



International
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European
Commission

► Policy dialogue between the EU and NEDLAC on Algorithmic management practices in logistics and healthcare sector

Meeting report

Policy dialogue under the joint EU-ILO
Project "Building Partnerships on the
Future of Work"

► Policy dialogue between the EU and NEDLAC

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June 2023

► Background and objectives

- The International Labour Organization (ILO), National Economic Development and Labour Council (NEDLAC) and the European Commission organized a policy dialogue between the EU and NEDLAC on algorithmic management practices in logistics and healthcare sector.
- The webinar took place on Thursday, the 22nd of June 2023 via Zoom.
- A policy dialogue was also held in March 2023 between the EU and NEDLAC that focused on decent work on digital labour platforms. Given the success of this earlier policy dialogue, the June 2023 policy dialogue followed a similar format with the objective to share results from new research and discuss their policy implications.
- The research and the policy dialogue are part of the international project titled, “Building partnerships on the Future of Work” funded by the EC Partnership Instrument. The ILO and the Joint Research Centre of the European Commission (EC-JRC) are together implementing the project.

► Presentations and discussions

Chair: Uma Rani (ILO Research Department)

Introductory remarks

Introductory remarks by Dorothea Schmidt-Klau (ILO Employment Policy, Job Creation and Livelihoods Department)

Ms Schmidt-Klau reminded the participants that the project, “Building partnerships on the Future of Work” was being implemented by the ILO and EC-JRC, together with partner countries, which also included South Africa. The project has a goal of generating innovative research, but also to foster dialogue between the EU and partner countries of the project. The project is nearing completion and one of the lessons learnt is that such policy dialogues are appreciated by the stakeholders, especially as they give an opportunity to discuss new and innovative research findings, which are often based on novel methodologies. The discussion will include presentations on the impact of platformisation and algorithmic management on traditional sectors, including with a focus on the logistics and healthcare sector in South Africa, as well as in India, to ensure a global perspective. She thanked the participants for engaging in the policy dialogue.

Welcome speech by Max Uebe (Head of Unit, DG EMPL)

Mr. Uebe thanked the Ms Rani and Ms Schmidt-Klau and noted that the EC was happy to share the insights and research that had been undertaken together with the ILO, the EC-JRC, and the University of Witwatersrand. This is an important aspect of the work at the EC and will contribute to policy development, especially as his unit was a policy unit working on the future of work, platform work, and is also exploring algorithmic management at the workplace. Collaborating with South Africa was particularly important not only due to the role played by the country within the ILO's Global Commission on the Future of Work, but also due to the country's significant role in advocating for decent work globally. While the previous policy dialogue focused on platform work, the current discussion will be exploring algorithmic management in different sectors. In the EU, including in the media, issues related to algorithms and artificial intelligence (AI) were high on the agenda, thereby making this discussion very timely. Algorithmic management brought both opportunities and challenges. It is important to gain a deeper understanding of the impact of algorithmic management, and a large-scale study has also been launched. This research aims to quantify the use of algorithmic management and assess the efficacy of the existing EU legal framework in addressing the challenges it poses. The study will be finalised later in the year. A joint EU-US paper under the Trade and Technology Council has been prepared discussing the impact of artificial intelligence on future workforces. The EC is also planning a major forum on artificial intelligence and the labour market. He further underlined the importance of this policy dialogue and the research undertaken for the EC to enhance an understanding of algorithmic management in the workplace. On the policy front, the EU President had stated at a trade union congress that the EU should also explore regulating workplace algorithms. He welcomed all the participants and looked forward to the discussions.

The impact of platformisation and algorithmic management on traditional sectors

Presentation by Ignacio González Vázquez (EC-JRC) and Uma Rani (ILO Research Department)

Mr Vázquez and Ms Rani presented a global overview on the impact of platformisation and algorithmic management on traditional sectors while exploring four countries, France, Italy, India and South Africa. This included a discussion on the conceptualisation and the methodology adopted, as well as the findings based on the comparative work.

Mr Vázquez noted that the EC-JRC and the ILO were collaborating for the past two and a half years, which also covered research areas that included the effects of automation and their gender dimension, new labour market transition patterns, and shifts in employment structures in EU and non-EU countries. These research trends address the need to generate new evidence on the topical themes relating to the future of work. These findings will inform policy discussions and assist in making decisions within this complex and evolving field.

Digital monitoring and algorithmic management is a complex and rapidly changing phenomenon. Various organizations, including EC-JRC and the ILO, have been studying digital labour platforms. The present research is related to it but has a broader focus, and analysis the increasing use of digital platforms, algorithms, and tools to manage work processes in traditional settings. Recent data collected in Spain and Germany indicate that the use of digital platforms and algorithms is spreading quickly, particularly within high-tech industries, knowledge-intensive services, and public administration. Clerks and operators are among the most impacted occupations, highlighting the need for more attention from both research and policy perspectives. While digitization can lead to opportunities in workplaces, such as efficiency improvements, it can also present challenges for both companies and workers. These include implications for working conditions, including loss of autonomy, work intensification, and deskilling. Increasing use of digital tools, which need not be sophisticated algorithms, for surveillance and control of workers also raises concerns. These have policy implications in areas like employment policies, industrial relations, labour law, data protection, etc. This is a growing phenomenon but as it is recent, there is little evidence on it, which was the motivation to undertake the research.

The research has taken a case study approach. While quantitative analysis is relevant and interesting, it is not sufficient on its own, and the research undertaken aims to better comprehend the algorithmic management practices that are being implemented in regular workplaces. Logistics and healthcare sectors were chosen for the research, an in particular to understand the degree of penetration and the impact of algorithmic practices on work organization, job quality, and industrial relations. Despite its constraints, a case study based methodology allows for in-depth understanding of what is happening at the workplace, complementing the quantitative data. The case studies are prepared through qualitative, in-depth, semi-structured interviews in the two sectors with employers, workers, and other key stakeholders. Field visits were also conducted at establishments in both sectors. The research was conducted in India, South Africa, Italy, and France, which allows for comparative analysis between countries in the global North and South. Logistics and healthcare were selected due to their different levels of algorithmic management penetration. Logistics is on the frontline of algorithmic management deployment, while in healthcare algorithmic management remains limited, it is going through a significant wave of digitalization and automation, with profound impacts on work organization and conditions. The collaboration with the ILO and other research institutions including, Open Evidence, International Institute of Technology (Bangalore, India), and University of Witwatersrand (Johannesburg, South Africa) has been critical for the research project.

Regarding the concept of algorithmic management, direct and explicit application of algorithmic tools for the management of work has been evolving and growing across sectors. The conceptual framework used to approach algorithmic management is also evolving. However, at the same time, digital tools are also used for managing other aspects and processes at the workplace. The use of such tools to manage different aspects of economic activity, even though not explicitly intended to manage work processes, can significantly impact work organization, task allocation, job quality, and industrial relations. These tools, even if not designed with the explicit purpose of managing work processes, can be considered equivalent to algorithmic management systems, and can also be used for worker monitoring and surveillance. As the evidence from the case studies

are reflected upon, there is a need for a revised and expanded definition of algorithmic management. It should include not just the use of algorithmic tools for explicit work coordination, but also any algorithmic system or digital tool with implications for work organization and monitoring within the workplace.

Ms Rani noted that with regard to regular workplaces, there was a need to reflect further on digital management as opposed to human management or algorithmic management. She presented an overview of the logistics and healthcare sectors, and how digital technologies are being integrated into them, and the implications for work processes and working conditions.

In the logistics sector, which has been on the frontline of digitalization, algorithmic management is being deployed extensively to track the production workflow, coordinating work processes, and monitoring performance. COVID-19 further highlighted these practices as some large warehouses were using these in a large scale with implications for workers. Examples of such technologies include, robots used for picking and storing items for retail orders, algorithmic tools to make itineraries of postmen more efficient, to assist companies to predict their client flows, stock needs, staff planning, as well as mobile handheld scanning devices. Their use can be traced to a change in business models, stressing the importance of optimization, efficiency, and improved service delivery. These changes, aimed at increasing productivity, may lead to simplified and streamlined work processes. However, it's unclear whether these modifications genuinely improve productivity and, if so, how the benefits of increased productivity are shared among workers.

The impact of these technologies on job losses is mixed, with some evidence of labour displacement and a potential for future job loss. Conversely, these technologies also drive increased work intensity and a push for higher worker productivity, which is beneficial for firms pursuing profit maximization. The quality of jobs however is a major concern amidst these changes. Furthermore, evidence is mixed on tasks and roles being redefined due to the standardization and simplification of tasks. This process nevertheless raises questions about workers' compensation, especially when workers upskill to meet technological demands but receive no recognition in terms of what the worker does or returns to work, such as compensation.

Regarding the quality of jobs and industrial relations, the findings are diverse and often hard to discern due to difficulties in directly contacting workers in their workplaces. In cases where engagements were possible, it was often biased by managerial presence. This highlights certain methodological constraints of the case study approach. However, there is clear evidence of work intensification, particularly in South Africa. Algorithmic systems sometimes divide workers within the shopfloor, and there is little room for workers' autonomy and discretion, although human decision-making remains key. Contrasting evidence was found regarding monitoring and surveillance, with no evidence in Europe, although conditions are in place, and regulations and institutions will define what happens in the future. However, outside of Europe, there is clear evidence of worker surveillance, with technology used to monitor and evaluate performance. Technology is ripe for action to be taken with regard to work termination and other processes. Regarding the social environment within companies, some improvement found in Europe, though this may vary depending on the workers' circumstances. Conversely, outside of Europe, competition has increased due to new technologies. In addition, there is a lack of awareness and involvement from trade unions in decisions regarding technological changes, with little consultation happening.

The healthcare sector is undergoing a digital revolution. One cannot look at a whole hospital as a site of research, but rather there are departmental specificities that need to be explored. There are regulations at play in the health sector that may limit the automation of certain work processes. While some technologies are not intended to coordinate work, they can have an impact on coordinating work. Technologies such as health information systems, digital tools (like tablets and mobile apps, including WhatsApp), data analytics, and telemedicine are becoming more prominent. Health information systems are being developed for healthcare system planning. The systems involve predictive analysis for managing emergencies, patient allocation, and coordinating the work processes between various rooms and healthcare professionals. Various digital tools,

such as tablets, WhatsApp, and mobile apps, are used to facilitate matching patients with doctors and coordinating work processes, and for having more transparency. These tools have also benefitted patients by reducing waiting times for reports and enabling faster analysis. Data analytics platforms, or dashboards, allow for measuring different indicators, with a primary aim of cost optimization. It also helps monitor doctors' prescription practices and medication utilization, improving efficiency and patient inflow. There has also been a significant increase in the integration of telemedicine, virtual follow-ups, and the use of digital healthcare platforms as follow-up mechanisms within the sector. Varying degrees of technology implementation in public versus private hospitals has occurred, influenced partially by resistance from doctors and nurses. Some evidence suggests these technologies have improved work coordination and reduced non-medical tasks, allowing healthcare professionals to dedicate more time to providing care. However, it's unclear whether this will lead to improvements or add more stress and pressure on these professionals over time.

The impact on jobs and skills varies across different establishments and countries, and is largely dependent on the nature of the job. Regarding findings on job quality and industrial relations, autonomy varies amongst workers, with increased autonomy for nurses, but potentially reduced for doctors due to specific data input frameworks. In Europe, work quality has reportedly improved due to better organization and lower workloads, especially in emergency departments. However, potential for worker surveillance exists, especially with instances monitoring and performance management outside Europe. This monitoring can influence pay and contract terms. Furthermore, limited consultations with workers about digital technology adoption was common across countries. At the same time, there are difficulties in accessing healthcare workers, like nurses, for interviews, which introduces some limitations with the findings. There is a need for more case studies and openness from businesses for furthering an understanding. There is clear evidence of intrusive monitoring and surveillance, and the expansion of algorithmic management. There is hence the need for improved institutional and regulatory frameworks, even in highly unionized sectors, to facilitate social dialogue and regulation concerning technology and automation. This is necessary to ensure workers' protection, while also allowing hospitals and warehouses to optimize productivity and efficiency.

Discussion

Mr Tobias Muellensiefen (European Commission) raised a question regarding the evidence of worker surveillance through algorithmic tools, particularly in Europe. While in hospitals these tools might be used for streamlining other processes besides work, in warehouses, there has been a perception that tools are being used for intense surveillance, and even to evaluate and potentially dismiss workers based on productivity.

Ms Rani noted that intensive surveillance was not observed universally across all countries, and other speakers will be discussing the matter further.

Mr Vázquez mentioned that there are also some methodological constraints that need to be considered in this context, such as difficulties interviewing workers, the presence of company representatives during interviews, and potential self-selection bias. Despite these constraints, the conditions exist for intrusive monitoring and surveillance to occur, due to the presence and application of certain technologies. While these technologies might not have been explicitly designed for this purpose, their capabilities allow for this intrusive surveillance. Evidence of intrusive monitoring and surveillance is reported outside of Europe. However, even though there is limited evidence within Europe, the conditions in Europe could also allow such practices to occur.

Mr Muellensiefen appreciated the clarifications and noted that a recent judgment in Germany regarding an Amazon warehouse illustrated the usage of systems for the monitoring and surveillance of workers.

Ms Rani clarified that all the warehouses did not operate like Amazon warehouses. While some may operate like Amazon warehouses, others had learnt to avoid Amazon's practices. It is important to also look at the good

practices. In India for instance, despite the limitations for data collection, the approach taken by warehouses is quite different, also because regulations could potentially shut down warehouses for infractions.

The impact of platformisation and algorithmic management in the logistics sector in South Africa

Presentation by Bridget Kenny (University of Witwatersrand)

Ms Kenney delivered a presentation on algorithmic management practices in the logistics sector in South Africa and noted that the sector was well developed in the country, and ranked 33rd out of 160 countries in the Logistics Performance Index. There has been a trend of growing digital warehouse management systems, although adoption was uneven depending on sub-sector, commodity, and market. The introduction of this technology in South Africa coincided with a global trend from the 2010s, with e-commerce being particularly impacted. The COVID-19 pandemic accelerated the adoption of these systems, with reasons for uptake varying from improving customer service, enhancing track and trace capabilities, to better integration with global firms and supply chains. The software technologies used are largely global products to which firms subscribe, and companies often selectively adopted components from global products based on their costs, leading to a "Frankenstein" effect where disparate components morph into a kind of hybrid system. Firms have started to understand the need to better integrate systems.

Regarding jobs, the evidence is varied based on the two firms that were under focus. For E-store, which is a pseudonym for an e-commerce company, jobs were increasing although most were precarious jobs via labour brokers. At the LogFirm (pseudonym for a road freight logistics firm), workers reported going through a retrenchment process, and their perception was that it must have had some linkages with digital technologies.

In the case of E-Store, key technologies used include barcode scanners, system software on laptops, biometric clocking, and communication via WhatsApp groups. These tools oversee the entire process from receiving orders to dispatching them. The stock handling process at the warehouse begins with the receipt of stock. Once the stock arrives, the accompanying invoice with a barcode is scanned and the order is confirmed, the filers then take the stock and generate a location in the laptop system. This location is associated with a barcode that's printed out and affixed to the palette. The filers then store the palette in the assigned location within the warehouse. Once stored, the stock becomes available for picking. Pickers receive orders on their devices which detail exactly what item to fetch and its precise location in the warehouse, indicated by a combination of letter and number code. Most of the pickers employed, were labour broker employees.

There was a category of workers who undertook monitoring and troubleshooting, which shows the presence of both the scanning devices and laptop systems, as well as traditional physical labour. The process involves various workers like stock controllers and inventory clerks, who check the shelves to ensure that physical stock aligns with the system records. They also resolve issues flagged by customers regarding missing items, which requires them to physically track down the location of the item in the warehouse. This role involves substantial physical labour. They have a productivity rate to meet, ranging between three to five orders per hour. Priority orders could interrupt their tasks. Many of these roles are filled by labour broker employees. Once items are picked, they are placed in a tote and sent on a conveyor belt or, in the case of larger items, transported directly to dispatch by forklift. Packers receive the totes and pack the items. Packers use scanners, logging in with their own identity, and scan items to identify where they need to be sent. They print out a waybill with customer information and physically pack the items. Packers have a productivity rate target of 125 units per hour, and most of them are labour broker employees. After packing, the parcels are sent back onto the conveyor belt and delivered to dispatch, where dispatchers, also using scanners, sort the items by geographic location and load them onto departing trucks. The process extensively utilizes scanners and manual labour, with no robotics used beyond the conveyor belt.

Hierarchy at E-Store involves management setting the total orders based on customer demand. Department managers and supervisors decide how to staff the shifts. Workers' hours vary significantly, with permanent workers working during normal shifts and are paid overtime, while labour broker workers are required to arrive well in advance before the start of their shift, work as long as needed to complete the orders without additional pay, and are punished for working shorter hours. Workers have to use biometric clocking to enter and exit, including for breaks and the toilet. In addition, the technology created divisions among workers and fostered competition. For instance, each scanner is under the name of a worker, and it is risky to ask another worker to use it in case there were to be an error.

Working conditions at the distribution centre operated on two shifts: day and night. The volume of orders determined the number of people on each shift. Labour broker workers' hours varied significantly - they could work as few as three days a week or as much as six days a week for up to eight hours a day. Wages and conditions also varied for permanent workers, especially when the company merged at different points. Each merger would bring in permanent workers with different sets of conditions, which were upheld, leading to discrepancies among workers' conditions that couldn't be equalized. Labour broker workers' wages varied by hours worked, which could change weekly or monthly. This inconsistency made it hard for them to plan or predict their earnings. The use of biometric clocking increased surveillance and affected workers' pay. When workers clocked out for breaks outside the centre, that time was often not counted as work time, making them very conscious of how much time they spent on breaks. Issues could arise if they had to queue to re-enter, as this time was also counted against them.

The increased emphasis on hourly rates led to higher productivity but also increased pressure on workers. The technology in place ensured that any mistakes were attributed to a specific worker, which was stressful for them. The hourly target rate was monitored for each worker, and if a worker didn't meet their target, they were pulled aside and questioned. If they couldn't explain their shortfall, they could lose their shift or receive a warning. Workers were acutely aware of their hourly rate and whether they were meeting or exceeding it. Sometimes, if they performed exceptionally well, they were sent home early after meeting the day's target, which also affected their pay. In addition, workers faced issues when the technology malfunctioned, such as when scanners glitched or during regular electricity outages, a common issue in South Africa. While distribution centres had generators, the transition between generator and regular electricity wasn't seamless and often impacted the networks and technology. These disruptions were frequently counted against workers' rates. Changes to workers' schedules also caused stress.

The technology being used in a road freight logistics firm, which moves bulk stock between businesses, was introduced differently than in the E-store warehouse due to the nature of their business. The primary roles impacted by scanning technology were the pickers and the reach truck drivers who used hydraulic trucks to access high shelves. These workers would use scanners to receive tasks. They would move bulk items into cages as part of their job. However, the timeline these workers operated on was on a weekly basis, and they worked in teams. Even though individual orders would come to individual workers, teams would have a meeting at the start of the day with their supervisor to discuss their goals. At the end of the day, they would report on what worked and what didn't, and this information would be passed on to the next shift. There was also a category of workers called checkers who ensured the accuracy of orders. Workers in the LogFirm complained that these roles were moved from one labour broker to another, and they transitioned from manual checking to using scanners. Workers perceived this as a reduction in employment and wages.

Workers in the E-store and the LogFirm, especially the pickers and packers, were categorized as "general workers" despite having to work closely with, troubleshoot, and correct errors in the technology being used. They also had to familiarize themselves with multiple apps. These responsibilities were not recognized in their pay or job categorization. Workers also felt that there was limited opportunity for promotion, with many remaining as general workers for several years. Despite the presence of unions, there was no consultation or

bargaining about the introduction of digital technologies in both firms. E-store, which identifies as a commerce company also sometimes identifies as a logistics company but is not part of the Road Freight and Logistics Bargaining Council. In contrast, LogFirm is part of the council and has a recognized union. Workers used the bargaining council agreement to ensure correct wage rates and to emphasize that workers must be trained on new technologies. In the case of E-store the management did not recognise the unions brought in by individual workers due to representation issues. However, in both cases, no consultation or bargaining occurred around the introduction of digital technologies.

The use of integrated or partially integrated systems in South Africa is fairly recent due to new sectors and growth, providing potential for job growth. However, this growth is happening through precarious, low-wage employment via labour brokers. While new digital technologies increase productivity and efficiency, they also increase stress levels in high volume contexts, such as the e-commerce sector. This results in radically varying working hours to match volumes, with labour broker workers effectively working under what could be considered zero-hour contracts, as there are no minimum guaranteed hours per week or month. Wages also vary with working hours. Some workers have benefited from the Bargaining Council and a recognized union, but are struggling to put forward their demands. While some workers believe that digital technologies have made their jobs easier, they contest that the risks and stresses associated with these technologies are placed onto them without any benefits or consultation. Workers uniformly argued that their use of digital technologies and skills levels should be recognized beyond being seen as a "general worker", but this recognition has not been given, nor is there any sense of possible promotion or career advancement.

Ms Rani clarified that in the case of South Africa, the information being collected is from the workers' lens as the management or the managers in the companies were unwilling to engage with the research.

The impact of platformisation and algorithmic management in the healthcare sector in South Africa

Presentation by Ms Nancy Coulson and Ms Nirvana Pillay (Sarrounia Institute, Johannesburg)

Ms Coulson delivered a presentation on the case study exploring the implementation of algorithmic management in South Africa's healthcare sector. There are three areas where algorithms are commonly used in healthcare globally, in diagnostics, system planning, and work process coordination. Identifying suitable case studies for the research was not a straightforward process, but eventually two were found, one in the private healthcare sector and one in the public sector/NGO servicing the public healthcare sector. The research was informed by key informant interviews with technology and data specialists, management, supervisors, middle management, and some workers affected by or using the technology, including clinically trained nurses and data capturers.

The policy environment is generally favourable for digital developments in health. The Department of Health's National Digital Health Strategy and the Protection of Personal Information Act are both crucial for the use of technology in the healthcare sector. The government's Universal Health Coverage agenda and commitment to rolling out a National Health Insurance scheme are tied to digital developments in healthcare. This will eventually require everyone in the country to have a universal electronic health record that can be accessed by health service providers in a nationalized system, including both public and private providers. These records will be used for both digital health records and billing purposes under the National Health Insurance.

The first case study, referred to as Program X, is from the private healthcare sector. It focuses on the use of digital technologies to coordinate the care delivery process for individual patients undergoing a specific medical procedure. Digital technologies are being used throughout the care pathway. This begins with a specialist diagnosing a particular condition and informing the patient that they require surgery, to post-operative care.

The technology comprised an integrated digital platform where all data could be stored, a patient-facing app providing patients with access to information about their condition and care, and a health worker-facing app used by various medical professionals to monitor patients' progress through the healthcare pathway. Program X uses an integrated digital platform to facilitate detailed cost reporting. Every item of cost, from theatre equipment to ward expenses, is recorded on this platform. It also tracks the patient's recovery process, their comfort level, and pain management. The platform also aims to evaluate the overall environment of the procedure and foster a values-based healthcare approach, which is new for healthcare workers. This represents a shift in healthcare practice as this level of detailed information is not typically collected.

One significant achievement of Program X is its ability to coordinate diverse healthcare professionals, such as doctors and allied healthcare professionals. Due to the regulatory framework in South Africa, these professionals are not employees but subcontractors of private hospitals. The digital platform allows these professionals to work together more efficiently, particularly with the detailed cost reporting and patient care data. As a result of this coordination and cost reporting, the business has managed to reduce costs significantly. It has reduced the time patients spend in high-care units and the overall length of hospital stay. Doctors are under pressure to minimize costs as their decisions and their impact on patient care are now recorded. However, despite the efficiency of the digital platform and apps, a significant finding from Program X is the necessity of an in-person coordinator for the system to work effectively. In this case, the business appointed nurse care coordinators, emphasizing the critical role of human interaction in the success of this digital healthcare initiative.

The implementation of Program X has significantly altered the work experience, especially for highly skilled professionals like surgeons. A significant change brought by Program X is the outcome monitoring system which ranks surgeons based on their efficiency. Their compensation for a procedure is linked to this efficiency ranking rather than their years of experience. Consequently, a surgeon with 30 years of experience is not necessarily paid more than a relatively new surgeon if they share the same efficiency level. Additionally, the payment model has changed significantly. Instead of billing for each consultation time or additional procedures, surgeons are now paid a global fee. This change necessitated consultation with the Healthcare Professions Council to agree on this new model of payment. For care coordinators, who were nurses, there is an increased requirement for digital literacy. Through the platform, they have an overview of post-operation care in different wards, enabling them to monitor if their colleagues administer medications according to the right protocol and time. This adds a level of oversight for workers in the wards, which is not related to direct line management.

The case study of a public sector NGO providing vaccine outreach services illustrates the use of digital technologies in addressing healthcare gaps in rural areas. The NGO implemented GIS-linked apps to identify at-risk rural communities often overlooked during mass vaccination campaigns due to accessibility issues. The app helped the NGO to record their activities for community buy-in, link up with the government's electronic vaccination database, and report their reach and costs daily. By monitoring the resources required to reach vaccination targets, they could work more efficiently and effectively. Workers in this context welcomed the technology, highlighting its indispensability for reaching out to the target population.

In terms of changes to the work experience, team leaders were surprised by the extent of data gathered by the apps, which allowed for direct performance comparisons among teams. This digital transformation also brought new potential disciplinary issues, as the platforms required health workers to adhere to standard operating procedures strictly. Management faced challenges from donors pushing for accountability, as the NGO relied entirely on donor funding. The staff, consisting of nurses and data capturers, had to remotely clock in and out using location-sensitive tools, leading to increased disciplinary cases due to lax timekeeping and attendance. However, the detailed reporting enabled by the digitisation of the work process allowed the management to demonstrate to the government and the donor that they could provide vaccination services in deep rural areas at the same cost as in urban centres.

The adoption of new technologies in the healthcare sector is largely driven by external factors such as donor demands for higher levels of reporting, and the ability to source technology providers both domestically and globally. In the private sector, technology is also being used to circumnavigate regulatory constraints regarding the employment of medical specialists. Internally, the primary drivers are reporting requirements and the pursuit of economic efficiencies. However, these technologies have been implemented in a top-down manner, with no worker consultation and without capturing patient or worker experiences. Several obstacles to the adoption of digital technologies in healthcare include internet availability, power shortages, low digital literacy among nursing staff, and access to devices like smartphones or tablets. The use of technology to link healthcare worker performance to targets is seen as a significant goal for the technology, as it can lead to productivity increases and facilitate the tracking of individual performance. This could result in greater individual accountability. However, there is a potential challenge as these technologies could also enable increased surveillance of workers. While management may argue that this isn't the aim, the potential for closer tracking of individual workers' activities is a clear possibility.

Ms Pillay explained that despite the opportunities and challenges brought about by the implementation of digital products in healthcare, both case studies highlight the necessity for human intervention in navigating these systems. This was evident through the crucial role of care coordinators in the private sector case study and vaccine data capturers in the public sector case study. These roles demonstrate that while technology can greatly aid in healthcare processes, human interaction remains an essential component.

The impact of platformisation and algorithmic management in the logistics and healthcare sector in India

Presentation by Amit Prakash and Rajesh Hanbal (International Institute of Technology, Bangalore)

Mr Hanbal began by sharing insights from two case studies in India from the healthcare sector. One from the private sector, ProHealth, a pseudonym for one of the top five private hospitals nationwide known for its digital technology adoption, and another from the public sector, NIMHANS, the National Institute of Mental Health and Neurosciences, a government-funded hospital specializing in neurology, psychiatry, and neurosurgery. Both cases were chosen due to their respective prominence and unique perspectives in their sectors, aiming to understand the impact of digital technology in healthcare.

Diverse digital technologies are utilized by the two healthcare providers. ProHealth uses a standard Hospital Information System (HIS) module that includes billing, registration, and insurance. They have also developed three other applications: IPCare Application: A mobile app exclusively for doctors to facilitate better communication and coordination among different specializations for the same patient's care; SelfCare Application: Designed for patients, this app is aimed at reducing the administrative load on the hospital staff by enabling patients to book appointments, make payments, and access medical records; and Data Analytics Dashboard: This tool provides real-time performance metrics for all of the hospital's branches, allowing for detailed data mining and performance tracking.

In the public sector side, NIMHANS uses the government-designed eHospital system for billing registration, etc. They also use two additional digital technologies. Firstly, CAMSoft, which is a custom application designed for the Centre for Addiction Medicine. It matches doctors with patients based on language compatibility, a key aspect in psychiatric treatment due to India's linguistic diversity. The tool also facilitates digital patient record maintenance and patient follow-ups, as patient attrition is common in addiction treatment. Secondly, the Neurosurgery Department uses WhatsApp-group based coordination and tablets, including the use of OneNote. However, traditional files are also used, and there is a coexistence of digital and traditional systems.

The introduction of digital technologies in the healthcare sector has significant organizational implications. For example, the emergence of technology teams was observed. These teams often consist of data entry operators crucial for digitizing data (who may sometimes be called as councillors or other designations), system analysts who iterate through requirements, software deployment teams that gather user feedback, and data analysts who play a vital role in handling data initiatives. The custom development of software has been favoured over off-the-shelf solutions, as the latter often requires adapting to the software's workflow. In contrast, customized applications allow for quicker feedback and better alignment with the hospital's existing workflow.

The implementation of digital technologies has had significant implications for work coordination. The appointment system at ProHealth, for instance, has been streamlined, with doctors providing work patterns or slots and patients filling slots either through an app, a helpline, or by walking in. The integration of digital systems has also enhanced the coordination between the billing and medical consultation teams. For example, a "green tick" system is used to ensure a consultation can start only after the billing team confirms that payment has been made. In terms of medical care coordination, IPCare app is now used for clinical decision-making related coordination, replacing the previous system of using WhatsApp groups. Finally, an algorithmic system has been introduced to automate the allocation of patients to doctors. This software assigns patients based on criteria such as the doctor's specialization, the languages the doctor speaks, and whether the patient's visit is a first-time or follow-up visit. This development signifies a shift towards algorithmic work allocation.

Productivity gains can also be observed, and these gains are largely attributed to micro-level process changes. For example, doctors no longer have to physically move between departments to sign off discharge summaries; this can now be done remotely, which not only saves the doctors' time but also makes patient beds available earlier. In another instance, the digitization of medical records has dramatically reduced patients' waiting time in clinics, especially the Centre for Addiction Medicine where wait times were previously up to 40 minutes. The use of data analytics has also improved efficiency in management decisions. With real-time data from every hospital branch, department, and doctor, discussions in the boardroom are more productive and decisions are data-driven. Questions about specialization choices, costs, and usage of materials are answered more precisely, leading to more efficient resource allocation.

The nature of work has also been altered, with remote work now more common. Apps and high-definition cameras provide detailed patient data, enabling senior doctors to review cases and provide instructions remotely. This has not only made senior doctors' work more flexible but also ensured their continued contribution to patient care. Digital systems have also made the task of transcribing medical records easier. Doctors can update records in detail from the comfort of their homes, reducing the workload during patient consultation hours. The introduction of clinical decision support systems is another noteworthy change. These systems ensure that doctors follow all required protocols and ask all necessary questions during patient consultation, which leads to better compliance and more diligent work.

In terms of working conditions, the adoption of digital technology has been met with significant resistance. For instance, there is apprehension about the time needed to enter data into electronic health records, which can detract from patient care. In addition, there are issues with the performative aspects regarding the use of technologies such as speech-to-text conversion engines during patient consultations. Another concern is the level of transparency introduced by these technologies, such as the IPCare app which makes instructions given by one doctor visible to all. While transparency can enhance learning opportunities for junior doctors, it also exposes any mistakes made in clinical decision-making to a wider audience. These changes have also led to an intersection of job roles and skills in healthcare. This is evident in the increasing number of software developers, data analytics teams, and electronic health record implementation teams in organizations like ProHealth. Furthermore, the convergence of technology and healthcare has also called for interdisciplinary skills, as seen in the case of a nurse who learned wireframing and mock-up techniques for software prototyping. Despite the potential for more extensive automation, particularly in the public sector, organizations are conscious of not

over-automating to ensure the continuous learning and skill development of doctors. Therefore, the digitization in healthcare is seen as a balance between technological efficiency and maintaining human-centred care and learning opportunities.

Discussion

Ms. Tsholo Lelaka (NEDLAC Secretariat) stated that such issues are still being engaged with and the research undertaken showcases a lot of new information that were previously unavailable, especially across the different sectors of the economy.

Ms. Annarosa Pesole posed a question regarding the possible impact of Western-influenced business models and consumer markets, especially from the US or Europe, on work conditions in different sectors.

Ms. Rani noted that there were instances of local technology developing, like in India, and not simply an imposition of Western models. In the healthcare sector, some of the digital tools inpatient care app or WhatsApp, may be seen to increase transparency but it has in-built monitoring and evaluation aspects. While the aim of these tools might be to improve efficiency, accuracy, and patient care, they can also bring about increased scrutiny and competition among doctors. Despite being referred to as 'transparency', these tools may inadvertently create a sense of surveillance or monitoring, leading to added stress and performance pressure on medical professionals. In addition, while there may be some hesitations with regard to further automation currently, this may not be the case in the future.

Mr Hanbal explained that unlike issues in Western countries, healthcare professionals stated that their work often extends beyond regular working hours, even prior to the introduction of digital tools. The shift from communication via WhatsApp to a custom application has simply streamlined this process. Concerning transparency, resistance has been observed, especially from nurses, towards detailed monitoring. The power dynamics within the healthcare system have become more apparent due to digitization. The corporate management and senior doctors now have greater visibility into the performance and clinical decisions of doctors, and senior doctors can monitor junior doctors and nurses.

Ms. Rani questioned if doctors could come under monitoring and evaluation as a result of using digital tools.

Mr Hanbal explained that digitization of healthcare allows for scrutiny over doctors' practices, particularly regarding costs associated with medical procedures. Using collected data, management can identify patterns such as the average cost of performing surgeries, including factors like antibiotic consumption. This enables the identification of outliers, that is, doctors whose practices deviate significantly from the average. Such doctors can then be questioned, leading to a level of scrutiny.

Mr Prakash emphasised that the concept of transparency in the digitization of healthcare is relative and depends on the power dynamics at play. With more transparency, groups with more resources and power can hold others accountable. In a public healthcare system, traditionally powerful groups like doctors have generally been less subject to scrutiny, a trend that is now being challenged with digital tools. As these groups realise that they are being monitored, they may resist certain aspects of digitization. There could also be claims to stop automation at a certain level to maintain the training quality for doctors.

Ms. Rani questioned the use of Western technologies in the logistics sector in the case of South Africa.

Ms Kenney observed that while the software products used are global, South African firms often only use components of the systems due to financial constraints. She noted that to gather data, interviews were conducted with industry experts and technologists, which revealed that the level of technological integration varied by sector. For example, a logistics company exporting horticulture to the European Union had very high standards for supply chain maintenance, and had developed a subsidiary to create a local South African software

that met specific local conditions. On the other hand, a small logistics company gained a competitive advantage by using a sophisticated software from a small firm from the United States. Furthermore, in South Africa, e-commerce gained significant traction during the COVID-19 pandemic. E-commerce companies adapted their services to reach a geographically dispersed market with centralized urban area distribution centres. This adaptation process involved developing a "last mile" system that relied on subcontracted drivers to reach rural areas, small towns, or difficult-to-access urban areas. Increasingly, a wide range of consumers are becoming aware of the benefits of quick and safe delivery, which might lead to further intensification of warehouse-level operations.

Ms Coulson added that while the main database platform in the healthcare sector was sourced internationally, local products such as apps for patients and healthcare workers were developed within South Africa. This suggests that local businesses are engaging with technology experts for assistance. There is an iterative nature of technological development - as needs arise, the corresponding technology is pursued, often without a clear understanding of how everything will fit together. This also requires someone within the business who is tech-savvy and can anticipate future needs. The COVID-19 pandemic had accelerated the pace of technological change and increased willingness within businesses to invest in technology, although such investments are often expensive and long-term. She also emphasised the need for healthcare professionals to become more digitally knowledgeable due to the intricacies of care pathways and clinical protocols. This suggests that the development of technology in healthcare is a multidisciplinary endeavour.

Ms Rani noted that there was trial held with an external company in India, which was not successful, and it was decided that the tool would be developed internally. In the logistics sector in India, despite having the technology and the ability to develop algorithms, these are not always implemented within the local companies. Instead, they are exported to other regions such as the United States or the European Union. This practice is worth considering in the context of this discussion about the influence of technology in different sectors and regions.

Mr Hanbal explained that control over processes, rather than technology itself, holds significant value for organizations. Existing technologies may not be ideal for encoding specific operational processes. In the logistics sector, due to the surplus and relatively inexpensive human labour in India, the introduction of new technologies, like drones for inventory audits, may not necessarily be the most cost-effective solution. Despite the technological feasibility of implementing these advanced solutions, the business value of such implementations should also be carefully considered, particularly in contexts where labour conditions differ significantly from those in countries like the United States.

Mr Prakash added that both ProHealth and NIMHANS, which is a public sector undertaking funded by the Indian government, have exhibited a preference for creating their own customized technology solutions rather than adopting off-the-shelf systems. These organizations favour the control, understanding, and better coordination that comes with developing their own systems. In the case of NIMHANS, despite being funded by the Indian government, it is reluctant to adopt the e-hospital system advocated by the government. This resistance suggests a general pushback against the imposition of centralized, standardized algorithms, indicating a preference for more customized, adaptable solutions that cater to the specific needs of these organizations.

Ms. Rani noted the role of the medical and healthcare associations in the healthcare sector. The potential of data regulation within healthcare could be interesting, particularly considering its increasing relevance in automation processes. A tighter regulation of data could possibly slow down the pace of automation or guide the development of automated processes. She questioned whether there are trends indicating that the healthcare industry, including medical associations, is moving towards stricter data regulation.

Mr Prakash explained that while the introduction of stricter data regulation in healthcare might be criticized as stifling innovation, it's a necessary step for ensuring the long-term sustainability of healthcare digitization. It

should not be seen as slowing down automation, but rather as a method to make the process more secure and manageable. He added that there has been resistance from larger hospital chains in India to relinquishing control over patient data, potentially hindering the ability of patients to access their records and use them at different healthcare facilities. Such corporations may use data protection regulations as an excuse to retain control over patient data. Innovative and careful data policies are needed in healthcare, particularly when it comes to patient data. These policies must navigate various tensions and potential pushbacks to ensure both data mobility and protection.

Ms Rani asked about the impact of healthcare apps on existing regulatory systems, especially considering patient privacy. The concern is that previously, data was maintained within the confines of certain hospital departments and accessible only to a limited number of doctors. However, with the advent of health apps and other platforms, patient data might be shared more widely, potentially infringing on privacy regulations. The question is how these health apps manage these regulatory issues currently.

Mr Prakash observed that while the use of healthcare apps has immediate short-term benefits, such as saving doctors' time, there has not been a comprehensive consideration of the possible issues these platforms may cause, especially around patient data privacy. Current precautions might include restricted groups and agreements prohibiting data sharing outside these groups. However, the risks associated with the unrestricted use of data across various platforms remain and pose challenges for the future.

Mr Hanbal acknowledged that organizations are increasingly recognizing the importance of data protection, especially in cases dealing with sensitive mental health data. NIMHANS requires that all data resides within its premises and cannot be stored elsewhere. The digitalization of data can also ensure greater control over who has access to what information. In this case, digital records allow certain information to be selectively shared with nurses, offering greater control than when physical files were used. Hence, effective data control and regulation can be achieved if it's thoroughly considered and implemented.

Ms Coulson underlined the importance of a legislative framework for data protection in the healthcare sector, citing South Africa as an example where it is firmly in place. However, the key challenge in healthcare is envisioning what the delivery of healthcare should look like and how digitization can assist in achieving this vision. If a government is committed to universal health coverage, a universal patient record accessible to all healthcare providers is crucial. Data protection and the structure of healthcare delivery are intertwined, and without a clear overarching framework, data sharing could become a competitive point. This opens up the potential for private hospitals to use extensive patient records to improve their service and outcompete other providers. She added that there are complex and interrelated pressures affecting global healthcare systems. These pressures include an aging population in Europe and the increasing demand for innovative diagnostic tools and alternative care delivery methods. Addressing these issues will likely require more than data regulation alone due to the multiple ideological and demographic factors at play. Moreover, technology can greatly enhance service delivery, especially in underserved populations, as illustrated by a case study in the South African public sector. The role of data and digitization should be considered within the broader context of these global healthcare pressures.

Ms Rani agreed with the points raised about the benefits of digitization in healthcare, especially in reaching underprivileged areas and building extensive databases of diseases and healthcare providers. Telemedicine also has an important potential. However, she expressed significant concern about the risks associated with patient data, particularly the potential misuse of this information by insurance companies. Such risks make the careful handling of patient data especially crucial.

Mr Prakash underlined that there were varying needs and demands across different levels of healthcare. Focusing on public health in India, a significant amount of care is provided at the primary level. However, doctors often have limited time for each patient, meaning that they may not have the capacity to fully utilize

comprehensive data dashboards or extensive patient histories. In addition, doctors at the primary level serve a broad range of functions, including prescribing medicine, explaining instructions in the local language, and building trust with patients. Given this context, comprehensive digitization might be excessive or less beneficial for these physicians. Understanding the context in which digital technologies are introduced is important.

Ms Kenney added that in the case of South Africa, there may potentially be a significant impact of Amazon's entry into the market, which is expected by the end of the year. Currently, Amazon doesn't operate in the country as a distributor. However, despite disputes over the construction of its head office, distribution centres are anticipated to be set up. This development could fundamentally change the nature of e-commerce in South Africa, and consequently, introduce new competitive dynamics around digital technology adoption. Hence, this upcoming change presents a new and interesting research question to explore.

Mr Prakash expressed gratitude for being part of the study and appreciated the opportunity to understand different sectors and learn from cross-country findings. This work is of importance as it engages with rapidly evolving sectors where emerging technologies like AI are claiming to have the potential to replace human roles. He underscored the need for careful responses, backed by evidence from such studies.

Mr Hanbal also expressed his gratitude and noted that one important takeaway from the study related to the local versus standardization debate. There are significant differences between cases in India, South Africa, and Europe, as well as within India itself. Even within one medical centre, different departments (like neurosurgery and psychiatry) have divergent requirements and ways of operating. This reinforces that the use of digital technologies and algorithmic management practices is extremely context-specific. The project has allowed for understanding these practices from a socially embedded perspective, and there was a need for such research in the future.

Ms Rani stated that while a standard hospital information system may exist, all other operations within the different departments need to be tailored to their specific needs. This is due to the varying demands across departments, as also mentioned by Ms Coulson.

Ms Coulson expressed gratitude for being included in the study and shared a final observation about the role of nurses in the healthcare system. She highlighted that the nursing sector in South Africa is facing a crisis due to an aging workforce, inadequate availability of new recruits, and a lack of digital preparedness. Private sector hospitals in South Africa are recruiting nurses from India. There was hence a need for future explorations of how technology affects different contexts based on varying workforce conditions in different countries.

Ms Kenney also expressed gratitude for the opportunity to participate in the research collaboration, which provided insights into warehouse operations. Reflecting on the study's implications, two key points are noted. First, the manner in which digital technologies interact with local industrial relations in various South African workplaces, characterized by racialized labour, perceived low skill, and punitive labour processes. This demonstrates how new technologies are integrating into the existing South African labour regime. Secondly, workers understood the influence of management in shaping their work environment, even as they engaged with technology. Workers recognized that managerial decisions, such as staffing levels or use of labour brokers, significantly impacted their working conditions. These insights serve as a valuable base for understanding how globally common technologies integrate into local conditions and how workers and unions respond to them.

Concluding remarks

Ms. Schmidt-Klau thanked the speakers and the participants. As a back-stopper for the project, she expressed deep appreciation for the collaboration. The project produced unique research findings and led to important discussions in the policy dialogues. She expressed gratitude to all the researchers, the European Union for funding the project, and NEDLAC for their interest and collaboration. She emphasized some key takeaways,

including the understanding that the application of algorithmic management can have positive and negative effects, depending largely on policy decisions, enterprise-level choices, and labour market institutions. Impacts differ between sectors and companies, indicating room for positive changes and learning opportunities. The risks associated with algorithmic management seem larger in the logistics sector compared to the health sector. At the same time, technological advancements may offer a solution in the healthcare sector to demographic challenges such as aging societies. Lastly, she highlighted that the synthesis reports will be available on the project website, which will consolidate the research findings, offering a valuable resource for those interested in this emerging area of research. She looked forward to potential future collaborations.

Ms. Lelaka expressed gratitude towards the partnership between the EU and ILO on the future of work, and noted the valuable information gained from the research. Further discussions are anticipated with social partners under the Decent Work Country Programme for South Africa, supported by the ILO, to determine the next steps following the reception of this new information, including the earlier webinars on digital platforms. She expressed hope that the EU will consider extending the project to address other relevant issues raised by social partners regarding the future of work. She thanked all the researchers for their contribution and both the EU and ILO for their partnership on the project.

Ms. Rani expressed gratitude for the collaborative efforts and insights gained over the past two and a half years of the project. The synthesis report will aim to communicate the findings to policy makers and academic researchers. The collaboration will continue, expanding into other sectors like automobiles, banking, retail, and electronics, and will include areas outside the current scope. There is scope to improve the research methodology and to further push for more transparency from companies. This type of research was instrumental in gaining a better understanding on the reality on the ground.