Proceedings of the 53rd Hawaii International Conference on System Sciences | 2020

Perceived Organizational Support in the Face of Algorithmic Management: A Conceptual Model

Nura Jabagi, MBA
John Molson School of Business
n_jaba@jmsb.concordia.ca

Anne-Marie Croteau, PhD
John Molson School of Business
anne-marie.croteau@concordia.ca

Luc K. Audebrand, PhD
FSA ULaval
luc.audebrand@fsa.ulaval.ca

Abstract

Organizational support theory proposes that employees develop global beliefs concerning the degree to which an organization values their contributions and cares about their well-being. These beliefs, known as perceived organizational support (POS), are related to a number of positive employee outcomes, including: job satisfaction, work effort, performance, etc. Three categories of POS antecedents have been recognized in the literature: perceived supervisor support; fairness of organizational procedures; and organizational rewards and job conditions. In this paper, we explore these antecedent categories in the gig-work context where organizations replace human managers with algorithmic management practices and data-driven procedures. In doing so, we develop a new conceptual model that centers on the role that a gig-organization's algorithm plays in engendering POS by promoting perceptions of algorithmic fairness (PAF) and perceptions of autonomy support (PAAS). Contributions and future research avenues are discussed.

1. Introduction

The gig-economy is an emerging labor market in which organizations engage independent workers to complete short-term contracts known as "gigs", by connecting workers to customers via a platform-enabled digital marketplace. Lauded as the future of work [1], industry experts predict that by 2023 more than half of the U.S. workforce will participate in the gig-economy, at least occasionally [2]. While gig-organizations derive many operational benefits such as agility and reduced costs from their business model, given the size and distributed nature of their workforces, they cannot rely on the traditional means of supervision to coordinate and control work [3]. Instead they rely on algorithmic management, a managerial practice whereby human managers are replaced by software algorithms that oversee, control, and optimize the performance of myriads of virtual workers at a large scale [4, 5, 6].

In recent years, the societal and managerial implications of algorithms have spawned much public debate and drawn increasing attention from scholars [4, 5, 7]. With research into the impacts of algorithms on human workers and work practices still in its nascent stages, one area of study that remains underexplored is the impact of algorithmic management on gig-workers' perceptions of organizational support [4, 8]. Perceived organizational support (POS) is the degree to which employees believe that their "organization values their contributions and cares about their well-being" [9, p. 698]. Importantly, perceptions of organizational support among workers are shown to lead to increased job satisfaction, commitment and loyalty, job performance, organizational citizenship behavior (OCB), as well as reduced turnover and employee deviance [9, 10, 11].

While the notion of POS may, at first thought, seem irrelevant to the gig-work context given that independent work is typically defined in part by its lack of organizational support [8], and where workers are not employees and have no official human supervisor, POS has been found to apply in non-traditional work contexts akin to gig-work like contract work [12]. Such research has not only demonstrated that contingent workers can, and do, experience POS, but that they form perceptions of support from multiple organizational relationships, thereby suggesting the existence of unique antecedents for each relational source of POS [12].

Nevertheless, in spite of such emergent research, research exploring POS in non-traditional relationships is just beginning. Like many organizational behavior theories, POS was developed in traditional management contexts where human managers supervise and support full-time employees, often by building close, trust-based relationships [12]. Unsurprisingly, there is a gap in the literature concerning how workers develop POS when managed by a "faceless boss" and a set of organizational policies enacted through codes [4, 8].

As the application of new information technologies to organizational design continues to change the nature of work [3, 13], there is a need to conceptualize new POS antecedents for non-traditional work contexts [8, 10, 12]. Thus, the goal of our paper is to understand how

URI: https://hdl.handle.net/10125/64231
978-0-9981331-3-3

do the impersonal, technology-mediated practices inherent of algorithmic management impact workers' perceptions of organizational support, and to explore whether the lack of a human supervisor can be compensated for by other POS antecedents. As the use of algorithmic management reaches beyond the gig-economy [3, 6, 8, 14, 15], closing this research gap stands to offer theoretical and practical contributions to the social and managerial study of algorithms – two growing and critical areas of research [5, 6, 16].

Our paper is structured accordingly. We first introduce our research context, including boundary conditions. Next, we review the POS literature including key antecedents, and the importance of POS in the context of the gig-economy. We then introduce our model and theoretical development. We conclude by discussing our research contributions and future work.

2. Algorithmic Management & Gig-Work

The term algorithmic management was initially coined by Lee et al. [4] in reference to software algorithms and surrounding institutional devices (e.g., platforms) that assume managerial functions. Considered one of the core innovations enabling the platform-based business models of the gig-economy, algorithmic management has allowed gig-organizations to manage myriads of distributed laborers in an efficient (low-cost and real-time) manner [4, 5, 6, 16, 17]. In the gig-economy, algorithms are typically responsible for matching workers with customers, assigning work, monitoring and evaluating work performance, as well as implementing a range of HR decisions [4, 6, 18].

Insofar as algorithmic management is most often adopted in freelancing or quasi-employment contexts on digital labor platforms [5], we delineate the scope of this paper to the study of gig-workers participating on platforms that operate as digital marketplaces for alternative work where the services exchanged on the platform are remunerated, labor-intensive (e.g., Uber) rather than capital-intensive (e.g. Airbnb), and can be fulfilled either virtually via a crowdsourcing platform business model (e.g., MTurk, Upwork) [13, 19] or physically via an on-demand platform business model (e.g., Uber) [3, 4, 8].

Within these boundaries, we further recognize that intermediary digital labor platforms can be conceptualized as a set of technological affordances where there is a trade-off between the agency that platform features (e.g., algorithms) take in conducting transactions and the amount left to participants [13, 18]. Using this distinction, digital labor platforms can be classified along a continuum ranging from highly centralized models (which automate and take control of exchanges) to decentralized platforms (which rely on the discretion, and thus autonomy, of participants to conduct exchanges). Since algorithmic management was initially developed to optimize the convenience, speed, and seamlessness of undifferentiated, low-skill on-demand service exchanges (e.g., Uber) [4, 6, 15], we restrict our theory-building to workers participating on such highly centralized digital labor platforms. Notably, while freelancers marketing higher-skill services on "digital platforms with substantial autonomy may not expect a [platform-provider] to care about their well-being", low-skill workers who are more actively managed by a platform firm tend to perceive themselves as employees [8, p. 193]. By consequence, perceptions of organizational support could have important consequences for gig-workers performing low-skill work on highly centralized platforms [8].

Insofar as digital labor marketplaces typically involve three parties (clients, gig-workers, and the platform provider), the gig-work relationship bears conceptual similarities with traditional contract work [5]. Given findings that contract workers can form perceptions of organizational support from their staffing agency, the client organization, or both [12], we recognize that gig-workers could form perceptions of support from interactions with clients [19]. However, considering that the interactions low-skill gig-workers have with clients are substantially more fleeting than traditional contract workers [5, 8, 12], we limit our focus to POS deriving from the platform provider. Notably, Kuhn & Maleki [8] suggested that where the nature of a platform precludes workers from forming long-term relationships with clients, the quality of the relationship between the platform firm and gig-worker is likely paramount. Thus, focusing on platform-firm induced POS is conceptually and contextually important.

3. Perceived Organizational Support

The concept of POS derives from Organizational Support Theory (OST) which explains employer-employee relationships through the lens of social exchange theory [9]. Specifically, "OST invokes social exchange theory [by conceptualizing employment] as the trade of effort and loyalty by the employee for tangible benefits and social resources from the organization" [10, p. 1857]. Within this frame, OST assumes that workers ascertain an organization's readiness to reward their work efforts and to meet their socioemotional needs by developing a set of global beliefs concerning an organization's support. Perceptions of organizational support allow employees to gauge their valuation by the organization which can range from a perception that the "organization regards

them very positively" to the perception that the organization disdains them and wishes "to get rid of them given the first opportunity" [20, p. 4].

According to OST, POS should stimulate the norm of reciprocity such that employees treated favorably will care about an organization's well-being and feel an obligation to help the organization reach its objectives, as well as feel an expectation that their increased performance will be recognized and rewarded. As a result, both parties benefit: employees experience heightened positive mood and job satisfaction, while organizations reap the benefits of increased commitment, work-effort, and performance [9, 10].

3.1. Antecedents of POS

In their 2002 meta-analysis of 70 studies, Rhoades & Eisenberger [9] identified three major categories of POS antecedents, namely: perceived supervisor support (PSS); fairness of organizational procedures; and organizational rewards and job conditions. More recently, the importance of these antecedents was re-confirmed by Kurtessis et al.'s (2015) meta-analysis of 558 studies, which subsumed these categories into a set of more broadly defined categories of POS antecedents [10]. For the sake of parsimony, we focus our theoretical development on Rhoades & Eisenberger's categories. This decision is justified by the fact that both PSS and fairness have been found to have the largest and most significant effects on POS in both meta-analyses.

We now briefly elaborate these antecedents to provide a conceptual understanding of their connections to POS and their underlying processes in traditional management contexts. Prior to doing so, it is important to note that in order to positively impact POS, the favorable treatment of workers through these antecedents must be perceived as discretionary (e.g., under the control of the organization), as opposed to compulsory practices imposed by external constraints (e.g., government regulations, public pressure, or a tight job market) [9, 10, 20]. Specifically, when the favorable treatment of workers is considered voluntary on the part of the organization, it signals that the motives behind such treatment are concerned with employees' welfare, and therefore they positively impact POS [20].

3.1.1. Perceived supervisor support (PSS). In the same way that employees develop global beliefs concerning their valuation by the organization, they also form similar views concerning the degree to which other organizational members value their contributions and care about their well-being [9]. The favorable treatment of employees by organizational members is linked to POS because of employees' tendency to personify the organization and to "attribute role-related actions taken by members of the organization to the organization itself" [10, p. 1861]. Thus, since supervisors act as agents of the organization, and have direct ties to upper management, employees associate supervisor support with organizational support [9].

Although both perceived co-worker support and team support have been positively related to POS, perceived supervisor support (the extent to which employees believe that their supervisor values their contributions, offers assistance, and cares about their well-being) has a significantly stronger effect on POS than support from other members [10]. The reason for this difference is because supervisors more closely embody the organization and are seen as acting on its behalf through their responsibility for directing and evaluating sub-ordinates' performance [10]. Moreover, supervisors and other organizational leaders play a key role in providing rewards and allocating resources to employees, and thus are considered to be a greater source of organizational support than coworkers [10].

3.1.2. Fairness of organizational procedures. The concept of fairness originates from the Theory of Organizational Justice [11]. Procedural justice concerns the fairness of the approaches used to determine how resources such as pay, promotions, and job assignments are distributed. Given that organizational procedures are considered by employees to be highly discretionary as well as essential to their long-term interests and well-being, procedural fairness has been found to be one of the strongest drivers of POS [9, 10].

Notably, procedural justice has been conceptualized as having both structural and social aspects [9]. Specifically, structural aspects are viewed as concerning the formal rules and policies pertaining to decisions that impact employees, including: "adequate notice before decisions are implemented, the receipt of accurate information, and voice (i.e., employee input in the decision process)" [9, pp. 700-701]. Social aspects are viewed as involving the quality of interpersonal treatment in the resource allocation process, including: "treating employees with dignity and respect, providing employees with opportunities for active involvement in the development and application of organizational procedures, and providing employees with information concerning how outcomes are determined" [ibid.].

Given these two conceptualizations, procedural justice can be both a function of an organization, such as through a formalized decision-making system, or a function of a decision-making agent such as a manager that involves an employee in decisions [21]. Nonetheless, regardless of the source, repeated episodes of intentional fairness in resource distribution are shown to have a strong cumulative effect on POS by signaling concern for employees' welfare [9].

3.1.3. Organizational rewards and job conditions. Human resource (HR) practices that recognize employees' contributions, as well as various work-role characteristics and job conditions, have long-been linked to POS. A wide array of HR practices and job conditions have been explored in relation to POS, including, but not limited to: rewards, benefits, job security, autonomy, flexible work-practices, as well as training and developmental opportunities [9, 10, 12].

It is important to note that of the three categories of antecedents, organizational rewards and job conditions have a weaker impact than PSS and fairness since they tend to be attributed to external pressures rather than to discretionary behavior [9]. Nevertheless, various HR practices, such as rewards and working conditions are linked to POS since employees consider such factors to be directly tied to the enhancement of their welfare. Specifically, by communicating a positive valuation of employees' contributions, favorable opportunities for rewards (e.g., recognition, pay, etc.) positively impact workers' perceptions of organizational support [9, 10].

Similarly, by providing workers with assurance that the organization wishes to maintain their future membership, both job security as well as training and development opportunities are positively linked to POS. Conversely, organizational size is negatively related to POS; specifically, individuals feel less valued in large organizations where formalized policies and procedures may reduce flexibility in dealing with employees' individual needs. In terms of effect size, both job security and autonomy have been found to have the strongest relationships with POS, while training and organizational size have been shown to have moderate relationships [9, 10].

3.2. POS and the gig-economy

Extensive research, including two meta-analyses (e.g., 12, 13), suggests that gig-organizations can address two of their key HR management challenges by engendering POS among gig-workers. Firstly, gig-organizations face high turnover rates [3]. Given that POS has been related to reduced voluntary turnover and turnover intentions [9, 10], gig-organizations that are perceived to care about workers' well-being should be better positioned to address the challenges of retaining independent workers. In point of fact, in discussing POS and PSS, Kuhn & Maleki reported that "workers who quit platforms often cite a lack of support" [8, p. 193].

Secondly, gig-organizations face the challenge of managing a large workforce of independent gig-workers that are often engaged in client-facing roles, and where there is a high risk for opportunistic behavior [3]. As an example, in a bid to increase earnings per ride, Uber drivers were found to be gaming Uber's dynamic pricing model by simultaneously logging off the app to deceptively activate surge pricing [17]. Where POS has not only been positively linked to performance, but also to organizational identification and organizational citizenship behavior, the theory of social exchange contends that gig-organizations that are perceived to care about workers' well-being are better positioned to manage workers' performance and to mitigate the risks of deviant behavior [9, 10, 11, 12].

While the benefits of engendering POS among gig-workers are clear, traditional paths to POS can be disrupted in the context of platform work. For instance, job conditions critical to the formation of POS such as job security and organizational size are hindered in the context of algorithmically-managed platform work. Specifically, platform work is characterized by low job-security [13], a lack of benefits [8], threats to autonomy [3, 5, 6], as well as a large and boundless organizational size [4, 5], all of which can harm POS.

The use of algorithmic management is also expected to disrupt the POS antecedents of supervisor support and procedural fairness. Insofar as algorithmic management systems necessitate the minimization of human intervention to benefit from algorithmic-efficiencies, algorithmic management marks a radical departure from earlier managerial logic, which relied heavily on human supervisors to direct work [5, 6, 15]. In algorithmically managed contexts, most managerial and decision-making processes are reduced into a set of opaque algorithmic processes that are both complex and inaccessible to the typical worker [1, 6, 8]. Thus, given the scarcity of human intervention and considering that workers' subjective interpretations of procedural justice play a key role in forming perceptions of organizational support, both antecedents of supervisor support and procedural justice will be disrupted by algorithmic management [8]. As such, a new theory of POS is required for algorithmically-managed gig-work.

4. Theoretical Development

We now develop our conceptual model exploring the impact of algorithmic management on POS. To do so, we rely on Möhlmann & Zalmanson's [5] conceptualization of algorithmic management which defines the concept across five dimensions: (1) the constant tracking of workers' behavior; (2) constant performance evaluation; (3) the automatic implementation of decisions; (4) workers' interaction with a "system"; and (5) (low) transparency. We adopt Möhlmann & Zalmanson's conceptualization as it is the first detailed, IS-specific research perspective of the phenomenon. Notably, their model is aligned with Lee et al.'s [4] pioneering exploration of the phenomenon,

and recent high-level definitions of algorithmic management and its key features (e.g., [15, 22]).

The foundation of our model (Figure 1) hinges on the role that a gig-organization's algorithm plays in engendering POS by promoting perceptions of fairness and perceptions of autonomy support. Our theoretical development is structured as follows. First, we propose the perception of algorithms as 'social agents' and introduce two algorithmic perceptions as antecedents of POS. After, we explore these two antecedents in depth to understand how they are impacted by Möhlmann & Zalmanson's dimensions of algorithmic management.

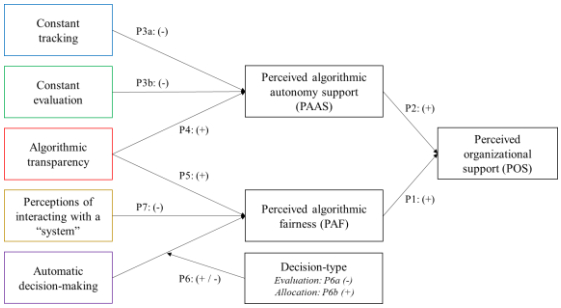

Figure 1: Conceptual Model

4.1. Algorithms as Social Agents

Insofar as gig-workers lack an official human supervisor and are often managed through customer service representatives over email correspondences or chatbots [5, 10], PSS is likely to be low [10]. Yet when supervisors are replaced by algorithms, we suggest that key POS antecedents are embodied within the algorithm itself such that it will be considered as more than just a tool or set of rules, but also as a social actor – an algorithmic 'manager' per se. To understand this conceptualization, we defer to a key predecessor of the contemporary literature on algorithmic perceptions.

Dating back nearly 20 years, scholars in the fields of human-computer-interaction (HCI) and social factors, studied how people perceive computers [14]. Within this stream of work, the Computers Are Social Actors (CASA) paradigm originated with the publication of Nass & Moon's [23] article which demonstrated that people respond to computers according to "socio-psychological principles similar to those that regulate human-to-human interaction" [14, p. 3]. Drawing on the human personality psychology literature, Nass & Moon argued that the tendency for individuals to interact with computers as if they were social agents, and not just tools, was due to individuals mindlessly applying social rules and expectations to computers [23].

Mindless behavior is the result of conscious attention to a subset of contextual cues, where such "cues trigger various scripts, labels, and expectations, [that] in turn focus attention on certain information while diverting attention away from other information" [23, p. 83]. Thus, to elicit mindless social responses in a computer-human context, a person must be presented with an object that has sufficient humanlike cues to lead the person to categorize it as worthy of social responses while ignoring the asocial nature of the computer [23]. Nass & Moon suggested three cues that might encourage the categorization of computers as social actors, namely: (1) words for output; (2) interactivity or responses based on multiple prior inputs; and (3) the filling of roles traditionally filled by humans.

Arguably, all of these cues are present in the context of algorithmic management where software algorithms operating on platforms assume managerial functions, and gig-workers remain connected to the digital labor platform through a digital device. Specifically, by virtue of definition, managerial algorithms fill roles traditionally assigned to humans. Moreover, the algorithms powering the platforms, which serve as the interface between the gig-worker and algorithm, use words for output, and exhibit high interactivity and responses based on personalized information which is supplied and gathered via the digital device that connects a worker to the platform [4, 5, 15]. Thus, we argue that the algorithms operating on digital labor platforms provide sufficient bases for workers to cue "humanness," and to encourage social responses via the treatment of computers as social actors.

4.1.1. Perceived Algorithmic Fairness. Perceptions of organizational support are driven by employees' tendencies to assign humanlike characteristics to organizations and to attribute the actions taken by its agents (e.g., managers) as indications of the organization's intent towards them. This process of personification is supported by "the organization's legal, moral, and financial responsibility for the actions of its agents; by organizational policies, norms, and culture that provide continuity and prescribe role behaviors; and by the power the organization's agents exert over individual employees" [9, p. 698].

Considering that algorithms implemented in management contexts operate on, and enact, a set of previously developed rules and instructions that embody an organization's policies and procedures, we suggest that managerial algorithms can be considered both as embodiments of procedural justice, and as organizational agents demonstrating fairness (or unfairness) in their decision-making processes. This proposition is supported by the CASA literature [23], and the notion that procedural justice can be a function of an organization, such as its formal decision-making system, or a function of a decision-making agent [21].

Importantly, recent work suggests that individuals do attribute managerial algorithms to the organizations

that chose them [14]. This is aligned with the fact that as an intermediary between workers and clients, the platform owner is the only party with full access to and control over the platform's data, processes, and rules [3]. As such, a gig-organization's algorithm(s) "can be understood as an automated manifestation of the interests of the platform organizer" [6, p. 9]. We therefore introduce the concept of Perceived Algorithmic Fairness (PAF) which we define as a platform-worker's perception concerning the fairness of the algorithmic approaches applied by a digital labor platform to determine how resources are distributed. Thus, we propose:

P1: *Perceived algorithmic fairness will be positively related to POS.*

4.1.2. Perceived Algorithmic Autonomy Support. While many job conditions critical to the formation of POS are hindered in algorithmically-managed contexts we propose that job autonomy will remain a key determinant of POS for platform workers. Specifically, the need for autonomy has been cited extensively by independent gig-workers as a leading driver for participation in the gig-economy [1, 3, 5, 6, 8, 17, 13].

Generally speaking, autonomy refers to an individual's inherent desire to experience a sense of choice, volition, and psychological freedom when engaging in an activity [3], while job autonomy refers to the freedom an individual has in carrying out their work including planning, decision-making, and choosing when and how to perform the task [9, 13]. Within the motivation literature, autonomy is considered a basic need among individuals such that its satisfaction promotes worker well-being [24]. Similarly, within the job-design literature, autonomy has been emphasized as an important aspect of job-design that makes jobs more satisfying, thereby promoting employee well-being [3]. Importantly, both the technical aspects of one's work (e.g., job-design) as well as the general social context in which the work is done can (e.g., managers' treatment of employees) can promote workers' autonomy [3, 24].

In the context of the gig-economy, algorithms typically assume control and responsibility for matching of workers with customers, assigning work, and evaluating workers' performance [4, 6, 15]. In this frame, a gig-worker's autonomy is defined in terms of their ability to self-schedule when they work, their right to reject or accept gigs and, depending on the platform, their ability to choose the methods and processes they use to conduct their work [1, 3, 6, 8]. Importantly, recent research has proposed that the operational choices embedded within a platform's architecture will implicitly shape a platform workers' autonomy such that platforms can be conceptualized and defined as either autonomy supportive or non-supportive [3, 8]. We thus introduce the concept of perceived algorithmic autonomy support (PAAS), which we define as the degree to which a platform-worker perceives that an algorithmically-managed digital labor platform is autonomy supportive.

Notably, the promise of freedom and autonomy (e.g., *be your own boss*) is a well-recognized cornerstone of the gig-economy's recruitment tactics. In this respect, platforms that fail to support workers' autonomy may represent a breach in psychological contract [12]. The concept of "psychological contract reflects employees' beliefs about their social exchange relationships with their organization, mutual obligations, and the extent to which the obligations are fulfilled" [10, p. 10]. Per Kurtessis et al. [10], obligations can be based on explicit organizational promises or implicit expectations held by employees. Since organizational promises are most often viewed as voluntary, contract breach has a strong negative relationship with POS [10]. Thus, platforms that thwart workers' autonomy should be negatively related to POS. Conversely, by demonstrating the organization's trust in workers' judgment and skills to decide wisely how to do their job, platforms that support workers' autonomy should strengthen POS [9, 10]. Moreover, in doing so, platforms that support workers' autonomy also demonstrate organizational concern for workers' well-being [3, 24] and fulfillment of the psychological contract [10]. Thus, we propose that:

P2: *Perceived algorithmic autonomy support will be positively related to POS.*

4.2. Perceived Algorithmic Autonomy Support

Given that companies that promote workers' autonomy through the right to self-schedule and the right to accept or decline work-orders tend to experience reduced profit margins, as well as coverage issues leading to client dissatisfaction, gig-organizations are known to counter workers' autonomy through "softer" and less visible forms of control [1]. A well-recognized phenomenon of the gig-economy, the concept of 'soft control' [17] is enabled by three features of algorithmic management: constant tracking; constant evaluation, and low transparency or high opacity [1, 5, 17, 18].

4.2.1. Constant tracking and evaluation. Algorithmic management is characterized by the constant tracking of individual workers' behaviors through a digital device that connects the worker to the platform [4, 5]. Such tracking can take various forms ranging from the tracking of Uber drivers' locations and driving patterns (e.g., acceleration and breaking) to platform-based surveillance software such as Work Diary used by Upwork to track workers' keystrokes and take

screenshots of their work [3, 5, 8]. In turn, the tracked data is used to evaluate workers' performance [4, 5, 17] whereby an algorithm will automatically reward or punish workers for achieving or failing to maintain benchmark levels of key performance indicators [1, 3, 4, 5]. Through algorithmic tracking and evaluations, workers' autonomy can be significantly curtailed; specifically, both the surveillance of workers as well as evaluations (accompanied by rewards or punishments) have been shown to threaten perceptions of autonomy and to foster feelings of control by impeding workers' freedom to govern and control their behavior [3, 1, 6, 8]. Thus, we propose that:

P3: *The constant tracking of gig-workers' behaviors (P3a) and the constant evaluation of their performance (P3b) will be negatively related to perceived algorithmic autonomy support.*

4.2.2. Algorithmic transparency. The term 'algorithmic transparency' was coined by Diakopoulos & Koliska [25] in reference to the disclosure of the factors that influence the decisions made by algorithms to ensure the monitoring, checking, criticism, and/or intervention by those who use, regulate, and are impacted by such algorithms. Per Möhlmann & Zalmanson [5], algorithmic management is characterized by low levels of transparency, a situation known as algorithmic opacity [25, 26]. Understandably, algorithmic opacity is often a strategic decision taken by the platform owner to avoid disclosing proprietary information and to deter workers from 'gaming the system' [4, 5, 6, 26]. Most often, it is leveraged by platform owners to intentionally generate information asymmetries aimed at controlling workers' decision-making autonomy [1, 6, 17, 25, 26].

When algorithms lack transparency, the decisions generated by an algorithm can seem "impenetrable, erratic, and unpredictable" [6, p. 2] leaving workers frustrated with the opacity of the decision-making system, and leading to reductions in workers' autonomy [3, 4, 5, 6, 16, 17, 27]. For instance, Shapiro [1] found that updates to the worker-facing application that limited the information an algorithm provided the worker, as well as unannounced changes to the algorithms' payment system, substantially curtailed workers' decision-making capacities with respect to which jobs to accept or decline. Conversely, when algorithms are transparent, workers are able to gain a basic familiarity with the platform's functions [6] and, by extension, regain their sense of autonomy through their ability to navigate and control various aspects of their work, and to take informed decisions [4, 5, 6].

Notably, transparency is also viewed as a way to discern the truth and motives behind people's actions [6, 25]. Given that algorithmic transparency bolsters workers' decision-making capacities, it is likely to be perceived by workers as an indication of the organization's trust in their abilities to decide wisely how to do their job, and thereby a support of their autonomy. Thus, we propose that:

P4: *Algorithmic transparency will be positively related to perceived algorithmic autonomy support.*

4.3. Perceived Algorithmic Fairness

Digital labor platforms rely heavily on minimizing human intervention to ensure flexibility, agility, and efficiency through a process of scaling and automation [5, 6, 14, 18]. As a result, algorithmic working environments are characterized by the automatic implementation of decisions where "algorithms do things" and feelings of working with a "system" rather than humans [5, 16, 17]. Justifiably, the impacts of algorithms as both decision-makers and enactors on workers' perceptions of fairness are significant, particularly in the characteristically low transparency context of algorithmic management [5, 14].

4.3.1. Algorithmic transparency. Generally speaking, procedural fairness is determined by whether the decision-making process is: based on accurate information; objective; transparent; consistently applied; and includes safeguards, such as an appeal process to correct flawed or inaccurate decisions [8, 9, 10, 21]. Given that algorithmic decision-makers lack both agency and emotion and, by definition, follow the same set of procedures every time, it has been suggested that algorithms have the potential to reduce bias and increase consistency in managerial processes such as decision-making [5, 8, 14]. Yet, it has also been found that the choices and decisions made by algorithms cannot be considered entirely free of bias [25] given that they "reflect both the conscious and subconscious assumptions and ideas of their creators" [16, p. 19].

Given these conflicting findings and considering that judging the bias of an organization's algorithm would be beyond the scope of this paper, we focus our theorizing on algorithmic transparency. Specifically, the organizational justice literature contends that providing employees with information concerning how outcomes are determined is key to engendering perceptions of procedural fairness and trustworthiness. Moreover, the provision of such information also allows workers to ascertain whether the decision-making process represents the concerns of the groups impacted, another criterion used to ascertain procedural fairness [9, 10, 21, 25]. Thus, we propose that:

P5: *Algorithmic transparency will be positively related to perceptions of algorithmic fairness.*

Notably, algorithmic transparency can also enable workers to form perceptions concerning other aspects of procedural fairness, including the presence of bias and the consistency of decisions over people and time, where the latter is particularly hard to discern given that algorithms also change over time as they learn [5, 26].

4.3.2. Automatic decision-making. Within algorithmic management systems, algorithms form and automatically execute a range of managerial decisions [4, 5]. While automatic decision-making processes promote operational efficiency [5], they may also have detrimental impacts on perceptions of fairness. As mentioned earlier, perceptions of procedural fairness are enhanced when decision-makers involve workers in decisions and provide them with adequate notice before such decisions are made. Considering that algorithmic decision-making processes are formed and executed automatically with minimal human intervention [4, 5], organizational justice theory suggests that automatic decision-making is expected to be negatively related to perceived algorithmic fairness [21]. Nevertheless, given that organizational justice theory was initially conceptualized for traditional work contexts where humans take and implement managerial decisions, to fully understand the impact of automatic decision-making on perceptions of procedural fairness, we must look to emerging work exploring the perceived fairness of algorithmic decision-makers.

In a recent experiment comparing algorithmic and human decision-makers across different decisions, Lee [14] found that people's perceptions of fairness were impacted by decision-type. Specifically, Lee identified two managerial decision-types: those requiring *mechanical skills* (e.g., work assignment and work scheduling) and those requiring *human skills* (e.g., hiring and work evaluation). In comparing participants' reactions across decision-makers and decision-types, Lee [14] found that when algorithms allocated work (a task requiring *mechanical skills*), such decisions were perceived as equally fair to human-made decisions. In this case, participants attributed the fairness of algorithmic decisions to their perceived efficiency and objectivity. Conversely, when algorithms evaluated workers (a task requiring *human skills*), people tended to view such decisions as less fair than human-made decisions due to perceptions that algorithms lack "intuition, only measure quantifiable metrics, and cannot evaluate social interaction or handle exceptions" [p. 12].

Thus, in contexts where automatic decision-making "leaves no time to discuss or revise decisions arising from special circumstances not wholly captured by the data" [5, p. 5], and where people perceive algorithms as efficient, but incapable of considering the nuances of human behavior as well as other non-quantifiable variables, we propose that:

P6: *The relationship between automatic decision-making and perceived algorithmic fairness will be moderated by decision-type, such that automatic decision-making will have a negative impact on perceived algorithmic fairness for work evaluation decisions (P6a) and a positive impact for work allocation decisions (P6b).*

4.3.3. Interacting with a "system". Another key determinant of procedural justice is the inclusion of mechanisms, or safeguards, to correct flawed or inaccurate decisions. Also, from a social perspective, providing employees with a 'voice' (e.g., allowing for input in the decision-making process) as well as providing information concerning how outcomes are determined have both been found to cultivate a strong sense that one's organization values one's contribution and cares about one's well-being [9, 10, 21].

Per Möhlmann & Zalmanson [5], a defining characteristic of algorithmic work environments is the lack of human and social relationships. In particular, gig-workers lack both an official human supervisor as well as access to co-workers [3, 4, 5, 6, 8]. Although gig-workers across various platforms (e.g., MTurk, Uber, TaskRabbit) have created independent online forums to support each other and to voice their opinions [3, 4, 6, 8], the social interactions afforded by these forums would have limited impact on perceptions of the social aspects of procedural justice. Specifically, although online forums provide a space for sensemaking activities around algorithmic management [1, 4, 5] that may help workers to understand and thereby ascertain whether a platform's decision-making algorithm is objective, lacks bias, and/or is consistently applied, these forums are neither supported nor promoted by platform owners [3]. As such, any information provided through such forums (and sensemaking activities, [6]) concerning algorithmic decisions is unlikely to be attributed to the organization, or its concern for workers' well-being [8]. Moreover, given that such virtual communities are independently run, they provide no avenues for workers to have a voice in organizational decision-making, nor do they offer organizationally-endorsed safeguards for appealing decisions.

Considering that algorithmic management allows a few human managers to oversee thousands of workers, by definition, gig-workers tend to have limited avenues to discuss issues with human supervisors [4, 5]. Specifically, given the lack of open, two-sided communication, algorithmic management does not allow for the questioning and discussing of algorithmic decision-making processes and outcomes [5]. Moreover, even when workers attempt to reach

customer service agents or managers, they are often referred to chatbots or email correspondence mediated via the platform [8, 17]. As a result, workers tend to perceive that they are working for an abstract "system", rather than an organization composed of people [5]. Thus, we propose that:

P7: *Perceptions of interacting with a "system" will be negatively related to perceived algorithmic fairness.*

5. Scholarly and Practical Contributions

To the best of our knowledge, this paper is among the first in IS to explore the impact of algorithmic management on POS. From a scholarly standpoint, it answers calls for technology-focused research on the growing platform economy. According to a recent review, though 91% of the papers surveyed consider technology to be a critical element of the platform-economy, most studies tend to ignore or black-box the conceptualization of technology [18]. By adopting Möhlmann & Zalmanson's [5] IS-based conceptual framework to explore how the five dimensions of algorithmic management impact POS, we begin to unpack the role of technology in this research stream [18]. Importantly, our focus on algorithmic perceptions (e.g., PAAS and PAF) is aligned with a growing stream of work exploring how people perceive algorithms and the mental models they form concerning how algorithms operate, despite how they actually work [14].

By exploring the phenomenon of POS within the context of the algorithmic management and the gig-economy, we answer calls for research exploring the impacts of contextual variables on POS [10], and the impact of algorithmic management on perceptions of justice and organizational support [8, 14]. Building on the CASA paradigm, we suggest that, in the absence of human interaction with organizational members (e.g., supervisors and peers), an organization's algorithm is likely to be viewed by gig-workers as both a social agent of the organization and a manifestation of the organization itself. Importantly, this proposition leads to several implications for the development of POS which can be empirically tested in the context of algorithmically-managed platform work. Notably, a key benefit of organizational support theory for the study of algorithmic management is that it is a relatively mature stream of research with well-established instruments that are readily available for empirical testing [9].

Given that gig-organizations are still experimenting with the technical designs and algorithms governing their platforms, scholars from the fields of IS and management have turned their attention to the design of platforms in an effort to improve both the treatment of workers and their satisfaction [3, 5, 6, 19]. From a practical standpoint, our paper highlights the possibility for gig-organizations to gain strategic advantage by engendering POS through the design of their platforms to address the universal challenges of retention and supervision in the gig-economy. In doing so, our paper echoes concern for the need for increased transparency in platform algorithms and the importance of the 'human element' with respect to decisions pertaining to evaluation and the provision of support [1, 5, 8, 14].

Understanding that algorithmic opacity is often an intentional strategy to protect 'trade secrets' tied to shareholder value, our theoretical development stresses that organizations must pay careful consideration to what aspects of the decision-making process should be transparent vs. opaque. More specifically, platform owners should bolster algorithmic transparency where doing so supports workers' autonomy. Though platform owners may worry that increasing transparency will enable workers to 'game the system', research shows that when faced with algorithmic opacity, workers tend to engage in sensemaking to circumvent algorithms that curtail their autonomy [1, 4, 6, 8]. In such cases, workers are more prone to harbor negative feelings towards the organization and to game the system in retaliation [4].

At a high-level, increasing algorithmic transparency could involve explaining to platform workers the goals and intent of a managerial algorithm, as well as articulating the "rationale for the selection, inclusion, exclusion, or optimization of various inputs or outputs to the algorithm" [25, p. 817]. Where disclosing algorithms is not possible, organizations may seek to elicit feelings of procedural fairness by submitting themselves to routine algorithmic audits carried out by a third-party which can provide indications that algorithms are objective, accurate, and consistent [26].

6. Limitations & Future Research

Given the developmental nature of our paper, two limitations in our work present opportunities for future research. Firstly, we did not consider the impact of workers' personality on POS and its algorithmic antecedents. For instance, individuals' dispositional tendencies to experience positive or negative affect can "influence POS by altering whether employees interpret organizational treatment as benevolent or malevolent" [9, p. 701]. Secondly, we did not consider differing extents of algorithmic management, which can impact a worker's agency and autonomy [18]. These limitations present valuable future research opportunities.

The next step in our research is to empirically test our theory. Due to the complexity of our model and the lack of existing instrumentation for the concept of algorithmic management (and its sub-dimensions), we

will begin by testing P1 and P2. An online survey study has been designed to collect data from a sample of 200 Uber drivers (an extreme case of algorithmic management) [5]. Undertaking our survey will require developing an instrument for our newly proposed PAAS construct. To do so, we will conduct interviews with Uber drivers, followed by content-validation with experts. We hope that the next stages of our research will provide both methodological and theoretical contributions to the study of algorithms and POS.

7. References

[1] A. Shapiro, "Between autonomy and control: Strategies of arbitrage in the "on-demand" economy," *New Media & Society*, vol. 20, pp. 2954-2971, 2018.

[2] I. Mitic, "Gig Economy Statistics for 2019: The New Normal in the Workplace," Fortunly, 1 August 2019. [Online]. Available: https://fortunly.com/statistics/gig-economy-statistics. [Accessed 23 August 2019].

[3] N. Jabagi, A.-M. Croteau, L. K. Audebrand and J. Marsan, "Gig-workers' motivation: thinking beyond carrots and sticks," *Journal of Managerial Psychology*, vol. 34, no. 4, pp. 192-213, 2019.

[4] M. K. Lee, D. Kusbit, E. Metsky and L. Dabbish, "Working with Machines: The Impact of Algorithmic, Data-Driven Management on Human Workers," in *33rd Annual ACM SIGCHI Conference*, 2015.

[5] M. Möhlmann and L. Zalmanson, "Hands on the wheel: Navigating algorithmic management and Uber drivers'," in *38th ICIS Proceedings*, Seoul, 2017.

[6] M. H. Jarrahi and W. Sutherland, "Algorithmic Management and Algorithmic Competencies: Understanding and Appropriating Algorithms in Gig work," in *iConference* , Washington, 2018.

[7] S. Newell and M. Marabelli, "Strategic opportunities (and challenges) of algorithmic decisionmaking: A call for action on the long-term societal effects of 'datification'," *The Journal of Strat. Info. Systems*, vol. 24, pp. 3-14, 2015.

[8] K. Kuhn and A. Maleki, "Micro-entrepreneurs, dependent contractors, and instaserfs: understanding online labor platform workforces," *The Academy of Management Perspectives*, vol. 31, no. 3, pp. 183-200, 2017.

[9] L. Rhoades and R. Eisenberger, "Perceived organizational support: a review of the literature.," *Journal Applied Psychology*, vol. 87, pp. 698-714, 2002.

[10] J. N. Kurtessis, R. Eisenberger, M. T. Ford, L. C. Buffardi, K. A. Stewart and C. S. Adis, "Perceived Organizational Support: A Meta-Analytic Evaluation of Organizational Support Theory," *Journal of Management*, vol. 43, no. 6, pp. 1854-1884, 2017.

[11] X. Pan, M. Chen, Z. Hao and W. Bi, "The Effects of Organizational Justice on Positive Organizational Behavior: Evidence from a Large-Sample Survey and a Situational Experiment.," *Frontiers in Psychology* , vol. 8, 2018.

[12] B. Baran and L. M. L. Shanock, "Advancing organizational support theory into the twenty-first century world of work," *Journal of Business and Psychology*, vol. 27, pp. 123-147, 2012.

[13] X. N. Deng and K. Joshi, "Is Crowdsourcing a Source of Worker Empowerment or Exploitation? Understanding Crowd Workers' Perceptions of Crowdsourcing Career," in *34th ICIS Proceedings*, Milan, 2013.

[14] M. Lee, "Understanding perception of algorithmic decisions: Fairness, trust, and emotion in response to algorithmic management," *Big Data & Society*, vol. 5, no. 1, pp. 1-16, 2018.

[15] A. Mateescu and A. Nguyen, "Explainer: Algorithmic Management in the Workplace," Data & Society, 2019.

[16] W. Orlikowski and S. Scott, "The Algorithm and the Crowd: Considering the Materiality of Service Innovation," *MIS Quarterly*, vol. 39, no. 1, pp. 201-216, 2015.

[17] A. Rosenblat and L. Stark, "Algorithmic Labor and Information Asymmetries: A Case Study of Uber's Drivers," *International Journal of Communication*, vol. 10, pp. 3758-3784, 2016.

[18] W. Sutherland and M. Jarrahi, "The Sharing Economy and Digital Platforms: A Review and Research Agenda," *International Journal of Information Management*, vol. 43, pp. 328-341, 2018.

[19] J. Taylor and K. Joshi, "Joining the Crowd: The Career Anchors of Information Technology Workers Participating in Crowdsourcing," *Information Systems Journal*, vol. 29, no. 3, pp. 641-673, 2019.

[20] R. Eisenberger, G. Malone and W. Presson, "Optimizing Perceived Organizational Support to Enhance Employee Engagement," *SHRM-SIOP*, 2016.

[21] J. Colquitt, D. Conlon, M. Wesson, C. Porter and K. Ng, "Justice at the millennium: A meta-analytic review of 25 years of organizational justice research," *Journal of Applied Psychology*, vol. 86, pp. 425-445, 2001.

[22] H. Schildt, "Big data and organizational design – the brave new world of algorithmic management and computer augmented transparency," *Innovation*, vol. 19, no. 1, pp. 23-30, 2017.

[23] C. Nass and Y. Moon, "Machines and Mindlessness: Social Responses to Computers," *Journal of Social Issues*, vol. 56, no. 1, pp. 81-2000, 2000.

[24] E. L. Deci, A. H. Olafsen and R. M. Ryan, "Self-Determination Theory in Work Organizations: The State of a Science," *The Annual Review of Org. Psychology and Org. Behavior*, vol. 4, p. 19–43, 2017.

[25] Diakopoulos and M. Koliska, "Algorithmic Transparency in the News Media," *Digital Journalism*, vol. 5, no. 7, pp. 809-828, 2016.

[26] J. Burrell, "How the machine 'thinks': Understanding opacity in machine learning algorithms," *Big Data & Society*, vol. 3, no. 1, p. 1–12, 2016.

[27] I. Constantiou and J. Kallinikos, "New Games, New Rules: Big Data and the Changing Context of Strategy," *Journal of Info. Technology*, vol. 30, no. 1, pp. 44-57, 2015.