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VOICES FOR THE NETWORKED SOCIETY

# Algorithmic Management

## From Technology to Politics and Theory

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ABSTRACT

This article provides an overview of the concept of ‘algorithmic management’. This concept has played an important role as an organizing frame for empirical research seeking to demystify the role of labor platforms in intermediating paid work. More recently, this concept has helped shed light on the increasing use of computer algorithms to automate managerial tasks in conventional work settings. However, beyond platform work, most research is confined to warehousing, with only a few notable studies in manufacturing and retail. Moreover, most empirical investigations highlight the conditional nature of algorithmic management, with human managers retaining important functions. Only recently have studies begun to go beyond technical functions and consider how human elements (worker, manager, and technologist) shape such systems. Relatedly, the contingencies, moderations, and variations in algorithmic management have received insufficient consideration. These weaknesses result from a tendency to generalize from single case studies without adequately extending out from the case to theory, history, and geography, and not situating empirical research within a broader theoretically motivated research program. Workplace regime theory, with its focus on technology, power, and embeddedness, is presented as a remedy that enables algorithmic management research to account for variations while explaining regularities.

The concept of algorithmic management was first developed by Lee et al. (2015) to describe how ride-hailing platforms (e.g., Uber and Lyft) manage their workforces in the absence of traditional employment relationships. According to these researchers, algorithmic management entails “software algorithms[...] assum[ing] managerial functions” to enable human labor to be “assigned, optimized, and evaluated through algorithms” (Lee et al., 2015, 1603). This understanding of algorithmic management has proven critical to demystifying the role of labor platforms in intermediating paid work. This shift was necessary to counter initial attempts by labor platform companies to portray themselves as technology companies providing neutral digital infrastructures that enable the emergence of markets by connecting two sets of “entrepreneurs” (see also Wood et al., 2019). Thus, theorizing the role of algorithmic management in the operations of labor platforms had two major consequences. First, the concept inspired research focused on how platforms control labor across diverse sectors, from ride-hailing (Rosenblat and Stark, 2016) to delivery (Shapiro, [2017] 2018) and online freelancing (Wood et al., [2018] 2019). Second, it made clear how labor platforms, like other digital platforms, “embody a politics by shaping the ways in which interactions can take place” (Srnicsek, 2017, 47). As such, labor platforms actually represent forms of dependence, control, governance, and managerial authority (Wood & Lehdonvirta, 2021; Wood et al., 2023). Consequently – and in contrast to claims otherwise made by platform companies – these workers have a strong desire for labor rights and collective representation (Martindale et al., 2024; Wood et al., 2023). In this way, the conceptual development of algorithmic management has proven an essential lens for framing the empirical studies of platform work undertaken across an array of industrial and institutional settings. Evidence of the practical value of this concept for researchers can be gleaned from the fact that three of the early studies discussed above have each been cited over 1,000 times (Lee et al., 2015; Rosenblat & Stark, 2016; Wood et al., [2018] 2019). The resulting body of research has also helped shift public, policy, and legal perceptions of how labor platforms operate and the need for regulation.

The concept’s relevance was further enhanced by a review article by Kellogg et al. (2020), which produced two important extensions of the concept. First, by reviewing the large body of findings that had emerged following the original study by Lee et al. (2015), Kellogg et al. (2020) were able to identify three main functions of algorithmic management: direction, evaluation, and discipline. These functions were argued to be achieved via “Six Rs”: recommending/restricting (direction), recording/rating (evaluation), and replacing/rewarding (discipline). This approach provided a helpful framework for researchers wanting to undertake finer-grained investigations into the operation of algorithmic management and has also been cited over 1,000 times. For example, Wood (2021a) uses the directing, evaluating, and disciplining typology as an organizing framework for reviewing the consequences of algorithmic management for work organization and working conditions. Second, Kellogg et al. (2020) provide clear evidence of algorithmic management extending to work

settings beyond platform work, a view developed further in reviews by Jarrahi et al. (2021) and Wood (2021a). Indeed, Jarrahi et al. (2021) highlight the potential for algorithms to reshape power relations at work generally. Wood's (2021a) review specifically builds upon Kellogg et al. (2020) to delineate three levels of algorithmic management: "conditional," wherein human managers are expected to intervene when requested by the system; "high," which sees the system run automatically without the need for human managers to intervene; and "full," in which human managers cannot intervene.

However, empirical research into algorithmic management in non-platform work settings remains largely confined to warehousing (Delfanti, 2021; Delfanti, 2022; Dörflinger et al., 2021; Gent, 2018; Krzywdzinski et al., 2024a; Vallas et al., 2022), with the few exceptions considering manufacturing (Dupuis 2024; Krzywdzinski et al., 2022; Krzywdzinski et al., 2024b; Schaupp, 2022) and retail (López et al., 2022; Van Oort, 2018; Van Oort, 2023). Furthermore, as Wood (2021a) recognizes, most examples of algorithmic management fall within the category of conditional systems, with ride-hailing platforms being rare examples of "high" algorithmic management. As such, Wood (2021a) argues that algorithmic management, in most cases, entails the "systematic and integrated assemblage of human and algorithmic actants" (p. 12) rather than full or even high automation. Indeed, according to a representative survey of the use of algorithmic management in Spain and Germany, the most common use of algorithmic management is for scheduling workers (Urzi Brancati et al., 2023). However, such algorithmic management tools tend to be conditional upon the input of human managers (Wood, 2021a). Even in platform work, the roles of human managers, supervisors, and team leaders are well documented in sectors such as delivery (Herr, 2024; Ivanova et al., 2018; Veen et al., 2019). Empirical studies also make clear the important functions of human managers in warehousing, with managers encouraging and disciplining workers when prompted by algorithms (Delfanti, 2021). Indeed, Briken and Taylor (2018) find that Amazon's "management consists of executing decisions based on data analytics" (p. 453).

It is only recently that studies have begun to really move beyond the technical functions of algorithmic management and focus on the ways that human elements (workers, managers, and technologists) shape the use of such systems in practice. As Wajcman (2006) points out, "politics and negotiation are key processes through which technical possibilities are, or are not, put into practice" (p. 774). For example, recent studies have highlighted the importance of negotiations over the introduction and operation of algorithmic management in German logistics (Krzywdzinski et al., 2024a). These researchers highlight the importance of firm-level politics in shaping algorithmic management, recognizing that this takes place between workers, different levels of management, and technology providers. The importance of including technology providers in such accounts is also illustrated by research on automated hiring by Dencik and Stevens (2023) and digital monitoring by Myers (2024). Notably, Dencik

and Stevens (2023) also illustrate how technology providers seek to legitimize their products.

In case studies by Krzywdzinski et al. (2022; 2024a), the works council provided a means by which workers could significantly influence algorithmic management. Similar findings have emphasized the potential for German works councils to regulate algorithmic management in other sectors, including manufacturing (Krzywdzinski et al., 2022; 2024b), retail (López et al., 2021), and call centers (Doellgast et al., 2023). However, research also highlights how weak union density and limited collective bargaining can render works councils impotent in the regulation of algorithmic management (Dörflinger et al., 2021; Krzywdzinski et al., 2024b; Schaupp, 2022). Indeed, the importance of strong unions is attested to by diverse research outside of Germany, such as at a US call center (O’Brady & Doellgast, 2021), Belgian warehouses (Dörflinger et al., 2021), and Canadian aluminum manufacturing (Dupuis, 2024). The work of Dupuis (2024) is particularly insightful, demonstrating that union effectiveness in this arena is influenced by the nature of preexisting technologies, whether the firm is embedded in stable markets where competitiveness rests on quality not price, and the degree to which the union has sufficient structural, associational, institutional, and societal power resources to press workers’ interests. Likewise, Krzywdzinski et al. (2024b) highlight the importance of not only bargaining power but also capital intensity in shaping the consequences of algorithmic management for workers. According to that study, where workers have weak bargaining power and are situated in labor-intensive workplaces, algorithmic management via wearables results in task standardization, reduced opportunities for decision-making, and staffing reductions. However, when workers have strong bargaining power, this standardization instead translates into reduced work intensity. Again, the consequences of algorithmic management differ in capital-intensive workplaces because here employers are more concerned with increasing labor flexibility to reduce production process interruptions instead of controlling labor costs. Although the research findings do not observe increased flexibility to result in work intensification, the researchers do note it as a risk, highlighting that their findings cover only the short-term consequences. Finally, Heiland (2023) importantly identifies the role of workers themselves in constituting the affordances of algorithms through their (mis)understandings, assumptions, and theories about the opaque operation of algorithmic management systems.

This brief review of the algorithmic management literature makes clear that this concept has been exceptionally useful for framing the ways that computer algorithms are used to automate managerial tasks. Notably, it is only recently that researchers have begun to consider the active role that workers, managers, and technologists play in shaping algorithmic management in practice. Put differently, in the words of Krzywdzinski et al. (2024a), until recently there has been a lack of attention paid to the “politics of algorithmic management.” Despite a lack of research beyond platform and warehouse work,

there is, nonetheless, a good understanding of the ways that algorithms can be used for the direction, evaluation, and disciplining of workers, including what strategies this is likely to entail, such as the six Rs identified by Kellogg et al. (2024). Similarly, the potential consequences that such strategies hold for working conditions are well understood, namely, work intensification, deskilling, and precarity (Wood, 2021a). However, a weakness of algorithmic management research has been its propensity to focus on the technical features and functions of algorithms in the workplace while paying insufficient empirical and theoretical attention to the contingencies, moderations, contexts, and variations associated with algorithmic management in practice.

This failure to sufficiently account for variation may be partly due to a tendency to generalize from single case studies without adequately connecting those cases to theory, history, and geography and without considering empirical studies a part of a broader theoretically motivated research program (see Burawoy, 2009). For example, the gamification entailed by many algorithmic management systems has frequently been equated with Burawoy's (1979) notion of work games. However, this concept only makes sense when understood as one element within his wider factory (workplace) regime framework (Burawoy, 1979; 1895), where it acts as a means of reproducing capitalism by generating consent under conditions of hegemonic security and stability. However, the wider theoretical implications of using this concept have rarely been considered by gamification researchers and nor has the need to situate their findings within a broader Burawoy-influenced workplace regimes research program been recognized.

A fuller understanding of algorithmic management that accounts for politics and negotiation so as to accommodate variations while still enabling productive generalizations where regularities exist can only emerge from the sophisticated integration of empirical findings within wider established theoretical frameworks. As indicated above and demonstrated by Dupuis (2024), one such framework is Burawoy's Marxist theory of workplace regimes (Burawoy, 1979; 1985; Webster et al., 2008; Wood, 2021b). In fact, one particularly rich vein of recent research has been the identification of regimes of algorithmic despotism (Delfanti, 2021; Dörflinger et al., 2021; Griesbach et al., 2019; Schappe, 2022; Vallas et al., 2022). However, a weakness of these attempts is a lack of attention to history and failure to situate the findings within the post-hegemonic regime research program that stretches back to the 1980s. Doing so is necessary to identify what is truly novel about algorithmic management.

Wood (2021) argues that three factors are constitutive of workplace regimes: technology, bargaining power, and embeddedness. While extant studies of algorithmic management have provided rich accounts of technology and, increasingly, bargaining power, embeddedness remains relatively under-considered. Two types of embeddedness are particularly important for shaping the design and implementation of technology and, thus, workplace regimes: net-

work and institutional. Network embeddedness includes inter-firm relations – such as product markets, capital markets, and supply chains – and inter-worker relations – for example, labor movements, recruitment networks, kinship and ethnic bonds, and households. Institutional embeddedness includes formal institutions – such as welfare states, support for trade unions, collective bargaining, and minimum labor standards – and informal institutions – for example, gender norms, constructions of race, and conceptions of skill. In fact, Gebrial’s (2022) application of Robinson’s (1983) Marxist theory of racial capitalism to platform work demonstrates the role of informal societal institutions such as race in shaping algorithmic management and determining its consequences. Interestingly, a focus on network embeddedness offers parallels with the recent reworking of Marxian labor process theory by Thompson and Laaser (2021). These researchers suggest an approach that they term “political materialism” as a means of understanding the adoption of workplace technologies, including algorithmic management. This approach stresses how firm embeddedness in accumulation and regulatory regimes shapes and constrains first-order (i.e., high-level business models) and second-order (i.e., workplace control regimes) strategic choices regarding technology adoption and use.

As noted, Wood (2020; 2021) highlights the role of bargaining power in shaping workplace regimes, and Dupuis (2024) elaborates this point by incorporating recent developments in power resource theory by Levesque and Murray (2005) and Schmalz et al. (2018). However, Korpi’s (1978) original Marxian power resource theory also importantly influenced Gallie’s (2007) articulation of employment regimes theory, which built on Korpi (1978) to conceptualize three types of employment regimes: market, dualist, and inclusive. Market regimes emphasize minimal employment regulation, with freer markets seen as leading to high employment levels and rewards that reflect marginal productivity. Dualist regimes are understood to be less concerned with overall employment levels than ensuring strong rights to a core workforce at the expense of a periphery. By contrast, inclusive regimes are argued to design policies that extend both employment and common employment rights as widely as possible (Gallie, 2007). These regimes are argued to centrally reflect the “role attributed to organized labor in employment policy and employment regulation” (Gallie, 2007, p. 18). Clearly, one would expect algorithmic management to diverge significantly across employment regimes, with inclusive regimes seeking to regulate it to ensure that it does not impinge on employment rights, market regimes, in contrast, doing little to regulate and dualist regimes only regulating in instances where it threatens the rights of core workers. This approach has been put to good use by Lloyd and Payne (2021) in their investigation of the differing cases of robotization within food and drink processing in the UK and Norway. The relationship between workplace regimes and employment regimes and how this interaction shapes algorithmic management represents a fruitful avenue for future research.

In conclusion, this brief reflection on algorithmic management highlights the strength of the concept as an organizing framework for empirical research concerned with how computer algorithms transform work organization and working conditions. Notably, that research has, in turn, generated important policy implications. Nonetheless, despite the richness of this research, it has tended to over-emphasize the functions and technical features of algorithmic systems at the expense of accounting for the political processes of negotiation that determine how technical possibilities are (or are not) put into practice (Wajcman, 2006). Thus, contingency and variation have been insufficiently theorized. This is partly the result of a tendency to generalize from single case studies without sufficiently extending specific observations to encompass theory, history, and geography and without viewing individual findings as part of a broader theoretically motivated research program, as encouraged by Burawoy (2009). Additionally, this overview has highlighted how our ability to generalize has been hampered by the absence of algorithmic management research beyond the idiosyncratic settings of platform and warehouse work. These findings have yielded some potentially fertile and complimentary theoretical avenues that could help illuminate not only variation but also regularities in algorithmic management, namely, Burawoy's (1979; 1985) workplace regimes, Robinson's (1983) racial capitalism, Thompson and Laaser's (2021) reworking of labor process theory, and Gallie's (2007) employment regimes.

## References

- Briken, K., & Taylor, P. (2018). Fulfilling the 'British way': beyond constrained choice – Amazon workers' lived experiences of workfare. *Industrial Relations Journal*, 49(5–6), 438–458.
- Burawoy, M. (1979). *Manufacturing consent: changes in the labor process under monopoly capitalism*. University of Chicago Press.
- Burawoy, M. (1985). *The politics of production: Factory regimes under capitalism and socialism*. Verso Books.
- Burawoy, M. (2009). *The extended case method: Four countries, four decades, four great transformations and one theoretical tradition*. University of California Press.
- Dencik, L., & Stevens, S. (2023). Regimes of justification in the datafied workplace: The case of hiring. *New Media & Society*, 25(12), 3657–3675. <https://doi.org/10.1177/14614448211052893>
- Delfanti, A. (2021). Machinic dispossession and augmented despotism: Digital work in an Amazon warehouse. *New Media & Society*, 23(1), 39–55.

- Doellgast, V., Wagner, I., & O’Brady, S. (2023). Negotiating limits on algorithmic management in digitalised services: cases from Germany and Norway. *Transfer: European Review of Labour and Research*, 29(1), 105–120.
- Dörflinger, N. N., Pulignano, V., and Vallas, S. P. (2021). Production regimes and class compromise among European warehouse workers. *Work and Occupations*, 48(2), 111–145.
- Dupuis, M. (2024). Algorithmic management and control at work in a manufacturing sector: Workplace regime, union power and shopfloor conflict over digitalisation. *New Technology, Work and Employment*. <https://doi.org/10.1111/ntwe.12298>
- Gallie, D. (2007). *Employment regimes and the quality of work*. Oxford University Press.
- Gebrial, D. (2022). Racial platform capitalism: empire, migration and the making of Uber in London. *Environment and Planning A: Economy and Space*. <https://doi.org/10.1177/0308518X221115439>
- Gent, C. (2018). *The politics of algorithmic management*. [Thesis submitted for the degree of Doctor of Philosophy in Interdisciplinary Studies, University of Warwick].
- Heiland, H. (2023). The social construction of algorithms: A reassessment of algorithmic management in food delivery gig work. *New Technology, Work and Employment*. <https://doi.org/10.1111/ntwe.12282>
- Herr, B. (2024). When flexible labour supply generates indeterminacy: Integrated labour control in place-bound platform work. *Work in the Global Economy*. <https://doi.org/10.1332/27324176Y2024D000000019>
- Ivanova, M., Bronowicka, J., Kocher, E., and Degner, A. (2018). *The app as a boss? Control and autonomy in application-based management*. Europa Universität Viadrina.
- Jarrahi, M. H., Newlands, G., Lee, M. K., Wolf, C. T., Kinder, E., & Sutherland, W. (2021). Algorithmic management in a work context. *Big Data & Society*, 8(2). <https://doi.org/10.1177/20539517211020332>
- Lee M. K., Kusbit, D., Metsky, E., & Dabbish, L. (2015). Working with machines: the impact of algorithmic, data-driven management on human workers. In: *Proceedings of the 33rd Annual ACM SIGCHI Conference*, Seoul, South Korea, 18–23 April. New York: ACM Press, 1603–1612.
- Levesque, C., & Murray, G. (2005). Union involvement in workplace change: a comparative study of local unions in Canada and Mexico. *British Journal of Industrial Relations*, 43(3), 489–514.
- Lloyd, C., & Payne, J. (2021). Food for thought: Robots, jobs and skills in food and drink processing in Norway and the UK. *New Technology, Work and Employment*, 38(2), 272–290.



- López, T., Riedler, T., Köhnen, H., & Fütterer, M. (2022). Digital value chain restructuring and labour process transformations in the fast-fashion sector: Evidence from the value chains of Zara & H&M. *Global Networks*, 22(4), 684–700.
- Myers, J. E. (2024). Triadic technology configuration: A relational perspective on technologists' role in shaping cloud-based technologies. *ILR Review*. <https://doi.org/10.1177/00197939241232992>
- O'Brady, S., & Doellgast, V. (2021). Collective voice and worker well-being: Union influence on performance monitoring and emotional exhaustion in call centers. *Industrial Relations*, 60(3), 307–337.
- Kellogg, K.C., Valentine, M., & Christin, A. (2020). Algorithms at work: The new contested terrain of control. *Academy of Management Annals*, 14(1), 366–410.
- Kirchner, S., & Schüßler, E. (2019). The organization of digital marketplaces: Unmasking the role of internet platforms in the sharing economy. In Ahrne, G. and Bunsson, N. (eds). *Organization outside organizations: The abundance of partial organization in social life* (pp. 131–154). Cambridge University Press.
- Kirchner, S., & Schüßler, E. (2020). Regulating the sharing economy: A field perspective'. In Maurer, I., Mair J. and Oberg, A. (eds). *Theorizing the sharing economy: Variety and trajectories of new forms of organizing: Research in the sociology of organizations, Vol. 66* (pp. 215–236). Bingley.
- Korpi, W. (1978). *The working class in welfare capitalism work, unions and politics in Sweden*. Routledge.
- Krzywdzinski, M., Pfeiffer, S., Evers, M., Gerber, C. (2022). *Measuring work and workers. Wearables and digital assistance systems in manufacturing and logistics* (WZB Discussion Paper SPIII 2022–301). WZB.
- Krzywdzinski, M., Schneiß, D., & Sperling, A. (2024a). Between control and participation: The politics of algorithmic management. *New Technology, Work and Employment*. <https://doi.org/10.1111/ntwe.12293>
- Krzywdzinski, M., Evers, M., & Gerber, C. (2024b). Control and flexibility: The use of wearable devices in capital- and labor-intensive work processes. *ILR Review*. <https://doi.org/10.1177/00197939241258206>
- Martindale, N., Wood, A. J., & Burchell, B. (2024). What do platform workers in the UK gig economy want? *British Journal of Industrial Relations*. <https://doi.org/10.1111/bjir.12797>
- Robinson, C. (1983). *Black marxism: The making of the black radical tradition*. Zed Press.

- Rosenblat, A., & Stark, L. (2016). Algorithmic labor and information asymmetries: A case study of Uber's drivers. *International Journal of Communication*, 10, 3758–3784.
- Schmalz, S., Ludwig, C., & Webster, E. (2018). The power resources approach: developments and challenges. *Global Labour Journal*, 9(2), 113–134.
- Shapiro, A. ([2017] 2018). Between autonomy and control: strategies of arbitrage in the 'ondemand' economy. *New Media & Society*, 20(8), 2954–2971.
- Schaupp, S. (2022). Algorithmic integration and precarious (dis)obedience: On the co-constitution of migration regime and workplace regime in digitalised manufacturing and logistics. *Work, Employment and Society*, 36(2), 310–327.
- Srnicek, N. (2017). *Platform capitalism (theory redux)*. Polity.
- Thompson, P., & Laaser, K. (2021). Beyond technological determinism: Re-vitalising labour process analyses of technology, capital and labour. *Work in the Global Economy*, 1(1–2), 139–159.
- Urzi Brancati, M.C., Gonzalez Vazquez, I., & Fernandez Macias, E. (2023). *The rise of digital monitoring and algorithmic management of work: Empirical insights*. European Commission, 2023, JRC133407.
- Vallas, S., Johnston, H., & Mommadova, Y. (2022). Prime suspect: Mechanisms of labor control at Amazon's warehouses. *Work and Occupations*, 49(4), 421–456.
- Van Oort, M. (2019). The emotional labor of surveillance: Digital control in fast fashion retail. *Critical Sociology*, 45(7–8), 1167–1179.
- Van Oort, M. (2023). *Worn out: How retailers surveil and exploit workers in the digital age and how workers are fighting back*. MIT Press.
- Veen, A., Barratt, T., & Goods, C. (2020). Platform-capital's 'app-etite' for control: A labour process analysis of food-delivery work in Australia. *Work, Employment and Society*, 34(3), 388–406.
- Wajcman, J. (2006). New connections: Social studies of science and technology and studies of work. *Work, Employment and Society*, 20(4), 773–86.
- Webster, E., Lambert, R., & Bezuidenhout, A. (2008). *Grounding globalization: Labour in the age of insecurity*. Blackwell.
- Wood, A.J. (2020). *Despotism on demand: How power operates in the flexible workplace*. Cornell University.
- Wood, A. J. (2021a). *Algorithmic management consequences for work organisation and working conditions*. JRC Working Papers Series on Labour, Education and Technology No. 2021/07.

- Wood, A. J. (2021b). Workplace regimes: A sociological defence and extension. *Work in the Global Economy*, 1(1–2), 119–138.
- Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. ([2018] 2019). Good gig, bad gig: autonomy and algorithmic control in the global gig economy. *Work, Employment and Society*, 33(1), 56–75.
- Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2019). Networked but commodified: The (dis)embeddedness of digital labour in the gig economy. *Sociology*, 53(5), 931–950.

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