Leadership Practices, Organisational Dynamics, Process Innovation and Operational Excellence in Downstream Fertiliser Manufacturing: A Conceptual Framework

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ABSTRACT

Operational excellence is a central requirement for process-intensive manufacturing organisations because performance depends on reliability, safety, quality consistency, compliance, efficiency and continuous improvement. In downstream fertiliser manufacturing, these requirements are especially important because plants must maintain disciplined operations while adapting to technology, sustainability and productivity pressures. This conceptual paper develops an integrative framework proposing how leadership practices and organisational dynamics may be associated with operational excellence through process innovation. The paper synthesises transformational leadership theory, Denison's organisational culture model, dynamic capabilities theory and organisational ambidexterity theory. It argues that leadership practices provide behavioural direction, motivation and improvement accountability, while organisational dynamics provide observable relational and behavioural conditions for empowerment, learning, coordination, change readiness and strategic alignment. Process innovation is positioned as a plausible mechanism through which these organisational capabilities may be translated into improved workflows, technologies, routines and process-management practices. Because the article is conceptual, the proposed relationships should be interpreted as theory-based propositions rather than empirically validated causal claims. The framework advances seven propositions linking leadership practices, organisational dynamics, process innovation and operational excellence. It contributes to management and operations literature by integrating human, organisational and innovation-based explanations of operational excellence in a sector-sensitive model for downstream fertiliser manufacturing. Practically, the framework suggests that managers should not treat operational excellence as a purely technical programme. Instead, leadership development, cross-functional coordination, organisational learning and structured process innovation routines should be managed together. The paper concludes that sustainable operational excellence in regulated process industries depends on the organisation's ability to balance process stability with disciplined process renewal, while also recognising that future empirical validation is required before the framework's practical effectiveness can be confirmed.

Keywords: Leadership practices; organisational dynamics; process innovation; operational excellence; downstream fertiliser manufacturing; conceptual framework

INTRODUCTION

Operational excellence is a central concern for process-intensive manufacturing organisations because performance depends on more than output volume or cost control. In downstream fertiliser manufacturing, operational excellence also requires process discipline, equipment reliability, safety awareness, regulatory compliance, quality consistency, energy efficiency and continuous improvement. These requirements make fertiliser manufacturing an appropriate context for examining the human and organisational foundations of operational performance.

Many operational excellence initiatives are implemented through technical tools such as lean methods, Six Sigma, automation, digital monitoring and process-standardisation systems. These tools are important, but they do not sufficiently explain why some organisations sustain improvement while others experience fragmented adoption, resistance or short-lived gains. Operations and quality-management literature increasingly recognises that operational excellence is embedded in organisational culture, learning and agility rather than being only a technical programme (Carvalho et al., 2023). Manufacturing evidence also shows that organisational culture can influence whether operational improvement practices produce performance benefits (Hardcopf et al., 2021).

This conceptual paper argues that operational excellence in Malaysian downstream fertiliser manufacturing should be examined as an integrated people-process-innovation phenomenon. Leadership practices provide behavioural direction, motivational support and improvement accountability. Organisational dynamics provide the internal cultural and relational conditions through which employees coordinate, learn, adapt and share operational knowledge. Process innovation then converts these organisational capabilities into improved workflows, technologies, production routines and problem-solving systems.

Terminology consistency is important in this paper. The focal construct is organisational dynamics, not organisational culture. However, organisational dynamics is theoretically derived from Denison's organisational culture model, particularly its emphasis on involvement, consistency, adaptability and mission (Denison & Mishra, 1995). The term organisational dynamics is used because the intended construct captures not only values and assumptions, but also employee empowerment, teamwork, coordination, learning, change readiness and strategic direction as experienced in operational settings.

The Malaysian downstream fertiliser context is theoretically useful because process-intensive plants require both stability and change. Operations must remain safe, reliable and compliant, while organisations also need continuous renewal to respond to cost, technology, sustainability and productivity pressures. This tension makes the context suitable for applying dynamic capabilities and organisational ambidexterity perspectives.

This paper contributes by proposing process innovation as the mediating mechanism that may explain how leadership practices and organisational dynamics are translated into operational excellence in process-intensive fertiliser manufacturing. The contribution is conceptual rather than empirical: it clarifies constructs, integrates theories and proposes testable relationships that should be validated in future field studies.

Industry-Specific Justification: Why Downstream Fertiliser Manufacturing Matters

Downstream fertiliser manufacturing should not be treated as a generic manufacturing setting. Fertiliser plants are process-intensive operations in which production reliability, process safety, equipment integrity, environmental compliance, product quality and cost efficiency are tightly connected. A disruption in one part of the process can affect output, quality, safety and downstream logistics. Operational excellence in this context therefore depends on disciplined process management as well as the organisational capacity to improve routines without weakening control.

The sector is also important because fertiliser products support agriculture and essential industries. PETRONAS Chemicals Group Berhad (n.d.) describes ammonia and fertilisers as solutions that help boost crop yields, grow food efficiently and enable manufacturing processes. This industry role gives fertiliser manufacturing strategic relevance beyond plant-level productivity.

Fertiliser manufacturing also faces strong energy and sustainability pressures. The International Energy Agency (2021) reports that ammonia production is highly energy- and emissions-intensive and that ammonia is the starting point for mineral nitrogen fertilisers. The International Fertilizer Industry Association (2009) further indicates that ammonia synthesis dominates fertiliser-sector energy use and is closely linked to CO_2 emissions. These sector characteristics make operational excellence especially important because efficiency, reliability, energy performance, environmental compliance and process renewal are closely connected.

In Malaysia, manufacturing transformation is also being shaped by technology adoption and Industry 4.0 policy. The Ministry of Investment, Trade and Industry (2023) explains that Industry4WRD was introduced to drive digital transformation in manufacturing and manufacturing-related services, with intervention logic built around people, process and technology. This is directly relevant to fertiliser plants because digital monitoring, process automation and analytics are only valuable when employees and organisational systems are ready to translate technology into safer, more reliable and more efficient operations.

For these reasons, downstream fertiliser manufacturing offers a strong context for studying leadership practices, organisational dynamics, process innovation and operational excellence. The sector requires stable operations, but it also requires disciplined innovation to manage equipment reliability, quality consistency, energy and cost pressure, safety and environmental compliance, and sustainability expectations.

METHODOLOGICAL APPROACH OF THE CONCEPTUAL REVIEW

This paper uses a narrative/conceptual literature review approach. This approach is appropriate because the aim is not to estimate an effect size or conduct a systematic meta-analysis, but to integrate related theoretical streams and develop a defensible conceptual framework. Consistent with guidance on literature review methodology, the review emphasises conceptual fit, theoretical relevance, contextual transferability and gaps in explanation rather than statistical aggregation (Snyder, 2019).

The review focused on four bodies of literature: leadership and transformational leadership, organisational culture and organisational dynamics, process innovation and dynamic capabilities, and operational excellence in manufacturing and process-intensive operations. Sources were identified through Scopus, Web of Science, ScienceDirect, Emerald, Google Scholar and selected official industry sources. Search terms included leadership practices, transformational leadership, organisational culture, organisational dynamics, Denison model, process innovation, dynamic capabilities, operational excellence, fertiliser manufacturing, ammonia, process industry, Industry 4.0 readiness, safety culture and manufacturing performance. Studies were selected when they offered conceptual relevance, empirical support, contextual similarity or industry-specific evidence.

The primary review period was 2015 to 2026 to capture recent work on operational excellence, innovation, digital transformation and manufacturing. Seminal works were included where they provided foundational theoretical support, including transformational leadership theory, Denison's organisational culture model, dynamic capabilities theory and organisational ambidexterity theory. Sources were selected where they met at least one of four criteria: direct theoretical relevance, empirical relevance to manufacturing or operations, relevance to innovation and process improvement, or relevance to fertiliser/manufacturing industry context. Because direct peer-reviewed evidence on Malaysian downstream fertiliser plants remains limited, the review also uses closely related evidence from manufacturing, chemical/process industries and operational-excellence research. This limitation is acknowledged rather than overstated.

The evidence was not treated as direct proof of the proposed model. Instead, studies were compared according to context, sector, method, construct alignment and relevance to process-intensive manufacturing. Where evidence was drawn from general manufacturing, SMEs, petrochemicals or other regulated process industries, its indirect nature is stated. This approach responds to the limited availability of fertiliser-specific management studies while avoiding overstatement of the evidence base.

Conceptual Problem and Research Gap

The central conceptual problem is that leadership practices, organisational dynamics, process innovation and operational excellence are often discussed as separate management domains. Leadership research explains how leaders motivate and guide employees. Organisational culture and organisational dynamics research explains how internal conditions influence coordination, learning and change readiness. Innovation research explains how organisations introduce new or improved processes. Operational excellence research explains how organisations sustain reliable and high-performing operations. However, process-intensive manufacturing requires these domains to work together rather than independently.

Theoretical gap

Existing literature provides strong but dispersed support for the constructs. Transformational leadership has been linked to employee motivation, learning and change-oriented behaviour (Bass & Riggio, 2006). Denison's model links organisational effectiveness to involvement, consistency, adaptability and mission (Denison & Mishra, 1995). Dynamic capabilities theory explains how organisations reconfigure resources and routines to respond to uncertainty (Teece et al., 1997; Teece et al., 2016). Operational excellence literature increasingly emphasises the integration of continuous improvement, culture and agility (Carvalho et al., 2023). What remains underdeveloped is an integrated conceptual explanation linking these ideas in one coherent model for process-intensive operations.

Mechanism gap

Leadership practices and organisational dynamics may create favourable internal conditions, but these conditions do not automatically become operational results. The mechanism through which leadership and internal organisational conditions become operational excellence requires clearer explanation. This paper argues that process innovation is the missing mechanism because it converts behavioural and organisational conditions into improved production methods, workflows, technologies, coordination routines and problem-solving practices.

Contextual gap

Malaysian downstream fertiliser manufacturing remains under-represented in management and operations scholarship despite its process-intensive, safety-sensitive, energy-intensive and strategically important character. Much of the relevant evidence comes from general manufacturing, SMEs, services or non-Malaysian settings. While such evidence is useful, it does not fully capture the operational reality of fertiliser plants, where stable operations and disciplined innovation must coexist.

Critical Synthesis and Alternative Explanations

The reviewed literature does not provide a single settled explanation of operational excellence. A leadership-centred explanation suggests that leaders shape discipline, commitment and improvement behaviour. A culture-centred explanation suggests that shared values and norms shape whether improvement practices become embedded; however, systematic review evidence cautions that culture-innovation relationships are complex and context-specific rather than universally positive (Tian et al., 2018).

A dynamic-capabilities explanation argues that performance improves when organisations reconfigure routines and resources. A socio-technical explanation would add that technology, structure, work design and human behaviour interact rather than operate independently. The present paper adopts an integrated position: leadership practices and organisational dynamics are important, but they are not sufficient unless they are converted into implemented process improvements.

There are also alternative explanations that the proposed model does not formally test. Operational excellence in process-intensive manufacturing may be shaped by safety culture, regulatory intensity, technological maturity, organisational size, environmental uncertainty and supply-chain complexity. Evidence from Malaysian petrochemical settings shows that safety culture and safety communication are important for employee safety performance (Naji et al., 2022), while manufacturing studies on Industry 4.0 show that digital readiness and maturity can condition operational excellence initiatives (Henriquez et al., 2023; Wong & Kee, 2022). These perspectives do not invalidate the proposed framework; rather, they indicate boundary conditions that should be considered in future empirical studies.

Accordingly, the conceptual framework should be read as a parsimonious explanatory model rather than a complete representation of all operational-excellence drivers. Its value lies in clarifying one important mechanism--process innovation--through which leadership and organisational conditions may become operationally meaningful in downstream fertiliser manufacturing.

THEORETICAL FOUNDATIONS

Transformational leadership theory

Transformational leadership theory explains how leaders influence employees by articulating vision, modelling expected behaviour, stimulating new thinking and supporting individual development (Bass & Riggio, 2006). In process-intensive plants, these behaviours matter because employees must simultaneously comply with established procedures and participate in continuous improvement. Leadership practices therefore provide the behavioural foundation for both operational discipline and process innovation.

Denison's organisational culture model and organisational dynamics

Denison and Mishra's (1995) organisational culture model links effectiveness to involvement, consistency, adaptability and mission. These cultural traits are relevant to fertiliser manufacturing because operational excellence depends on empowered employees, cross-functional coordination, learning from operational issues and alignment with strategic priorities. However, this paper does not use organisational culture and organisational dynamics as identical constructs. Denison's model provides the theoretical origin, while organisational dynamics represents the observable organisational conditions through which culture is enacted in daily operations.

Conceptual distinction between organisational culture and organisational dynamics

Organisational culture generally refers to relatively enduring shared assumptions, values and norms that shape how members interpret and behave within an organisation. Organisational dynamics, as used in this paper, is narrower and more operationally oriented. It refers to the visible and actionable patterns of interaction, coordination, learning, empowerment, change readiness and strategic alignment that employees experience in day-to-day work.

The distinction is important for the framework. Culture explains the deeper value system behind organisational behaviour, whereas organisational dynamics explains how that value system becomes operationally relevant through communication, cross-functional coordination, employee involvement and learning routines.

Thus, organisational dynamics is derived from Denison's culture dimensions but is conceptually positioned as the enacted, process-facing expression of culture in a manufacturing environment. This positioning helps connect culture-based theory to process innovation and operational excellence without claiming that organisational dynamics captures the whole of organisational culture.

Dynamic capabilities theory

Dynamic capabilities theory explains how organisations integrate, build and reconfigure resources to address changing environments (Teece et al., 1997; Teece et al., 2016). Process innovation is conceptualised here as a dynamic capability because it renews operational methods, technologies and routines. This theory supports the mediating role of process innovation: leadership practices and organisational dynamics create enabling conditions, but process innovation reconfigures those conditions into practical operational improvements.

Organisational ambidexterity theory

Organisational ambidexterity theory explains the need to balance exploitation of existing capabilities with exploration of new practices (Tushman & O'Reilly, 1996). Fertiliser manufacturing requires this balance because excessive stability may create rigidity, while uncontrolled innovation may increase operational risk. The proposed framework therefore treats operational excellence as the result of disciplined improvement rather than unrestricted change.

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Integrative theoretical logic

The four theories are not used as parallel explanations; each addresses a different part of the proposed mechanism. Transformational leadership theory explains leader behaviour and employee motivation. Denison's model explains the organisational conditions through which involvement, coordination, adaptability and mission become operationally visible. Dynamic capabilities theory explains how internal resources and routines are renewed through process innovation. Organisational ambidexterity theory explains why process-intensive plants must improve while preserving stability, safety and compliance. The integrated logic is therefore conditional rather than deterministic: leadership practices and organisational dynamics may support operational excellence directly, but their operational value is expected to be stronger when they are converted into disciplined process innovation.

Table 1: Theoretical Integration Underpinning the Conceptual Model

Theory	Core idea	Construct supported	Contribution to conceptual model
Transformational leadership theory	Leaders influence employees through vision, motivation, intellectual stimulation, role modelling and individualised support.	Leadership practices	Explains how leadership activates employee commitment, improvement behaviour and operational discipline.
Denison's organisational culture model	Culture shapes involvement, consistency, adaptability and mission.	Organisational dynamics	Explains the organisational conditions that support empowerment, learning, coordination and innovation readiness.
Dynamic capabilities theory	Organisations renew and reconfigure resources and routines under uncertainty.	Process innovation	Explains why process innovation mediates the conversion of internal capabilities into operational outcomes.
Organisational ambidexterity theory	Organisations balance exploitation of existing routines with exploration of new practices.	Process innovation and operational excellence	Explains why process-intensive plants must maintain process stability while innovating.

CONSTRUCTS AND PROPOSITIONS

Leadership practices

Leadership practices refer to behaviours through which leaders guide, motivate, support and align employees toward operational and improvement goals. In fertiliser plants, effective leadership is not limited to assigning tasks. It includes clarifying priorities, reinforcing safety and quality expectations, encouraging problem-solving, supporting employee learning and recognising improvement contributions.

Leadership practices are conceptually proposed to be associated with operational excellence because leaders shape employee commitment, process discipline and improvement accountability. They are also proposed to be associated with process innovation because leaders can encourage employees to question inefficient routines, propose better methods and support implementation of new processes. At the conceptual stage, these relationships should be understood as theoretically plausible associations rather than confirmed causal effects.

Proposition 1: Leadership practices are positively associated with operational excellence in downstream fertiliser manufacturing.

Proposition 2: Leadership practices are positively associated with process innovation in downstream fertiliser manufacturing.

Organisational dynamics

Organisational dynamics refer to the internal conditions that influence how employees communicate, coordinate, learn, adapt and align their work with organisational priorities. These conditions include empowerment, team orientation, cross-functional coordination, organisational learning, readiness for change and strategic direction. The construct is conceptually derived from Denison's culture dimensions, but the term organisational dynamics is retained because the paper focuses on operationally experienced internal conditions rather than culture as a separate title construct.

Organisational dynamics are conceptually proposed to be associated with operational excellence because process-intensive work depends on coordination across production, maintenance, technical services, quality, safety, logistics and support functions. They are also proposed to be associated with process innovation because employees require actionable conditions--such as empowerment, learning routines and cross-functional coordination--to share knowledge, propose improvements and participate in changes to work methods.

Proposition 3: Organisational dynamics are positively associated with operational excellence in downstream fertiliser manufacturing.

Proposition 4: Organisational dynamics are positively associated with process innovation in downstream fertiliser manufacturing.

Process innovation

Process innovation refers to the implementation of new or significantly improved operational methods, workflows, technologies, production routines and process-management practices. The Oslo Manual defines innovation as a new or improved product or business process that differs significantly from previous practices and has been put into use (OECD/Eurostat, 2018). This definition is suitable because the framework is concerned with implemented process change, not merely with ideas or intentions.

Incremental and radical process innovation

The paper also distinguishes incremental and radical process innovation. Incremental process innovation refers to small but continuous improvements to existing workflows, operating procedures, maintenance routines, digital monitoring, quality practices or coordination systems. Radical process innovation refers to more fundamental changes in production technology, process architecture, automation, digital platforms or operating models. Innovation research recognises that incremental and radical innovative capabilities may draw on different organisational knowledge bases and capabilities (Subramaniam & Youndt, 2005), while broader innovation reviews caution that innovation should be treated as both a process and an outcome (Crossan & Apaydin, 2010).

In downstream fertiliser manufacturing, incremental process innovation is likely to be more common because highly regulated plants must protect safety, environmental compliance, reliability and product quality. Radical process innovation may still occur, particularly through major technology upgrades, digital transformation or sustainability-driven process redesign, but such change normally requires stronger governance, technical validation and risk control. This distinction strengthens the framework because process innovation in fertiliser plants should not be interpreted as uncontrolled disruption; it is better understood as disciplined renewal within safety- and compliance-sensitive operating boundaries.

Process innovation is conceptually proposed to be associated with operational excellence because improved workflows, technologies and routines may enhance reliability, efficiency, quality consistency, responsiveness and continuous improvement. In process-intensive manufacturing, innovation must be embedded into daily operating routines rather than treated as isolated projects. Manufacturing evidence also suggests that process innovation can mediate the relationship between internal organisational capabilities and operational performance (Al-Sa'di et al., 2017), although fertiliser-specific validation remains limited.

Proposition 5: Process innovation is positively associated with operational excellence in downstream fertiliser manufacturing.

Mediating role of process innovation

The core proposition of this paper is that process innovation mediates the relationship between leadership practices, organisational dynamics and operational excellence. Leadership practices can create motivation, direction and support, but operational performance improves when these behaviours are converted into specific process improvements. Similarly, organisational dynamics can create empowerment, learning and coordination, but these conditions become operationally valuable when they are translated into implemented improvements in workflows, technologies and routines.

The mediation logic is consistent with dynamic capabilities theory because process innovation represents reconfiguration of organisational resources and routines. It is also consistent with ambidexterity theory because process innovation allows organisations to improve without abandoning the discipline required in safety-sensitive process environments. Process innovation literature also distinguishes innovation capability and process performance, which supports the argument that innovation processes can connect internal organisational conditions with performance outcomes (Prajogo, 2006; Prajogo & Ahmed, 2006).

Proposition 6: Process innovation mediates the relationship between leadership practices and operational excellence in downstream fertiliser manufacturing.

Proposition 7: Process innovation mediates the relationship between organisational dynamics and operational excellence in downstream fertiliser manufacturing.

Table 2: Construct Definitions and Conceptual Roles

Construct	Conceptual meaning	Role in conceptual model
Leadership practices	Leadership behaviours that motivate, guide, support, intellectually stimulate and reinforce employees in relation to operational and improvement goals.	Antecedent organisational capability.
Organisational dynamics	Internal cultural and relational conditions involving empowerment, teamwork, coordination, organisational learning, adaptability and strategic direction.	Antecedent organisational capability.
Process innovation	Implemented improvements in operational methods, workflows, technologies, production routines and process-management practices.	Mediating mechanism that translates organisational

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		capabilities into operational improvements.
Operational excellence	Sustained process discipline, reliability, safety, quality, compliance, efficiency and continuous improvement.	Outcome of the conceptual model.

Table 3: Proposition Development

Proposition	**Relationship**	**Theoretical basis**	**Conceptual logic**
P1	Leadership practices → Operational excellence	Transformational leadership theory	Leaders strengthen direction, commitment, discipline and improvement accountability.
P2	Leadership practices → Process innovation	Transformational leadership theory; dynamic capabilities theory	Leaders encourage problem-solving, learning and support for new work methods.
P3	Organisational dynamics → Operational excellence	Denison's organisational culture model	Empowerment, coordination and strategic alignment support disciplined operational execution.
P4	Organisational dynamics → Process innovation	Denison's organisational culture model; dynamic capabilities theory	Learning, teamwork and adaptability create conditions for process renewal.
P5	Process innovation → Operational excellence	Dynamic capabilities theory	Improved processes and routines enhance reliability, quality, efficiency and responsiveness.
P6	Process innovation mediates leadership practices → operational excellence	Dynamic capabilities theory	Leadership becomes operationally meaningful when translated into implemented process improvements.
P7	Process innovation mediates organisational dynamics → operational excellence	Dynamic capabilities theory	Culture and coordination become operationally valuable when converted into improved workflows and routines.

Conceptual Framework

Figure 1 summarises the proposed conceptual framework. Leadership practices and organisational dynamics are positioned as antecedent organisational capabilities. Process innovation is positioned as the mediating mechanism, and operational excellence is positioned as the outcome. The framework also recognises direct paths from leadership practices and organisational dynamics to operational excellence because behavioural and

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internal organisational conditions may support operational discipline even before formal process innovations are implemented.

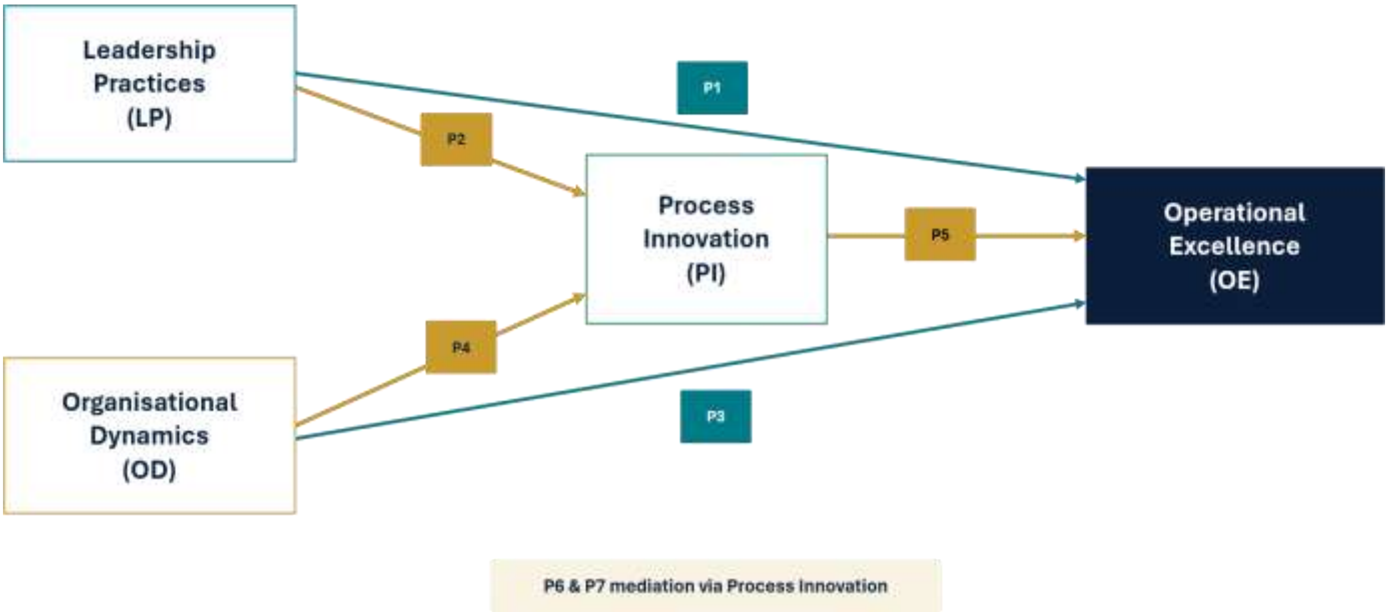

Figure 1: Conceptual Framework Linking Leadership Practices, Organisational Dynamics, Process Innovation and Operational Excellence

The figure reflects the central contribution of the paper: process innovation is proposed as the mechanism that may explain how leadership practices and organisational dynamics are translated into operational excellence. The direct paths recognise that leadership and organisational dynamics may also support operational discipline without formalised process innovation. Because the framework is conceptual, the diagram should be interpreted as a parsimonious theoretical model rather than an empirically tested causal structure.

Boundary conditions and contextual influences

The framework is intentionally linear to support conceptual clarity, but process-intensive manufacturing is more complex than any single linear model can capture. Operational excellence may also depend on organisational size, plant age, technological maturity, Industry 4.0 readiness, digital capability, environmental uncertainty, regulatory intensity, safety culture, maintenance maturity, supply-chain complexity and workforce capability. For example, Industry 4.0 maturity research highlights that operational excellence increasingly depends on digital and organisational readiness (Henriquez et al., 2023), while Malaysian manufacturing evidence shows that organisational capabilities and firm size may affect readiness for Industry 4.0 (Wong & Kee, 2022).

These contextual variables are not included as formal constructs in the present model because the paper aims to develop a focused conceptual framework around leadership practices, organisational dynamics, process innovation and operational excellence. Future empirical studies could extend the model by testing these variables as moderators, controls or boundary conditions. This would clarify whether the proposed relationships are stronger in plants with higher digital maturity, stronger safety culture, greater regulatory intensity or more advanced operational excellence systems.

Managerial and Management Education Implications

The framework suggests, subject to future empirical validation, that operational excellence should not be managed as a stand-alone technical programme. Managers in downstream fertiliser plants should begin by diagnosing whether leadership practices and organisational dynamics create the conditions needed for process innovation. Without leadership support and organisational readiness, improvement tools may be adopted superficially and may not become embedded in daily routines.

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First, leadership development should focus on communication, coaching, intellectual stimulation and recognition of improvement contributions. Middle and frontline leaders are particularly important because they translate corporate priorities into daily operational behaviour. Leadership training should therefore include problem-solving conversations, safety-and-quality communication, improvement facilitation and change leadership.

Second, organisational dynamics should be strengthened through empowerment, team-based problem solving, cross-functional coordination and learning routines. Process innovation often requires collaboration among production, maintenance, engineering, quality, safety and support functions. Managers should therefore reduce functional silos and create formal channels through which employees can raise issues, share lessons and test improvements.

Third, process innovation should be institutionalised as a management system rather than treated as a series of projects. This may include structured improvement pipelines, idea evaluation routines, cross-functional kaizen teams, digital monitoring pilots, maintenance optimisation projects and feedback loops that convert lessons learned into updated procedures. Continuous improvement infrastructure may function as a dynamic capability when embedded in organisational routines and learning systems (Anand et al., 2009).

Table 4: Managerial Translation of the Conceptual Framework

Model element	Managerial action	Expected operational value
Leadership practices	Clarify operational priorities, coach employees, stimulate problem-solving and recognise improvement contributions.	Stronger improvement accountability and safer, more disciplined operational behaviour.
Organisational dynamics	Strengthen empowerment, teamwork, cross-functional coordination, learning routines and strategic alignment.	Better collaboration across production, maintenance, quality, HSE and support functions.
Process innovation	Build structured routines for idea capture, process redesign, technology piloting and procedure updating.	Implemented process improvements that support reliability, quality, efficiency and sustainability.
Operational excellence	Integrate process management and continuous improvement as one management system.	Sustained operational discipline with controlled process renewal.

For management education, the framework can be used as a teaching model to show how soft organisational capabilities become hard operational outcomes. It is especially useful for DBA teaching, executive education and plant-leadership programmes because it connects theory with practical operational challenges in process-intensive manufacturing.

FUTURE RESEARCH AGENDA

Future research should validate the proposed framework empirically using samples of employees from Malaysian downstream fertiliser plants. Because this article is conceptual, empirical testing should examine whether the proposed associations are statistically significant, whether process innovation provides full or partial mediation, and whether the relationships remain robust after controlling for contextual variables.

Future studies should distinguish incremental and radical process innovation. Incremental process innovation may be more common in regulated fertiliser plants because it supports continuous improvement without destabilising safe operations. Radical process innovation, such as major digital transformation or process-technology replacement, may require stronger governance, technical validation and change-management capability.

Future versions of the framework should incorporate contextual or moderating variables such as Industry 4.0 maturity, digital capability, organisational size, technological maturity, environmental uncertainty, regulatory intensity, safety culture and supply-chain complexity. These variables may explain why similar leadership and organisational conditions produce different operational outcomes across plants.

Multi-level empirical investigations are also recommended. Future research could collect leadership perceptions from managers, employee experiences from technicians and executives, and objective plant-level performance indicators such as downtime, process interruptions, quality deviations, safety incidents, maintenance reliability, energy intensity, cost variance and improvement-project completion rates. This would reduce overreliance on self-reported perceptions and provide stronger validation of operational excellence.

Comparative studies involving other process-intensive industries such as petrochemicals, refining, pharmaceuticals, specialty chemicals, palm oil processing and oil and gas would help determine whether the framework is fertiliser-specific or generalisable across regulated process industries. If future researchers use SEM or PLS-SEM, they should report measurement-model assessment, structural-model assessment, mediation analysis and relevant robustness checks (Hair et al., 2022), while avoiding causal claims unless supported by longitudinal or experimental design.

CONCLUSION

This conceptual paper develops an integrative framework linking leadership practices, organisational dynamics, process innovation and operational excellence in downstream fertiliser manufacturing. The central argument is that leadership practices and organisational dynamics are not merely soft background conditions. They are organisational capabilities that shape whether employees can coordinate, learn, innovate and sustain disciplined operational performance.

Process innovation is positioned as the mediating mechanism that translates leadership practices and organisational dynamics into operational excellence. This contribution is important because it explains how behavioural and internal organisational capabilities become operationally meaningful through improvements in workflows, technologies, routines and process-management systems.

The framework is particularly relevant for process-intensive and safety-sensitive industries where organisations must balance stability and change. By integrating transformational leadership theory, Denison's organisational culture model, dynamic capabilities theory and organisational ambidexterity theory, the paper offers a practical and theoretically grounded model for future empirical validation and managerial application. At the same time, its conceptual nature must be recognised: the framework proposes relationships and boundary conditions, but does not yet demonstrate their empirical strength, direction or practical effectiveness in actual plant operations.

Declarations

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Data availability: No new empirical data were generated or analysed for this conceptual paper.

Ethical approval: Not applicable because the manuscript is conceptual and does not report new data from human participants.

REFERENCES

1. Al-Sa’di, A. F., Abdallah, A. B., & Dahiyat, S. E. (2017). The mediating role of product and process innovations on the relationship between knowledge management and operational performance in manufacturing companies in Jordan. Business Process Management Journal, 23(2), 349–376. https://doi.org/10.1108/BPMJ-03-2016-0047
2. Anand, G., Ward, P. T., Tatikonda, M. V., & Schilling, D. A. (2009). Dynamic capabilities through continuous improvement infrastructure. Journal of Operations Management, 27(6), 444–461. https://doi.org/10.1016/j.jom.2009.02.002
3. Bass, B. M., & Riggio, R. E. (2006). Transformational leadership (2nd ed.). Psychology Press. https://doi.org/10.4324/9781410617095.
4. Carvalho, A. M., Sampaio, P., Rebentisch, E., McManus, H., Carvalho, J. Á., & Saraiva, P. (2023). Operational excellence, organizational culture, and agility: Bridging the gap between quality and adaptability. Total Quality Management & Business Excellence, 34(11–12), 1598–1628. https://doi.org/10.1080/14783363.2023.2191844
5. Crossan, M. M., & Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: A systematic review of the literature. Journal of Management Studies, 47(6), 1154-1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x
6. Denison, D. R., & Mishra, A. K. (1995). Toward a theory of organizational culture and effectiveness. Organization Science, 6(2), 204–223. https://doi.org/10.1287/orsc.6.2.204
7. Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). SAGE Publications.
8. Hardcopf, R., Liu, G., & Shah, R. (2021). Lean production and operational performance: The influence of organizational culture. International Journal of Production Economics, 235, Article 108060. https://doi.org/10.1016/j.ijpe.2021.108060
9. Henriquez, R., Munoz-Villamizar, A., & Santos, J. (2023). Key factors in operational excellence for Industry 4.0: An empirical study and maturity model in emerging countries. Journal of Manufacturing Technology Management, 34(5), 771-792. https://doi.org/10.1108/JMTM-09-2022-0330
10. International Energy Agency. (2021). Ammonia technology roadmap: Towards more sustainable nitrogen fertiliser production. https://www.iea.org/reports/ammonia-technology-roadmap
11. International Fertilizer Industry Association. (2009). Energy efficiency and CO2 emissions in ammonia production. https://www.fertilizer.org/wp-content/uploads/2023/01/2009_IFA_energy_efficiency.pdf
12. Ministry of Investment, Trade and Industry. (2023). Industry4WRD. https://www.miti.gov.my/index.php/pages/view/4832
13. Naji, G. M. A., Isha, A. S. N., Alazzani, A., Saleem, M. S., & Alzoraiki, M. (2022). Assessing the mediating role of safety communication between safety culture and employees safety performance. Frontiers in Public Health, 10, Article 840281. https://doi.org/10.3389/fpubh.2022.840281
14. O’Reilly, C. A., III, & Tushman, M. L. (2013). Organizational ambidexterity: Past, present, and future. Academy of Management Perspectives, 27(4), 324–338. https://doi.org/10.5465/amp.2013.0025
15. OECD/Eurostat. (2018). Oslo manual 2018: Guidelines for collecting, reporting and using data on innovation (4th ed.). OECD Publishing. https://doi.org/10.1787/9789264304604-en
16. PETRONAS Chemicals Group Berhad. (n.d.). Ammonia & fertilisers. Retrieved June 24, 2026, from https://www.petronas.com/pcg/our-business/ammonia-fertilisers
17. Prajogo, D. I. (2006). The relationship between innovation and business performance: A comparative study between manufacturing and service firms. Knowledge and Process Management, 13(3), 218–225. https://doi.org/10.1002/kpm.259
18. Prajogo, D. I., & Ahmed, P. K. (2006). Relationships between innovation stimulus, innovation capacity, and innovation performance. R&D Management, 36(5), 499–515. https://doi.org/10.1111/j.1467-9310.2006.00450.x
19. Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. Journal of Business Research, 104, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

20. Subramaniam, M., & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. Academy of Management Journal, 48(3), 450-463. https://doi.org/10.5465/amj.2005.17407911
21. Teece, D. J., Peteraf, M. A., & Leih, S. (2016). Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. California Management Review, 58(4), 13–35. https://doi.org/10.1525/cmr.2016.58.4.13
22. Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z
23. Tian, M., Deng, P., Zhang, Y., & Salmador, M. P. (2018). How does culture influence innovation? A systematic literature review. Management Decision, 56(5), 1088–1107. https://doi.org/10.1108/MD-05-2017-0462
24. Tushman, M. L., & O'Reilly, C. A., III. (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. California Management Review, 38(4), 8–30. https://doi.org/10.2307/41165852
25. Wong, A. P. H., & Kee, D. M. H. (2022). Driving factors of Industry 4.0 readiness among manufacturing SMEs in Malaysia. Information, 13(12), Article 552. https://doi.org/10.3390/info13120552