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A Journey of a Thousand Miles Begins with A Quantum Step: The Importance of Quantum Leadership to Promote Lifelong Learning in Organisations

Soh Wan Geok, *BSc majoring in Physics Industry from Universiti Teknologi Malaysia (UTM), Master of Management from Open University Malaysia (OUM), and is currently a candidate for Doctor of Philosophy in Education (OUM).*
Mohamad Bin Bilal Ali, BSc *in Mathematics from Universiti Teknologi Malaysia (UTM), Master of Science in Mathematics from Ohio University, USA and obtained a PhD in Educational Technology from Universiti Teknologi Malaysia (UTM)*

Abstract. **Context**: The study explores the consciousness and importance of new leadership styles to promote lifelong learning through quantum leadership in organisations.
Objective: To examine the literature reviews of current quantum leadership style paradigms to promote lifelong learning among employees in organisations.
Data sources: Searching was conducted through major databases, such as SCOPUS, Web of Science, ProQuest, Dimension.ai, Emerald Insight, Ebscohost, and Google Scholar.
Study selection: Related articles on quantum leadership, quantum leaders, and lifelong learning or organisational learning.
Methodology: A synthesis of qualitative studies was conducted in this study for an overview of quantum leadership style regarding lifelong learning in organisations.
Findings: Previous studies examined the role of organisational learning to achieve competitive advantage and relate between learning systems and leadership roles. A quantum leadership style framework was presented to promote lifelong learning among employees through management science.
Conclusion: Quantum leaders understood the implications of organisational learning at the workplace in challenging times. Lifelong learning was promoted to improve profitability, stability, and organisational growth with a conducive learning environment.
Recommendation: The resurgence of quantum leadership would contribute to new management science developments in the industry and higher education. The need for future studies on purposeful learning through quantum leadership to support knowledge creation and the constant paradigm was evident.

Keywords: Quantum leadership, Quantum leader, Lifelong learning, Manufacturing organisation

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INTRODUCTION

Effective leadership is pivotal to organisational success. Scholars have strived to understand the essence of leadership success for decades. Hence, much ongoing research on effective leadership continues to elude the key stakeholders. Most of the studies revealed three crucial leadership responsibilities towards complex changes and continual organisational improvement: effective communication among stakeholders, effective assessment of practices and the subsequent impact on people, and the fostering of shared beliefs and belongingness for cooperation.

Although the quantum era reflects potential and unlimited possibilities for a comfortable and robust society, the challenges in societal development remain. Rapid technological changes have propelled current leaders to adapt and accommodate to innovative thoughts and learning. Thus, the quantum age defined the effects on management and leadership revolutions through thoughts and practices, whereby changes in management role characteristics were necessary for sustenance in the new era (O'Grady & Malloch, 2013). A new mindset must emerge in organisational leaders, particularly regarding learning and development. Likewise, linear management systems were irrelevant in the current technological upheaval, resulting in chaos, uncertainties, and threats (Turner & Baker, 2019). Resultantly, the management science of quantum theory was introduced with regards to a system model.

Amid major social transformations, changes and developments were inevitable and constituted a transcendent consciousness. Most organisational leaders believed that quantum physics or physical science was irrelevant to organisational management and leadership. Humans live in a world surrounded

by energy particles and matter (Márquez-Ramos & Mourelle, 2016). In the organisational context, an organisation is a human-oriented living system that is sensitive to energy and influences employees through organisational leaders. Thus, the energy level would indirectly influence the consciousness level.

Quantum leaders catalyse change and convince others to discover and advance in organisational learning through new skills and insights (Watson, O'Grady, Horton-Deutsch & Malloch, 2018). Conscious and quantum leaders emphasise growth possibilities and strive for better developments. To understand the seemingly elusive concept of innovation framework, quantum perspectives involve the quantum effect on organisations emphasising gratitude and external contributions to bring positive energy to the learning field. Additionally, superior performance was achieved through inspiring, meaningful, and purposeful organisation-oriented visions beyond profit-making (Laszlo, 2019). In other words, quantum leaders embrace self-transformation and induce potential energetic vibrations.

As the dynamic energy systems within an organisation consisting of conscious observers enable reality, organisations are also viewed to have quantum values. Chaos and complexities influence the physical systems on a daily basis. Similarly, the quantum paradigm is perceived to be complex, chaotic, and uncertain by nature. The thought processes associated with quantum physics, chaos, and complexities subsequently magnified creative potentials and uncertainties, thus compelling leaders to self-transform into quantum leaders (Curtin, 2011; M. Akmal, 2019). As the initial company habits, assumptions, skills, and thinking tools do not promote sustenance, the need for an alternate perspective at both individual and corporate levels is evident. Thus, quantum thinking generated progress and brought people closer to a particular model, perspective, or rationale in a holistic manner (Laszlo, 2020). Likewise, potential creativity in a chaotic physical system can only emerge through a liberating learning experience within the organisational system to mould potential leaders.

Regarding the quantum paradigm, the current unfamiliar events in complex and turbulent living systems, particularly during economic turmoils, strong pressure to change, and potentially chaotic events and objectives tend to become ambiguous. Therefore, the key to organisational success relies on new leadership insights to positively impact organisational performance through mental cognition and structure and learn capacities. The study introduced and examined a new quantum leadership style paradigm to promote employees' lifelong learning in organisations, thus incorporating quantum leadership in organisational management. In this regard, quantum concepts could be implemented in new practical skillsets for 21st-century organisational leaders. In attempting to fulfil leadership and managerial roles, leaders in the current organisational dynamics must be spirited and go beyond mechanistic organisations or reductionist approaches by adopting new skills based on a more congruent paradigm within the complex environment of the quantum age.

METHODOLOGY

The literature on quantum leadership and leaders were examined to evaluate new leadership roles in manufacturing organisations through an exploratory study. The study objective involved reviewing the new quantum leadership paradigm to promote lifelong learning in manufacturing organisations. Rigorous searching through several major databases, such as SCOPUS, Web of Science, ProQuest, Dimension.ai, Emerald Insight, Ebscohost, and Google Scholar using Boolean operators (OR and AND) and truncation in the search strings was adopted in the review-based study.

In the data search procedure, literature review identification involving inclusion and exclusion criteria, manual screening, full-text assessment for eligibility, data extraction, and qualitative synthesis was conducted. The searching timeline for scholarly articles comprised the past five years. Concerning exclusions, non-English papers and the keywords found in references were excluded. The contents only focused on quantum leadership styles, quantum leader roles, and organisational learning for full-text assessments.

LITERATURE ASSESSMENT

Organisational learning concept

Globalisation and rapid environmental and technological advancements have resulted in a paradigm shift. In other words, change is the only constant element in current organisations or businesses. It was also noted that only the organisations accepting and proactively implementing the change would flourish. Therefore, the potential for expansion and transformation was interconnected to people's understanding. Organisations must also effectively improve creative learning capacities to manage internal and external outcomes and maintain a competitive advantage. Learning is an essential ability to adapt, understand, and utilise potentials (Li, Easterby-Smith & Hong, 2019). Consequently, learning has become a central

component in organisational changes and developments. As such, learning highly contributed to organisational development through transformation (Siddique, 2017; Szabla, Pasmore, Barnes & Gipson, 2017).

The core organisational learning principle required the structuring of processes and procedures to enhance individual or organisational efficiency and thrive in a challenging climate (Ravichandran & Mishra, 2018). Apart from predicting and responding to changes, long-term organisational success was determined through sustainability and development. Organisations needed to develop and transform through learning to embrace globalisation. Therefore, organisations should utilise learning to manage complexities and uncertainties (Alpaslan, 2019; Kasim & Altinay, 2016). Transformations through learning provided individual leverage and mutual learning opportunities among employees, inspired employees internally and externally, and efficiently managed information using technology (Tortorella et al., 2020). Organisational members who continually learned and transformed information management demonstrated organisational performance and improvement. Hence, transformation was the core feature in organisational learning (Kumar & Sharma, 2018).

Regarding organisational change, learning should be flexible and responsive to increase organisational efficiency and performance. The essential criteria for organisational learning included consolidation, reorganisation, effective operation, skilled manpower to face challenges, innovative technological advancements, and the responsiveness towards organisational shifts (Dubihlela & Kupangwa, 2016; Mullen & Mariam, 2019). In this vein, learning integrated innovative development and superior performance in an organisation. Besides, learning increased the participants' ability to develop in and adapt to a dynamic environment and boost organisational performance (Feng & Ha, 2016).

Previously, learning was theoretically-inclined with no established techniques, instruments, or methodologies. Consequently, the specific circumstances contributing to the formation of learning institutions were not acknowledged. Nonetheless, the incidents could be described as the need to attract more manpower. With an increase in the manufacturing of standardised products and services and the development of civil rights and aspirations, leaders perceived transitions or improvements to be in line with citizens' perceptions and actions (Hussein, Mohamad, Noordin & Ishak, 2014; Li et al., 2019). A sustainable organisational learning system through the integration of employees and organisational learning led to satisfactory problem-solving (Gachanja et al., 2020). Hence, optimal cooperation and commitment from employees were necessary.

Learning in manufacturing organisations

Learning constitutes all the important innovation ventures in successful organisations. For example, learning promotes self-improvement through personal or collective learning to (1) motivate people internally and externally, (2) process knowledge effectively, (3) allow effective technology use, (4) respond to dynamic business environments, and (5) generate progress (Siddique, 2017; Tortorella et al., 2020). Diversity and depth in learning are distinct organisational features establishing the framework for internal organisational competence (Al Idrus, Ahmar & Abdussakir, 2018). Hence, learning skills that enabled the incorporation of constructive input and knowledge-sharing resulted in integrated intelligence and internal skills beyond the manufacturing industry.

Learning is particularly beneficial to manufacturing organisations for the constant development, adaptability and value-adding structured in organisational development (Beyene, Shi & Wu, 2016; Koç, Kurt & Akbiyik, 2019). Organisational development may be measured through various learning factors, such as collaboration, performance progress, prosperity, promotion, respect, and behavioural attitudes towards the achievement (Mehdibeigi, Dehghani & Yaghoubi, 2016). Efficiency in the development of novel ideas, creative resource management, continual education, risk awareness, and open communication with stakeholders could encourage professional skill enhancements organisational accountability and knowledge integration in. The measures used to determine organisational learning include the diversity of experiments, generation capacity, engagement in progress management, the transition in mastery and adaptation, versatility and interaction involving external business contexts, continuous learning, and risk-taking (Gachanja et al., 2020; Siddique, 2017).

Practical learning involves business knowledge, skills, and behaviours requiring the learners' participation. In this regard, the analysis corresponds to the notion of pragmatism, wherein information and learning are the primary concepts (Szabla et al., 2017). Additionally, Dewey suggested pragmatism as a visionary, innovative, and forward-looking method, whereas learning related to the underlying situations that affect internal responses to individual behaviours. Experience is observed through a constant and relevant mindset towards unexplored elements using inquiries (Mullen & Mariam, 2019). Consequently, organisational learning would continuously collect, maintain, and translate information into influential knowledge that affected business outcomes or performances.

Besides, learning and organisational performance improved internally and externally in recognising and utilising technology. The essential aspects in organisational learning involving manufacturing include absolute organisational understanding (Kools et al., 2020), organisational leaders' acknowledgement of the importance of continuous learning in organisational sustainability and advancement (Beyene et al., 2016), and the simultaneous introduction and operation of the learning process continuously and strategically. Innovation would also be prioritised. Overall, organisational learning pertains to systematic thinking.

Potential assimilations are essential in the industry. For example, human resources enhanced opportunities to consume and incorporate new and external knowledge for better performance within the manufacturing activities in an organisation. Hence, a supportive learning climate would increase the potential assimilations of businesses, enhance production team functions, and decrease learning styles in a volatile learning environment (Phong, Hui & Son, 2018). The learning methodology created a conducive environment for employees to directly and constructively engage with superiors and related to the overall company management and performance analyses. Access to accelerators and incubators and fundings for corporate companies and consumer tools were also indicators to measure learning (Feng & Ha, 2016). The requirements encouraged dynamic networking for the economy and accelerated the technological advancement necessary for innovation.

Leadership in learning organisations

Leadership is defined as a reciprocal process (Szabla et al., 2017) in which leaders and followers with values and perspectives compete against others amid conflicts to accomplish individual or collective goals (Dziallas & Blind, 2019). Leadership promoted goal achievements by fulfilling employees' expectations and building a company culture organisational success. Leadership could also be linked to a particular function or a social structure involving control and ideology. In other words, leaders played a crucial role in organisational performance goal accomplishments (Bashir, Akram & Lodhi, 2017). Previous theories were highlighted to determine leaders' performance. It was believed that particular characteristics, behaviours, and traits defined leaders and differentiated leaders from other organisational members. The theories were proven unsuccessful in leadership performance evaluations and affected the development of behavioural justification that integrated behavioural representatives with results (Li et al., 2019; Szabla et al., 2017).

Regarding leadership accomplishments, the theories were based on the belief that some of the distinguished leaders possessed power, determination, and the drive for progress. On the contrary, leadership would be ineffective if the hopes and commitments were illusory. Participatory leadership encouraged action and creative work for organisational members in a modern dynamic world requiring a distinct form of leadership compared to conventional leadership roles (Lawrence & Shaw, 2017; Volles, 2016). Leadership in the current working classes and communities needed a more resilient and agile individual who could yield the best characteristics among followers in a dynamic environment. In organisational learning, leaders catalysed change using innovative ideas and visions of future possibilities, thus resulting in changes involving attitudes, aspirations, values, and belief (Janežič, Dimovski & Hodošček, 2018; Stoll & Kools, 2017).

Conventionally, individuals adapted to leadership roles by shaping the actions of others. Multiple studies revealed different leadership styles in varying contexts. For example, leaders could utilise power for intimidation (Szabla et al., 2017) or strength and resolution (Choi, Kim & Yoo, 2016). Various approaches, characteristics, behaviours, and situations seemed to be fundamental to leadership effectiveness. Commonly, transactional leaders may clarify members' roles and task requirements, define the expectations and preferences, and specify the appropriate needs and subsequent fulfilment (Uddin, Khan & Ali, 2017). Transformational leaders encouraged the followers to be creative concerning goals and goal attainments, collaborations, and self-esteem (Elrehail, Emeagwali, Alsaad & Alzghoul, 2018; Xie, 2020). Therefore, leaders create and express company objectives to be achieved beyond expectations.

Studies have been emphasising two leadership styles (transactional and transformational) for decades. Transactional leaders influenced employees by rewarding or penalising acts and performances. The leadership style occurred with employees' sharing of useful items (Dajani & Mohamad, 2017; Shao, Feng & Hu, 2017). Transactional leaders recognised that candidates needed to gain certain rewards in return for the contributions to guarantee the achievement of the advantages (Uddin et al., 2017). On the contrary, transactional leaders often negotiated with followers to justify the leaders' future accomplishments and aim to gain rewards. Hence, the repetitive process could cultivate a reward-based working environment (Shao et al., 2017).

On another note, transformational leadership occurred if confidence and morale increased among leaders and followers. The leadership type included a consistent personality. The followers shared

a worldly perception that went beyond self-interest and personal reward (Gil & Mataveli, 2016). Transformational leaders influenced followers to achieve goals and targets and indicated the importance of productive results (Elrehail et al., 2018; Xie, 2020). Hence, the followers' aims needed to change in recognising shared values and beliefs. The leadership style allowed connectivity between individuals, groups, or organisations. and assisted followers in envisioning and practising the goal-achieving approaches (Akhnif, Macq & Meessen, 2019). Nevertheless, long-term sustainability was one of the main weaknesses due to the overly conceptual approach that omitted employees' needs, such as guidance in duties and responsibilities.

Learning organisations may not occur naturally due to the effort required within the organisation to develop essential competencies. It was affirmed that the apex of the organisation must possess long-term dedication and commitment to operational activities (Anshar, 2017). Learning remains a distant vision so long as the establishment of leadership skills does not significantly influence manufacturing organisations. Three literary themes (visions and encouragements, leadership roles in learning, and core learning skills for leaders) were identified. Therefore, leadership activities relied on performance.

Introduction to quantum leadership

Companies have started recognising leading corporate thinkers as educators who utilised science to transform the future of business and create workplace synergy to thrive in leadership. Quantum leadership primarily relates to empirical studies investigating how the new leadership paradigm leads to a conceptual and practical framework for organisational management. Much literature on quantum leadership was published for the past decade to create an awareness of and strive to construct a new leadership style paradigm in the quantum era.

The generalisability of published leadership research denoted that quantum leaders were capable of progressing beyond conventional constraints by creating culture-based quantum leaps on multiple levels. The potential paradigm complemented the inner and outer, logic and emotion, the self and other, and consciousness and physical matter (Barrash, 2012). In Hanine's (2019) study, quantum leadership is a multidimensional concept that includes cognitive, relational, ethical, emotional, and spiritual dimensions.

From the quantum theory perspective, organisations were recommended to implement effective management approaches and techniques for service delivery. Therefore, organisations require dynamic leaders who are fully engaged, creative, energetic, and competent to lead using various strategies and approaches to improve corporate environmental quality (Haris, Budiman & Haris, 2016). The multi-tasking abilities could be realised through quantum leadership. Barrash (2012) also indicated a new set of operating assumptions in a consciousness-infused paradigm of interconnectedness that acknowledged the relationships between intuition and logic, part and whole, and mind and matter.

A novel leadership approach was needed in organisations to manage present challenges in a globalised world. Quantum leaders did not only possess intellectual, analytical, and technical competencies, but the leaders were also able to understand and manage human relationships. The competencies acknowledged new workplace concepts of quality with basic conflict management skills. The principle of accountability was consistently applied in organisations as the most dominant approach. Kocak (2020) mentioned quantum leadership as an organisational capacity to induce trust, confidence, and a sense of belongingness among employees to achieve organisational goals.

The complexities in science contributed to a conceptual structure. The social application of a globalised and computerised world through the widespread use of the internet led to uncertainties and complexities to most 21st-century organisational structures. Therefore, leadership in conventional organisations following classical or Newtonian understanding was deemed obsolete to overcome current challenges in business management. Therefore, novel leadership styles were required to navigate the rules of quantum physics (Kocak, 2020; Naderifar, Barkhordar, Dehkordi, Jalalodini & Ghaljaei, 2016).

The paradigm is based on a symbiotic relationship between organisations and quantum mechanics, whereby quantum mechanics, the chaos theory, and the complexity theory were associated with organisational issues and the challenges faced by organisational leaders (Gülcan, 2015; Laszlo, Sroufe & Waddock, 2017). The core element of the system defined meaning using new science to reformulate organisational thinking regarding wisdom and compassion while maintaining an implicit awareness and external stability (Hanine, 2019). Global trends, such as global recessions, high market volatility, and social and environmental challenges led to the need for the emergence of new markets.

The profit-centric supremacy model which created material wealth at the expense of the depletion of natural resources, pollution, and the imbalances in income distribution predicted a significant organisational transformation. In this vein, organisations were required to undertake new roles, become agents of change and create value economically, socially, and environmentally (Nigri &

Agulini, 2019). In-depth transformations at an intuitive level for greater effectiveness and well-being at work enabled the integration of the environment, society, and governance into a holistic and sustainable corporate performance management system. Nigri and Agulini (2019) reported that the phenomenon led to quantum leadership, wherein organisations could reach a higher level of consciousness following the relevant structure and learning culture.

Long-term organisational success was strongly linked to the quality of thought including empowerment, participation, and teamwork (Nurrohim, 2010). In Paz, Martelo & Acevedo's (2018) study leadership is used as a management tool to counter the fluctuations generated by crises and a fundamental phenomenon in the history of human society regarding the development and durability of social organisations. Ample evidence supported quantum leadership as the art of changing a person towards evolution and transformation. Several landmark studies that observed leaders in the quantum paradigm described a complex and scientific practice that reflected the importance of understanding and creating change in complex environments (Root, Denke, Johnson, McFadden & Wermers, 2020).

The authors identified multiple relationships and interconnections of new structural developments and processes including the merging of innovations and changes within a conventional system. From the extensive evidence in the literature on the creation of a dynamic and diverse team willing to respond and adapt to ongoing changes promoted innovations and positive and measurable outcomes. Classical management skills in mechanical organisations were also extensively demonstrated, thus holding leaders accountable due to rigid beliefs and order command systems for successful strategies (Senses & Temoçin, 2018). Regardless, current organisational leaders must possess appropriate abilities for the new quantum era that that different from social study disciplines. Moreover, quantum leaders emphasised teamwork for interaction and sharing (Dehkordi & Moradipordanjani, 2015; Sardashti & Pordanjani, 2019).

A thorough study on quantum leadership was presented in Simbulan's (2011) study regarding dominant logic and quantum leadership in enhancing the understanding of successful businesses. Much research surrounding the concepts of dominant logic, quantum leadership, and entrepreneurial aptitude pertained to the visions, missions, and objectives of higher education institutions in business curricula (Simbulan, 2011). Similarly, quantum leadership was extensively explored in literature for a holistic disciplinary paradigm and the intersecting principles of caring science.

The study by Watson et al. (2018) uncovered and highlighted ontological and philosophical disciplinary congruence between caring science and quantum leadership. The expansion of the quantum paradigm in healthcare leadership embraced provocative thoughts and critiques regarding the discipline and consciousness in healthcare leadership. The importance of relationships between the members in an organisation was emphasised rather than a sole focus on the individual. As mentioned by O'Grady (2020), the leader did not create change but perceived and perpetuated changes. Thus, emotional investment is crucial to provide a sense of ownership with integrity by a person's daily actions.

One of the considerations that spearheaded quantum leadership involved how scholars may productively fuse the internal estimations of significant advancement with the possibility of the theory. The theory distinguished the similarities in quantum leadership models and proposed an integrative model of hierarchical quantum leadership dependent on internal significance, leader's self-esteem, vision, and good models at various degrees of being (Laszlo, 2020; Watson, Porter-O'Grady, Horton-Deutsch & Malloch, 2018). A leader practising a Newtonian orientation strived to encourage employees to develop professionally relevant attributes. The practice was supported from the perspective of the organisation members to achieve organisational goal or objectives more effectively. Nevertheless, a leader adopting the quantum paradigm encouraged both professional and individual developments in technical, intellectual, affective, and cognitive dimensions and personal welfare rather than an instrument to achieve organisational objectives (Dargahi, 2013; Üredi, Özarslan & Ulum, 2018).

Quantum leaders provided significant insights and inspirations that cultivated potential internal development and the fundamental leadership requisites in complex organisations (Sazesh & Siadat, 2019), such as acting with moral purpose, generating positive differences for stakeholders, building relationships, creating information, and transforming knowledge into sharing sessions. In the quantum paradigm, the leader emphasised relationships and strived to improve human relationships following the Newtonian style. The sense of community, inclusiveness, and holistic approach valued the individual's work-relevant technical and emotional attributes (Barrash, 2012). Many studies showed that rewards diminished employees' interest in obtaining larger goals. The emphasis that attracted and fulfilled the greater good through the quantum approach contributed to engagement and spirituality and strived to acknowledge professional and individual developments (Paz et al., 2018).

Given the path-goal theory based on identifying suitable leader motivations or leadership styles to facilitate employees' goal achievement, this theory focuses on three main aspects, such as the leader,

the subordinate, and the environment (Farhan, 2018). The behaviour that enabled employee empowerment increased motivation and improved employee satisfaction for more organisational productivity, eventually contributing to the organisational performance and self-satisfaction. Nevertheless, as the primary concept of the path-goal theory would gradually enable rewards and cause leader vulnerability during acclimatisation.

Various leadership styles in the particular theory were used for different achievement-oriented situations that were directive, supportive, and participative. Leaders would still consistently provide guidance and coaching for inexperienced subordinates in managing complex and unstructured tasks. It was found that the major difference between quantum leadership and the path-goal theory pertained to control despite similarities in task achievement through motivation (Naderifar et al., 2016). Therefore, quantum leadership is a continuously evolving management science beyond artistic qualities. Organisational theories, particularly in large organisations, could be more closely following quantum logic than classical logic. For example, people working with management systems would observe many parallels between the physical theoretical systems of concerning organisational management. Without such a framework, most business management instructions may have contradictory effects.

Importance of quantum leadership in lifelong learning

Critical leadership roles in developing and communicating the mission of organisational learning viewed learning as solutions to consumer problems rather than opportunities for experimentation. The topic is of pivotal importance in building a versatile organisation with high resiliency among organisation members. A multitude of leadership approaches was identified in the relevant literature as one of the most critical influences impacting the development of organisational or institutional learning. A leader's role could be summarised as the development and expression of the prospects and ideal circumstances of a community to (1) nurture and inspire followers, (2) identify environmental challenges, (3) adapt to difficulties, (4) create and promote a learning climate, and (5) foster behavioural learning (Antonacopoulou, 2018; Saputra, Abdinagoro & Kuncoro, 2018).

Leaders focused on fostering an educational ideology that allowed behavioural changes and working practices among followers to embrace the culture of organisational learning (Bashir et al., 2017). Organisational learning also required the willingness of learning organisation members to engage in start-up learning and remain accessible. The main contributions of leadership to promote learning include the stimulation of intellectual curiosity, and external performance enhancement by mentoring or tutoring across internal programmes to offer practical learning opportunities (Manuti, Pastore, Scardigno, Giancaspro & Morciano, 2015).

The leader also facilitated a collaborative climate and created methods for knowledge-sharing from individuals to organisations and vice versa. The various leadership roles described were opposed to conventional business leaders and popularised the organisational learning concept, whereby manufacturing organisation leaders deliberately improved the capacity to recognise complexities and intent and created a shared philosophical construction of learning central to manufacturing organisations (Janežič et al., 2018; Shao et al., 2017).

Another contribution signifying that leaders influenced the creation of a conducive atmosphere, wherein learning organisations could flourish and organisation members were encouraged to develop through self-learning. whereas such, lifelong learning was promoted by company leaders to understand the environment and pursue new approaches towards problem-solving, thus enhancing learners' imaginative skills and encouraged the learners to identify new ideas and methods for task performance. Consequently, people's cognitive patterns were enhanced and promoted an environment to learn organisational strategies and practices (Volles, 2016). Additionally, leaders also acted as educators who conceived and communicated information to boost the progress of adherents and develop a sense of purpose and inspiration (Bajasut, Hadi & Arafah, 2019).

The roles were ideal for progressive leaders who undertook the revitalisation of the company in representing progressive organisations. The recognition of the need for change created new ideas and the engagement of principles, eventually improving company performance. Service organisations have evolved from a traditional agency involving human efforts and guided the companies towards operational goal-achievement that emphasised the achievement of external assignments through a quality-based target, aim, and complex range of expectations (Beyene et al., 2016; Widyastuti, Qosasi, Noor & Kurniawati, 2017). Emphasis was placed on autonomous and interactive individuals under lifelong learning. Therefore, manufacturing organisation members formed corporate values and changed expectations and intellectual frameworks by designing, teaching, and facilitating with the chairperson's guidance.

The idealised portrayal of a leader is challenging and motivates people to change under specific circumstances through a shared perception and ensures that all the followers could fulfil the given objectives. New leadership styles needed to support the corporation regarding tasks, organise a versatile business, and institutionalise the changes over time (Haris et al., 2016; Watson et al., 2018). Such new leaders are known as quantum leaders. The sustainability of learning organisations required tactful representatives who were sensitive to the learning needs of other people and advised members to adapt and react to environmental shifts and promote skills and growth development (Dargahi, 2013; O'Grady, 2020).

Over the last decade, recognition and research information on quantum leadership has become available in health, clinical, and education settings. Quantum leadership has also become significant. It was commonly known that educational institutions were affected by the constant change to understand, capture, and interpret. Therefore, training development and lifelong learning were needed to cope with change (Kayman & Ercetin, 2011). It was also shown as a prevalent research area that paved the way through unpredictable, non-linear, and highly complex organisational environments, particularly in educational settings.

A considerable body of research was conducted in relevant literature to reveal leadership as a complex process, involving leaders' introspection to improve the current educational quality. As a leadership concept, quantum leadership could influence students in conducive and effective teaching and learning process (Nurrohim, 2010). In the field of contemporary management, novel elements and assumptions tend to become obsolete and lose validity. Interestingly, individuals seldom felt the necessity to envision leadership change through new efforts. The use of potential complexities and paradigm shifts or a quantum leap in leadership must shift from leaders' targets and results due to uncontrollability and unknown phenomena, such as indetermination, chaos, and complexities.

Recent studies and perspectives focusing on quantum skills have become a necessity to achieve quantum leadership. With the indication of four main factors to explain quantum leadership (uncertainty phenomena, environmental complexities, reciprocal interactions towards continual improvement, and rapid changes in the quantum paradigm), a balance between management and quantum was necessary. For example, the principles of quantum mechanics emphasised characteristics and behavioural and contingency approaches (Bozorgi, Fard & Sharifi, 2020).

As creativity and knowledge are crucial for organisational success, employees' participation contributed a significant impact on the overall company performance. A new balance between insight and oversight and control and adaptability in the new leadership choice resulted in a new level of optimism based on a paradigm that increased potential, reduced fear, built a sense of interconnectedness, created commitment, and developed the fullest capacities (Barrash, 2012). Besides, quantum leadership improved educational quality with characteristics involving seeing and dreaming, the nurturing of respect, love, and care, visionary supervision, creative society, empathy, empowerment, prioritising and helping students' development and success, ethical behaviour, and persuasive communication (Mundiri & Ningtias, 2019). The characteristics provided quantum leaders with novel abilities and capabilities to understand the current issues in organisational management and problems-solving (Kocak, 2020).

The key to becoming a learning organisation concerns a holistic perspective of how particular aspects are interconnected to the larger whole. Accountability in continual improvement and the implementation of authentic disciplines through self-training (in the act of control, consistency, and challenging environmental changes) was a norm in organisational learning. The importance of quantum leadership in promoting lifelong learning involved creating and reconstructing mental models and inducing an atmosphere of self-actualisation in a quantum organisation. O'Grady (2020) mentioned that leadership and knowledge were associated with horizontal growth connections instead of previous vertical ones.

Newtonian mechanical models are no longer acceptable and relevant to mould organisational structures, interactions, and perceptions regarding chaos and change. Commands, control, and hierarchies counteracted the efforts towards positive changes. In Peter Senge's learning organisation theory, organisations that expanded individuals' capacity to create desired results nurtured expansive thought patterns, whereby aspirations were realised and people were continually learning to see holistically to survive and excel. The flexible, adaptive, and productive lifelong learning elements reflected people's commitment and capacity to learn at multiple levels (Whitmer & Miller, 2016).

Quantum leadership is not the conventional management of leadership style. In contrast, the new paradigm concerned advanced organisational leadership or stewardship. Following quantum physics and the theory of quantum mechanics, quantum leadership provided a path through unpredictable, non-linear, and highly complex organisational natures requiring the creation of a dynamic atmosphere. As

such, quantum leaders conceptualised organisations as a biological or organic structure to create the passion of working towards the needs of the entire organisations rather than self-interests.

THEORETICAL FRAMEWORK

The theoretical framework includes a review of quantum leadership roles in promoting learning for organisational development and growth. In light of the studies that examined organisational learning roles to achieving competitive advantage focused on improved learning strategies, the learning rate primarily affected the relationship between the learning system, leadership role, the competitive edge, logic, and strategic advantages of the system.

Based on implicit leadership theories, managers could follow strategies that enhanced organisational learning efficiency through concrete learning processes, corporate theory, and thought processes. Formal and informal learning approaches that maximised the usage of concentrated knowledge creation and communication strategies were encouraged. To ensure effective staff or employee engagement in the learning phase, companies needed to develop and enhance the capacity of talented personnel and partners to internally facilitate effective practices. It was found that classical models continued to adhere to the law of total probability, consequently failing to explain the violations of the sure-thing principle. Regarding the quantum model, the addition of cognitive dissonance components produced interference effects that caused unknown probabilities to deviate from the average of known probabilities through continual learning (Szabla et al., 2017). Behaviours that were seemingly irrational under classical probability models were explained through the quantum perspective.

The contextual factors influencing quantum leadership proved effective in inducing followers' behaviours on the impact of learning organisation components regarding employee productivity in an organisation. Managerial studies using the quantum theory led to accurate results and provided a sound understanding of human cognitive and psychological behaviours in decision-making. The five noticeable components include the system approach, collective interaction, logical reflection, universal awareness, and intellectual competence in accounting for the learning gap.

Most reviews of leadership theories revealed the key areas in learning and various external and internal capabilities contributing to the current transactional and reactive path. Authors believed that the basic philosophy of adult learning in organisations heavily relied on leadership support and decision-making. The central concept was explored in the various fields and functions essential to the creation of the collaborative endeavour as demonstrated in the different case studies motivated by the learning theory. Thus, this research would generally help emerging and well-established educators and higher education leaders.

A sense of mission for employees was also evident with the acknowledgement of top management on the value of knowledge management and learning for strategic planning. Employees were ideally aligned to knowledge enhancement and organisations to develop a performance management process to identify the gaps in the predicted output and the appropriate details available to all employees across business processes, thus creating an environment that promoted knowledge growth. The effective rate of idea creation and innovation could be improved if employee productivity was well-managed. Information could also be generated without constraints in the absence of a system managing employees and organisational sustainability (Daryani & Amini, 2016; Widyastuti et al., 2017).

Using the notion of leadership as a continuous process that influenced leaders and followers and was affected by the integration of scientific and managerial contexts. Higher output levels from organisational learning were associated with the social process of quantum leadership that enabled organisational goals. Besides, quantum leaders motivated and facilitated followers to foster and support innovation through new products, services, processes, and practices that promoted social change. Thus, a framework comprising quantum leadership style was presented to predict the likelihood of lifelong learning among organisation members. Following the insight of management science and institutional configuration perspectives, it was demonstrated that quantum leaders positively impacted individuals' lifelong learning. Furthermore, the impact was significant in a chaotic and uncertain external business environment.

Based on the literature gaps in leadership and lifelong learning to develop the theoretical framework, this study specifically integrated leadership and lifelong learning research by introducing a quantum leadership paradigm that advanced the understanding of social leaders across cultures. Hence, the study contributed to the development of multidisciplinary research for the advancement, application, and understanding of leadership theory.

CONCLUSION

Quantum leaders are currently living in challenging times. The underlying foundations of quantum leadership in applying the key principles of compiling and evaluating multiple factors within an organisation needed to be understood. Additionally, the theoretical and practical implications of learning organisation in the workplace and the relevant skills needed to be wholly developed and incorporated. Learning was promoted and encouraged to improve organisational profitability with the right learning environment, thus ensuring the stability of production approaches and framework design practices, organisational resources, and the motivation to grow. Numerous reflections on interactions were meaningless without the participation of competent professionals for better learning results. Lifelong learning was encouraged with the expansion of creativity and the potential for internal and external integration.

As opposed to the groundless arguments for additional studies to reduce the uncertainties in testing and capacity for losses, the creation and implementation of the organisational learning elements would enhance employee participation in multiple fields. The utilisation of learning components might be inferred to influence people's organisation, job satisfaction, and continual improvement. Placing a high value on the concept involving a common and positive vision among organisation members and a sense of unity or energy were key to quantum leadership. Consequently, quantum leadership is the cutting edge alternative for organisations to cultivate a broader perception and greater awareness and build a knowledgeable organisation in a natural context. Authentic, creative, and collaborative efforts among quantum leaders met the expectations and fulfilment of future generations and addressed different types of social challenges.

RECOMMENDATION

Research in quantum leadership is still progressing with insights into the importance of the leadership type to management choices and utilise the multiple work dimensions in a rational, emotional, individual, and collective manner. Both organised and informal learning processes maximising user-oriented learning and knowledge exchange are supported. Consequently, learning occurs in a swift and non-reflective environment as individuals and teams stopped reflecting and assessing the actions. Participating in the decision-making phase and the development of strategies to strengthen the intellectual frameworks of organisational leaders are encouraged. Additionally, the need to conduct future studies on purposeful learning through quantum leadership creates and enacts a comprehensive strategy amid the world of constant changes and shifts while remaining open-minded and flexible. Hence, the resurgence of interest in this area has led to new developments in the management and industrial sciences and higher education.

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