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Differential Effects of Algorithmic Management Functions on Employee Helping Behavior: Evidence from High-Tech Manufacturing Firms in China

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Abstract
Algorithmic systems increasingly perform managerial functions such as task allocation, performance-based pay, monitoring, and scheduling. Because these functions intervene in different aspects of work, their consequences for employee behavior may differ. This study examines how four algorithmic management functions are associated with employee helping behavior in high-tech manufacturing firms in China. A two-wave, multi-source matched survey was conducted with 450 employees. Confirmatory factor analysis was used to assess the measurement model, hierarchical regression was employed to test the relationships between the four algorithmic management functions and employee helping behavior, and pairwise equality tests of unstandardized regression coefficients were conducted to compare the effects across functions. The results show that task allocation and performance-based pay are positively associated with employee helping behavior, whereas monitoring and scheduling are negatively associated with helping behavior. Pairwise coefficient equality tests further indicate that task allocation and performance-based pay do not differ significantly from each other, nor do monitoring and scheduling; however, each of the two positive relationships differs significantly from each of the two negative relationships. These findings demonstrate the behavioral heterogeneity of algorithmic management and show that different managerial functions are associated with distinct consequences for informal employee cooperation. By distinguishing specific algorithmic management functions, the study provides a more precise account of how digital management systems relate to helping behavior in high-tech manufacturing and offers comparative implications for organizations in ASEAN and other emerging economies undergoing digital transformation.

Keywords: algorithmic management; task allocation; performance-based pay; monitoring; scheduling; helping behavior

1. Introduction

Algorithms are increasingly involved in managerial activities that were traditionally undertaken by human managers. Digital systems can allocate tasks, monitor work processes, evaluate performance, calculate compensation, and arrange work schedules. Research on algorithmic management initially developed largely in digital platform settings, where algorithms play a central role in matching workers with tasks and controlling how work is performed (Lee et al., 2015; Duggan et al., 2020; Möhlmann et al., 2021). More recent research shows that algorithmic management is also becoming relevant in traditional organizations with relatively stable employment relationships and established organizational structures (Schmid

& Wiesche, 2026). Prior research has increasingly established that algorithmic management is functionally heterogeneous rather than a single, uniform management practice. Algorithms may allocate tasks, determine rewards, monitor behavior, or structure work time, and these functions affect different elements of work design (Kellogg et al., 2020; Parent-Rocheleau & Parker, 2022; Liu et al., 2025). Comparatively less attention, however, has been paid to whether these functions have systematically different implications for discretionary cooperation among employees in traditional organizations. This question matters because algorithmic systems increasingly formalize work while organizations continue to depend on employee responses that cannot be fully specified in advance.

Recent research in non-platform workplaces underscores that algorithmic management is embedded in existing organizational control arrangements rather than producing uniform worker responses. Manufacturing evidence identifies shop-floor tensions around algorithmic control (Dupuis, 2025), while evidence from German workplaces shows that algorithmic direction and monitoring relate differently to experienced autonomy across control configurations (Gensler et al., 2024). These studies motivate, but do not directly test, the present comparison of four management functions in relation to coworker helping. Employee helping behavior provides a useful outcome for examining this issue. Helping refers to voluntary, work-related assistance provided to coworkers and represents an important form of interpersonal citizenship behavior (Settoon & Mossholder, 2002; Podsakoff et al., 2000). Unlike formally prescribed task performance, helping is situational and discretionary. Employees may assist coworkers who encounter difficult work problems, face unusually heavy workloads, fall behind schedule, or experience temporary disruptions. Such behavior is especially consequential when employees depend on one another for task completion.

High-tech manufacturing is therefore a particularly relevant setting. Digital systems increasingly formalize task assignment, performance evaluation, work monitoring, and production scheduling. At the same time, production work continues to involve equipment alarms, quality deviations, material coordination problems, temporary staffing shortages, and other contingencies that cannot always be resolved through predefined procedures. Employees may still need to exchange information, share practical experience, or temporarily assist coworkers across formal task boundaries. The increasing formalization of work through algorithms thus coexists with a continuing need for informal cooperation. Different algorithmic functions may have different implications for such cooperation. Task allocation structures responsibility and task interfaces; performance-based pay links valued outcomes to rewards; monitoring makes individual work behavior more visible and traceable; and scheduling structures when and how quickly work should be completed. Because helping depends both on employees' recognition that coworker problems are relevant to their own work and on their discretion to redirect time and effort, these functions need not produce the same relationship with helping behavior. The central question of this study is therefore not whether algorithmic management is generally beneficial or detrimental, but whether the particular managerial function performed by the algorithm matters for employee helping behavior.

Accordingly, this study examines the relationships between algorithmic task allocation, performance-based pay, monitoring mechanisms, scheduling, and employee helping behavior, and directly compares the corresponding regression coefficients. The coefficient comparisons are important because different coefficient signs alone do not establish that the effects are statistically different. By combining function-specific theorizing with direct tests of coefficient differences, the study seeks to clarify how algorithmic formalization is associated with informal coworker assistance in a traditional organizational setting. Although the data were collected in China, the research question also has comparative relevance for ASEAN and other emerging

economies. ASEAN's Fourth Industrial Revolution strategy identifies industrial digitalization and advanced manufacturing as important areas of regional transformation (ASEAN Secretariat, 2021). Evidence from Chinese high-tech manufacturing is therefore used here as comparative evidence rather than as a direct representation of ASEAN workplaces.

2. Literature Review and Hypotheses

2.1 Algorithmic Management and Employee Helping Behavior

Algorithmic management refers to the use of algorithmic systems to partially or fully perform managerial functions such as assigning work, monitoring employees, evaluating performance, scheduling activities, and determining rewards. In platform work, algorithms often combine matching and control by allocating work while simultaneously monitoring and evaluating workers (Möhlmann et al., 2021). In traditional organizations, however, several algorithmic functions can coexist within the same employment relationship. A functional perspective is therefore important because each function intervenes in a different part of the work process (Parent-Rocheleau & Parker, 2022; Liu et al., 2025). Helping behavior is well suited to examining these differences because it lies partly outside formal task requirements. Settoon and Mossholder (2002) conceptualize coworker-directed assistance as interpersonal citizenship behavior involving support with work-related problems and responsibilities. Helping is especially valuable in interdependent work. Allen et al. (2003) show that task and reward interdependence influence helping and group outcomes, while Bachrach et al. (2006) demonstrate that the performance value of helping depends on task interdependence.

High-tech manufacturing combines formal specialization with substantial operational interdependence. Employees have defined responsibilities, yet their tasks remain connected through equipment, workflow, quality standards, and production timing. Algorithmic management may therefore affect helping through the specific aspect of work it regulates. Functions that clarify task relationships or increase the performance relevance of coordination may support helping, whereas functions that intensify surveillance or constrain temporal discretion may reduce it. Across the four functions, a common analytical distinction concerns what the algorithm formalizes and how that formalization relates to discretionary assistance. Task allocation can make task interfaces and coordination needs more identifiable, while performance-based pay can make helping instrumentally relevant where coworkers' outputs are interdependent. Monitoring, by contrast, can increase the visibility of departures from assigned tasks, and scheduling can restrict the time available for responding to unplanned coworker needs.

These explanations draw on work-design considerations involving task interdependence, work demands, and discretion (Parent-Rocheleau & Parker, 2022; Bachrach et al., 2006). They explain why opposite associations are plausible without treating these unmeasured processes as established mediators. A complementary job demands–resources (JD–R) perspective helps clarify this distinction: identifying task interfaces and the performance relevance of coordination may facilitate the use of work resources for coworker assistance, whereas intensive monitoring and rigid scheduling may increase work demands or constrain the discretion needed to help (Bakker & Demerouti, 2017). This perspective is used only to interpret plausible relationships; demands, resources, and the proposed mechanisms were not measured or tested as mediators.

2.2 Algorithmic Task Allocation and Helping Behavior

Algorithmic task allocation uses data on employee capability, historical records, workload, and current production requirements to assign and dynamically adjust work (Liu et al., 2025). In interdependent manufacturing systems, such allocation does more than define individual responsibility: it also specifies where employees are positioned within connected production

activities. More explicit responsibility assignment may therefore reduce uncertainty about where coordination is needed when a disruption occurs. When one task affects subsequent work, employees may be better able to recognize which coworker is encountering a problem and whether that problem is likely to affect connected activities. In this sense, algorithmic task allocation may make coordination needs easier to identify without necessarily prescribing the helping behavior itself. Prior research shows that helping becomes more consequential when task interdependence is high (Bachrach et al., 2006), and that task interdependence is related to helping and group performance (Allen et al., 2003). Accordingly, in interdependent manufacturing work, clearer task allocation may be associated with more coworker assistance when employees encounter production problems.

H1a: Algorithmic task allocation is positively associated with employee helping behavior.

2.3 Algorithmic Performance-Based Pay and Helping Behavior

Algorithmic performance-based pay uses quantified indicators to evaluate work outcomes and determine performance-related compensation (Liu et al., 2025). Performance-based pay does not uniformly increase or decrease helping. Its behavioral consequences depend in part on whether employees perceive coworker assistance as relevant to valued performance outcomes. He et al. (2021), for example, show that pay for performance can motivate helping under conditions in which helping is expected to contribute to performance. This conditional logic is especially relevant to interdependent manufacturing work. In manufacturing systems, individual performance is often affected by connected production activities. An upstream quality problem can create rework downstream, equipment failure can interrupt several tasks, and one employee's delay can affect subsequent operations. Under such conditions, helping a coworker may protect not only collective workflow but also the focal employee's own ability to achieve valued performance outcomes. Algorithmic performance-based pay makes quantified performance consequences especially salient. When disruptions in coworkers' work can threaten those outcomes, helping may acquire instrumental value rather than being perceived only as a diversion from one's own task. On this basis, algorithmic performance-based pay is expected to be positively associated with helping behavior in an interdependent manufacturing context.

H1b: Algorithmic performance-based pay is positively associated with employee helping behavior.

2.4 Algorithmic Monitoring and Helping Behavior

Algorithmic monitoring uses digital systems to assess compliance with operating procedures, monitor work status, and track task progress and deviations (Liu et al., 2025). Compared with conventional supervision, it makes individual activity more continuously visible and recordable. Helping often requires employees to redirect attention from their own assigned work. An employee may interrupt a task, assist with a production problem, or temporarily assume work outside formal responsibilities. Such behavior can benefit the work unit but may not be captured fully by systems centered on individual task progress. A meta-analysis by Ravid et al. (2023) found no general evidence that electronic performance monitoring improves worker performance and showed that monitoring is associated with greater worker stress. Alge et al. (2006) likewise link workplace information practices to empowerment and extra-role performance. When formal work is continuously recorded, employees may prioritize activities that are directly visible to the system, making discretionary assistance more costly.

H1c: Algorithmic monitoring is negatively associated with employee helping behavior.

2.5 Algorithmic Scheduling and Helping Behavior

Algorithmic scheduling uses digital systems to determine work schedules, attendance requirements, task deadlines, and production pace (Liu et al., 2025). Such systems can improve formal coordination, but they also structure employees' discretion over when tasks are

performed and how much time can be reallocated during the work process. Parent-Rocheleau and Parker (2022) similarly argue that algorithmic scheduling can affect employee autonomy and work demands. Helping behavior is difficult to schedule in advance because it often responds to unexpected problems such as equipment alarms, quality abnormalities, temporary absences, workload imbalances, or information handoff failures. Providing assistance requires employees to temporarily redirect time from their assigned work. When schedules, deadlines, and production rhythms are tightly specified, employees have less temporal discretion to absorb such unplanned activity. Research on work demands also suggests that resource constraints can reduce discretionary citizenship behavior (Montani & Dagenais-Desmarais, 2018). Algorithmic scheduling is therefore expected to be negatively associated with helping insofar as it narrows employees' ability to reallocate time toward coworkers' emergent needs.
H1d: Algorithmic scheduling is negatively associated with employee helping behavior.

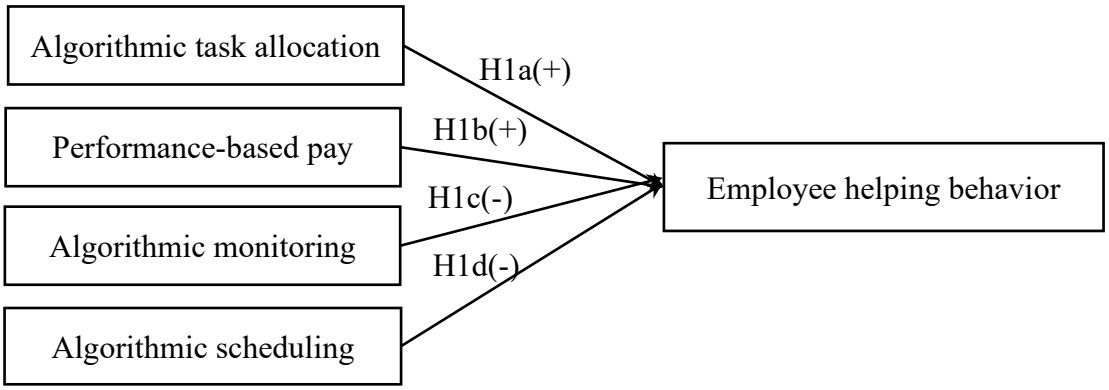


Figure 1. Conceptual model of the hypothesized relationships

3. Research Methodology

3.1 Research Design and Participants

This study used a two-wave, multi-source matched survey design among employees in high-tech manufacturing firms in China. At Wave 1, focal employees reported their perceptions of algorithmic task allocation, performance-based pay, monitoring mechanisms, and scheduling, together with demographic and occupational information. One month later, at Wave 2, helping behavior was evaluated independently by three eligible coworkers per focal employee who had sufficient work contact to observe work-related assistance. Different respondent sources for the predictors and outcome reduced reliance on a single respondent, although this observational design does not establish causality.

Of 490 focal employees considered for coworker matching, 470 met the eligibility requirements for coworker evaluation and could be linked with three eligible coworker raters. Initially, 1,410 coworkers were invited, with 40 additional candidates invited under the replacement procedure when initial invitees declined, failed to complete the questionnaire in time, or did not meet rater requirements. Ratings were checked for eligibility, completeness, response quality, and matching accuracy, and valid questionnaires were grouped by anonymous focal-employee identification codes. Employee records with missing data at any relevant wave, inconsistent identifiers, fewer than three valid coworker assessments, or other failures to meet the data-quality criteria were excluded. The resulting analytical sample comprised 450 matched focal employees. The three coworker ratings for each helping-behavior item were averaged to form employee-level scores. Participants took part voluntarily, and their responses were used for academic research only. As the sample was drawn from participating Chinese high-tech

manufacturing firms rather than a probability sample of the wider workforce, its representativeness should not be presumed.

3.2 Measures

All focal constructs were measured using five-point Likert-type scales. Algorithmic management. Employees' perceptions of algorithmic management were measured with the 12-item, four-dimensional scale reported by Liu et al. (2025). Each dimension contained three items. Task allocation assessed the use of algorithms to assign and adjust work; a representative item was, "My daily work tasks are primarily assigned by an algorithmic system." Performance-based pay assessed algorithmic performance evaluation and performance-related compensation; a representative item referred to calculating performance ratings from quantitative indicators such as output, quality, and efficiency. Monitoring mechanisms assessed algorithmic supervision of work status, compliance, task progress, and deviations. Scheduling assessed the use of algorithms to determine work schedules, attendance requirements, deadlines, and production pace. Minor wording adjustments were made for the high-tech manufacturing context, reviewed by subject-matter experts, and refined through pretesting.
Helping behavior.

Helping behavior was measured with six items adapted from Settoon and Mossholder (2002). The original English items were translated into Chinese using translation and back-translation and then adapted to frontline manufacturing situations. The items covered assistance with difficult work problems, heavy workloads, production delays, temporary staffing shortages, and operational disruptions. Representative items included, "When a coworker encounters a difficult work-related problem, this employee voluntarily offers assistance" and "When equipment alarms, quality abnormalities, material coordination problems, or information handoff problems occur, this employee voluntarily provides assistance." Helping behavior was rated by coworkers, with higher scores indicating more helping. The helping-behavior items adapted from Settoon and Mossholder (2002) were translated into Chinese and back-translated, as described above. Item wording was then adapted to the manufacturing setting; the reported expert review and pretesting concerned the contextual suitability of these adaptations. In particular, the reported item examples refer to work problems, workload, equipment alarms, quality deviations, and information handoffs. These procedures were used for linguistic and contextual adaptation, not as a test of cross-language measurement equivalence; such equivalence was not independently examined in this study.
Control variables. Gender, age, education, job category, and organizational tenure were included as controls. Job category was treated as nominal and dummy-coded, with frontline production/operation employees as the reference group.

3.3 Measurement Assessment and Data Analysis

A confirmatory factor analysis was conducted on the 18 items measuring the five focal constructs. The hypothesized five-factor model fit the data well: $\chi^2(125) = 150.921$, $\chi^2/df = 1.207$, CFI = .995, TLI = .994, RMSEA = .021, and SRMR = .029. Alternative models that combined theoretically distinct algorithmic management functions fit substantially worse, supporting construct distinctiveness. All standardized factor loadings were significant and ranged from .713 to .933. Cronbach's alpha coefficients ranged from .814 to .958, composite reliability values from .815 to .958, and average variance extracted (AVE) values from .597 to .793. In addition, the square root of AVE for each construct exceeded its correlations with the other focal constructs, satisfying the Fornell-Larcker criterion (Fornell & Larcker, 1981). These results supported reliability, convergent validity, and discriminant validity.

Hierarchical regression was used to test the hypotheses. Controls were entered first, followed by the four algorithmic management functions simultaneously. Because the study

focuses on functional differences, pairwise equality tests of the unstandardized regression coefficients were also conducted. Variance inflation factors remained below conventional thresholds, indicating no material multicollinearity concern.

Table 1: Measurement Model, Reliability, and Validity

Construct	Items	Loading range	Cronbach's α	CR	AVE	√AVE
Task allocation	3	.758-.854	.840	.842	.641	.800
Performance-based pay	3	.747-.851	.838	.840	.637	.798
Monitoring mechanisms	3	.713-.846	.814	.815	.597	.773
Scheduling	3	.765-.781	.817	.817	.598	.773
Helping behavior	6	.862-.933	.958	.958	.793	.890

Note. N = 450. CR = composite reliability; AVE = average variance extracted.
Source: Authors' own analysis.

4. Research Findings

4.1 Descriptive Statistics and Correlations

Table 2 presents the descriptive statistics and correlations. Task allocation and performance-based pay were positively correlated with helping behavior, whereas monitoring and scheduling were negatively correlated with helping behavior. Correlations among the four algorithmic management dimensions were modest, supporting their simultaneous inclusion in the regression model.

Table 2: Descriptive Statistics and Correlations

Variable	M	SD	1	2	3	4	5
1. Task allocation	3.289	.855	.800				
2. Performance-based pay	3.247	.832	.316***	.798			
3. Monitoring mechanisms	3.223	.796	-.188***	-.201***	.773		
4. Scheduling	3.259	.811	-.130**	-.138**	.238***	.773	
5. Helping behavior	3.329	.690	.199***	.198***	-.210***	-.217***	.890

Note. N = 450. Values on the diagonal are the square roots of AVE. ** p < .01. *** p < .001.
Source: Authors' own analysis.

4.2 Hypothesis Testing

Table 3 reports the hierarchical regression results. The control-only model explained relatively little variance in helping behavior ($R^2 = .017$). After the four algorithmic management functions were added, explained variance increased significantly ($\Delta R^2 = .102$, $\Delta F = 12.731$, $p < .001$), and the full model was significant ($R^2 = .119$, adjusted $R^2 = .097$, $F = 5.385$, $p < .001$).

Task allocation was positively associated with helping behavior (B = .092, SE = .039, p = .018), supporting H1a. Performance-based pay was also positively associated with helping behavior (B = .105, SE = .041, p = .011), supporting H1b. Monitoring mechanisms were negatively associated with helping behavior (B = -.104, SE = .041, p = .012), supporting H1c. Scheduling likewise showed a significant negative relationship with helping behavior (B = -.128, SE = .040, p = .001), supporting H1d.

Pairwise coefficient equality tests provide stronger evidence of differentiated effects than coefficient signs alone. Task allocation did not differ significantly from performance-based pay ($t = -.204$, $p = .838$), and monitoring did not differ significantly from scheduling ($t = .385$, $p = .700$). In contrast, task allocation differed significantly from monitoring ($t = 3.677$, $p < .001$) and scheduling ($t = 4.089$, $p < .001$), while performance-based pay differed significantly from monitoring ($t = 3.878$, $p < .001$) and scheduling ($t = 4.215$, $p < .001$). Thus, the two positive relationships differed statistically from the two negative relationships, while no significant difference appeared within either pair.

Table 3: Hierarchical Regression Results for Employee Helping Behavior

Variable	Model 1 B (SE)	Model 2 B (SE)
Gender	-.048 (.067)	-.002 (.064)
Age	-.022 (.040)	.006 (.038)
Education	-.053 (.035)	-.044 (.034)
Organizational tenure	.098 (.053)	.063 (.051)
Engineering/process/equipment[1]	.018 (.074)	.036 (.071)
Quality/inspection/reliability[1]	.007 (.112)	.027 (.107)
Other job category[1]	-.089 (.188)	-.092 (.179)
Task allocation	—	.092* (.039)
Performance-based pay	—	.105* (.041)
Monitoring mechanisms	—	-.104* (.041)
Scheduling	—	-.128** (.040)
R^2	.017	.119
Adjusted R^2	.001	.097
ΔR^2	—	.102
F	1.073	5.385***
ΔF	—	12.731***
N	450	450

Note. Unstandardized coefficients are reported. [1] Job category was dummy-coded with frontline production/operation as the reference group. * p < .05. ** p < .01. *** p < .001.
Source: Authors' own analysis.

Table 4: Tests of Equality of Regression Coefficients Across Algorithmic Management Functions

Comparison	Coefficient difference	SE	t	p
Task allocation vs. performance-based pay	-.013	.064	-.204	.838
Monitoring mechanisms vs. scheduling	.024	.063	.385	.700
Task allocation vs. monitoring mechanisms	.196	.053	3.677	< .001
Task allocation vs. scheduling	.220	.054	4.089	< .001
Performance-based pay vs. monitoring mechanisms	.209	.054	3.878	< .001
Performance-based pay vs. scheduling	.233	.055	4.215	< .001

Note. Two-tailed tests based on the full regression model; residual df = 438.
Source: Authors' own analysis.

5. Discussion

5.1 Interpretation of Findings

The principal finding of this study is not simply that some algorithmic management functions are positively associated with helping whereas others are negatively associated with it. More importantly, the coefficient equality tests show that these differences are statistically meaningful. Task allocation and performance-based pay each differed significantly from monitoring and scheduling, while the differences within the two positively related functions and within the two negatively related functions were not significant. The behavioral consequences of algorithmic management therefore depend on the managerial function being performed, even when those functions coexist within the same organizational setting.

The statistical differences do not imply large effects. In the full model, a one-point increase in a function score corresponds to an estimated change of approximately 0.09–0.13 points in helping behavior on its five-point scale, holding the other included variables constant. Moreover, the full model explains 11.9% of the variance ($R^2 = .119$), meaning that most variation in helping behavior remains unexplained by these predictors and controls. This level of explanatory power warrants modest practical claims and attention to additional employee, team, and organizational influences.

The results also indicate that greater formalization of work through algorithms does not uniformly displace informal employee cooperation. Task allocation was positively associated with helping behavior. One plausible interpretation is that clearer responsibility assignment in an interdependent production system reduces uncertainty about where coordination problems are located and who is affected by them. This interpretation is consistent with research showing that helping becomes particularly consequential when task interdependence is high (Allen et al., 2003; Bachrach et al., 2006). However, task interdependence was not directly measured in this study, so it should be treated as a contextual explanation rather than an empirically tested mechanism.

Performance-based pay was also positively associated with helping. This result should not be interpreted as evidence that performance incentives generally promote cooperation. Rather, it is consistent with the conditional argument that helping is more likely to be supported by performance incentives when employees perceive helping as relevant to valued performance outcomes (He et al., 2021). In an interdependent manufacturing process, coworker problems can disrupt the focal employee's own work, making assistance instrumentally relevant to maintaining performance. The present result therefore points to the importance of the production context in interpreting algorithmic performance incentives.

Monitoring showed the opposite relationship. Algorithmic monitoring makes individual work processes and task progress more continuously observable, whereas helping often requires employees to redirect attention toward work outside their immediate formal assignment. One possible explanation is that employees under more intensive monitoring give greater priority to activities that are directly visible in formal records. This interpretation is consistent with research linking electronic performance monitoring to higher worker stress and less favorable work experiences (Ravid et al., 2023), but the present study did not directly test stress or attention allocation as mediating mechanisms.

Scheduling was likewise negatively associated with helping. Algorithmic scheduling can improve the precision of formal coordination while simultaneously reducing employees' discretion to absorb unplanned activity. Because helping often arises in response to unexpected production problems, temporal flexibility may be particularly important. The negative scheduling result is therefore consistent with the view that tightly structured time can constrain discretionary behavior, although temporal discretion itself was not directly measured.

Taken together, the findings suggest that the relationship between algorithmic formalization and informal cooperation depends on what is being formalized. Functions that structure task responsibility or make performance consequences salient can coexist with higher levels of helping, whereas functions that intensify behavioral visibility or tightly structure time can be associated with lower levels of helping. This pattern should not be treated as evidence for two higher-order dimensions of algorithmic management: the measurement model strongly supports the empirical distinctiveness of the four functions. Rather, the coefficient comparisons show that function-specific analysis reveals behavioral differences that would be obscured by an overall algorithmic management score.

An alternative interpretation is that unmeasured work-unit characteristics—for example, collaboration norms, supervisory practices, or differences in production coordination—are associated with both the adoption or perception of particular algorithmic functions and helping behavior. The measured coefficients therefore reflect conditional associations, not proof that implementing a given algorithmic function will cause a corresponding change in helping. Future research could examine task interdependence, monitoring pressure, and temporal discretion as possible mediators or moderators, rather than assuming those mechanisms from the present associations.

5.2 Theoretical Contributions

The study makes three theoretical contributions. First, it provides direct empirical support for a function-specific approach to algorithmic management. Conceptual research increasingly recognizes that algorithms perform distinct managerial functions (Kellogg et al., 2020; Parent-Rocheleau & Parker, 2022), but empirical studies can obscure those distinctions when algorithmic management is represented by a single overall score. By estimating four functions simultaneously and directly testing coefficient equality, this study shows that functional differences are not merely descriptive: they are statistically meaningful in relation to helping behavior.

In relation to recent empirical studies of algorithmic control and autonomy in conventional workplaces (Dupuis, 2025; Gensler et al., 2024; Schmid & Wiesche, 2026), the incremental contribution here is the simultaneous comparison of four function-specific relationships with an explicitly coworker-directed, discretionary behavioral outcome. This design does not establish the psychological mechanisms underlying those relationships.

A particularly close manufacturing study by Li et al. (2025) examined algorithmic management and employee team-cooperation behavior using 473 matched questionnaires from 37 smart-workshop teams and focused on belongingness and information needs as explanatory processes. In contrast, the present study examines coworker-rated, work-related helping specifically, estimates four managerial functions together, and tests pairwise equality of their regression coefficients. Its incremental contribution is therefore a function-level comparison of associations with a more specific discretionary behavior, rather than a claim that algorithmic management and employee cooperation in manufacturing have not previously been studied.

Relative to studies that discuss algorithmic management as a configuration of managerial control or job design (Kellogg et al., 2020; Parent-Rocheleau & Parker, 2022), and to emerging evidence about algorithmic management within traditional organizations (Schmid & Wiesche, 2026), the added contribution here is the direct within-model comparison of four specific functions against the same coworker-rated helping outcome. The significant cross-function coefficient differences support differentiated associations; they do not establish that one underlying psychological mechanism has been verified.

Second, the study extends algorithmic management research to informal employee cooperation. Existing studies frequently focus on performance, autonomy, stress, work demands, innovation, or resistance. Helping behavior raises a different question because it concerns discretionary assistance that algorithmic systems do not directly prescribe. The findings therefore show that algorithmic management can have consequences beyond the formal tasks it directly organizes, affecting the interpersonal cooperation on which interdependent work systems continue to rely.

Third, the study contributes evidence from high-tech manufacturing, where algorithmic management is embedded in established organizational structures rather than platform-based employment relationships. The Chinese setting should not be assumed to generalize directly to ASEAN workplaces because labor institutions, managerial practices, and workforce characteristics vary across countries. Instead, the findings provide comparative evidence on function-specific relationships that can be tested in ASEAN manufacturing settings as digital management technologies diffuse across the region.

5.3 Limitations and Future Research

Several limitations suggest directions for future research. First, although the two-wave, multi-source design separates the predictor and outcome across time and rating sources, the observational design does not establish causality. Longitudinal studies with additional measurement occasions, field experiments, or analyses surrounding the introduction of new algorithmic systems could provide stronger causal evidence.

Second, the sample is drawn from high-tech manufacturing firms in China. The importance of algorithmic functions may vary across industries, occupations, and institutional settings. Replication in ASEAN manufacturing, logistics, service organizations, and other emerging-economy contexts would clarify the boundary conditions of the findings.

Third, the study identifies differentiated direct relationships but does not directly test the mechanisms proposed to explain them. In particular, task interdependence is used to interpret the positive relationships of task allocation and performance-based pay, while behavioral visibility and temporal discretion are used to interpret the negative relationships of monitoring and scheduling. None of these mechanisms was directly measured. Future research should test whether task interdependence, helping-performance expectancy, perceived monitoring pressure, and temporal discretion mediate or condition the relationships identified here.

6. Conclusion and Managerial Recommendations

This study examined four algorithmic management functions in relation to employee helping behavior. Task allocation and performance-based pay were positively associated with helping, whereas monitoring and scheduling were negatively associated with helping. Pairwise coefficient tests confirmed significant differences between the positive and negative relationships. The results therefore suggest that algorithmic management should not be evaluated as a behaviorally uniform management practice.

Managers should consider the behavioral implications of the specific function being automated. Task-allocation systems should represent task interdependence and provide employees with enough information to understand how their work connects with that of coworkers. Performance systems should recognize collaborative contributions where work outcomes depend on interconnected production activities; otherwise, valuable assistance may remain invisible in algorithmic performance records.

Monitoring should be proportionate to legitimate operational requirements. Digital monitoring can support safety, quality, and reliability, but organizations should avoid creating conditions in which reasonable coworker assistance is implicitly treated as a deviation from

productive work. Scheduling systems should likewise preserve enough flexibility for employees to respond to equipment failures, quality problems, temporary staffing gaps, and other contingencies that formal schedules cannot anticipate.

A human-centered implementation implication is to evaluate algorithm-supported task assignment, incentives, monitoring, and schedules separately and to solicit frontline-worker feedback on whether the system leaves room for legitimate assistance. In particular, organizations can review whether collaborative contributions are recognized, whether monitoring interpretations distinguish helping from noncompliance, and whether schedules allow responses to unforeseen production problems. These are design considerations suggested by associations in this sample, not interventions whose causal effects were tested here.

For manufacturing firms in ASEAN and other emerging economies, the broader implication is comparative rather than prescriptive. ASEAN's digital and Fourth Industrial Revolution agenda is increasing the relevance of algorithm-supported production management, but institutional and workforce conditions differ across countries. The present evidence suggests that managers should evaluate digital management systems function by function and examine their effects on both formal efficiency and informal cooperation, rather than assuming that greater algorithmic control has a uniform behavioral consequence.

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