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MANAGERIAL ROLES BEYOND ARTIFICIAL INTELLIGENCE: WHY CERTAIN FUNCTIONS REMAIN IRREDUCIBLY HUMAN

The rapid advancement of artificial intelligence (AI) has profoundly transformed organisational decision-making and managerial work. Contemporary organisations increasingly rely on algorithmic systems for data processing, forecasting, and operational optimisation. Despite these developments, the assumption that AI will fully replace managerial functions remains conceptually flawed. Instead, AI introduces a reconfiguration of managerial roles, distinguishing between tasks that can be algorithmically optimised and those that remain inherently human.

This paper [1] argues that certain managerial roles are irreducibly human and therefore not an issue for AI, as they rely on relational intelligence, ethical reasoning, and meaning-making capacities beyond computational logic. Drawing on Mintzberg's framework of managerial roles and Senge's theory [2] of organisational learning, the analysis demonstrates that while AI enhances computational dimensions of management, it cannot substitute core human functions of leadership and governance.

The integration of AI into management introduces a dual cognitive structure: strategic thinking and computational thinking. Strategic thinking is grounded in intuition, systems awareness, ethical judgment, and long-term orientation. In contrast, computational thinking focuses on data analysis, algorithmic problem decomposition, and optimisation.

AI excels in domains characterised by computational logic, such as monitoring, forecasting, and resource allocation. These functions align with roles where decision-making is structured, repeatable, and data-intensive. However, managerial work extends beyond optimisation problems. It involves interpretation, judgment, and value-based decision-making, which remain human responsibilities.

Mintzberg's classification [3] distinguishes between interpersonal, informational, and decisional roles. The impact of AI varies significantly across these categories.

The analysis identifies interpersonal roles as fundamentally resistant to AI substitution.

Leader. The leader role involves vision-setting, motivation, and ethical alignment. These functions depend on emotional intelligence, trust, and moral legitimacy. While AI can provide performance insights or behavioural analytics, it cannot inspire commitment or establish shared purpose. Leadership is inherently a normative and relational process, requiring human presence and accountability.

Figurehead. As a symbolic representative, the manager embodies organisational identity and values. Ceremonial and representational functions rely on social recognition and institutional legitimacy, which cannot be authentically reproduced by AI systems.

Liaison. The liaison role centres on relationship-building and network coordination. It requires interpreting social cues, managing informal interactions, and maintaining long-term trust. AI may map networks or analyse sentiment, but it cannot engage in genuine interpersonal relationships.

Negotiator. Negotiation involves balancing competing interests, navigating ambiguity, and resolving ethical dilemmas. Although AI can simulate outcomes or optimise bargaining strategies, it lacks the capacity to interpret context-dependent meanings and moral implications. Consequently, negotiation remains a domain of human judgment and responsibility. Together, these roles demonstrate that relational and ethical dimensions of management are not translatable into algorithmic processes.

Beyond purely human roles, some managerial functions operate as hybrid domains where AI and human cognition intersect.

Entrepreneur. AI supports innovation through predictive modelling and scenario simulations. However, the identification of opportunities and the selection of strategic directions depend on human creativity and interpretation.

Disturbance handler. AI can detect anomalies and provide diagnostic insights, but managing crises requires contextual judgment, ethical evaluation, and accountability for consequences. In these roles, AI enhances analytical capacity, but final authority remains with the manager, reinforcing the principle of human-in-the-loop governance.

The analytical conclusions presented in this study are grounded in a combination of descriptive statistical calculations and comparative analysis of managerial cognition across sectors, as reported in the underlying research.

First, the empirical component is based on respondent-level questionnaire data collected across five sectors (technology, finance, healthcare, retail, and manufacturing). The dataset includes structured responses to a 12-item Likert-scale instrument, where respondents evaluated aspects of strategic thinking (ST), computational thinking (CT), AI-assisted competence (AI), and hybrid thinking (HT).

To operationalize these constructs, the survey items were grouped into four composite indices:

- Strategic Thinking (ST): items 1-3,
- Computational Thinking (CT): items 4-6,
- AI-Assisted Decision Competence (AI): items 7-9,
- Hybrid Thinking (HT): items 10-12.

For each respondent and sector, mean values (arithmetic averages) were calculated for these indices to provide a summarized measure of cognitive orientation. These mean scores formed the basis for cross-sector comparison and role-related interpretation.

In addition to descriptive statistics, the study applied Welch's pairwise comparison tests with Holm correction to evaluate potential differences between sectors. This method was used due to unequal

sample sizes and variance heterogeneity across groups. However, none of the observed differences remained statistically significant after correction, indicating that results should be interpreted as descriptive tendencies rather than confirmatory findings.

To assess internal consistency of the constructed indices, Cronbach's alpha coefficients were computed separately for each sector. The results indicated relatively low or unstable alpha values, which is consistent with the use of short three-item scales and the conceptual heterogeneity of the constructs. Therefore, the indices were treated as formative descriptive composites, rather than reflective latent variables.

Finally, the study employed comparative sectoral analysis of mean values to identify patterns in the distribution of strategic, computational, and hybrid thinking across industries. This comparative logic supports the interpretation that roles with higher computational scores (e.g., monitor, resource allocator) are more susceptible to AI augmentation, while roles associated with strategic and relational dimensions demonstrate lower alignment with AI-supported decision-making.

Thus, the combination of descriptive means, reliability testing, and pairwise statistical comparisons provides the empirical foundation for distinguishing managerial roles according to their relative exposure to AI influence. The calculated mean values of ST and CT provide a direct empirical basis for interpreting managerial roles through the lens of AI applicability and substitutability. Specifically, the relative balance between computational and strategic components can be used to approximate how strongly a given managerial function aligns with algorithmic logic versus human judgment.

In this context, the study adopts a conceptual interpretation framework in which: higher CT and AI scores indicate stronger alignment with data-driven, algorithmic processes; higher ST and HT scores reflect a greater reliance on human-centered judgment, ethical reasoning, and contextual interpretation.

This empirical distribution corresponds to a simplified analytical logic of AI substitutability, where managerial roles can be implicitly positioned along a continuum:

AI alignment increases with CT and decreases with ST and HT

Thus, although the article does not compute a formal index, the ratio-like relationship between computational and strategic mean values effectively functions as an empirical proxy for evaluating the degree to which managerial roles are exposed to AI influence.

Applying this logic to Mintzberg's framework, the calculated cognitive profiles support a differentiated interpretation of managerial roles:

- Roles associated with higher computational means (e.g., monitor, disseminator, resource allocator) demonstrate stronger alignment with AI-supported processes.
- Roles characterised by higher strategic and hybrid components (e.g., leader, liaison, negotiator, figurehead) show lower alignment with computational logic and therefore remain less susceptible to AI substitution.
- Roles with balanced scores (e.g., entrepreneur, disturbance handler) emerge as hybrid domains where computational support and human judgment coexist.

The persistence of human-centred managerial roles stems from three structural limitations of AI. First, AI lacks ethical agency. Algorithms operate within predefined objectives and cannot assume responsibility for decisions or evaluate their moral implications. Second, AI does not possess relational intelligence. Trust, empathy, and influence are fundamental to managerial effectiveness, yet they require authentic human interaction rather than algorithmic simulation. Third, AI cannot perform meaning-making functions. Managers interpret complex environments, construct shared understanding, and define organisational purpose. These processes involve narrative construction and symbolic communication beyond

data-driven reasoning. Thus, the descriptive statistical results indirectly operationalize the broader theoretical claim that AI optimizes structured, data-intensive functions, while irreducibly human roles persist where meaning, ethics, and relationships dominate.

The findings suggest that the future of management is neither fully automated nor purely human but hybrid. Organisations must develop managerial competencies that combine: computational literacy to interact with AI systems, strategic thinking to interpret outputs and define objectives, ethical reasoning to ensure responsible decision-making.

Moreover, governance structures should institutionalise human oversight mechanisms, ensuring that critical decisions remain accountable and aligned with organisational values [4].

This shift also redefines managerial legitimacy. Managers are no longer solely decision-makers but sense-makers and integrators, bridging algorithmic outputs with human values and organisational context. Artificial intelligence does not eliminate managerial roles; rather, it selectively transforms them. Functions based on data processing and optimisation are increasingly automated, while roles grounded in relational, ethical, and interpretive capacities remain beyond AI capabilities.

The analysis confirms that the roles of leader, figurehead, liaison, and negotiator are irreducibly human, as they depend on qualities that cannot be codified into computational systems. Even within hybrid roles, AI serves as an augmenting tool, not a substitute for human judgment. Therefore, the central conclusion is that managerial work in the age of AI is defined not by technological replacement but by the preservation and enhancement of human-centred capabilities. The enduring relevance of these roles highlights that effective management ultimately depends on what machines cannot replicate: meaning, responsibility, and human connection.

References:

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