedefop, 2020; OECD, 2021). In this regard, achieving an understanding of the different degrees of sensitivity to digitalisation in various types of ALMPs is vital for policy-making purposes to identify priority areas of strategic investment and to enhance this sector.

Some of the limitations that can be identified in the context of existing literature concern the lack of recourse to international comparisons. Clearly, the limited set of applications that have been implemented by countries do not yet provide a sufficient basis for any robust comparative analysis. Following a comparative methodology will remain the best strategy to identify and explain similarities and differences across countries from an overarching perspective regarding the use of digital tools across different PES settings.

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