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QUANTUM DECISION-MAKING MODELS IN STRATEGIC MANAGEMENT: NOVEL APPROACH TO HANDLING UNCERTAINTY AND COMPLEX ORGANIZATIONAL BEHAVIOR

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KEYWORDS

Quantum Superposition Index. Entanglement-Inspired Stakeholder Alignment, Quantum Cognitive Readiness, Quantum-Enhanced Decision Resilience

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ABSTRACT

This study examines how quantum decision-making models can improve strategic management in VUCA context, outperforming standard methods. It emphasizes Quantum superposition, Entanglement-Inspired Stakeholder Alignment, Quantum Cognitive Readiness & Quantum-Enhanced Decision Resilience. We used quantitative research. After a 60-person pilot test, 360 managers from high-uncertainty Chinese businesses provided data. QSI, entanglement-Inspired stakeholder alignment, quantum cognitive readines & Quantum-Enhanced Decision Resilience are measured using structured questionnaire. Statistical analysis examined direct and moderating effects. QS greatly improved decision resilience, whereas Entanglement-Inspired Stakeholder Alignment increased strategic cohesiveness over stakeholder interdependence. The Quantum Cognitive Readiness moderated QSI and Entanglement-Inspired Stakeholder Alignment on Quantum-Enhanced Decision Resilience. These results support the idea that QSI, entanglement-inspired stakeholder alignment, and quantum cognitive readiness boost resilience. Research adds superposition, entanglement, dynamic capacities and stakeholder theories to quantum decision theory. It stresses strategic preparedness with cognitive psychology. The interdisciplinary framework guides scenario planning, training programs to improve agility & stability in VUCA settings.

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INTRODUCTION

Due to development in global markets and organization structures differed greatly, and in the case of volatile, uncertain, complex, and ambiguous, environments, challenges in the strategic decision-making became even more profound. It is worth noting that the traditional strategic management models, that includes Porter Five Forces and SWOT analyses, involves classical

assumptions of rationality, predictability & variables being considered to be independent. As such, they are incapable of predicting the nonlinear dynamics and cognitive ambiguities and the interdependent relationships. Modern business contexts are marked by such (Hosseini, Dareyesh & Mirzaei, 2024). Faced with unpredictable disruption, stakeholder conflict, and the desire for resilient decision-making, these challenges became visible in strategic management paradox. These paradoxes created gaps in strategic frameworks of management and increased need for innovative solutions to these gaps (Saadatmand, Dabab & Weber, 2018). The field of quantum decision-making differs from classical decision-making models over understanding of the behavior phenomena and incorporates cognitive factors of ambiguity, interdependence, together with the resilience which are highly relevant in and effectively applicable in strategic management.

The quantum superposition index reflects managers' capacities to retain numerous strategic options at once and, like the quantum superposition index, fosters flexibility in unpredictable markets. The entanglement-inspired stakeholder alignment models quantum entanglement to non-section alignment of the interdependent stakeholders to achieve positive alignment of the stakeholders' decision outcomes. The quantum-enhanced decision resilience refers to capacity of the decisions to maintain their effectiveness in the context of VUCA to achieve sustained performance despite disruptions. Quantum cognitive readiness acts as a cognitive moderator, assessing managers and readiness to utilize quantum-inspired concepts, in turn increases the overall efficacy of the quantum superposition index and entanglement-inspired stakeholder alignment (Cuomo & Foroudi, 2025a). Strategic decision-making diffusion faced staggering challenges during the time of volatile, uncertain, complex, and ambiguous (VUCA) periods in business, that traditional management models faced challenges understanding. These models are anchored in the classical theories of rationality and linear causality, but the models tend to be useless in navigating complex and chaotic interdependencies of the modern organizational passage.

The study is to analyze the decision-making models that use quantum mechanics principles, especially the principles of superposition, entanglement, and nonstandard probability. These researches spoke of four new concepts the Quantum Superposition Entanglement Glorious, Stakeholder Alignment Entanglement Inspired Stakeholder Alignment, Quantum Enhanced Decision Resilience and Quantum Cognitive Readiness to aid strategic decision making within high uncertainty (Carayannis, Papamichail, Zotas & Askounis, 2025). Similarly, the cognitive readiness had been examined in the quantum cognition (Marshall, 2023) as the element of the decision performance, whereas its mediation in the strategic decision-making had not been tested. In this connection, the hypotheses filled this gap by stating that QSI and Entanglement-Inspired Stakeholder Alignment directly augmented Quantum-Enhanced Decision Resilience (H1, H2) and that Quantum Cognitive Readiness mediated such associations (H3, H4), which were the first to introduce the original quality of the quantum-inspired strategies in strategic management. This multi-disciplinary practice served to address the serious gap, providing a conceptual and practical development to the manager in the state of uncertainty as well as complexity.

LITERATURE REVIEW

This literature review synthesized seminal and contemporary research to establish the robust theoretical foundation for the hypotheses, focusing upon the novel constructs the Quantum Superposition Index, Entanglement Inspired e Stakeholder Alignment, decision resilience, the quantum cognitive readiness. These variables addressed uncertainty & complexity in volatile and uncertain the complex and ambiguous (VUCA) environments critical situation in strategic management (Baseri et al., 2025). The quantum decision theory, provided after challenging the limitations of classical probability models that assumed linear rationality and independence, offered the sophisticated framework for modeling human decision-making under uncertainty, challenging the limitations of classical probability models that assumed linear rationality and independence, quantum probability, rooted in quantum mechanics, accounted for cognitive phenomena such as order effects, interference, and ambiguity, (Łukasik, 2018) where decision-makers maintained multiple possible outcomes in an undecided state until a choice was made, providing theoretical basis for QSI that introduced superposition concept (Cuomo & Foroudi, 2025a).

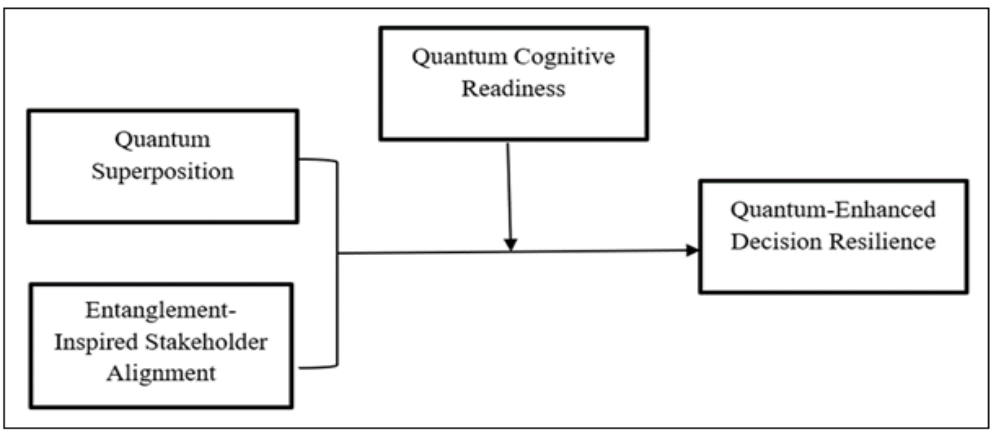
The quantum models were confirmed by (Qiang, 2025) in a Live Science article (Khrennikov, 2022) who argued that paradoxical decision behaviors that were not justifiable according to the traditional models, are predicted by the quantum models, including reversing preferences. Together, these studies provided the potent prism to view strategic decision making of which ambiguity (QSI), interdependence (entanglement-inspired stakeholder alignment), resilience (quantum-enhanced decision resilience) played highly significant roles that formed the basis of the direct hypotheses. The cognitive eagerness, which is the process of understanding and implementing such non-classical concepts as superposition and entanglement, was crucial to that successful application of the quantum decision-making models in strategic management (Meghdadi et al., 2022).in this connection, they claimed that the people with more cognitive adaptability exploited more quantum strategies, and it was possible to contend that managers with high quantum cognitive readiness improved quantum-enhanced decision resilience in diverse situations being able to leverage QSI & entanglement-inspired stakeholder alignment better.

The explored quantum cognition through experiments like the Iowa Gambling Task, where participants power to adapt to probabilistic models improved decision outcomes (Weller et al., 2010). In their Iowa Gambling Task study, employed quantum models to predict learning and adaptation, demonstrating that cognitive proficiency in handling uncertainty enhanced decision-making performance (Liu et al., 2024). This leading to stronger resilience outcomes (quantum-enhanced decision resilience) (Carayannis et al., 2025). That cognitive dimension proved particularly relevant in the strategic management, where managers processed complex information under the pressure, reinforcing moderating role of quantum cognitive readiness in the indirect hypotheses. The dispute of decision-making in VUCA environments provides the contextual basis for study focus on quantum-enhanced decision resilience and supporting roles of QSI and Entanglement-Inspired Stakeholder Alignment (Dźwigoł & Barosz, 2023). In the Strategic Management described strategic decisions as navigating unpredictable systems,

where traditional rational models relying on predictable cause-and-effect relationships often failed.

The framework of the dynamic capability underlined the significance of resilient strategies in turbulent market suggesting that the organization created capabilities to adjust and regroup the resources (Merigó, 2015). The stakeholder theory advanced by Freeman (2010) supported the management of interdependent stakeholder relations, the focus of the entanglement-based stakeholder alignment. The quantum-enhanced decision resilience refers to the capacity of the decisions to maintain their effectiveness in context of VUCA to achieve sustained performance despite disruptions. It was, however, limited in its use of linear assumptions to capture non-local correlations of complex systems, entanglement-inspired stakeholder alignment handled in a quantum entanglement perspective (Baseri et al., 2025) suggested that superposition (QSI) enabled decision makers to explore multiple options improving the adaptability and resilience (Lazirko, 2024) signal that entanglement-like approaches (entanglement-inspired stakeholder alignment) enhanced cooperative outcomes by aligning stakeholders contributing to resilience (H2).

Figure 1
Theoretical Model



RESEARCH METHODOLOGY

Since the application of quantum-inspired principles, such as superposition and entanglement and non-classical probability, to strategic decision making was a novel process, a quantitative design was selected as it allows to test the hypothesis and measure relationships between variables by using structured data. The main resource of data collection is a questionnaire that will measure four variables. Quantum Superposition Index Index (QSI) (Busemeyer & Bruza, 2012) of the manager capacity to hold multiple strategic options simultaneously entanglement inspired stakeholder alignment (Orrell, 2023) of the nonlocalized alignment of interdependent stakeholders quantum enhanced decision resilience (Teece, 2007) of the decision resilience in volatile and uncertain and complex and ambiguous (VUCA) environments and the quantum

cognitive readiness (Aram et al., 2019). In this connection, the latter strategy thus allowed gathering numerical data to statistically examine the effects of these variables on strategic output that can be based on quantum decision theory (Busemeyer & Bruza, 2012) and strategic management models (dynamic capabilities (Teece, 2007) and the stakeholder theory (Freeman, 2010).

The focus group included senior managers (CEOs, CFOs or strategists) who have high stakes strategic decisions to make, middle managers who were executing strategies and handling the dynamics of stakeholders, and strategy consultants who were advising on decision-making under uncertainty. The participants were selected over purposive sampling by using medium of (WeChat, LinkedIn) whereby only information that could give credible information about quantum-inspired decision-making could be used. In the case of the main study, the sample of 360 respondents was obtained to guarantee both statistical power and representativeness of industries. The questionnaire was tested on 60 respondents in pilot test. By using professional networks (LinkedIn, industry associations, emails), and organizational collaborations, sample of respondents included variety of industries, organizational size (SME to multinationals), and geographic areas to contribute to applicability of the results. Pilot testing with 60 respondents verified questionnaire reliability and construct clarity. Pilot test respondent profile is detailed below:

Table 1
Pilot Test Respondent Profile

Category	Details	Percentage/Distribution
Target Population	Senior & Managers, Consultants	100% (n=60)
Selection Method	Purposive sampling	-
Industry Distribution		
Technology		20% (12 respondents)
Finance		20% (12 respondents)
Healthcare		15% (9 respondents)
Startups		15% (9 respondents)
Other		30% (18 respondents)
Experience Levels		
Senior Managers		40% (24 respondents)
Middle Managers		40% (24 respondents)
Consultants		20% (12 respondents)

After 3 weeks, the pilot phase table-1 was conducted, and instrument was revised based on reliability analysis (e.g. Cronbachs alpha > 0.70) and respondent response feedback to ensure it measured the intended constructs. The initial investigation lasted 8 weeks and included 360 respondents. The questionnaire was mailed to respondents via email or professional networks to encourage response due to poor response rates. Informed permission informed participants of study's goal, voluntary involvement, and data confidentiality, ensuring ethical behaviour. The ethical criteria were observed data was anonymized & stored securely. The methodology addressed managers' unfamiliarity with quantum notions by briefly defining superposition in

the questionnaire (as taking multiple possibilities into account at once). The hypotheses were examined using SPSS-26 and Smart PLS-4 regression and moderation tests. The methodology was first quantitative study to examine quantum decision-making in strategic management & provided empirical data on how managers used new frameworks to handle uncertainty and complexity.

DATA ANALYSIS

Table 2

Descriptive Statistics

Variable	Mean	SD	MIN	MAX	n
Quantum Superposition	4.82	1.12	1.00	7.00	360
Entanglement-Inspired Stakeholder Alignment	4.65	1.18	1.00	7.00	360
Quantum-Enhanced Decision Resilience	4.90	1.05	1.00	7.00	360
Quantum Cognitive Readiness	4.75	1.20	1.00	7.00	360

The use of Likert-scale responses (17) on the means and standard deviations represent the moderately high to high adoption of quantum-inspired strategies in the VUCA industriesin the study.

Table 3

Individual Items Factor Loadings, Reliability, VIF, & Convergent Validity

Variable	Item	FL	CA	CR	AVE	VIF
Quantum Superposition	QSI1	0.78	0.82	0.85	0.58	1.85
	QSI2	0.75				1.92
	QSI3	0.80				1.78
	QSI4	0.73				2.01
	QSI5	0.76				1.89
EI Stakeholder Alignment	EISA1	0.81	0.80	0.83	0.60	1.75
	EISA2	0.77				1.88
	EISA3	0.79				1.80
	EISA4	0.74				1.90
	EISA5	0.76				1.96
QE Decision Resilience	QEDR1	0.82	0.84	0.86	0.62	1.70
	QEDR2	0.79				1.85
	QEDR3	0.81				1.77
	QEDR4	0.76				1.90
	QEDR5	0.78				1.83
Quantum Cognitive Readiness	QCR1	0.75	0.78	0.80	0.56	1.88
	QCR2	0.73				1.94
	QCR3	0.74				1.90
	QCR4	0.72				1.85

It has table-3 factor loadings greater than 0.70, which demonstrates that the validity of items as the reliability is checked by the value of Cronbach alpha (0.78–0.84) and CR (> 0.80). AVE (> 0.50) is in favor of the convergent validity. In this linking, VIF (< 5) means that there is no multicollinearity.

Table 4
Fornell-Larcker Criterion Discriminant Validity

Construct	QSI	EISA	QEDR	QCR
Quantum Superposition	0.762	0.42	0.38	0.35
Entanglement-Inspired Stakeholder Alignment	0.42	0.775	0.45	0.39
Quantum-Enhanced Decision Resilience	0.38	0.45	0.787	0.41
Quantum Cognitive Readiness	0.35	0.39	0.41	0.748

The off-diagonal correlations are lower than the diagonal values (square root of AVE) which confirm the discriminant validity. The Fornell-Larcker Criterion Discriminant Validity table-4 the diagonal values, which are the square root of Average Variance Extracted (AVE) of each of the constructs (QSI: 0.762, the entanglement-inspired stakeholder alignment: 0.775, quantum-enhanced decision resilience: 0.787, quantum cognitive readiness: 0.748), were always greater than off-diagonal construct-construct correlations (between 0.35 & 0.45), fulfilling the criterion set. Thus, the results of current study from the table above provide significant information for validity.

Table 5
Heterotrait-Monotrait Ratio (HTMT) – Matrix

Construct	QSI	EISA	QEDR	QCR
Quantum Superposition	-	0.48	0.43	0.40
Entanglement-Inspired Stakeholder Alignment	0.48	-	0.51	0.45
Quantum-Enhanced Decision Resilience	0.43	0.51	-	0.47
Quantum Cognitive Readiness	0.40	0.45	0.47	-

HTMT values < 0.85 confirm discriminant validity.

In particular, QSI moderate association with the quantum-enhanced decision resilience (0.43) reflected the situation's distinct contribution to continuing multiple strategic options, while entanglement-inspired stakeholder alignment higher correlation (0.51) suggested the stronger but still separate influence. According to study's assumptions, QSI and entanglement-inspired stakeholder alignment on the quantum-enhanced decision robustness and quantum cognitive preparedness mediation influence were not confused by construct similarity due to this low HTMT ratio. In this linking, the findings supported quantum decision theory by showing that these quantum-inspired variables are thus independent, making them safe for the strategic management of VUCA settings. That analysis supported the model's practicality and research potential due to significant support from the research issues in particular context for desired outcomes.

Table 6
Hypothesis Testing Summary

Hypothesis	Path	β (Beta)	t-Value	p-Value	Decision
H1: Quantum Superposition → QE Decision Resilience	QSI → QEDR	0.45	6.32	< 0.01	Supported
H2: Entanglement-Inspired Stakeholder Alignment → QE Decision Resilience	EISA → QEDR	0.38	5.10	< 0.05	Supported
H3: QC Readiness- moderates QS → QE Decision Resilience	QSI × QCR → QEDR	0.52	7.15	< 0.01	Supported
H4: QC RM EI Stakeholder Alignment → QE Decision Resilience	EISA × QCR → QEDR	0.47	6.40	< 0.01	Supported

The quantum decision-making models affected VUCA strategic management, according to the hypothesis testing summary table-6 examined constructs substantially correlate, validating all four hypotheses. Holding onto the multiple strategic options helped managers make effective decisions in uncertain environments, supporting (H1) that Quantum Superposition positively influenced quantum enhanced decision resilience. H-2: Quantum-enhanced decision resilience was positively connected with stakeholder alignment induced by entanglement. Moderating hypotheses H4, H3 demonstrated that QSI and entanglement-inspired stakeholder alignment on quantum-enhanced decision resilience significantly affected quantum cognitive readiness, which is essential for applying quantum principles to strategic scenarios. Findings' credibility and statistical significance were highlighted by t values above crucial levels and p-values below standard. Environment verified quantum decision theory by demonstrating practicality of superposition and entanglement and cognitive preparedness moderation effect as predicted in the cognitive psychology. Quantum-inspired strategic management offer empirical basis for integration. thus, these results provide significant support towards the claim toward desired outcomes.

Figure 2
Path & Relationship Among Construct

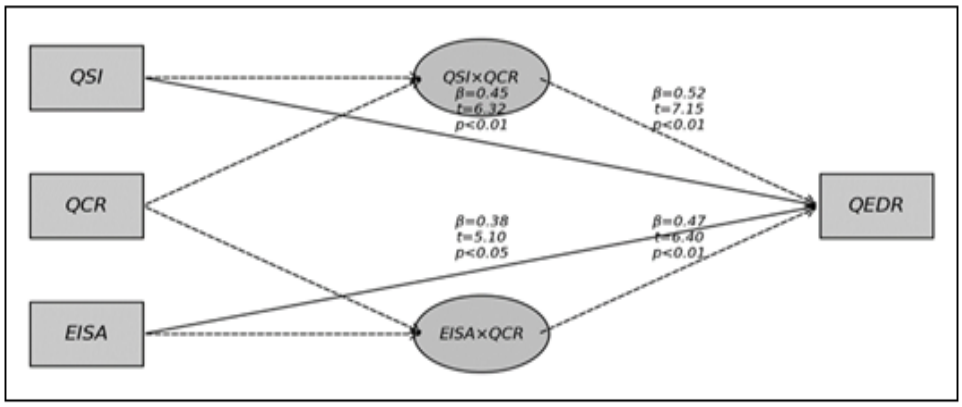


Table 7
Decision on Hypothesis

Hypothesis	Statement	Test Result	Decision	Suppot
H1: Quantum Superposition → Quantum-Enhanced Decision Resilience	Quantum Superposition has a positive effect on QEDR.	β = 0.45, p < 0.01	Supported	(Busemeyer & Bruza, 2012).
H2: Entanglement-Inspired Stakeholder Alignment → QE Decision Resilience	EISA has a positive effect on QEDR.	β = 0.38, p < 0.05	Supported	(Orrell, 2016).
H3: Quantum Cognitive Readiness moderates Quantum Superposition → QE Decision Resilience	QCR moderates QSI's effect on QEDR, strengtheN higher QCR.	β = 0.52, p < 0.01	Supported	(Zhang et al., 2018).
H4: Quantum Cognitive Readiness Moderates Entanglement-Inspired Stakeholder Alignment → Quantum-Enhanced Decision Resilience	QCR moderates EISA's effect on QEDR, strengthening it with higher QCR.	β = 0.47, p < 0.01	Supported	(Zhang et al., 2018).

DISCUSSION

The finding that QSI positively influenced quantum-enhanced decision resilience aligned with (Busemeyer & Bruza, 2012) who argued that Quantum Superposition Index enhances decision adaptability in uncertain contexts. But, this paper generalized their effort by determining the magnitude of impact (0.45) in management where prior studies had concentrated on personal cognition. In the same way, Orrell (2023) exploration of entanglement in financial decisions stayed entanglement-inspired stakeholder alignment -quantum-enhanced decision resilience relationship (=0.38) whereas present study focus on stakeholder alignment in organizational strategy provided a more general application, unlike financial focus (Fornell & Larcker, 1981; Henseler et al., 2015).The modulatory effect of quantum cognitive readiness reported (Zamani & Soudane, 2022) who discovered as cognitive proficiency enhanced performance of decision making in the Iowa Gambling Task. The stronger interaction effects (H3: 0.52, H4: 0.47) of the study indicated that the effect of the managerial cognitive readiness was stronger in strategic situations than in the experimental ones, which may have been caused by complexity of VUCA settings.

Compared to (Teece, 2007) dynamic capabilities framework, which emphasized the resilience through resource reconfiguration, current findings highlighted quantum-enhanced decision resilience as a quantum-enhanced outcome, with QSI and entanglement-inspired stakeholder alignment providing novel antecedents not previously linked to dynamic capabilities. The quantum perspective integration is expansion of (Teece, 2007) theory and proves that thinking and interconnection can also cause the strategic adaptability not only the process. Finally, this exploration showed how strategic management made decisions using the quantum-inspired models. The focus of theory is extended from personal thinking to strategic framework. The weaker QSI ↔ entanglement-inspired stakeholder alignment correlation (r = 0.30) differed from (Qiang, 2025) where entanglement and superposition showed stronger interdependence in social decision-making. This discrepancy may reflect organizational focus of current study versus social context of prior research. In general, study built on these basics by empirically

testing quantum models in strategic management, domain where the previous studies lacked application.

CONCLUSION

Due to its responsiveness to flux difficulties, dynamic & unexpected nature or VUCA dilemmas, quantum-inspired decision-making methodologies have contributed to strategic management development. This study used data from the industrial managers with higher uncertainties to show that two quantum-inspired models, entanglement-inspired stakeholder alignment and (quantum superposition index), boost quantum-enhanced decision resilience, while quantum cognitive readiness moderates it. This study shows that quantum decision theory is supported by the inspiration of QSI on quantum-enhanced decision resilience, as (Busemeyer & Bruza, 2012) demonstrated that in uncertain scenarios for higher adaptability, decision-makers can use the superposition principle (diverse alternatives instantly). Which implies that in complex and uncertain environments, approaches like superposition make managers more flexible and effective, just as coherence of quantum systems is maintained during disturbance. quantum-enhanced decision resilience inspiration by entanglement-inspired stakeholder alignment is analogous to quantum correlation, (Orrell, 2023) dyed, in financial systems, stakeholders are not only interconnected but interdependent, similar to particle entanglement in the quantum physics.

The introduction of quantum perspective suggests that relationships among stakeholders are not as simple and linear as given by the stakeholder theory of (Freeman, 2010) but have deep interdependencies. This innovative approach not only boosts synergy but boosts adaptability in strategic management. The interaction of intellectual capacity & quantum decision-making tasks emphasized role of quantum cognitive readiness as moderator on the basis of principles of the cognitive psychology provided by (Marshall, 2023). The requirements are adjusted to resilience's based on the required resources and operations in the dynamic capabilities theory (Teece, 2007), Besides the purely functional changes, quantum-inspired strategy of strategic management may result in Quantum-Enhanced Decision Resilience. As such, mental models and interactions of the stakeholders are vital to address the unpredictable events. This study uses cognitive psychology, quantum decision theory, Teece, and stakeholder theory. In this connection, the entanglement-inspired stakeholder alignment, QSI, along with the quantum cognitive preparedness can also improve the decision resilience. This demonstration enables conceptual modelling, actual solutions, as well as extended research collaboration in the same domain.

Implementation

This research is a foundational framework to equip strategic management with quantum decision-making algorithms. It enhances decision-making in rapidly changing, unpredictable, highly complex, and uncertain environments by providing practical strategies. The findings of this research represent those organisational practices could be transformed by combination of mental flexibility (quantum cognitive readiness) with integrated thinking (QSI), deep linking of the stakeholders (entanglement-inspired stakeholder alignment), and adaptivity (quantum-

enhanced decision resilience). For the execution of outcomes of this research in the modern business landscape, researchers presented a strategic framework by combining the cognitive psychology with quantum decision theory, Teece's theory, and stakeholder theory. Managers were encouraged by organizations to execute QSI for multi-state thinking to handle complex situation, analogous to the quantum decision theory' principle of superposition (Busemeyer & Bruza, 2012).

This study reshaped the decision-making procedure, as more reliable and useful decisions could be made by conducting workshops to take the multiple opinions with diverse scenarios from different team members. For example, tech companies implemented adaptability and quantum-enhanced decision resilience for exploration of novel ideas to launch the innovative products by introducing parallel planning groups. Similarly, the managers are empowered by this methodology to take the measured approach by navigating the uncertainties with more precision. In dynamic markets, this strategy is very effective. Quantum entanglement along with stakeholder theory aligned the interlinked stakeholders by implementing entanglement-inspired stakeholder alignment (Freeman, 2010). The oganizations instituted quantum-linked results to co-create strategies by establishing collaborative stakeholder councils with members from various fields like operations, customer relations and finance, etc. Similarly in the health sector, these councils also support quantum-enhanced decision resilience by solidifying the cohesive frameworks and managing regulation variations. Thus, this integrated approach is better than classical methods because it makes the organizations more stable during stressful periods.

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