Antecedents of Robotic Technology Acceptance in Thai Organizations: A Conceptual Model of Organizational Culture, Innovativeness and Digital Leadership for Performance Enhancement

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Abstract

Robotic technology and robotic process automation are widely credited with raising productivity, accuracy and long-run competitiveness, yet their diffusion inside Thai organizations remains shallow and uneven, and the behavioural conditions under which employees actually accept working alongside such systems are still poorly specified. This conceptual paper synthesises the literatures on organizational culture, organizational innovativeness, digital leadership, technology acceptance and organizational performance in order to propose an integrative antecedent model for the Thai organizational context. Working definitions are derived for each construct, and each construct is decomposed into three observed sub-dimensions: involvement, consistency and adaptability for culture; product, process and behavioural innovativeness for innovativeness; innovation driving, digital technology skills and driving behaviour for digital leadership; perceived usefulness, perceived ease of use and attitude for acceptance; and financial, customer-market and internal-process outcomes for performance. Seven propositions are advanced in which culture, innovativeness and digital leadership each exert direct influence on both technology acceptance and organizational performance, while acceptance of robotic technology operates as an intervening mechanism that transmits organizational conditions into performance outcomes. A mixed-method design is proposed for subsequent empirical testing, combining in-depth interviews with fifteen purposively selected executives and a survey of three hundred organizational members, with content validity established through item-objective congruence, reliability through a pilot administration, and hypothesis testing through covariance-based structural equation modelling. The paper contributes an explicitly context-sensitive acceptance model and a testable research agenda for robot-enabled organizational improvement in Thailand.

Keywords: organizational culture, innovativeness, digital leadership, technology acceptance, robotic technology

1. Introduction

Digital technology has become the operational core of contemporary organizations. Firms adopt digital systems to raise productivity, compress processing time, reduce cost and improve the precision of managerial decisions, and the competitive penalty for failing to do so grows steadily heavier. Among these technologies, robotics occupies a distinctive position because it substitutes for, or augments, human effort at the level of the task itself. Physical robots have long been embedded in manufacturing, while software robots, usually described as robotic process automation, now perform data entry, document verification, transaction handling and workflow orchestration in financial services, insurance, logistics and public administration. The organizational appeal is straightforward: repetitive and rule-governed activities are executed faster and more consistently than a human operator can manage, error rates fall, output becomes more standardised, and scale can be increased without a proportional increase in headcount. Employees, in turn, are released towards analytical, creative and judgement-intensive work that carries higher value for the organization.

The empirical literature broadly supports these claims. Studies of technology-enabled organizations report that automation improves internal process quality, strengthens measurement and control, and contributes to durable competitive advantage. Yet the same literature is equally clear that technology alone does not produce these outcomes. The benefits materialise only where the organization is able to integrate machines with people, which means that culture, leadership and the

innovative disposition of the workforce become decisive rather than peripheral. Where those conditions are absent, robotic investment tends to stall at the level of pilot projects, and the promised gains are never realised at the scale required to justify the investment.

The Thai case illustrates this tension sharply. Robotic technology is not unknown in Thai organizations, but its penetration remains limited relative to the aspirations expressed in national digital and industrial policy. Evidence from Thai service and hospitality settings suggests that robots are frequently introduced as demonstrations or learning exercises rather than as embedded operating capabilities, and that the acceptance of such systems among operational staff, precisely those who must work alongside the technology, remains low. This matters at national scale. The labour force survey conducted by the Thai statistical authority reports approximately 8.57 million people employed in the manufacturing sector, the sector in which robotic and automated systems are most concentrated (National Statistical Office of Thailand, 2024). A persistent gap between technological availability and organizational acceptance therefore represents a substantial forgone opportunity for productivity growth, for the mitigation of demographic pressure on the labour supply, and for the competitiveness of the national economy.

Three gaps motivate the present paper. First, research on the antecedents of technology acceptance has tended to examine organizational culture, innovativeness and digital leadership in isolation, so that their relative contributions cannot be compared within a single specification. Second, the dual role of acceptance, as an outcome of organizational conditions and simultaneously as a mechanism through which those conditions influence performance, is rarely modelled explicitly; acceptance is usually treated either as a terminal dependent variable or as a background assumption. Third, almost all of the available evidence originates outside Thailand, in institutional settings whose hierarchical distance, employment security norms and communication conventions differ appreciably from those of Thai organizations. The behavioural translation of leadership and cultural signals into acceptance cannot be assumed to be invariant across such contexts.

This paper responds to those gaps by developing an integrative conceptual model of the antecedents of robotic technology acceptance and organizational performance in Thai organizations. It is deliberately conceptual: no data have been collected, and no empirical claims are advanced. Its objectives are threefold. The first is to synthesise the literatures on organizational culture, innovativeness, digital leadership, technology acceptance and organizational performance, and to derive a working definition and a set of observed sub-dimensions for each construct that are appropriate to a robotics context. The second is to specify a causal structure in which the three organizational antecedents influence both acceptance and performance, and in which acceptance itself operates as an intervening construct, expressed as seven numbered propositions supported by prior evidence. The third is to propose a mixed-method research design capable of testing that structure, including instrument development, validation procedures and the analytical strategy. The contribution is thus a theoretically grounded and context-sensitive model, together with an operational research agenda for the empirical study that will follow.

2. Theoretical Background

The model draws on five bodies of theory. Organizational culture is treated through the trait-based tradition that links shared values to measurable organizational outcomes; innovativeness through the resource- and capability-based view of the innovative firm; digital leadership through emergent leadership theory adapted to digital transformation; technology acceptance through the technology acceptance model; and organizational performance through the multidimensional performance-measurement tradition. Table 1 sets out the working definition adopted for each construct together with the literature from which it is synthesised, and Table 2 then reports the observed sub-dimensions through which each latent construct is proposed to be measured.

2.1 Organizational Culture

Organizational culture is understood here as the values, beliefs, behavioural patterns and shared practices of organizational members that shape how work is conceived, how decisions are taken, and how change is received. In a robotics setting the relevant aspect of culture is the degree to which the organization is disposed towards learning, openness to new ideas, technological adaptation and active support for the introduction of robotic systems. Following the trait-based tradition, three

sub-dimensions are adopted. Employee involvement refers to the affective, cognitive and behavioural engagement of staff, expressed through commitment, discretionary effort and proactive participation, and sustained by shared values, supportive leadership and open communication. Consistency of values and systems refers to the degree of coherence between stated values, structures, working systems and administrative mechanisms, which together produce organizational unity and strategic alignment. Adaptability refers to the organization's capacity to perceive, learn from and respond to environmental change through flexibility, continuous learning and customer orientation (Denison & Mishra, 1995).

Prior work supports the relevance of culture in technology contexts. Culture has been shown to shape the success of digital transformation initiatives and the readiness of organizations to absorb new systems (Alshallaqi, 2023), to condition the acceptance of cloud-based workplace technologies through perceptions of usefulness (Sanguineti & Maran, 2024), and to require deliberate adjustment when technologies are introduced into small and medium-sized enterprises (Benelli et al., 2024). Culture is also consistently associated with organizational outcomes, whether directly or through adaptation and decision quality (Brahm & Poblete, 2024; Khedr, 2024).

2.2 Innovativeness

Innovativeness denotes the capability and the propensity of an organization to generate, develop and apply new ideas, methods, processes or technologies in order to create value and raise operational effectiveness. It is neither reducible to the count of innovations produced nor to individual creativity; it is better understood as an internal state that makes the systematic conversion of ideas into practice likely. Three sub-dimensions are adopted. Product innovativeness covers idea generation, the improvement of existing offerings and the introduction of new products that respond to customer and social needs. Process innovativeness covers the significant redesign of internal procedures, activities, techniques and systems in order to raise efficiency, reduce cost and improve quality. Behavioural innovativeness covers the capacity of individuals and groups to create, modify and enact new behaviours in pursuit of new solutions, shaped by social, economic and organizational context.

The literature ties innovativeness to organizational learning and knowledge management, since the acquisition, interpretation and embedding of knowledge are the conditions under which new practices become durable (Urban & Matela, 2022). It also ties innovativeness to the technological capability and human capital of the firm, which support the communication and knowledge exchange on which innovation depends (Marchiori et al., 2022). An innovative disposition is further associated with employee-level performance through a culture of workplace innovation (Khan et al., 2022), with strategic flexibility and financial outcomes (Kafetzopoulos, 2023), and with firm performance under environmental turbulence (Arici & Gok, 2023).

2.3 Digital Leadership

Digital leadership is defined as the capacity of leaders to articulate a vision, mobilise support and manage change using digital technology as the principal mechanism, so that the organization can adapt and operate effectively in a digital environment. In the present study it refers specifically to the role of executives in promoting robotic technology, supporting technological learning and creating an atmosphere conducive to the acceptance of innovation. The construct is broader than the instrumental use of digital tools and broader than electronic leadership of virtual teams, because it is bound up with whole-system organizational transformation. Three sub-dimensions are adopted. Innovation driving is the leader's use of digital technology, strategic vision and collaborative management to create conditions for continuous innovation in products, processes and business models. Digital technology skills are the leader's ability to use technology, data and digital instruments to steer the organization and to inform decisions, extending beyond tool use to data analysis and the leadership of teams in digital settings. Driving behaviour is the observable pattern of leader action, including modelling, communication and encouragement, that propels digital change through technology, vision and social influence.

Evidence links digital leadership both to acceptance and to performance. Leaders have been shown to raise employees' acceptance of new technologies and their innovative work behaviour (Gil et al., 2026), to act as a decisive influence on technology adoption in manufacturing settings (Arumugam et al., 2022), and to shape acceptance in educational and vocational contexts (Susilowati et al., 2025). Studies of the digital workplace report direct effects on organizational performance

(Chatterjee et al., 2023; Shin et al., 2023), effects mediated by digital skill (Tulungen et al., 2022), effects in smart-working settings (Carbonara & Basile, 2025), and effects transmitted through organizational entrepreneurship (Arabioon, 2024).

2.4 Technology Acceptance of Robotic Technology

Technology acceptance is the level of perception, understanding, attitude and intention among organizational members with respect to the actual use of a technology in their work. Its theoretical foundation is the technology acceptance model, which holds that the principal obstacle to the success of an information system is not its technical capability but whether users accept it, and which connects system characteristics to perceived usefulness, perceived ease of use, attitude towards using, and actual use (Davis, 1989). Three sub-dimensions are adopted here. Perceived usefulness is the belief that robotic technology raises work efficiency, supports goal attainment and improves outcomes at individual and organizational levels. Perceived ease of use is the belief that the technology can be used without undue complexity or effort and can be learned quickly. Attitude is the positive or negative evaluation of using the technology, reflecting the feelings, beliefs and experiences that shape intention and the decision to accept. In a robotics context these perceptions are unusually consequential, because robotic systems visibly alter the boundary between human and machine work and therefore engage concerns about displacement as well as judgements of utility.

2.5 Organizational Performance

Organizational performance is treated as a multidimensional construct rather than a purely financial one, on the grounds that organizations pursue heterogeneous objectives and that the indicators of success differ across sectors. Three sub-dimensions are adopted, consistent with the balanced measurement tradition. Financial performance is the capacity to generate economic results from efficient resource use, reflected in cost, profit, growth and return on investment. Customer or market performance is the capacity to use resources, strategies and marketing activity to create satisfaction, relationships and value for customers, reflected in responsiveness, service quality and competitive standing. Internal process performance is the capacity to manage resources, processes and operations systematically so as to reduce waste, raise output and improve the consistency and standardisation of work. In the robotics context each dimension is framed with explicit reference to the technology, so that respondents evaluate the contribution of robotic systems rather than performance in the abstract.

Table 1: Synthesised working definitions of the five constructs

Construct	Representative sources	Synthesised working definition adopted
Organizational culture	Denison & Mishra (1995); Alshallaqi (2023); Khedr (2024)	Shared values, beliefs and practices that dispose the organization towards learning, openness and technological adaptation.
Innovativeness	Marchiori et al. (2022); Urban & Matela (2022); Kafetzopoulos (2023)	The capability and propensity to create, develop and apply new ideas, processes and technologies to raise organizational value.
Digital leadership	Chatterjee et al. (2023); Gil et al. (2026); Carbonara & Basile (2025)	The leader's capacity to set vision, mobilise support and manage change with digital technology as the principal mechanism.
Technology acceptance	Davis (1989); Chen (2023); Guevara (2024)	The degree to which members judge robotic technology useful, easy to use and appropriate, and are ready to use it in work.
Organizational performance	Chatterjee et al. (2023); Nyanga & Eresia-Eke (2025); Nguyen et al. (2023)	The multidimensional capacity to achieve financial, customer-market and internal-process outcomes from organizational resources.

Source: Synthesised by the authors from the cited literature.

Table 2: Latent constructs, observed sub-dimensions and representative sources

Latent construct	Observed sub-dimensions	Conceptual emphasis	Representative sources
Organizational culture	Involvement; consistency of values and systems; adaptability	Engagement, internal coherence and responsiveness to environmental change	Denison & Mishra (1995); Brahm & Poblete (2024)
Innovativeness	Product; process; behavioural	Renewal of offerings, redesign of	Marchiori et al. (2022);

Latent construct	Observed sub-dimensions	Conceptual emphasis	Representative sources
	innovativeness	procedures and enactment of new work behaviour	Khan et al. (2022)
Digital leadership	Innovation driving; digital technology skills; driving behaviour	Vision, technological competence and observable change-driving action	Tulungen et al. (2022); Gil et al. (2026)
Technology acceptance	Perceived usefulness; perceived ease of use; attitude	Judgements of utility and effort, and evaluative orientation towards use	Davis (1989); An et al. (2023)
Organizational performance	Financial; customer or market; internal process	Economic return, customer value and operational consistency from robotic use	Kahfi et al. (2022); Ismail et al. (2021)

Source: Synthesised by the authors from the source proposal and the cited literature.

3. Conceptual Framework and Propositions

The proposed framework arranges five latent constructs in a causal structure with three exogenous antecedents, one intervening construct and one endogenous outcome. Organizational culture, innovativeness and digital leadership are specified as exogenous constructs, each measured by three observed sub-dimensions. Technology acceptance of robotic technology is specified as an intervening construct, likewise measured by three sub-dimensions, and organizational performance is specified as the endogenous construct with three sub-dimensions. Six direct paths run from the three antecedents to acceptance and to performance respectively, and a seventh runs from acceptance to performance. The structure implies that the three organizational conditions influence performance in two ways: directly, by improving the manner in which resources and people are organized, and indirectly, by raising the willingness of members to accept and use robotic systems that then deliver operational gains. No moderating variables are specified, and the model is confined to direct effects consistent with the source formulation. Table 3 summarises each proposition, its hypothesised relationship, the supporting literature and the expected direction of influence.

3.1 Organizational Culture as an Antecedent

Culture supplies the interpretive frame through which employees make sense of a new technology. Where involvement is high, staff participate in decisions about how robots will be deployed and are therefore less likely to experience automation as something done to them. Where values and systems are consistent, the introduction of robotics is read as an extension of what the organization already stands for rather than as an arbitrary imposition. Where adaptability is strong, learning a new system is a familiar demand rather than an exceptional one. Cultural conditions of this kind have been shown to shape the acceptance of digital and cloud technologies and the success of transformation programmes (Alshallaqi, 2023; Sanguineti & Maran, 2024; Jain & Mitra, 2025). Accordingly, Proposition 1 (P1): organizational culture exerts a direct positive influence on the acceptance of robotic technology in Thai organizations.

Culture is also expected to influence performance independently of acceptance. Coherent values reduce coordination cost, involvement raises discretionary effort, and adaptability shortens the organization's response to environmental change; each is a route to financial, customer and internal-process improvement, and the association has been reported across manufacturing, service and educational settings (Khedr, 2024; Kahfi et al., 2022; Nguyen et al., 2023; Brahm & Poblete, 2024). Accordingly, Proposition 2 (P2): organizational culture exerts a direct positive influence on organizational performance in Thai organizations using robotic technology.

3.2 Innovativeness as an Antecedent

An innovative organization treats novelty as ordinary. Where product and process innovativeness are established, robotic systems are encountered as one more instance of a familiar practice of renewal, and where behavioural innovativeness is present, employees are already accustomed to experimenting with unfamiliar methods and to absorbing the learning cost that experimentation entails. Both conditions should raise perceived ease of use and favourable attitudes towards robotics. Prior studies report that individual and organizational innovativeness exert direct influence on technology acceptance across a range of applications (Chen, 2023; An et al., 2023).

Accordingly, Proposition 3 (P3): innovativeness exerts a direct positive influence on the acceptance of robotic technology in Thai organizations.

Innovativeness is equally well established as a determinant of performance in its own right. It improves managerial processes, refreshes existing offerings and sharpens the organization's handling of target markets, and it converts knowledge into value in a way that shows up in financial and operational indicators. Evidence spans manufacturing, hospitality and small enterprise settings (Marchiori et al., 2022; Khan et al., 2022; Arici & Gok, 2023; Kafetzopoulos, 2023; Urban & Matela, 2022; Subagja et al., 2022). Accordingly, Proposition 4 (P4): innovativeness exerts a direct positive influence on organizational performance in Thai organizations using robotic technology.

3.3 Digital Leadership as an Antecedent

Leadership is the most proximate organizational signal that employees receive about a new technology. A leader who models the use of digital systems, allocates resources to experimentation and communicates a credible digital vision reduces the perceived risk of adoption and raises the perceived legitimacy of robotic work. The three sub-dimensions operate jointly: vision without technological competence is unconvincing, and competence without visible driving behaviour is invisible to staff. Studies across sectors report direct effects of digital and digitally oriented transformational leadership on acceptance (Gil et al., 2026; Arumugam et al., 2022; Susilowati et al., 2025). Accordingly, Proposition 5 (P5): digital leadership exerts a direct positive influence on the acceptance of robotic technology in Thai organizations.

Digital leadership is also expected to affect performance directly, through the allocation of investment, the design of digital workflows and the development of employee digital capability, none of which requires the mediation of acceptance to register in organizational outcomes. This direct path is consistently reported in the digital workplace literature (Chatterjee et al., 2023; Shin et al., 2023; Tulungen et al., 2022; Carbonara & Basile, 2025; Arabioon, 2024). Accordingly, Proposition 6 (P6): digital leadership exerts a direct positive influence on organizational performance in Thai organizations using robotic technology.

3.4 Technology Acceptance as an Intervening Construct

The final proposition carries the analytical weight of the framework. Robotic systems generate value only when they are actually used, used competently, and used willingly enough that employees do not construct informal workarounds. Acceptance is therefore the behavioural gateway between organizational investment and operational return: perceived usefulness sustains continued use, perceived ease of use lowers the cost of learning, and a favourable attitude reduces resistance and the covert non-use that erodes the business case. Studies of workplace technology and financial technology adoption report direct effects of acceptance on organizational and employee performance (Guevara, 2024; Nyanga & Eresia-Eke, 2025; Ismail et al., 2021). Accordingly, Proposition 7 (P7): acceptance of robotic technology exerts a direct positive influence on organizational performance in Thai organizations. Taken together with the preceding propositions, P7 implies that culture, innovativeness and digital leadership also reach performance indirectly, through acceptance, so that the framework anticipates both direct and mediated influence without specifying mediation as a separate hypothesis.

Table 3: Proposition–literature support matrix

Proposition	Hypothesised relationship	Supporting studies	Expected direction
P1	Organizational culture → technology acceptance	Alshallaqi (2023); Sanguineti & Maran (2024); Benelli et al. (2024); Jain & Mitra (2025)	Positive, direct
P2	Organizational culture → organizational performance	Khedr (2024); Kahfi et al. (2022); Nguyen et al. (2023); Brahm & Poblete (2024)	Positive, direct
P3	Innovativeness → technology acceptance	Chen (2023); An et al. (2023)	Positive, direct
P4	Innovativeness → organizational performance	Marchiori et al. (2022); Khan et al. (2022); Arici & Gok (2023); Kafetzopoulos (2023)	Positive, direct
P5	Digital leadership → technology acceptance	Gil et al. (2026); Arumugam et al. (2022); Susilowati et al. (2025)	Positive, direct
P6	Digital leadership → organizational performance	Chatterjee et al. (2023); Shin et al. (2023); Tulungen et al. (2022); Arabioon (2024)	Positive, direct

Proposition	Hypothesised relationship	Supporting studies	Expected direction
P7	Technology acceptance → organizational performance	Guevara (2024); Nyanga & Eresia-Eke (2025); Ismail et al. (2021)	Positive, direct

Source: Compiled by the authors from the reviewed literature.

4. Proposed Research Design

The empirical study that will follow this conceptual paper is proposed as a mixed-method investigation combining a qualitative phase with a larger quantitative phase, on the grounds that a causal model of behavioural acceptance benefits from contextual grounding before it is estimated. The target population comprises personnel in Thai public, private and industrial organizations who use robotic technology, participate in decisions to adopt it, or work alongside it, and who are therefore positioned to report on culture, innovativeness, leadership, acceptance and performance. Table 4 illustrates the measurement items proposed for each construct, Table 5 summarises the overall design and analysis plan, and Table 6 states the criteria proposed for model evaluation.

4.1 Population, Sampling and Instrument

The qualitative phase proposes in-depth interviews with fifteen key informants selected purposively: executives and policy-level stakeholders in organizations that have used robotic technology for more than three years. Interviews are proposed to last approximately forty-five to sixty minutes, to follow a flexible guide covering all five latent constructs, and to continue until saturation, with audio recording and observational notes taken by consent. The quantitative phase proposes a survey of three hundred organizational members drawn purposively from every region of the country. That figure follows the multivariate rule of twenty cases per observed variable; with three observed sub-dimensions for each of the five latent constructs the model contains fifteen observed variables, giving a minimum of three hundred cases. The figure is also consistent with the recommendation that samples for confirmatory factor analysis fall between two hundred and four hundred cases (Hair et al., 2010).

The instrument is proposed as a five-part questionnaire, one part per latent construct, with items written from the operational definitions established in the literature review and phrased with explicit reference to robotic technology so that respondents evaluate the technology rather than the organization in general. Responses are proposed on a rating scale interpreted against fixed class intervals for each construct. Content validity is proposed to be established by three experts, respectively in social science research, research statistics, and organizational robotics, using the index of item-objective congruence, with items retained where the coefficient exceeds 0.5. Reliability is proposed to be established through a pilot administration to fifty respondents in organizations that have introduced comparable new technologies and who are excluded from the main sample, using the alpha coefficient with an acceptance criterion of 0.70 (Cronbach, 1951).

4.2 Planned Analysis and Ethics

Analysis is proposed in three stages. Descriptive statistics, principally means and standard deviations interpreted against the class intervals, will address the first objective by characterising the present level of each construct. Confirmatory factor analysis will then examine the measurement model, checking sample adequacy, linearity, factor loadings and average variance extracted. Finally, covariance-based structural equation modelling will estimate the structural model and test the seven propositions simultaneously, an approach preferred to a series of separate multiple regressions because it accommodates multiple simultaneous causal equations and explicitly represents measurement error (Hair et al., 2010). Model adequacy will be judged against the goodness-of-fit criteria reported in Table 6, and respecification will be considered where criteria are not met. Qualitative material will be organised, grouped and interpreted thematically, with member checking at the close of each interview, and will be used to contextualise and elaborate the quantitative structure rather than to test it.

Ethical safeguards are proposed in line with institutional and international standards. Informed consent will be obtained before data collection, with a full explanation of purpose, procedure, benefits and risks; participation will be voluntary and withdrawal permitted at any time without justification or consequence; and the process will be designed so that it poses no physical,

psychological or occupational harm. Results will be reported only in aggregate, with no personally identifying information disclosed; raw data and completed questionnaires will be stored in a password-protected secure system and destroyed within one to three years of the completion and publication of the research.

Table 4: Illustrative measurement items proposed for each construct

Construct and dimension	Illustrative items (translated and adapted)	Adapted from
Culture — involvement	Employees participate in decisions affecting their work; employees may propose new ideas freely.	Denison & Mishra (1995)
Culture — adaptability	The organization adapts quickly to environmental change; staff are ready to learn new skills.	Brahm & Poblete (2024)
Innovativeness — process	The organization regularly improves its work processes; automation is used to raise efficiency.	Marchiori et al. (2022)
Innovativeness — behavioural	Employees dare to try new working methods; employees are open to change and new technology.	Khan et al. (2022)
Digital leadership — driving behaviour	Executives model the use of digital technology; executives create a climate favourable to digital work.	Tulungen et al. (2022)
Acceptance — perceived usefulness	Using robotic technology raises my work efficiency; it reduces errors in my work.	Davis (1989)
Acceptance — attitude	I hold a positive attitude towards using robotic technology; I intend to continue using it.	Chen (2023)
Performance — internal process	Robotic technology speeds up our processes; work has become more consistent and standardised.	Ismail et al. (2021)

Source: Adapted and translated by the authors from the measurement tables of the source proposal.

Table 5: Proposed research design and analysis plan

Element	Qualitative phase	Quantitative phase
Purpose	Contextual grounding of the five constructs in Thai organizations	Estimation and testing of the seven propositions
Population and sampling	Fifteen executives, purposively selected, from organizations using robots over three years	Three hundred personnel across regions, purposively selected
Instrument	Semi-structured in-depth interview guide covering all five constructs	Five-part questionnaire, rating scale, robot-referenced items
Quality criteria	Member checking, attentive observation, saturation of themes	Item-objective congruence above 0.5; alpha above 0.70
Analysis	Data organisation, thematic grouping and interpretive synthesis	Descriptive statistics, confirmatory factor analysis, structural equation modelling
Ethics	Consent, voluntary participation, anonymity, secure storage	Consent, aggregate reporting, secure storage and timed disposal

Source: Compiled by the authors from chapter three of the source proposal.

Table 6: Proposed criteria for evaluating the structural model

Evaluation criterion	Proposed threshold	Purpose
Relative chi-square (CMIN/DF)	Below 5	Overall discrepancy adjusted for model complexity
Goodness-of-fit index	0.80 or above	Proportion of covariance explained by the model
Normed and relative fit indices	0.90 or above	Improvement over the independence baseline model
Incremental and Tucker–Lewis indices	0.90 or above	Incremental fit adjusted for degrees of freedom
Comparative fit index	0.90 or above	Comparative fit relative to the null model
Root mean square error of approximation	0.08 or below	Discrepancy per degree of freedom in the population
Average variance extracted	Convergent validity criterion	Convergent validity of each measurement block

Source: Compiled by the authors from the analysis plan of the source proposal; thresholds as stated there.

5. Discussion and Implications

The theoretical contribution of the framework lies in the position it assigns to technology acceptance. Much of the acceptance literature treats perceived usefulness and perceived ease of use as

terminal outcomes, explaining why a technology is adopted but stopping short of the organizational consequences of adoption. Much of the performance literature, conversely, treats culture, innovativeness and leadership as direct determinants of results, leaving the behavioural step by which technology is actually taken up unmodelled. By specifying both sets of paths simultaneously, the framework makes acceptance a mechanism rather than an endpoint and allows the relative weight of direct and technology-mediated influence to be estimated within one specification. It also extends the technology acceptance model beyond its individual origins (Davis, 1989) by treating organizational conditions, rather than system characteristics alone, as its principal antecedents.

A second theoretical contribution concerns the joint treatment of three antecedents that are usually studied separately. Culture, innovativeness and digital leadership are conceptually adjacent but analytically distinct: culture is the shared interpretive frame, innovativeness the organizational disposition towards renewal, and digital leadership the proximate agency that converts both into action. Estimating them together permits questions that a single-antecedent design cannot address, such as whether leadership substitutes for a weak innovative culture in the short term, or whether cultural adaptability is a precondition without which leadership signals fail to translate into acceptance.

For managers the implications are practical. If the framework holds, investment in robotic hardware and software will be insufficient on its own, since the return depends on a behavioural condition that hardware does not create. Executives would be advised to work on the three antecedents in parallel with the technology programme: to widen employee involvement in deployment decisions so that automation is experienced as participation rather than imposition; to align stated values, incentives and working systems with the intended technological direction; to build adaptability through continuous learning provision; and to develop digital leadership deliberately, since the modelling of digital behaviour by executives is one of the few levers that acts directly on both acceptance and performance. Attention to perceived ease of use is particularly warranted, because training and interface simplification are comparatively inexpensive relative to the cost of stalled adoption.

For policy the framework speaks to the Thai context specifically. Public support for robotics has concentrated on capital subsidy and infrastructure, which addresses availability rather than acceptance. If organizational conditions are what convert availability into use, then measures aimed at workforce upskilling, at executive digital capability, and at the reassurance of employees who fear displacement may yield more diffusion per unit of expenditure than equipment incentives alone. Given the scale of employment in the manufacturing sector (National Statistical Office of Thailand, 2024), even a modest improvement in acceptance across that base would have appreciable aggregate consequences for productivity. Contextually, the relatively high hierarchical distance and the strong preference for interpersonal harmony characteristic of many Thai workplaces suggest that leadership signals and cultural consistency may carry more behavioural weight than in the settings where most acceptance evidence has been produced, and that open resistance is likely to be expressed as quiet non-use rather than as stated objection.

6. Conclusion

This paper has developed a conceptual model of the antecedents of robotic technology acceptance and organizational performance for Thai organizations. It synthesised five literatures into working definitions and observed sub-dimensions, and it advanced seven propositions in which organizational culture, innovativeness and digital leadership each influence both the acceptance of robotic technology and organizational performance, while acceptance itself transmits organizational conditions into performance outcomes. A mixed-method design was proposed for testing the model, combining purposive in-depth interviews with a survey of three hundred organizational members, validated through expert review and a pilot administration, and analysed through covariance-based structural equation modelling.

The limitations follow from the nature of the exercise. The framework is a synthesis of prior literature and has not been estimated; the propositions are argued rather than tested, and the relative magnitude of the paths remains unknown. The supporting evidence is drawn largely from settings outside Thailand, so its transferability is an assumption of the model rather than a demonstrated property. The specification is confined to direct effects and omits potential moderators such as

organizational size, sector, ownership or prior automation experience, and it relies on self-reported perceptual measures of performance, which are convenient across heterogeneous organizations but weaker than objective indicators.

Future work should therefore begin with the empirical study for which this paper prepares the ground: estimation of the measurement and structural models on the proposed sample, followed by examination of the indirect paths through acceptance. Beyond that, three extensions appear promising. Comparative estimation across sectors would establish whether the behavioural mechanism differs between manufacturing and service organizations. Longitudinal observation would allow acceptance to be modelled as it develops through the phases of a robotics programme rather than at a single point. Finally, incorporating objective operational indicators alongside perceptual measures would strengthen the performance side of the model and permit a firmer estimate of the return that acceptance actually delivers.

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