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Integrating algorithmic management in hotels: Emerging challenges and opportunities for frontline managers

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ABSTRACT

The increasing adoption of Algorithmic Management in the hospitality sector presents a number of challenges and opportunities. Emergent research has considered the impacts on operational staff. However, the implications for frontline managers, who have to negotiate between the interests of multiple stakeholders and organisational pressures, are less well understood. This paper examines key factors that will affect the comprehension and enactment of managerial roles within algorithmically managed hotels, drawing on a three-stage Delphi study with hotel managers and academic experts, built on the Competing Values Framework. The findings stress that Algorithmic Management's impact on productivity and process standardisation will intensify work demands, and risk stifling employee motivation and collaboration. Hence, managers must evolve from controllers to supportive actors, improving understanding, facilitating employee empowerment and aiding transparency in algorithmic decisions. We conceptualise these functions as communication, performance, social and creative facilitation. The findings are used to theorise how emerging socio-technological arrangements will transform line management, driving the expansion of translational work and the emergence of what we call 'algorithmic coaching'.

1. Introduction

The use of intelligent algorithms for labour management, also known as Algorithmic Management (AM), presents dramatic implications for the nature of labour (Gandini, 2019) and the roles of frontline managers in a movement towards shared leadership with algorithms (Harms and Han, 2019). Presently, algorithms manage millions of employees working in logistics, fulfilment and delivery services by directing, evaluating and disciplining them (Kellogg et al., 2020). Therefore, many tasks traditionally associated with management of employees, such as shift and task allocation, performance management and evaluation no longer require human input (Waldkirch et al., 2021). As such, AM presents as one of the most disruptive forms of technological change affecting the management of employees (Parent-Rocheleau and Parker, 2022), posing fundamental challenges for organisations and managers. This growing body of work has begun to consider the opportunities and challenges of introducing AM more generally, but the implications for hotel management have received limited attention, and thus remain poorly understood (Spektor et al., 2023a, 2023b). Much of the discussion concerning AM's application to this sector has come from journalistic commentary, which has primarily sought to extol its benefits rather than appraise its wider implications (see e.g. Hertzfeld, 2023).

Previous academic studies, mostly set in the context of 'platform' or 'gig' work, have primarily focused on the impacts of AM on, and reactions of, frontline, operational staff (e.g., Caza et al., 2022; Duggan et al., 2023; Gagné et al., 2022; Norlander et al., 2021). These studies have revealed that emerging forms of algorithmic control (Cram et al., 2022; Duggan et al., 2023; Kellogg et al., 2020), in conjunction with algorithmic opacity (Jarrahi et al., 2021; Möhlmann et al., 2023), have numerous negative effects on workers (Caza et al., 2022; Parent-Rocheleau and Parker, 2022; Rosenblat and Stark, 2016).

Studies have also begun to explore the skills and effort required by managers for the integration and deployment of AM systems in organisations. For example, Brady et al. (2017) recognised the importance of technical, linguistic and emotional competencies necessary for the translational work that bridges the impenetrability of algorithmic systems and the complex social and psychological characteristics of the people who work in organisations. Kellogg et al. (2020) referred to 'algorithmic brokers' to conceptualise this type of translational work, referring to the capacity of these people to explain these algorithmic

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systems, but also to 'sell' their benefits and to persuade workers to accept their integration. Similarly to Brady et al. (2017), Kellogg et al.'s. proposition suggests that these intermediary actors must be able to appreciate the fundamental workings of algorithmic systems and be able to demonstrate the potential value for disparate stakeholders, and to address their psychological barriers.

These studies provide useful sensitising perspectives to help make sense of these translational roles. However, the impact of AM on the changing role of managers in the context of 'traditional' hospitality workplaces has not been examined, which is problematic because AM has been recognised to bring significant shifts in terms of organisational culture (Martínez-Caro et al., 2020), decision-making processes (Peeters, 2020), collaboration and teamwork (Parker and Grote, 2022), competition and innovation (Martínez-Caro et al., 2020), and generally, in managerial functions, particularly those formerly handled by middle and frontline management (Jarrahi et al., 2021). Given the pivotal role that frontline managers in hospitality operations hold, tasked with providing support and developing and retaining high performing employees (Park et al., 2019), and the value that human connection holds in hospitality experiences (Solnet et al., 2019), examining how AM restructures managers' roles and responsibilities in hotels is critical for several reasons.

First, with services requiring high levels of customisation by frontline employees to each guest's needs, these employees represent one of the most valuable contributors to successful hospitality operations (Úbeda-García et al., 2016). In this context, staff behaviours are directly influenced by the relationship with and the level of empowerment facilitated by their immediate supervisors, which can greatly affect customer service (Huertas-Valdivia et al., 2022). Hence, examining if and how the infusion of AM systems in hotels has relational implications is critical. Moreover, creativity is a key competitive advantage for hospitality organisations (Kitsios and Grigoroudis, 2020), and frontline managers' creativity can play a crucial role in improving frontline employees' job performance and service quality (Romero and Tejada, 2020). Research shows that deploying algorithms in management tasks reduces prosocial motivation (Granulo et al., 2024), a key predictor of creativity (Liu et al., 2016), and it increases the perception of compromised creative capacities of algorithmically managed employees (Schweitzer and De Cremer, 2024). Therefore, it is critical to assess the potential effect of these systems on the creativity of frontline managers, and their capacity to engage in innovative problem-solving.

Second, the narrow focus of AM systems on optimisation and efficiency may lead to the dehumanisation of work (Marjanovic et al., 2022), with algorithms incapable of grasping the ethical implications of their decisions (Faraj et al., 2018). This raises questions concerning how to utilise 'complementarity tactics' to 'humanise' (Cui et al., 2024) and 'moralise' the AM systems, when AM decisions harm the wellbeing of employees, or are insufficient or unethical. With frontline management implementing the majority of HR practices and policies (Madera et al., 2017) and even ameliorating negative aspects of HR policies imposed over frontline employees (Harney and Jordan, 2008), in algorithmically managed hospitality workplaces, this link becomes even more critical, as frontline managers may have to compensate for 'laissez-faire approaches to "algorithmification"' (Faraj et al., 2018, p. 10).

Third, from a decision-making perspective, the adoption of AM systems requires frontline managers to adapt to a symbiotic relationship with AI (Artificial Intelligence) (Jarrahi, 2018). Specifically, human-AI decision-making operates in several different configurations: in addition to the traditional 'human only' decision loops, managers now also operate in 'human-in-the-loop' (i.e. human decisions based on AI recommendation), 'human-on-the-loop' (i.e. AI decisions with potential for human override) and 'human-out-of-the-loop' configurations (Ivanov and Webster, 2024). This illustrates the transformative impact of AM systems over managerial decision-making processes, with managers having to navigate different levels of involvement when performing their duties (Faraj et al., 2018).

Fourth, from the perspective of frontline management, as mediators between senior management directives and their implementation in daily operations, carried out by frontline employees, line managers now must also 'manage the algorithm', ensuring that decisions made by AM systems align with broader strategic goals. This task is made even more difficult by algorithmic opacity (Burrell, 2016; Cameron and Rahman, 2022; Faraj et al., 2018), which does not allow insight into decision logic of these 'black boxes'. This adds another layer of complexity to frontline managers' daily tasks and raises additional questions concerning accountability for decisional misalignments with organisational goals and the possibility of over-reliance on algorithmic suggestions (Barati and Ansari, 2022).

Finally, frontline managers provide relational support, including through coaching and mentoring, positively affecting frontline employee attitudes and behaviours (Clayton et al., 2025), which underpins higher levels of job satisfaction and service performance (Han et al., 2017). However, research suggests a decrease of human involvement in the context of algorithmic decision-making, with managers increasingly separated spatially and temporally from decisions and their consequences (Bader and Kaiser, 2019). The automation of interactions between managers and employees are transforming frontline managers' ability to establish and maintain relationships with frontline staff and reducing opportunities for communication and collaboration.

To address these important and contradictory issues, we draw on the Competing Values Framework (CVF) (Cameron and Quinn, 2006; Cameron et al., 2022), and apply it, as a sensitising framework, to comprehend the opportunities and challenges for managers that emerge in the adoption and integration of AM in hotels. The CVF emphasises the contrasting demands of flexibility versus stability, and external versus internal focus in management strategy and behaviour. The framework differentiates between four types of organisational orientation and their corresponding demands: control, competition, collaboration and creativity. The CVF thus helps to consider the tensions between pursuing collaboration over competition, and control over creativity, areas further polarised by algorithmic overemphasis on centralised decision making and efficiency, underscoring the necessity for adopting a balanced approach in the integration of these technologies (Bouwman et al., 2005).

Building on the CVF, which recognises that leaders must adopt multiple roles and behaviours to manage competing pressures, our study aims to identify ways in which managerial roles are subject to transformation by the adoption of AM in hotels. Specifically, we seek to understand how managers may navigate tensions exacerbated by AM, for example between the organisation's need for control and workers' need for flexibility and empowerment (Duggan et al., 2023), and how they could negotiate the additional layers of complexity in workplace relationships. To achieve this aim, we utilised the Delphi method, combining theory and practice to gauge the perspectives of industry and academic experts to address two questions: Q1. How will AM impact hotel managers' daily tasks and functions? and Q2. How will AM affect managerial performance?

2. Literature review

2.1. Competing values framework

According to the CVF, organisations and their approaches to culture and leadership can be analysed based on a set of competing values that these entities and the constituent actors who manage them must balance to achieve effectiveness (Cameron and Quinn, 2006; Cameron et al., 2022; Yu and Wu, 2009). The CVF focuses on two organisational dimensions, the first concerning organisational orientation towards flexibility and change versus stability and control; the second, orientation internally towards the organisation versus an external, market focus. 'Hierarchical' organisational arrangements with a strong internal focus and emphasis on control, prioritise clear chains of command where

authority and decision-making power are concentrated among senior levels of organisations. Within these organisational contexts, efficiency and consistency remain dominant values that are reflected in hierarchical management structures and leadership styles. 'Competitive' organisational configurations that emphasise control, but with an external focus, concentrate on competition and short-term market performance. These translate into performance-oriented leadership that emphasises competition and goal achievement.

'Clan'-type organisational arrangements with an internal focus and a flexible approach prioritise collaboration, teamwork, and loyalty, valuing internal cohesion, participation, and mentoring-style leadership. Creative, 'adhocratic' organisational configurations, which are flexible but with an external focus, prioritise innovation and risk-taking among their constituents. These types of organisations thrive on pioneering new products and services, they value adaptation and flexibility in uncertain and ambiguous environments, and corresponding management styles therefore stress vision, enterprise and agility.

In sum, these ideal types of organisational orientation, and accompanying management and leadership approaches, represent four essential domains of organisational practice: first, control, with emphasis on efficiency and hierarchy; second, competition, stressing achievement and market performance; third, collaboration, reflecting group cohesion and participation; and finally, creativity, which foregrounds innovation and flexibility. By identifying and differentiating between these four domains, the CVF helps to capture and analyse the contradictory nature of organisational contexts, and the complexity of forces encountered by managers when responding to competing tensions (Cameron et al., 2022). Consequently, the CVF has been used in leadership studies to design and assess the appropriateness of particular roles, personality traits, skills and competencies of managers (Belasen and Frank, 2008; Lavine, 2014; Müller et al., 2024) as well as in information systems research to study, for example, the impact of organisational culture on the deployment of systems development methodologies, software processes, and software process improvement (Iivari and Huisman, 2007; Müller and Nielsen, 2013).

We adopt the CVF as a sensitising conceptual approach to capture and comprehend how managerial functions, roles and styles are reconfigured, amplified or marginalised to meet the challenges presented by digital transformation and the infusion of AM systems. By doing so we recognise that certain managerial roles might become less relevant or obsolete, while others more critical; some roles might be complemented by algorithms and entirely new roles might emerge. The CVF was deemed particularly suitable to our study because the adoption and integration of AM introduces additional layers of complexity for frontline managers, shifting priorities and polarising power relations; consequently, this framework helps us to comprehend the tensions, trade-offs, and paradoxes in how competing values may be negotiated (Weber et al., 2022).

2.2. AM and evolving management challenges and opportunities

The term 'Algorithmic Management' emerged from gig and platform work contexts, but algorithms are increasingly being deployed in 'traditional' work settings, including hotels, to direct, evaluate and discipline workers, becoming a vital component of the future of work (Benlian et al., 2022; Kellogg et al., 2020). In hotels, AM optimises labour productivity by using data-driven insights and predictive technologies, enabling management to gain more control over operations (Hertzfeld, 2023). Specifically, AM systems are responsible for dividing complex tasks and making autonomous decisions within the boundaries of predetermined parameters. For example, in revenue management, algorithms perform fully automated price optimisation (Cobanoglu et al., 2021). Automated demand forecasting and pricing functions relieve managers from the need to make independent analysis and frequent adjustment themselves, but managers may intervene and override pricing and inventory decisions based on contextual adjustments and applied decisional heuristics (Garcia et al., 2024). AI-powered housekeeping platforms allocate rooms to clean based on personnel skills and volume handling abilities, and they record their room cleaning times (InnSpire INC., 2024; Optii Solutions, 2023; Reyes, 2018). In this context, managers can re-distribute fewer room cleaning tasks to housekeeping attendants with back problems or assign particular suites to specific workers. Other algorithmic systems guide or 'coach' reservation agents during customer interactions by recording and analysing the conversations and providing real-time analysis of engaging real-time emotion and conversation capabilities (Aviles, 2023). Other algorithms automatically manage rotas and employees' time tracking (Deputy, 2024). The applications of AI in hotel HRM can be found across the entire employee life cycle, from screening resumes, scheduling interviews, and conducting background checks to forecasting and adjusting staffing levels, analysing employee performance and providing feedback, identifying training needs, and tracking employee engagement (Hollander, 2024).

The wider AM literature presents two diverging perspectives. Organisational advocates such as technology and consultancy firms present an optimistic perspective, praising the accuracy and operational efficiency of algorithms (Benlian et al., 2022), their predictive and analytic capabilities (Parry et al., 2016) and the fairness and objectivity of algorithmic decision making (Höddinghaus et al., 2021; Lee, 2018). Conversely, studies examining the lived experiences of workers under AM are more critical, revealing concerns about pervasive surveillance (Newlands, 2021), tightening control (Norlander et al., 2021) and dehumanisation (Bankins et al., 2022). For example, automated scheduling software exacerbate 'just-in-time' scheduling, making work hours highly unpredictable. Customer-sourced rating systems are criticised for harbouring consumer biases (Mateescu and Nguyen, 2019) and for causing increased anxiety (Chan, 2022). Further studies revealed negative impacts on employee satisfaction (Sun, 2023) and organisational commitment (Tomprou and Lee, 2022). This body of work provides useful insights into emerging challenges and opportunities, especially for operational staff working in sectors outside hospitality. However, the implications for management, in hospitality and hotels in particular, are less well researched or understood.

The applications of AM in hospitality have received limited academic attention, but studies are emerging. For example, Garcia et al. (2024) explored how algorithmic price suggestions affected managers' pricing behaviour in the context of revenue management, arguing that full delegation to the recommendation algorithm significantly outperformed human manager price determinations. Ivanov and Webster (2024) found that hoteliers were hesitant to trust AI with decisions that required emotional intelligence or interactions with customers and/or employees, but preferred to delegate decisions involving room allocations, setting overbooking limits and scheduling employee shifts. These works provide important albeit partial insights into the implications for management more generally; but, importantly, they highlight the need to expand the evidence base that helps to understand the changing scope and content of management roles and functions in the context of AM.

The introduction of AM systems in management has numerous implications for frontline hospitality managers. Platform workers often take instructions directly from algorithms, and have little to no interaction with human managers, but in work settings such as hotels, employees operate in dual management environments with human oversight and are subject to dual management—algorithmic and human. Hence, as social-technological actors, AM systems introduce a layer of mediation in the relationship between managers and employees (Jarrahi et al., 2021), which presents new challenges and opportunities.

Adding to this complexity, frontline managers in hospitality organisations in general, and hotels in particular, often have to navigate paradoxical demands, balancing the pressures of rising service requirements, the need for operational efficiency and customer expectations regarding the 'human-touch', alongside and in conjunction with the adoption of technology in general and AM systems specifically

(Solnet et al., 2019). Striking the right balance in the division of labour between a human and algorithmic manager may be subtle and complex. This further reinforces the need to examine the implications of AM for line managers especially, who are tasked with translating and negotiating between the potentially competing worldviews, values and expectations of disparate organisational stakeholders in hotels.

3. Methods

3.1. Research approach

This study adopted a Delphi methodology to gauge consensus about the future implications of AM on the roles of hotel managers and identify areas of transformation in the hotel sector. The Delphi method represents a qualitative analysis by which a group of experts anonymously share their opinions on a complex problem over several rounds of interactions (Turoff and Linstone, 2002). It is particularly useful for forecasting emerging issues that can significantly affect the future (e.g., Ashton et al., 2024). Experts were recruited to comment on their vision of the issues and how they will evolve.

Following established Delphi protocols, during the first round, experts were asked the following open-ended questions on the topic, informed by the CVF's four dimensions: (1) What are up to five effects of algorithmic management that managers working in hotels should consider in terms of collaboration, teamwork, and employee development? (2) What are up to five potential effects of algorithmic management on creativity, innovation, and flexibility that managers working in hotels need to consider? (3) What are up to five ways in which algorithmic management will affect competition, achievement, and market results of managers working in hotels? (4) What are up to five ways in which algorithmic management will impact on control ability and efficiency of managers working in hotels? Their responses were collated into a series of statements, which were presented to the experts in the second round, requesting their level of agreement on each statement and comments supporting their decisions. In the final round, aggregated opinions were presented, and each expert was given the opportunity to re-evaluate and revise their agreement with each statement and provide further comments.

3.2. Sampling and expert recruitment

The study was conducted in three stages over a three-month period. Participants were recruited by email from the researchers' own networks based on a combination of purposive and snowballing sampling. Senior managers working in full-service hotels in the UK with over three years of managerial experience and academics who have published on technology in tourism and/or hospitality in the last three years were considered the most appropriate expert informants. As Lin and Song (2015) argued, including practitioners and academics, with different backgrounds, experiences and knowledge of fields, helped to ensure diversity in perspectives.

To account for potential attrition, as recommended by Green et al. (1990), 22 experts were recruited for the study. The online questionnaire included a screening question to ensure that participants made managerial decisions in the hotel industry or had recent relevant publications in this field. The participant profiles are summarised in Table I.

3.3. Data generation and analysis

3.3.1. Round 1 — brainstorming

During the first round, survey respondents were provided with the following definition: 'AM refers to the delegation of managerial functions to algorithmic and automated systems. Algorithms are computer programs that can be used to make decisions, direct, evaluate and discipline workers and they are increasingly being used in the workplace.' Examples of its use in hotels under the tasks of scheduling, task allocation, performance tracking and guiding were provided, such as 'using an algorithm to schedule housekeepers based on the number of rooms that need to be cleaned each day'. The respondents were asked about how AM might affect the future role of managers in algorithmically managed hotels.

Participants were asked to provide up to five responses for each of the four themes and to briefly explain the reasons for their views. The first round of the Delphi process yielded 159 unique statements, which were open-coded in NVivo 12. Control-related data yielded 36 codes and 14 thematic items; and 38 codes and 10 thematic items were identified regarding competition. Data on collaboration yielded 43 distinct codes and 14 thematic items. Creativity-related data gave rise to 42 codes and 11 distinct thematic items. After eliminating duplicate themes and combining similar ones, 31 final thematic items were generated.

3.3.2. Round 2 — first ranking

15 participants completed the second-round questionnaire, in which they were asked to indicate, using a five-point scale, their level of

Table I
Participant profiles.

Position	Gender	Age	Employees	Round 1	Round 2	Round 3
Asset Manager	Male	35–44	100–199	x		
Assistant Professor	Female	25–34	-	x	x	x
Assistant Professor	Male	45–54	-	x		
Associate Professor	Male	55–64	-	x	x	x
Director of Rooms	Male	35–44	200 or more	x		
Front Office Manager	Male	25–34	100–199	x	x	x
General Manager	Male	35–44	100–199	x		
General Manager	Male	35–44	Less than 50	x	x	x
General Manager	Male	25–34	50–99	x	x	x
General Manager	Male	55–64	100–199	x		
Hotels Development Manager	Male	35–44	100–199	x	x	
Managing Director	Male	45–54	200 or more	x		
Professor	Male	45–54	-	x	x	x
Professor	Male	35–44	-	x	x	x
Professor	Female	35–44	-	x	x	x
Professor	Female	55–64	-	x	x	x
Regional Learning and Development Manager	Female	35–44	200 or more	x	x	x
Resident Services Manager	Male	25–34	Less than 50	x	x	x
Revenue manager	Male	45–54	50–99	x	x	x
Rooms Operations Manager	Male	25–34	200 or more	x	x	
Senior Lecturer	Male	35–44	-	x		
Senior Lecturer	Male	25–34	-	x	x	x

agreement with each of the 31 items developed from the first-round interviews. Each expert was also given the opportunity to explain the reasoning behind their opinions. Responses were analysed using descriptive statistics. The six items that achieved below 60 % consensus were used for a subsequent Delphi round (see Tables II-VI).

3.3.3. Round 3 — second ranking

The third and final round had 13 valid survey completions where experts provided written feedback on six of the items. Participants were asked to indicate why they agreed, disagreed or were undecided on each item. Each expert was also given the past aggregate percentage agreement with each item, along with the opportunity to provide further ideas or comments. Stability (consistency of replies between subsequent rounds), as proposed by Dajani et al. (1979), and agreement were employed as criteria for stopping the Delphi investigation, when the coefficient of variation (standard deviation divided by the mean) was attained to be ≤ 0.5 (Dajani et al., 1979). Following Hill and Fowles (1975), the 60 % cut-off criterion was also utilised to define consensus.

Following this round, the experts reached consensus on all but one item 'Algorithmic-based decisions will be perceived as more fair (versus intuitive decisions from the manager)'. For time and project budget efficiency, the research team agreed to stop data collection at this point because the one item where no consensus was reached represented only 3 % of the total number of items examined in this study. Tables II-V include the stability and the agreement ratings for each item after the second and third round of the Delphi survey.

4. Findings and discussion

The following sections comprise the findings of the Delphi rounds, statements and views from experts on the 31 items that were identified as being relevant to future management roles and responsibilities in algorithmically managed hotels. We interpret these findings in relation to emerging literature on AM, but we provide a wider discussion in the conclusion section, with particular reference to conceptualising the transformational potential for line management roles and functions, encompassing new forms of coaching that AM may engender.

4.1. AM's impact on control and efficiency

Experts were asked about the ways in which AM could change managers' ability to control and the impacts on their efficiency. In total, 36 responses were summarised into 9 items (Table II). When strongly agree/somewhat agree responses were combined, agreement was achieved in round 2 on all eight items. The item 'The ultimate impact of AM will depend largely on managerial style and company culture, as well as how transparently it's used' reached strongest consensus, with 66.67 % of experts strongly agreeing on it. Experts further agreed that AM will increase managerial efficiency. However, when it came to the question of control, experts noted that AM may have a dual effect on the control ability of managers. AM will provide new forms of control over employees by utilising real-time measurement of key metrics, yielding better overall control over resources; but managers may equally lose control to the algorithm, resulting in employee dissatisfaction and resistance to new forms of power. As one respondent observed, '*the "big brother" perception of AM might decrease employee retention rates and lead to increased micromanagement*'. On the positive side, algorithms may help to identify skill gaps among employees through real-time performance measurement, helping managers to target learning and development interventions. Three items reached weaker consensus: 'The risk that managers could lose touch with the less formal feelings of teams, potentially hurting the company culture' (66.67 %); 'Control will always remain with the manager, unless AM is set to run automatically' (73.34 %); and 'Managers will have more control but less empowerment' (61.54 %).

More interestingly, additional experts' comments conveyed the idea that management from an '*algorithmic cockpit*', which was removed from the lives of operational staff, may largely depend on the system's design, organisational culture and the way that it is implemented in the organisation. For example, respondents noted, '*AM is a tool so empowerment for setting boundaries comes from the culture at the top*,' and that '*[AM's influence] depends on the design of the systems*.' More specifically, as one respondent observed, '*[Its impact] will depend on how the system is introduced and from where the system specs come from. Off-the-shelf, SaaS [Software as a Service], or in-house development will all be different use cases*.'

These findings suggest that maintaining open channels of

Table II
Effects of AM on control and efficiency.

Statement Round 2	Mean	Std Dev	Stability	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
AM will increase managerial efficiency	3.87	0.88	0.23	0.00 %	13.33 %	6.67 %	60.00 %	20.00 %
The implementation of AM may yield better control over resources and provide new forms of control for managers, thereby improving cost management	4	0.82	0.21	0.00 %	6.67 %	13.33 %	53.33 %	26.67 %
Workers and managers will experience a loss of autonomy and control, leading to potential dissatisfaction and resistance	3.87	0.88	0.23	0.00 %	13.33 %	6.67 %	60.00 %	20.00 %
The 'big brother' perception of AM might decrease employee retention rates and lead to increased micromanagement	3.87	0.96	0.25	0.00 %	13.33 %	13.33 %	46.67 %	26.67 %
Implementation of AM could lead to real-time measurement of key metrics and help identify skill gaps for targeted learning and development	4.07	0.85	0.21	0.00 %	6.67 %	13.33 %	46.67 %	33.33 %
There's a risk that managers could lose touch with the less formal feelings of teams, potentially hurting the company culture and negatively impacting performance	4.07	1	0.25	0.00 %	6.67 %	26.67 %	20.00 %	46.67 %
The ultimate impact of AM will depend largely on managerial style and company culture, as well as how transparently it's used	4.53	0.72	0.16	0.00 %	0.00 %	13.33 %	20.00 %	66.67 %
Unless the AM runs automatically control will always remain with the manager	3.87	0.96	0.25	0.00 %	13.33 %	13.33 %	46.67 %	26.67 %
Statement **Round 3**	Mean	Std Deviation	Stability	Agree	Disagree	Undecided		
More control but less empowerment for setting boundaries	1.62	0.84	0.52	61.54 %	15.38 %	23.08 %		

communication with employees and having a culture that values and empowers employees may assume critical importance in facilitating the effective integration of AM in organisations. Line managers, as intermediators, will therefore have to adopt and perform communication facilitator roles. Given that hospitality jobs are characterised by employees' perceived lack of control over their own work, the absence of employee empowerment and 'hierarchical, 'autocratic,' and harsh supervision styles (Ariza-Montes et al., 2018), and with previous research showing that digital technologies can create tensions between old and new organisational values (Martínez-Caro et al., 2020), hotels may need to transition to a more collaborative and free information sharing culture, to avoid inadvertently exacerbating tendencies towards increased control inherent in AM systems. This is echoed by previous studies, which found that organisations with people-oriented rather than production-oriented cultures have higher chances of achieving successful IT implementation (Harper and Utley, 2001).

In summary, findings highlighted two key implications on the role of hotel managers. First, despite greater efficiency, managers might experience dissatisfaction or resistance from their subordinates due to a loss of control and autonomy. Hence, managers will have to ensure that they maintain constructive relations with their teams in which they balance control and empowerment to offset the negative effects of their newly found augmented control abilities. Second, extending from the previous observation, successful AM implementation will depend on effective organisational communications. Hotels should consider transitioning towards a more collaborative and transparent organisational culture to mitigate tendencies towards increased control.

4.2. AM's impact on competition, achievement and market results

Experts were asked about the effects of AM on competition, achievement, and market results of managers. 38 responses were summarised into 5 items (Table III). This section showed the strongest agreement with all items reaching strong consensus in round 2. All experts agreed (100 %) that AM will improve financial results by optimising processes, increasing efficiency, and providing better utilisation of resources. For example, our respondents observed,

> *The implementation of AM is expected to enhance the competitiveness of hotels by enabling better decision-making, real-time monitoring, and increased task-orientation.*

> *AM is projected to improve financial results and overall performance levels of hotels by optimizing processes, increasing efficiency, and providing better utilization of resources.*

These were highlighted in prior work which focused on the efficiency and organisational goal attainment made possible by algorithmic systems' capacity to streamline operations and eliminate inefficiencies (Kellogg et al., 2020).

When combining strongly agree/somewhat agree statements, experts also agreed that AM brings increased efficiencies for managers, but it also demands higher efficiency levels from them. This was also identified by several studies of the platform economy (Cram et al., 2022; Parent-Rocheleau and Parker, 2022). Shifting the emphasis to more data-oriented competencies can indeed enhance results (Chen et al., 2012), however, organisations need to proceed with caution in what may become a reduction in the need for human-oriented managerial skills.

In a similar vein, the expert contributors to our study believed that '*Managers will have to have AI systems fluency, and analyse and understand data generated by algorithms*.' At the same time, AM will '*Significantly influence existing performance appraisal systems, with decisions becoming more data-driven*', which may result in more pressure for employees, and demotivating effects. Analogous problems concerning the negative influence of AM on worker motivation has been discussed extensively in the gig economy literature (Chan, 2022; Gagné et al., 2022). Recognising the importance of employee motivation may emerge as a critical strategy for productivity optimisation. Therefore, an essential part of managerial roles will include devising motivational strategies that contribute to the wellbeing of operational staff. As our respondents observed, '*New leadership skills need to be close to teams to offset the effect of algorithmic management*,' and that '*Managers will need to be skilled in human-machine interaction and collaboration*.' Again, these qualitative observations highlighted the importance of intermediatory roles among managers in direct contact with staff, for example, suggesting that '*Briefing employees and engaging in discussion circles can foster understanding of AM*.'

In summary, regarding competition and achievement, the findings suggest two key implications on the role of hotel managers. First, with the help of AM, managers faced improved efficiency, processes optimisation, and better utilisation of resources that drives individual and organisational competitiveness. In principle, this also represents an opportunity for human resource management insofar as line managers have more time to invest in supporting frontline staff in their wellbeing and nurturing collaborative service cultures. Second, in practice, the same line managers should prepare for higher demands being imposed upon them, which emerge from, and are tied to, data-driven performance indicators and appraisal systems. More precisely, they will be expected to service the algorithmic systems, which have the potential to reduce their performance and that of their supervisees' to a narrow set of quantitative indicators. As our respondent noted, '*Managers will have to have AI systems fluency, and analyse and understand data generated by algorithms*.' Moreover, '*Managers will have to be flexible and able to quickly*

Table III
Effects of AM on competition, achievement and market results.

Statement Round 2	Mean	Std Dev	Stability	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
The implementation of AM is expected to enhance the competitiveness of hotels by enabling better decision-making, real-time monitoring, and increased task-orientation	4.4	0.61	0.14	0.00 %	0.00 %	6.67 %	46.67 %	46.67 %
AM is projected to improve financial results and overall performance levels of hotels by optimising processes, increasing efficiency, and providing better utilisation of resources	4.4	0.49	0.11	0.00 %	0.00 %	0.00 %	60.00 %	40.00 %
AM could potentially heighten the individual performance of managers but may also demand higher efficiency levels, maintaining service quality as a key differentiation factor	4.07	0.68	0.17	0.00 %	0.00 %	20.00 %	53.33 %	26.67 %
AM may significantly influence the existing performance appraisal system, with decisions becoming more data-driven, potentially pressuring employees to achieve objectives	4.07	0.77	0.19	0.00 %	6.67 %	6.67 %	60.00 %	26.67 %
The use of AM may have a demotivating effect on workers, with a possible loss of work meaning, as they may feel less part of a 'family'	3.93	1.06	0.27	6.67 %	0.00 %	20.00 %	40.00 %	33.33 %

adjust strategies based on real-time data and algorithmic insights.' Line managers will also be required to mediate between these systems and the individual needs of the operational staff that they supervise. This represents an expansion and intensification of line managers' jobs insofar as they are required to perform expansive technical as well as emotional competencies to manage competing priorities of disparate human and non-human stakeholders.

4.3. AM's impact on collaboration and employee development

The question we asked experts in this category concerned the effects of AM in terms of collaboration and employee development. In total, 9 items were developed based on 43 responses (Table IV). When strongly agree/somewhat agree statements were combined, the overwhelming majority (93.3 %) agreed that transparency will be required concerning managerial and algorithmic decisions regarding tracking workers and work processes, echoing studies on algorithmic control outside hospitality settings (Barati and Ansari, 2022; Möhlmann et al., 2023). This raised important questions concerning how transparency could be managed and by whom in the organisation, highlighting the potential role of line managers as intermediators in these organisational arrangements.

Experts agreed on the possibility for decline in employee motivation and the need for proactive communication and change management interventions from managers during the implementation of AM, reflecting studies that highlight the adverse effects of algorithms on employee motivation (Gagné et al., 2022; Parker and Grote, 2022) and the importance of explainability of artificial intelligence (Vredenburgh, 2022). This indicates that managers, particularly those in key line management positions in regular and direct contact with frontline staff, must actively engage in transparent communication to help employees understand and accept the decisions made by algorithmic systems and to mitigate potential negative impacts on employee morale and motivation. This points to a key emergent translational role among line managers, which requires them to coach frontline associates to make sense of and respond appropriately to algorithmic decisions that are outside of their sphere of influence, and the workings of which manifest opaquely.

The adoption of AM may polarise employee behaviour, substituting collaboration with automated decision-making tools and complacency, while increasing competition. Consistent with the literature on stress, frustration, and powerlessness among gig workers (Glavin et al., 2021; Pignot, 2023), round 3 showed agreement on the topic of increased employee stress due to increased competition and performance pressure from algorithmic monitoring. This was also highlighted in some of the qualitative comments, for example:

> *More measurement in general will probably lead to more competition, as there are more metrics that individual employees can compare between each other (and that management can compare without them knowing).*

> *Certain features of AM distance coworkers from each other and from their management, for example, punishment and reward systems or surveillance and control, that are common in the gig economy.*

Performance ratings atomise gig workers, who withhold information from one another out of fear of competition (Yao et al., 2021), making work highly stressful (Cram et al., 2022). To offset similar increased competitiveness introduced by algorithmic rating systems, hotel managers will be expected to coach their colleagues to promote a collaborative culture and empower teams to engage in cooperative problem-solving. Hence, the key challenge and opportunity for managers will be to re-humanise working relations threatened by the mechanistic influence of AM. These were themes also raised in the qualitative feedback, for example: '*I do firmly believe that AM will help in creating more engaged teams as managers will have more time to train and assist*.'

Echoing these observations, agreement was also reached on the topic of feeling of alienation and isolation of employees, which is likely to increase due to reduced human management. This further underscored the growing social integrator role of line managers who are in regular contact with frontline staff.

Experts could not agree if algorithmic decisions will be perceived as fairer than human decisions. This disagreement could stem from perceptions of task-specific decision fairness. For example, Lee (2018) observed that for mechanical tasks, algorithmic and human decisions were perceived similarly; however, for human tasks, algorithmic decisions were perceived as less fair and trustworthy, attributed to their perceived lack of intuition. Previous empirical studies provided a mixed

Table IV
Effects of AM on collaboration, teamwork and employee development.

Statement Round 2	Mean	Std Dev	Stability	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Transparency will be needed regarding tracking workers, work processes and generally about AM and how it works	4.27	0.57	0.13	0.00 %	0.00 %	6.67 %	60.00 %	33.33 %
The use of algorithms might lead to employee complacency, replacing collaboration with system-based decision-making	3.8	1.11	0.29	6.67 %	6.67 %	13.33 %	46.67 %	26.67 %
Impact on natural team formation and stifling of collaboration due to competition within teams will be observed	3.4	0.95	0.28	0.00 %	26.67 %	13.33 %	53.33 %	6.67 %
Proactive communication and change management will be essential in algorithmic management	4.2	1.05	0.25	0.00 %	13.33 %	6.67 %	26.67 %	53.33 %
Employee motivation may decrease if employees are treated solely as robotic entities, not empowered to problem-solve	4.27	0.77	0.18	0.00 %	0.00 %	20.00 %	33.33 %	46.67 %
Statement **Round 3**	Mean	Std Deviation	Stability	Agree	Disagree	Undecided		
The feeling of alienation and isolation will increase, in part due to reduced human management	2	0.88	0.44	76.92 %	15.38 %	7.69 %		
There will be increasing competition and stress between employees due to increased pressure for performance	1.31	0.61	0.47	76.92 %	15.38 %	7.69 %		
Algorithmic-based decisions will be perceived as more fair (versus intuitive decisions from the manager)	2	0.78	0.39	30.77 %	38.46 %	30.77 %		
AM will remove the necessity for collaboration to arrive at consensus	1.85	0.53	0.29	23.08 %	69.23 %	7.69 %		

picture on fairness perception (e.g., Lee and Baykal, 2017), which highlighted the need to further examine the scale and impacts on perceived fairness.

Notably, one item 'AM will remove the necessity for collaboration to arrive at consensus' showed a decrease in stability as it progressed from Round 2–3, as some participants may have re-evaluated their response to recognise that human collaboration will be required even in algorithmically managed workplaces (see Table VI). Interestingly, some experts expressed optimism about AM's potential to foster more engaged teams by allowing managers to dedicate additional time to training and assistance. For example, one respondent noted: '*If AM is used correctly, it will increase competition which is a positive, I do feel it will reduce stress due to streamlining managers' tasks to spend more time on culture*.' This is in line with prior studies, which suggested that human resource and line managers' roles following AI implementation may switch from control to coaching (Drent et al., 2022). Such a role redefinition suggests that line managers in hotels will need to balance data-driven efficiency with developing their teams' skills and enhancing employee engagement through personalised training and support.

In summary, findings concerning collaboration have two key implications for the role of hotel managers. First, it is likely to drive a shift in managerial focus from direct control to coaching functions, whilst overseeing and optimising algorithmic processes. Second, related to the previous point, managers will have to adopt a translational role, attempting to create a sense of trust among staff in the AM system, and addressing an increased need to focus on mitigating employee feelings of alienation and distrust by ensuring transparency and explainability for human and algorithmic management. It will be important to balance the shift to automation with re-humanising work relations to offset the negative effects of AM causing increased competitiveness and stress.

4.4. AM's impact on creativity, innovation and flexibility

In response to the question concerning the effects of AM in terms of innovation, creativity and flexibility of managers, 42 responses were summarised into 8 items (Table V). When strongly agree/somewhat agree responses were combined, a majority agreement was achieved in round 2 on seven out of eight items. Experts most strongly agreed (73.33 %) on the expected standardisation of services due to AM implementation and on the potential of well-integrated AM systems to stimulate innovation and to enable managers and employees to concentrate on creativity. However, they also concurred that algorithmic monitoring and rigorous guidance may equally restrict flexibility and creativity, not only for employees but also for line management. It was also agreed that a decrease in employee numbers due to automation and standardisation of services was one of the significant operational outcomes resulting from AM implementation. One of the items with the least overall agreement was 'Pressure to adopt AM for the sake of innovation may arise', with 60 % of experts agreeing.

Some contrasting opinions on the controversial topic of the influence of AM on creativity and innovation were identified. Some colleagues remained positive expressing that '*AM systems will inspire creativity*' and '*Automating tasks frees up time for managers and employees to focus on creativity*.' Others felt more pessimistic, stating '*Work surveillance and clear direction may reduce creativity*' or '*Middle management may have reduced flexibility and creativity under AM*' or at least that '*Creativity is limited to the interpretation of existing data. Some important data may not be measured, and thus gets overlooked*.' Importantly, there was consensus reached that the way businesses adopt and utilise AM will ultimately determine whether its impact on creativity and innovation is positive or negative. For example, contributors stated '*If used properly, AM systems can help realise innovative ideas into practice*', '*Well-integrated AM systems can foster deeper innovation*,' and '*Reliance and use will be shaped by adoption practices, and whether they are high road or low road*.'

With increased standardisation and new operational dynamics, it will be important for frontline managers to balance meeting demands for standardised operating procedures with fostering a culture that values

Table VI
Stability change between Round 2 and Round 3.

	Stability Round 2	Stability Round 3
The feeling of alienation and isolation will increase, in part due to reduced human management	0.35	0.44
There will be increasing competition and stress between employees due to increased pressure for performance	0.38	0.47
Algorithmic-based decisions will be perceived as more fair (versus intuitive decisions from the manager)	0.36	0.39
AM will remove the necessity for collaboration to arrive at consensus	0.45	0.29
The initial stages of innovation may be hindered by the reliance on AM solutions	0.25	0.49
More control but less empowerment for setting boundaries	0.29	0.52

Table V
Effects of AM on creativity, innovation and flexibility.

Statement Round 2	Mean	Std Dev	Stability	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
AM implementation will lead to reduced employee count	3.67	0.87	0.24	0.00 %	13.33 %	20.00 %	53.33 %	13.33 %
Well-integrated AM systems can foster deeper innovation	3.67	0.94	0.26	0.00 %	13.33 %	26.67 %	40.00 %	20.00 %
Middle management may have reduced flexibility and creativity under AM	3.33	1.01	0.30	6.67 %	20.00 %	6.67 %	66.67 %	0.00 %
Pressure to adopt AM for the sake of innovation may arise	3.73	0.85	0.23	0.00 %	6.67 %	33.33 %	40.00 %	20.00 %
Standardisation of products and services can be a result of AM	3.87	1.15	0.30	6.67 %	6.67 %	13.33 %	40.00 %	33.33 %
Automating tasks frees up time for managers and employees to focus on creativity	4	0.89	0.22	0.00 %	6.67 %	20.00 %	40.00 %	33.33 %
Work surveillance and clear direction may reduce creativity	3.67	0.94	0.26	0.00 %	20.00 %	6.67 %	60.00 %	13.33 %
Statement **Round 3**	Mean	Std Deviation	Stability	Agree	Disagree	Undecided		
The initial stages of innovation may be hindered by the reliance on AM solutions	1.54	0.75	0.49	61.54 %	23.08 %	15.38 %		

freedom, innovation, and creativity. Arguably, this also points to an important coaching function requiring line managers to negotiate the effects of AM, and to translate its increasing presence into positive workplace experiences for staff. The incorporation of technologies and algorithmic systems can, at the same time, restrict and enhance creativity of managers, by freeing their time from mundane tasks (Malik et al., 2021). However, it is assumed that the individuals will utilise the freed-up time for creative purposes, which may not always be the case.

A more critical perspective is that algorithmic surveillance and direction will inhibit creativity, because of the 'threat-rigidity effects' observed in high-pressure environments (Staw et al., 1981). Specifically, when exposed to threatening environments, employees adopt less varied and less flexible behaviours, sticking to familiar procedures. This critique assumes that all forms of strict, rules-based management and managerial oversight, even when algorithmically mediated, are inherently stifling, which may not be the case as some workers might thrive under clear monitoring and instructions. Hence, this interesting dual effect of AM on creativity and innovation should be investigated by future studies. Moreover, research in this stream could be used to assess the differentiated impacts on diverse grades of management, from those in supervisory and team leader roles, middle managers to those in senior positions. Assessing the impacts on creativity and innovation can thus be used to identify and evaluate how emergent management roles can be used to negate the harmful effects on creativity and to promote innovation among frontline staff.

In summary, concerning creativity and innovation, the data highlighted two key implications for hotel manager roles. First, managers will need to adapt to new operational dynamics as algorithms increase standardisation of processes. It will be crucial to balance the need for standardised procedures with fostering a culture that values freedom, innovation, and creative thinking, with creativity and innovation possibly becoming a key competitive differentiator in a highly standardised operations landscape. Second, managers and organisational leadership must understand the dual effect of AM on creativity. While it may provide opportunities for creative expression by freeing up time, it may also introduce constraints that limit flexibility and innovation. In either case, there is a potentially crucial role for line managers to provide localised interventions to manage the risks and to increase the possibilities for positive outcomes for organisational cultures.

5. Conclusion and implications

Our findings suggest that AM has the potential to increase efficiency, expand accountability and extend managerial control over processes and performance in the hotel sector, thus improving competitiveness. AM and associated intelligent systems have been applied primarily to areas such as revenue management, pricing, and data analytics for marketing purposes (see e.g. Hertzfeld, 2023; Ivanov and Webster, 2024), but their application is increasingly being extended to human resources including hiring, training and onboarding, and to operational areas such as workload allocation, scheduling and performance monitoring (Deputy, 2024; Optii Solutions, 2023; Spektor et al., 2023a, 2023b). However, in doing so, it is likely to increase stress among operational staff, who perceive loss of control and growing surveillance as threats to their autonomy and agency (Meijerink and Bondarouk, 2023; Spektor et al., 2023b). In principle, freeing up resources by reducing the burdens of administrative work may enhance prospects for greater creativity, for example in developing new hotel services or cultivating new consumer segments; and expanded capacity among managers could provide opportunities to invest in supporting staff development and wellbeing. In practice, it is likely to create new administrative tasks required to provide inputs for, manage the processes of, and interpret the outputs of the systems that drive AM (see Ivanov and Webster, 2024).

Fig. 1 summarises the potential impacts that AM integration is likely to present across the different organisational domains of control, competition, collaboration and creativity, which were distilled from the CVF and applied to structure the Delphi elicitation. Moreover, Fig. 1 presents the emergent managerial roles and functions that are required to address those challenges and exploit potential opportunities. 'Communication facilitation' concentrates on improving interaction across organisational hierarchies and improving transparency regarding AM-driven decisions and their logics. 'Performance facilitation' recognises that managers will have to increase and improve their engagement

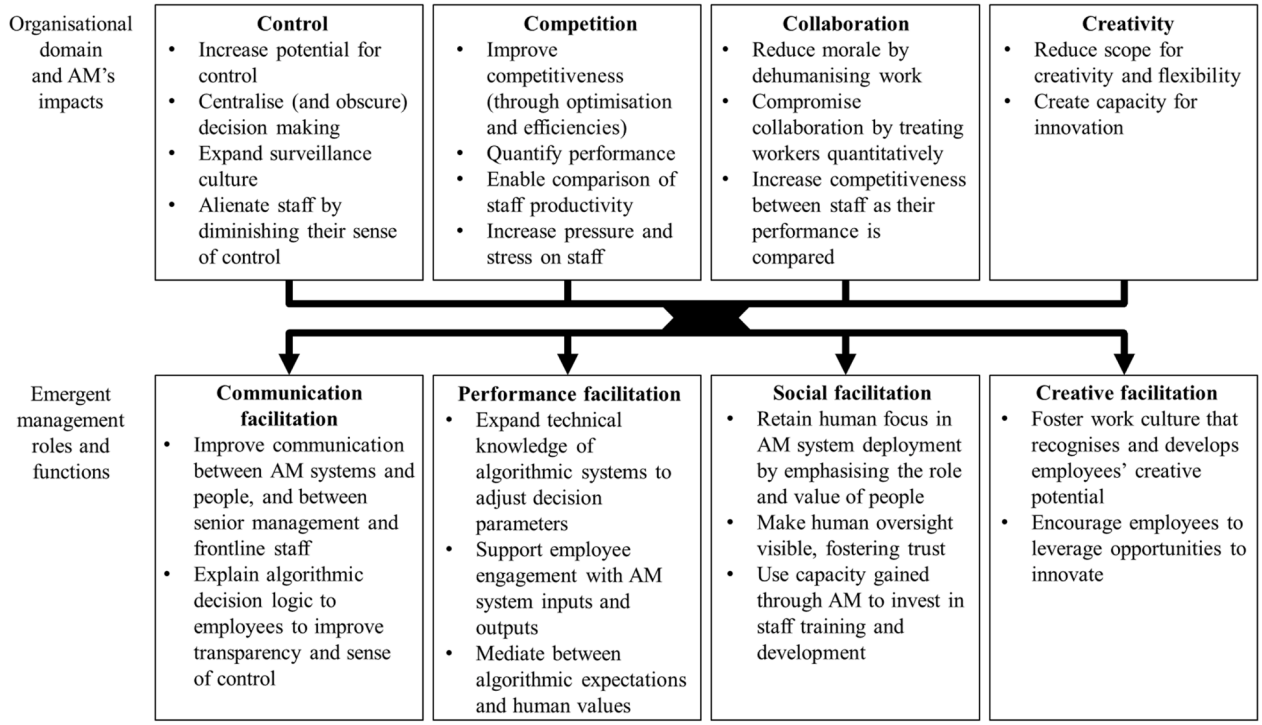

Fig. 1. AM's impacts on organisational domains and emergent management roles and functions.

with, and technical understanding of, AM systems, and managers will be required to mediate between human and non-human actors to drive performance while keeping frontline staff motivated and engaged. This focus on humanising work and workplace relations extends in the realm of 'social facilitation' where managers will have to continually foreground the interests of frontline staff and to invest in their personal and professional development, within the constraints of organisational cultures shaped by AM. Finally, regarding 'creative facilitation', the emphasis will fall on creating, utilising, recognising and rewarding creativity, which will require managers to stress flexibility and innovation. This is likely to run counter to the restrictive and alienating effects of AM integration, but an optimistic interpretation of AM's impacts is that increasing automation will provide additional capacity to foster and pursue creativity.

The analysis of our findings points to fundamental challenges and opportunities for staff involved in front- or first-line management. In recent years, the scope and responsibilities of these roles has expanded beyond operational supervision, quality control and reporting to incorporate wider business and performance management and human resource development functions (cf. Hales, 2005; Kehoe and Han, 2020). Line managers are also positioned within the organisational hierarchy between senior management and frontline operational staff, which requires them to interpret, convey and enact organisational objectives, mediate between diverse organisational actors and their various logics, and to humanise the organisational experience for frontline staff. These areas of practice are central to managing all four strands of facilitation. The pressures of managing these diverse interests, perspectives and objectives are amplified in hospitality settings, where the provision of outstanding service and memorable consumer experiences requires the ongoing mobilisation of human capital (Solnet et al., 2015, 2019).

Our data suggested that the growing adoption of AM is likely to expand and intensify the pressure on line managers to manage disparate forms of facilitation, which will drive further transformation of their organisational roles. Consequently, our findings enable us to reconceptualise the responsibilities of front-line hotel managers who will have a key role in mediating between senior management, algorithmic decision-making systems and the frontline staff whose organisational experiences and performance of service work will be shaped by the organisational cultures and workplace regimes they engender.

As noted at the outset, previous studies, outside hospitality, have begun to appreciate the intermediary work required for AM to function (Brady et al., 2017; Kellogg et al., 2020). However, these studies provided general commentary on managers' translational work and the competencies they may require. Based on our findings, we identified and differentiated between four areas of facilitation (see Fig. 1), which helps to better understand managers' emerging roles, responsibilities and their associated challenges. With this focus on facilitation, we seek to extend our contribution to knowledge by proposing conceptualising this domain of line management activity as 'algorithmic coaching', and outline a distinctive way to theorise its dynamics within a hospitality and, specifically, a hotel context.

Algorithmic coaching can be conceptualised as being goal-oriented, developmental and relational, analogous to other forms of coaching, with the aim of improving staff mindsets, experiences and their performance (cf. Clayton et al., 2025; Dolot, 2017; Grover and Furnham, 2016). However, algorithmic coaching is different to other forms because it is embedded within socio-technological systems of (human and non-human) organisational 'actors', with diverse and often conflicting goals, priorities, processes and performance indicators. Algorithmic coaching within AM is performed or enacted as humans interact with socio-technological networks and interfacing 'devices' requiring particular forms of engagement e.g. data input platforms, dashboards, reporting protocols etc. (see e.g. Ivanov and Webster, 2024). Within hotels, line managers interact with these systems, in the context of wider organisational processes, targets and imperatives (ibid.), for example, in pursuit of revenue rates, productivity targets for service delivery or guest satisfaction ratings. By doing so, line managers are also governed through these algorithmic systems and thus subject to their algorithmic logics. Importantly, line managers also have ongoing interactions with frontline staff, which requires managers to engage with, and according to, staff's cultural logics, competencies and norms (Drent et al., 2022). The four areas of facilitation (see Fig. 1) require line managers to embrace pivotal intermediary roles and functions that they continually have to perform within these socio-technological networks, which are subject to algorithmic logic and governance (i.e. based on datafication of procedures, quantification of performance, pervasive, comparative analysis and ongoing surveillance).

Our findings lead us to conclude that algorithmic coaching within the hotel context entails two key dimensions – 'mitigatory' and 'facilitative' – both of which require person-centric sensitivities and skills. The mitigatory focus of algorithmic coaching seeks to compensate for the negative impacts of AM and their introduction into a human-centric experiential setting of hotels. Specifically, AM represents organisational arrangements with strong control and/or competition orientation (Möhlmann et al., 2021, 2023), where performance is conceived and measured quantitatively, which risks alienating frontline workers and reducing their labour to a numerical set of indicators. Moreover, algorithmic decision concerning workload allocation, for example, regarding shift allocations, the number of staff in a hotel department during a shift, or the number of rooms to be cleaned, may have detrimental effects. Such negative sentiment may be exacerbated if workers feel helpless regarding those decision, lacking clarity regarding the underlying rationale of those decision, or if their workload is overwhelming and reduced to numerical indicators of productivity, which are compared to those of colleagues (Meijerink and Bondarouk, 2023). Mitigation in pursuit of communication and performance facilitation through algorithmic coaching will require line managers to have a certain level of technical understanding of the AM systems, which will underpin their ability to explain and justify otherwise opaque algorithmic decisions to frontline staff. More importantly, mitigation in performance and social facilitation via algorithmic coaching is likely to require significant emotional intelligence, listening skills and empathy to help frontline staff cope with the dehumanising effects of AM.

Algorithmic coaching also has a facilitative dimension insofar as it tries to strengthen collaboration in the workplace, improve staff's relationships with(in) potentially alienating work arrangements, and rehumanise decision-making processes within organisations reliant on AM. Across all four domains of facilitation captured in Fig. 1, algorithmic coaching will require line managers to mobilise their emotional intelligence to help frontline staff find meaning in, and organisational or occupational identification within, these types of working arrangements. Social facilitation may focus on establishing staff wellbeing initiatives, which may themselves be subject to AM logics, insofar as they are data and target driven (e.g. regarding staff satisfaction and retention). Given the potential for alienation and dehumanisation, line managers will need to help staff identify new goals and rewards to be gained from working within algorithmic decision systems. Coaching in pursuit of social facilitation may focus on training and identifying learning opportunities within the organisation, foregrounding staff's personal and professional development, and thus helping to realise the potential of new technologies to facilitate these activities. Creativity facilitation could be progressed by implementing new forms of reward or recognition for staff who drive innovation within algorithmically managed organisations. Finally, algorithmic coaching, in pursuit of performance facilitation, will also need to address underperforming staff performance, identifying the causes and overcoming them through creative, people-centric interventions.

5.1. Theoretical implications

A central tenet of the CVF is that different organisational orientations – control, competition, collaboration and creativity – represent

potentially conflicting values and priorities that have to be interpreted, accommodated and negotiated by managers (Cameron and Quinn, 2006; Cameron et al., 2022). The CVF is a versatile, integrative framework for comprehending how competing orientations and imperatives drive changes in management practices (Yu and Wu, 2009). Drawing on the CVF, our findings demonstrated how these orientations and corresponding areas of management practice are transformed through AM in hotels. The theoretical implication is that our work shows the potential of applying CVF as a structured sensitising framework to analyse the impacts of integrating AM systems and practices on managers' functions, roles and responsibilities in diverse organisational contexts, in hospitality and other service sectors that rely extensively on human capital to create consumer experiences. In light of emerging calls to extend theorisation in (and through) hospitality management research (cf. Khan and Hefny, 2019; Lynch et al., 2021), this framework provides a theoretical underpinning for empirical research and applied evaluation or consultancy work. More specifically, our theoretical framework, as captured in Fig. 1, is novel in differentiating between the challenges emerging across four orientational domains, which may have different priorities in organisations, while recognising their interactions. Moreover, our framework distinguishes how these translate into concrete areas of change in management roles and responsibilities. This final point is particularly important for our second theoretical implication concerning the impacts of AM on line management tasks and functions.

With previous explorations of algorithmic intermediary work among managers primarily focusing on the transactional aspects, for example in helping to make AM comprehensible to non-specialists (Brady et al., 2017; Kellogg et al., 2020), we proposed that the emergent management roles and functions can be conceptualised as *communication*, *performance*, *social* and *creative facilitation*. The theoretical implication is that this typology differentiates between areas of management competencies, which can be used to explore, evaluate as well as test how these functions are interpreted, enacted or even resisted in other empirical contexts. Significantly, this conceptualisation was developed within a hospitality context, but is highly transferable, and thus contributes to theorising AM and its management impacts beyond our field. This exemplifies the capacity of hospitality management research to make theoretical advancements outside our applied area of work, thus contributing to the external credibility and impact of our academy (cf. Lugosi, 2020; Rivera and Pizam, 2015)

Beyond developing this typology, we proposed that line management can be conceptualised through the notion of algorithmic coaching. We argued that algorithmic coaching is goal-oriented, developmental and relational, but embedded within socio-technological systems of (human and non-human) organisational actors. We extended this theorisation by differentiating between the mitigatory and facilitative dimensions of algorithmic coaching. This provides a new and more nuanced framework for comprehending the skills and challenges involved in line management within the context of AM, and the opportunities afforded by adopting coaching techniques to realise the potential benefits of AM systems. These are critical issues within hotels where human capital remains a key organisational resource and where the frontline staff's competencies continue to be essential to the value created through hospitality experiences. Theorising the potential of coaching in the facilitation of AM within hotels has thus enabled us to contribute to conceptualisations of coaching, situating it in the wider context of AM and socio-technological systems, with applications in and beyond hospitality (cf. Clayton et al., 2025; Grover and Furnham, 2016).

5.2. Practical implications

Our findings suggest that the organisational and human resource implications of adopting AM will be determined by several factors. First, maintaining transparency about AM processes will be critical for preserving trust and mitigating potential negative impacts on employee motivation. We referred to this as communication facilitation. For example, executive housekeepers in hotels should openly communicate to their housekeeping attendants how the AI-powered housekeeping platform tracks room cleaning time, time spent transitioning across corridors, and evaluates their work efficiency (Optii Solutions, 2023).

Moreover, proactive change management strategies, such as anticipating employee reactions to AM implementation, addressing concerns early and creating open channels for vertical communication, as part of performance and social facilitation, will be essential for successfully managing the transition to these automated systems. For example, when implementing shift scheduling platforms (Deputy, 2024), managers should continuously communicate scheduling changes implemented by the algorithm, but also attempt to adjust algorithmic parameters based on employee feedback, addressing any concerns as they arise. Specifically, if the algorithm allocates lengthy shifts based on efficiency, and this is felt to be unreasonable by frontline staff, managers could actively engage with staff to explain the underpinning logic, agree a reasonable compromise and visibly intervene in the system to shorten the shift length. This approach would valorise employee voice, and make human oversight of AM systems visible.

Additionally, our findings suggest that management should prioritise coaching, entailing communication skills and emotional competencies, focusing on helping employees understand the logic of the algorithm and its processes, interpret its outputs, and cope with potentially dehumanising effects. We have emphasised how coaching translates into relations with frontline staff. However, coaching should extend across the organisational hierarchy as part of social facilitation. For example, coaches could work alongside AI-powered platforms such as D2O, which provides hotel general managers and corporate central offices with rolling forecasts, intelligent resource guidance and staff scheduling intelligence (D2O (no date)). Instead of using data solely for performance evaluation, coaching for heads of departments and general managers can focus on working alongside the algorithm to not only achieve efficiency targets, but help them understand their performance data and identify areas for improvement and opportunities for complementary human-AI collaboration. In the context of AM's impact on creativity, and in pursuit of creative and performance facilitation, managers could work closely with developers of algorithmic platforms to integrate performance indicators that not only address productivity targets, but also measures of personalised service, enhanced communication with customers and finding creative solutions to problems.

It is also important to assess the wider organisational culture into which these algorithmic systems and decision processes become integrated. This includes the processes through which AM systems are introduced to the organisation and the extent to which the benefits for and potential concerns of frontline staff and their line managers are acknowledged and addressed. The organisational culture's implications also encompass how AM is deployed as part of performance monitoring, reward, disciplinary and professional development practices, including the potential for coaching interventions to support these transitions. The challenge for management will be to anticipate and mitigate the impact of these cultural considerations. Organisations must depart from adopting a reactive approach to the implementation of AM, responding to challenges as they become manifest, for example in staff turnover, service quality, deviant behaviour and staff wellbeing. Organisations could use scenario planning techniques, work improvement teams and pilot projects to help predict emerging challenges and to design the implementation process to counteract anxiety and resistance among staff. These concerns about the ability to plan for and evaluate the impacts of AM inform our discussion of our study's limitations and the implications for future research.

Finally, it is also important to address the practical implications for line management and for algorithmic coaching in the context of AM. From a techno-optimistic perspective, the introduction of AM will help to reduce the burdens of mundane line management tasks, providing line managers further opportunities to be creative and to invest in staff well-being. Therefore, AM is seen as a potential facilitator of job

enrichment. However, a more critical stance suggests that AM is likely to lead to job enlargement and intensification, requiring line managers to engage with a wider range of technical systems, while also having to translate organisational imperatives and to mediate the logic of AM decision making, which restricts creativity.

Importantly, optimistic and pessimistic readings of AM both suggest changes to line management responsibilities. A key implication concerns the job design of line management roles, the training and support line managers receive and how their changing responsibilities attract commensurate rewards. The complex requirements of algorithmic coaching and the translational nature of line management in AM-driven organisations will require line managers to expand their technical, communication and emotional competencies to actively engage in the four strands of facilitation.

Technical competencies refer to their knowledge of algorithmic systems, including the ability to adjust performance parameters (e.g. the time allotted to specific tasks or to transferring between tasks), and understanding of its limitations. To this end, simulation exercises (Bell and Kozlowski, 2008), which facilitate learning from errors, improvement of self-regulatory processes, and adaptability would further prepare managers to interpret algorithmic outputs and make data-driven decisions. Establishing cross-functional teams that bring together IT experts and frontline managers can foster peer learning and ensure that technical expertise is shared across the organisation, contributing towards aligning technology innovation effectiveness with operational effectiveness (Santa et al., 2011). Possessing this technical knowledge will also help avoid managers overestimating the objectivity of AM systems and thus reduce potential power asymmetries (Barati and Ansari, 2022).

Building on technological capabilities, communication competencies encompass line managers' ability to explain the logic of the system and its decisions to non-specialists including other managers and frontline staff. Intelligent systems explanations play a central role in human sense-making, decision-making and coordination (Hoffman and Klein, 2017). With explanations being socially situated (Lombrozo, 2012) and AM systems implicitly representing human-AI assemblages (Ehsan et al., 2021), it is important that managers do not adopt an algorithm-centred approach, devoid of any context, in explaining these systems. To achieve this, a manager might engage in ongoing discussions with the frontline employees, using regular feedback sessions to understand real-world challenges and adjust recommendations. Echoing Holmström and Hällgren (2021), who suggest that AI-human interactions will require mutual shaping, establishing frontline feedback loops should contribute to demystifying the 'black-boxes' of algorithmic systems by helping to clarify the decision-making approach to managers and business leaders (Jarrahi et al. (2021).

Emotional competencies refer to soft skills including listening and empathy, which enables line managers to comprehend the perspectives of frontline staff, including their anxieties concerning dehumanised decision making and algorithmically determined performance targets, which will increase competitive pressure amongst employees. Developmental programs aimed at enhancing emotional intelligence skills, especially in detecting feelings of stress and frustration, and conflict resolution, will ensure that managers can interpret AM outputs within the context of human emotions and social dynamics, to address emerging conflicts, including employee resistance to these systems (Tuomi et al., 2023). Practically, this might involve setting up regular one-on-one or team feedback sessions where employees can share their insights, thereby creating safe spaces for open dialogue.

To address this expansion of required competencies for line managers, organisations should provide managers with targeted learning and development programs, and decision-making frameworks, to help them make informed decisions based on algorithmic outputs, promote a coaching culture and implement feedback mechanisms. Developing, recognising and retaining these individuals will be a key priority to ensure that AM continues to add value to the organisation and to the everyday experiences of frontline employees who enact hospitality.

5.3. Limitations and implications for future research

A key limitation of this study is its focus on experts representing predominantly UK-based hotel organisations. Future research should expand the sample to include international contexts, with different labour laws and human relations practices, and to consider the integration of AM across diverse types of hotel operations (encompassing different quality categories and ownership models). Furthermore, this study has only focused on hotels. Future research should generate data from hospitality subsectors sectors such as healthcare and assisted living, foodservice and events.

As noted above, the integration of AM will likely result in a range of emergent behaviours, which may be difficult to predict. Consequently, future work may adopt action research approaches, combining ethnographic and embedded case study strategies, to understand, evaluate and address the impacts of AM implementation in situ. Similarly, research may adopt design thinking methodologies, where planning, prototyping, testing and evaluation is co-created strategically between technology specialists, management and employees, including and especially those involved in line management. These iterative, solutions-focused research approaches provide opportunities to develop bespoke socio-technological systems designed around the needs of its users rather than on abstracted algorithmic logics and generic technology solutions.

Finally, research may focus more narrowly on the perceptions, experiences and behaviours of line managers who are expected to perform translational work and algorithmic coaching. These studies should adopt longitudinal approaches and/or use multi-stage (and multi-method) data collection that considers perceptions and attitudes prior to implementation, which can be used as benchmarks to assess changes emerging through AM integration. Studies may adopt explanatory quantitative approaches, including field experiments and surveys to measure changes in staff perceptions of their working conditions, wellbeing and future intentions. However, studies of AM's impact may also utilise exploratory qualitative methods, including interviews, focus groups and netnographic research on social media, to understand how staff, and line managers in particular, respond to and cope with AM through their individual behaviours and their shared organisational practices. Again, it is important to stress the potential of examining these as networks of socio-technological relations in which human and non-human actors exercise various forms of agency in their engagement with and enactment of AM.

CRediT authorship contribution statement

Jianu Brana: Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ashton Mark:** Writing – original draft, Investigation, Formal analysis, Conceptualization. **Lugosi Peter:** Writing – original draft, Formal analysis.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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