Algorithmic Control: Does One Size Fit All?

Hui Hao, University of Massachusetts Amherst, huihao@umass.edu
Monideepa Tarafdar, University of Massachusetts Amherst, mtarafdar@umass.edu
Traci J. Hess, University of Massachusetts Amherst, thess@isenberg.umass.edu

Introduction and Motivation

Algorithmic work uses online labor platforms (OLPs) to digitally connect human workers (i.e., service providers) with service consumers (Duggan et al. 2020). Examples of OLPs include Uber, Deliveroo, Amazon Mechanical Turk (MTurk), and Upwork etc. Mediated by OLPs, humans interact with algorithms to accomplish work such as driving taxis, delivering food, and executing Human Intelligence Tasks (HITs) on crowdsourcing platforms such as MTurk (Duggan et al. 2020, Tarafdar et al. 2022). In turn, algorithmic control has emerged as an important aspect of algorithmic work. Algorithmic control (AC) is defined as the use of algorithms to manage the human workers who do algorithmic work and to ensure alignment between their task activities and the OLP's goals (Möhlmann et al. 2021, Wiener et al. 2021). OLPs use AC to allocate work to human workers, monitor workers' task activities, and evaluate their performance (Möhlmann et al. 2021, Wiener et al. 2021, Tarafdar et al. 2022).

Tasks associated with different types of algorithmic work can vary along three dimensions as shown in Table 1. *Task variety* represents the distinct types of jobs that workers perform (Zaniboni et al. 2013). For example, MTurk tasks range from filling out surveys to extracting data, while ride-sharing tasks are similar, such that all Uber drivers drive customers to a destination. *Task structure* is the extent to which tasks are clearly defined. In a highly structured task, procedures are well-defined, whereas in an unstructured task, there is uncertainty about how to proceed. For instance, tasks on Deliveroo are highly structured, e.g., a delivery worker should accept an order, drive to the restaurant, get the food, and deliver to the customer. While on Freelancers, a crowdsourcing platform, worker activities are hard to predict. *Task location* is the place where a task is conducted and can be either local or remote (Duggan et al. 2020). For example, Uber drivers drive customers to local destinations, while MTurk workers conduct their tasks remotely.

Task Variety	Task structure	Task Location	Example
high (different tasks)	low	remote	MTurk, Clickworker, Upwork, Fiverr
high (different tasks)	low	local	TaskRabbit
low (the same task)	high	local	Uber X, DoorDash, Postmates, Deliveroo

Table 1. Characteristics of Tasks and Different Algorithmic Work

Given these tasks differences in algorithmic work, AC should be correspondingly distinct for different types of algorithmic work. For example, low task structure implies that task related flexibility and innovation are important, whereas high task structure emphasizes task related efficiency and convenience. AC should be tailored accordingly, when the nature of the tasks such as the variety, structure, and location vary. However, the literature considers AC as an overall concept uniformly applicable to all types of algorithmic work. There is a lack of understanding of how different types of AC should be applied to different

kinds of algorithmic work. Such a lack of correspondence and fit can lead to both reduced worker performance and worker well-being (Cram et al. 2022). Therefore, *in this paper we develop a framework for explaining how and why different types of AC are applicable to different kinds of algorithmic work.*

Drawing from the configurational theory of organizational control, we first develop a classification framework for different kinds of AC. We then analyze existing types of algorithmic work within this framework and provide insight on the forms of AC that should be considered for different types of algorithmic work. Thus, we develop novel theorization that explains why different types of AC are needed for different kinds of algorithmic work. We also identify under-studied aspects of AC as opportunities for future research and provide practical implications for OLP designers and managers.

This paper is part of an ongoing larger, empirical research on control of algorithmic work. If accepted, we will present empirical findings from our ongoing analysis.

Literature Background

Algorithmic Control

AC refers to the use of algorithms to manage the human workers who do algorithmic work and to ensure alignment between their task activities and the OLP's goals (Möhlmann et al. 2021, Wiener et al. 2021). A related concept is that of algorithmic management, which is defined as "a system of control where self-learning algorithms are given the responsibility for making and executing decisions affecting labor, thereby limiting human involvement and oversight of the labor process" (Duggan et al. 2020). OLPs, in addition to matching work with the worker, also provide management functions in that the various activities executed by workers through the OLPs are controlled by algorithms (Möhlmann et al. 2021). Kellogg et al. (2020) proposed six formal control mechanisms through which algorithms direct (by restricting and recommending), evaluate (by recording and rating) and discipline (by replacing and rewarding) workers. Specifically, Wiener et al. (2021) and Cram et al. (2022) have investigated two forms of AC on Uber, i.e., gatekeeping and guiding. Gatekeeping AC focuses on who is allowed to commence, or to continue, working for Uber. Guiding AC is about influencing how workers conduct their daily work (Wiener et al. 2021, Cram et al. 2022). Evidence shows that AC can affect workers' continuance intention, workaround use (Wiener et al. 2021) and well-being (Cram et al. 2022). The current literature considers AC as a broad concept applicable to all types of algorithmic work. The literature needs a classification of AC corresponding to different types of algorithmic work.

Configurational Model of Organizational Control

Organizational control is defined as a "process whereby managers direct attention, motivate, and encourage organizational members to act in ways desirable to achieving the organization's objectives" (Cardinal et al. 2010, p. 56). Key aspects of organizational control include *control mechanisms*, *control targets*, and *control systems* (Cardinal et al. 2010). Based on these concepts, Cardinal et al. (2010) proposed a control configuration framework. Table 2 shows four types of control systems with their corresponding configurations of control mechanisms and targets: market, bureaucratic, clan, and

integrative. Within each system, control mechanisms are classified based on whether they are formal or informal and whether they are applied to input, behavior, or output targets.

Reliance on Informal Controls		LOW Reliance on Formal Controls			HIGH Reliance on Formal Controls		
HIGH		**Clan System**			**Integrative System**		
			Formal	Informal		Formal	Informal
		Input	Low	High	Input	High	High
		Behavior	Low	High	Behavior	High	High
		Output	Low	High	Output	High	High
LOW		**Market System**			**Bureaucratic System**		
			Formal	Informal		Formal	Informal
		Input	Low	Low	Input	High	Low
		Behavior	Low	Low	Behavior	High	Low
		Output	High	High	Output	High	Low

Table 2. The Configurational Model of Organizational Control

Control mechanisms refer to the means of control, formal or informal (Cardinal et al. 2010). Formal control mechanisms include officially sanctioned institutional aspects, such as written rules and procedural directives (Sitkin, 1995). Informal control mechanisms are based on values, norms, and beliefs that guide workers' actions and behaviors (Cardinal et al. 2010). *Control targets* are the specific elements of organizational transformation processes (i.e., inputs, behaviors, or outputs) to which control mechanisms are applied (Cardinal et al. 2010). Specifically, input controls focus on worker/employee skills as an input to work; behavioral controls regulate the specific worker/employee actions taken to complete the work; and output controls focus on work outcomes, e.g., performance quality, and customer satisfaction (Cardinal et al. 2010).

Control systems are configurations of formal and informal control mechanisms on different control targets (Cardinal et al. 2010). Organizations in market and bureaucratic systems focus more on formal control mechanisms. Managers in clan systems place greater emphasis on informal control mechanisms (Sitkin and George, 2005). In integrative systems, managers apply moderate to high levels of both formal and informal control mechanisms (Cardinal et al. 2010). In market systems, managers primarily focus on evaluating outcomes (e.g., performance quality) through formal and informal control while bureaucratic control systems apply high levels of formal control to the targets of input, behavior, and output (Cardinal et al. 2010).

Configurational Framework for Analyzing Algorithmic Control

Drawing from the above, we develop a configurational framework to explain how different control systems are needed for different kinds of algorithmic work. We focus on the work executed on prominent OLPs, including MTurk, Uber X, and Deliveroo, etc., as these OLPs collectively engage the largest number of workers and consumers (Schulze et al. 2021).

To start with, we argue that informal control for all forms of algorithmic work is generally low, with some variations between platforms. Informal control mechanisms refer to the use of values, norms, and beliefs to guide workers' actions and behaviors (Cardinal et al. 2010). In traditional organizations, workers learn values, norms, or beliefs from organizational trainings, regular meetings, conversation with peers etc. In contrast, OLP workers do not 'meet' and communicate with other workers. Training is confined to task execution. Thus, informal control is low, but it is not non-existent. It is enabled through online communities

and forums where algorithmic workers (e.g., MTurkers) socialize and exchange information about the OLP and their work (Martin et al. 2014). This enables the formation of values and norms that could influence workers' behaviors. Therefore, we map algorithmic work as either a market or bureaucratic system, both with low informal control.

To develop more granular insights vis-à-vis these two systems, we consider the characteristics of the tasks on particular OLPs, as shown in Table 3. OLPs such as MTurk and Upwork require different types of HIT tasks, e.g., data extraction, website design, and writing. This makes it difficult for the platform to control workforce quality (input control), as well as process rules and behavioral norms (behavior control). Moreover, those tasks tend to be less structured, and it is difficult to make specific rules or norms for work processes (behavior control). Further, all tasks on such OLPs are conducted remotely. When workers are from all over the world, maintaining human resource quality (input control) is far more challenging. Therefore, task characteristics make control of input and behavior less feasible. As a result, such OLPs pay more attention to the output of the work, e.g., client satisfaction, and work performance quality, and accordingly design mechanisms for both clients and workers to control outcomes. For example, Upwork clients can choose workers through a bidding process. On MTurk, clients can reject tasks that are not performed according to specifications and workers can decline to do tasks they find unsatisfactory. Crowd workers have created informal ways to increase their work performance quality (Martin et al. 2014), such as informal online communities, where they share advice and suggestions about how to do their work. Thus, market systems, where workers are controlled mainly by output, both formally and informally, should apply to these types of OLPs.

For OLPs such as DoorDash, the task for all workers is the same, i.e., delivering food to customers. That makes it more feasible for platform managers to set up consistent rules for managing worker skills and quality (input control), task processes (behavior control), and customer satisfaction (output control). Second, the task of food delivery is more structured. Such OLPs can define and organize worker activities (behavior control) as well as workers' required skills (input control). Third, the tasks are performed locally, e.g., DoorDash workers deliver food in a restricted area, which makes the selection of the workforce more manageable (input control). At the same time, work process changes are easier to handle (behavior control). Using rating and recording algorithms, customer satisfaction and worker performance quality (outcomes), are also easy to manage. Thus, bureaucratic systems with formal control mechanisms on input, behavior, and output should apply to these types of OLPs. Some OLPs may employ high levels of both formal and informal mechanisms, as integrative systems. Future studies could be conducted to verify the existence of such OLPs and explore their characteristics.

	Market System			**Bureaucratic System**		
Algorithmic Control		Formal	Informal		Formal	Informal
	Input	Low	Low	Input	High	Low
	Behavior	Low	Low	Behavior	High	Low
	Output	High	High	Output	High	Low
Algorithmic	MTurk, Prolific Academic, Clickworker,			Uber X, Didi, DoorDash, UberEats,		

Work	Microworkers, Picoworkers, Freelancer, Upwork, Fiverr, Deskwork, Guru, Zhubajie, TaskRabbit	Grubhub, Postmates, Deliveroo, Instacart, Meituan

Table 3. Configurational Framework of Algorithmic Control

Contributions and Implications

We develop a novel conceptual framework to explain how and why different AC systems are needed for different kinds of algorithmic work. We do this by categorizing algorithmic work of prominent OLPs by their task characteristics and mapping them into particular control systems. We make the following contributions to the IS algorithmic work literature.

First, we problematize the current monolithic approach to AC, given the variety of algorithmic work on different kinds of OLPs. Drawing from the configurational control approach, we classify different types of algorithmic work in different types of control systems. The systems differ by formal and informal control for each control target, i.e., input, behavior, and output. We thus provide a novel conceptual direction to the literature, which has so far examined only broad AC mechanisms.

Second, our framework identifies particular (formal and informal) AC mechanisms, that are salient for different types of algorithmic work. Using different tools to guide workers' actions (e.g., rules vs. norms), formal and informal control are both important and complement each other (Cardinal et al. 2010). In the context of algorithmic work, OLPs set up specific rules to guide, evaluate and discipline workers' performance, i.e., formal control. For informal control, workers develop and share work norms on online communities and forums, i.e., informal control (Martin et al. 2014). Algorithmic technologies can implement formal control, as they can direct, evaluate, and discipline workers (Kellogg et al. 2020). OLPs can also use technologies to support informal control, but we know little about how this can be done. We suggest that future studies address this shortcoming.

Practically, OLPs should use control systems that fit the task characteristics on the platform, which has implications for the design of OLP interfaces. When tasks are less structured, varied in content, and conducted remotely, OLPs should consider controlling the output of algorithmic tasks (e.g., taxi rider satisfaction), both formally and informally. In contrast, when the tasks are highly structured, similar in content, and conducted locally, OLPs could consider controlling not only output, but also input (e.g., rider qualification) and behavior (e.g., riding task processes).

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