(REVIEW ARTICLE)

Entrepreneurial leadership in high-tech industries: A review of key traits and success strategies

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Abstract

Entrepreneurial leadership plays a pivotal role in navigating the dynamic landscape of high-tech industries, where innovation, agility, and strategic vision are imperative for success. This paper provides a comprehensive review of key traits and success strategies associated with entrepreneurial leadership in the context of high-tech sectors. In high-tech industries, characterized by rapid technological advancements and fierce competition, the traditional leadership paradigm often falls short. Entrepreneurial leaders in this domain are distinguished by a set of traits that enable them to thrive in uncertainty and foster innovation. Proactivity, risk-taking propensity, and a keen sense of opportunity recognition emerge as fundamental traits that differentiate successful entrepreneurial leaders from their counterparts. This review explores how these traits contribute to creating an environment conducive to innovation and adaptation. Strategies employed by entrepreneurial leaders in high-tech industries are multifaceted, encompassing both organizational and individual levels. At the organizational level, fostering a culture of experimentation, encouraging cross-functional collaboration, and establishing flexible structures emerge as critical success factors. These strategies not only enhance the organization's adaptive capacity but also stimulate a culture of continuous learning and knowledge sharing. On an individual level, entrepreneurial leaders in high-tech industries often display a high degree of emotional intelligence, enabling them to navigate complex interpersonal relationships and foster a collaborative work environment. Additionally, effective communication and the ability to inspire and motivate diverse teams become crucial tools for leaders to drive innovation and ensure sustained success. Furthermore, the review delves into the role of strategic vision and adaptability in entrepreneurial leadership. Successful leaders in high-tech industries possess the foresight to anticipate market trends, coupled with the flexibility to adjust strategies swiftly in response to evolving technological landscapes. This paper encapsulates the essence of entrepreneurial leadership in high-tech industries by exploring key traits and success strategies. By understanding and incorporating these elements, leaders can cultivate an environment that fosters innovation, resilience, and sustainable growth in the ever-evolving high-tech landscape.

Keywords: Entrepreneurship; Leadership; High-Tech; Industries; Review

1. Introduction

The intersection of entrepreneurship and leadership in high-tech industries has become a focal point of scholarly inquiry as organizations navigate the complexities of an ever-evolving technological landscape as explain in figure 1

(Allioui and Mourdi, 2023). In the fast-paced world of high-tech, where innovation is the lifeblood and disruption are the norm, traditional leadership paradigms are being reshaped by the emergence of entrepreneurial leaders. This paper aims to delve into the nuanced realm of Entrepreneurial Leadership in High-Tech Industries, providing a comprehensive review of the key traits and success strategies that distinguish leaders who thrive in this dynamic environment. The technology level is shown in figure 1.
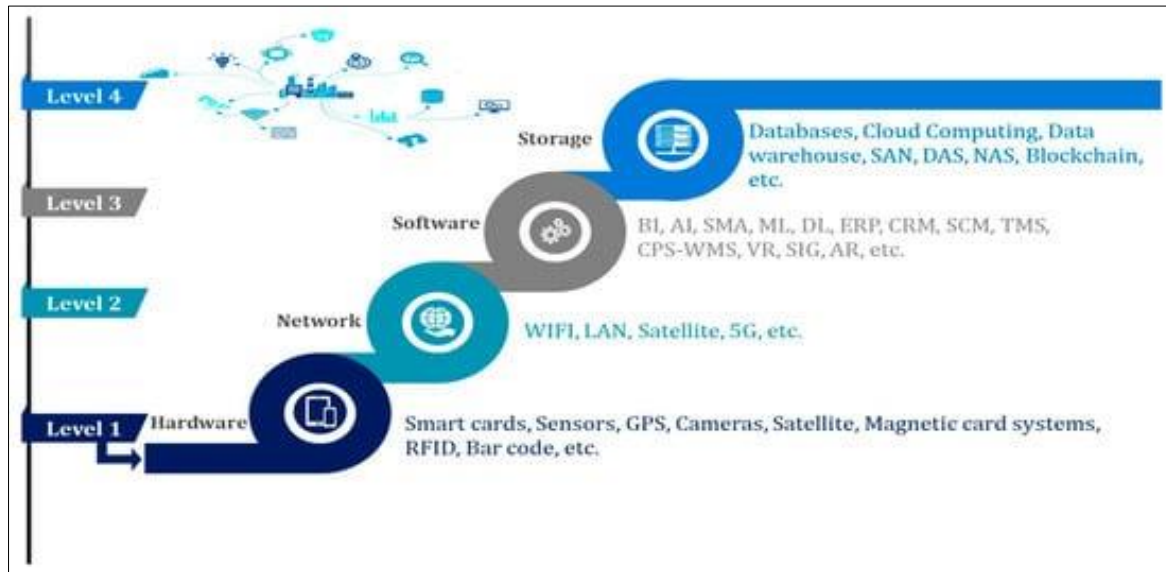
Figure 1 Technology levels (Allioui and Mourdi, 2023)

High-tech industries, spanning sectors such as information technology, biotechnology, and telecommunications, are characterized by rapid technological advancements, volatile market conditions, and intense global competition (Aaldering and Song, 2021). In such a landscape, entrepreneurial leaders play a pivotal role in driving innovation, fostering agility, and ensuring organizational adaptability (Sari and Ahmad, 2022). As organizations grapple with the challenges of digital transformation, artificial intelligence, and other cutting-edge technologies, the need for leaders who can navigate uncertainty and capitalize on emerging opportunities has never been more pronounced (Popov, 2023). The first section of this review will explore the essential traits that set entrepreneurial leaders apart in high-tech industries. Proactivity, a propensity for risk-taking, and a keen sense of opportunity recognition are central to the entrepreneurial leadership model. Understanding how these traits contribute to the creation of an innovative and adaptive organizational culture is crucial for aspiring leaders and academics alike.

Moving beyond individual traits, the second section will delve into the multifaceted success strategies employed by entrepreneurial leaders (Daradkeh, 2023). These strategies operate at both the organizational and individual levels, encompassing elements such as organizational culture, collaboration, and flexible structures. Additionally, the importance of emotional intelligence, effective communication, and strategic vision will be examined in the context of high-tech leadership (Malik, 2022).

The purpose of this review is to delve into the key traits and success strategies of entrepreneurial leadership in high-tech industries. By examining the characteristics that define successful entrepreneurial leaders, we aim to provide insights that can guide aspiring leaders and organizations in fostering a culture of innovation and adaptability. This review serves as a valuable resource for leaders, executives, and scholars seeking to understand the nuances of entrepreneurial leadership in the context of high-tech industries. By distilling the experiences and strategies of successful entrepreneurial leaders, the aim is to offer practical takeaways that can be applied in real-world scenarios. In essence, this review contributes to the ongoing discourse on leadership in the digital age, shedding light on the specific attributes and approaches that set entrepreneurial leaders apart in high-tech industries. As the business landscape continues to evolve, understanding and embracing entrepreneurial leadership becomes increasingly imperative for organizations aspiring to thrive in the highly competitive and rapidly changing world of high-tech (Mohamad *et al.*, 2023).

By synthesizing existing research and insights, this review aims to provide a comprehensive understanding of the entrepreneurial leadership landscape in high-tech industries. As organizations strive to harness the power of innovation

and stay ahead in a competitive marketplace, the identification and cultivation of these key traits and success strategies become imperative for leaders aiming to navigate the intricate challenges of the high-tech ecosystem (Azeem *et al.*, 2021).

2. Entrepreneurial Leadership

In the dynamic landscape of modern business, entrepreneurial leadership has emerged as a key driver of innovation and success. This paper explores the intricate facets of entrepreneurial leadership, its specific relevance in high-tech industries, and the purpose of reviewing its key traits and success strategies.

Entrepreneurial leadership is a unique blend of visionary thinking, risk-taking propensity, adaptability, and resilience that empowers individuals to navigate and thrive in dynamic business environments (Ishak *et al*, 2021). It goes beyond traditional leadership models, emphasizing a proactive approach to identifying and capitalizing on opportunities, often in the context of uncertainty and ambiguity. Entrepreneurial leaders exhibit a keen sense of foresight, are unafraid of calculated risks, and possess the ability to adapt swiftly to changing circumstances (Groves and Feyerherm, 2022).

At its core, entrepreneurial leadership involves fostering an organizational culture that encourages innovation, experimentation, and creative problem-solving. It is about inspiring teams to embrace change, take risks, and view challenges as opportunities for growth. This leadership style is particularly pertinent in industries characterized by rapid technological advancements, where staying ahead of the curve is paramount. High-tech industries, marked by continuous innovation and disruptive technologies, demand a leadership approach that mirrors their fast-paced nature. Entrepreneurial leadership is especially crucial in these sectors due to several reasons (Sawaean and Ali, 2020). High-tech industries thrive on visionary thinking, where leaders must anticipate and shape the future. Entrepreneurial leaders possess the foresight to identify emerging trends, envision technological advancements, and strategically position their organizations to capitalize on these opportunities (Hajizadeh and Valliere, 2022). This foresight is instrumental in shaping the trajectory of high-tech companies. In the ever-evolving landscape of high-tech, the ability to take calculated risks is essential. Entrepreneurial leaders are not averse to risk; instead, they engage in risk assessment and implement strategies to mitigate potential downsides. This risk-taking propensity allows organizations to innovate boldly and gain a competitive edge. High-tech industries are known for their rapid pace of change. Entrepreneurial leaders excel in adapting to new technologies, market shifts, and industry disruptions. Their ability to pivot and embrace change positions their organizations to thrive amidst uncertainty and volatility (Attar and Abdul-Kareem, 2020). Failures and setbacks are inherent in high-tech endeavors. Entrepreneurial leaders exhibit resilience, bouncing back from failures with renewed determination. This resilience is crucial in an environment where experimentation and iteration are integral to the innovation process.

3. Key Traits of Entrepreneurial Leaders in High-Tech Industries

In the rapidly evolving landscape of high-tech industries, entrepreneurial leaders play a pivotal role in driving innovation and steering organizations towards success. The distinct traits that define these leaders set them apart in an environment characterized by constant change, technological disruptions, and intense competition (Farjoun and Fiss, 2022). This paper explores the key traits of entrepreneurial leaders in high-tech industries, focusing on visionary thinking, risk-taking propensity, adaptability, and resilience.

Entrepreneurial leaders in high-tech industries possess a remarkable ability to anticipate and capitalize on emerging industry trends (Siegel and Krishnan, 2020). They go beyond reacting to current market dynamics and instead adopt a proactive stance, foreseeing shifts in technology and consumer preferences. By staying attuned to the pulse of the industry, these leaders position their organizations strategically, often ahead of the curve. For instance, leaders like Steve Jobs at Apple demonstrated an unparalleled foresight by anticipating the convergence of technology and design, leading to groundbreaking products like the iPhone.

Visionary thinking extends to fostering a culture of forward-looking innovation within the organization (Snihur and Eisenhardt, 2022). Entrepreneurial leaders cultivate an environment where teams are encouraged to think beyond immediate challenges and envision the future possibilities of technology. This commitment to innovation is not limited to incremental improvements but extends to revolutionary ideas that can redefine markets. Elon Musk's ventures with Tesla and SpaceX exemplify this trait, where he envisions and actively works towards transforming the automotive and space industries.

Entrepreneurial leaders exhibit a unique approach to risk, characterized by a calculated and strategic assessment of potential outcomes. Rather than avoiding risks altogether, these leaders engage in a meticulous analysis, weighing the potential benefits against the possible downsides (Raji *et al*., 2020). This approach enables them to make informed decisions that align with the organization's goals. Jeff Bezos, the founder of Amazon, is known for taking calculated risks, such as entering new markets and investing in ventures like Amazon Web Services, which have significantly contributed to the company's success (Denning, 2021). Recognizing that risks are inherent in the high-tech landscape, entrepreneurial leaders implement robust risk mitigation strategies. These strategies may involve diversification of products or services, strategic partnerships, or effective crisis management plans. By proactively addressing potential challenges, leaders create a safety net that allows the organization to navigate uncertainties with resilience. Bill Gates, co-founder of Microsoft, strategically diversified the company's product offerings, mitigating risks associated with dependency on a single product (Butler, 2020).

High-tech industries are characterized by rapid technological advancements. Entrepreneurial leaders demonstrate a high degree of flexibility in adapting to these changes (Anning-Dorson, 2021). They embrace new technologies, methodologies, and business models, ensuring that their organizations remain at the forefront of innovation. Sundar Pichai, CEO of Google, has shown adaptability by steering the company through the transition from a search-centric business to a diversified tech giant, expanding into areas like artificial intelligence and cloud computing.

Entrepreneurial leaders foster a culture of openness to new ideas and approaches within their organizations. They encourage collaboration and experimentation, recognizing that innovation often arises from diverse perspectives. By creating an environment where employees feel empowered to contribute novel ideas, leaders ensure that their organizations remain dynamic and responsive to changing market dynamics (Agustian *et al*., 2023). The open-source approach adopted by leaders like Linus Torvalds in developing Linux exemplifies this trait, showcasing the power of collaborative innovation. Failures are inherent in the pursuit of innovation. Entrepreneurial leaders exhibit resilience by viewing failures as learning opportunities rather than setbacks. They bounce back with renewed determination, extracting valuable insights from setbacks and using them to refine strategies. Reed Hastings, co-founder and CEO of Netflix, faced setbacks early in the company's history but learned from them to create a global streaming giant.

Entrepreneurial leaders display persistence in the face of challenges. Whether it's navigating regulatory hurdles, market fluctuations, or internal obstacles, they maintain a steadfast commitment to their vision. This persistence inspires confidence among team members and stakeholders, creating a culture of determination that propels the organization forward. Mark Zuckerberg, founder and CEO of Facebook, faced numerous challenges in the social media landscape but persisted in evolving the platform, making it an integral part of modern communication.

In conclusion, the key traits of entrepreneurial leaders in high-tech industries encompass visionary thinking, risk-taking propensity, adaptability, and resilience. These traits collectively enable leaders to navigate the complexities of the high-tech landscape, driving innovation and ensuring the long-term success of their organizations (Benkirane and Benazzi, 2023). As the digital age continues to unfold, these traits remain essential for leaders aspiring to make a lasting impact in the dynamic and ever-changing world of high-tech.

4. Success Strategies for Entrepreneurial Leadership in High-Tech Industries

In the fast-paced and dynamic realm of high-tech industries, entrepreneurial leaders navigate challenges and drive success through a combination of strategic approaches (Meena *et al*., 2023). This paper explores key success strategies for entrepreneurial leadership in high-tech industries, focusing on strategic networking, innovation management, talent acquisition and retention, and a customer-centric approach to market analysis.

Successful entrepreneurial leaders recognize the importance of building strong relationships with key players in the industry, networking goes beyond casual interactions; it involves intentional efforts to connect with industry influencers, thought leaders, and decision-makers (Chaker *et al*., 2022). By establishing a robust network, leaders gain access to valuable insights, potential collaborators, and opportunities for collaboration. Bill Gates' early partnerships with IBM and Steve Jobs' collaboration with Pixar and Disney are examples of strategic networking that significantly influenced the trajectory of their respective companies. Entrepreneurial leaders leverage their networks to form collaborative partnerships and alliances. These collaborations may involve joint ventures, research partnerships, or strategic alliances with other companies in the ecosystem. By pooling resources and expertise, leaders enhance their organizations' capabilities and open doors to new markets. Elon Musk's partnerships with NASA for SpaceX and with various automakers for electric vehicle development exemplify the strategic alliances that have fueled innovation and success in high-tech industries.

Entrepreneurial leaders foster a culture that values and encourages innovation, this involves creating an environment where employees feel empowered to think creatively, take risks, and contribute to the ideation process (Mehmood *et al.*, 2020). By instilling a mindset of continuous improvement and curiosity, leaders ensure that their organizations stay ahead of technological advancements. Jeff Bezos' emphasis on Amazon's "Day 1" philosophy, which prioritizes constant innovation, is a testament to the importance of cultivating a culture that embraces change.

Innovation is not just about generating new ideas; it's also about implementing them effectively. Entrepreneurial leaders excel in the strategic deployment of new technologies within their organizations (Siderska, 2020). This involves assessing the feasibility of adopting emerging technologies, ensuring seamless integration, and aligning technological advancements with the overall business strategy. Satya Nadella, CEO of Microsoft, has successfully steered the company towards cloud computing and artificial intelligence, showcasing effective innovation management in a rapidly evolving tech landscape.

The success of high-tech industries is inherently tied to the talent within organizations. Entrepreneurial leaders prioritize attracting skilled and creative professionals who can drive innovation, this involves proactive recruitment strategies, a compelling employer brand, and creating an organizational reputation that attracts top-tier talent (Deshmukh *et al.*, 2023). Google, under the leadership of Larry Page and Sergey Brin, has been known for its emphasis on hiring the best minds in the industry, contributing to the company's success in various tech domains. Beyond attracting talent, retaining it is equally crucial. Entrepreneurial leaders focus on fostering a positive work environment that promotes employee engagement, collaboration, and work-life balance (Wood *et al.*, 2020). By investing in employee well-being, leaders ensure that their teams remain motivated and committed to the organization's goals. Tim Cook, CEO of Apple, has emphasized creating a positive workplace culture that encourages employees to thrive and contribute to Apple's ongoing success.

Entrepreneurial leaders prioritize comprehensive market analysis to understand current needs and future demands (Pless *et al.*, 2021). This involves staying attuned to market trends, consumer preferences, and competitive landscapes. By conducting thorough market research, leaders gain insights that inform product development and strategic decision-making. Mark Zuckerberg's emphasis on understanding user behavior and preferences has been pivotal in shaping Facebook's evolution and maintaining its relevance in the dynamic social media landscape (Moschini, 2021). A customer-centric approach involves tailoring products and services to meet the evolving expectations of the target audience (Gupta and Ramachandran, 2021). Entrepreneurial leaders actively seek customer feedback, iterate on products based on user experiences, and anticipate future needs. This iterative approach ensures that products remain relevant and competitive. Reed Hastings, CEO of Netflix, has demonstrated a customer-centric approach by continuously adapting the streaming service's content and features to align with changing viewer preferences.

In conclusion, entrepreneurial leadership in high-tech industries is marked by strategic networking, innovation management, talent acquisition and retention, and a customer-centric approach to market analysis. These success strategies collectively contribute to the resilience and competitive edge of organizations in the ever-evolving high-tech landscape. As technology continues to advance, entrepreneurial leaders who adeptly implement these strategies are poised to navigate challenges and drive sustained success in the dynamic world of high-tech industries (Allioui and Mourdi, 2023).

5. Case Studies

In the realm of high-tech industries, certain entrepreneurial leaders stand out as pioneers and visionaries who have not only transformed their respective companies but have also left an indelible mark on the technology landscape (Bareis and Katzenbach, 2022). This paper delves into case studies of three iconic figures – Steve Jobs (Apple Inc.), Elon Musk (Tesla, SpaceX), and Mark Zuckerberg (Facebook) – examining their leadership traits, strategies, commonalities, and the valuable lessons gleaned from their experiences.

Steve Jobs, the co-founder of Apple Inc., is synonymous with innovation and design excellence. Jobs' leadership was characterized by his visionary thinking and a relentless pursuit of perfection. Under his guidance, Apple introduced groundbreaking products such as the iPhone, iPad, and MacBook. Jobs had a unique ability to anticipate consumer needs, crafting products that seamlessly blended technology and aesthetics. Elon Musk, the CEO of Tesla and SpaceX, is renowned for his audacious goals and transformative impact on the automotive and aerospace industries (Reid Jr, 2023). Musk's leadership is marked by his risk-taking propensity and an unwavering commitment to sustainability. He pushed the boundaries with electric vehicles at Tesla and pursued the goal of interplanetary travel with SpaceX. Musk's ability to challenge industry norms and drive innovation has positioned him as a trailblazer in high-tech entrepreneurship.

Mark Zuckerberg, the co-founder and CEO of Facebook, has played a pivotal role in shaping the social media landscape. His leadership is characterized by adaptability and a focus on user engagement. Zuckerberg led Facebook through strategic acquisitions, such as Instagram and WhatsApp, expanding the platform's reach and influence. His emphasis on constant iteration and responding to user needs has been instrumental in Facebook's continued relevance. All three leaders exhibited visionary thinking, anticipating industry trends and foreseeing opportunities that others might have overlooked. Jobs envisioned a world where technology seamlessly integrated into daily life, Musk aimed for a sustainable future, and Zuckerberg foresaw the power of social connectivity. A common trait among these leaders is their willingness to take calculated risks. Whether it was launching innovative products (Jobs), investing heavily in sustainable technology (Musk), or acquiring key platforms to expand user base (Zuckerberg), calculated risk-taking was a hallmark of their entrepreneurial journeys. Innovation was at the core of their leadership strategies. Each leader focused on pushing the boundaries of technology and introducing products or services that redefined industries (Volberda *et al.*, 2021). This commitment to innovation fueled their companies' growth and differentiation.

Zuckerberg's emphasis on understanding and responding to user needs teaches us the importance of customer-centricity (Amoncar, 2020). Constantly adapting to user preferences and evolving with the dynamic landscape is crucial for sustaining success in the tech industry. Jobs' emphasis on design and user experience teaches us that aesthetics and functionality are not mutually exclusive. Prioritizing the user experience, from product design to software interfaces, can create a lasting impact on consumer perceptions and brand loyalty. Musk's focus on long-term vision and audacious goals underscores the importance of setting ambitious objectives. While short-term goals are essential, having a grand vision can motivate teams and drive innovation at an unprecedented scale. All three leaders faced setbacks and challenges, emphasizing the need for adaptability and resilience. From Jobs' ousting and subsequent return to Apple, to Musk's struggles with Tesla's early financial woes, and Zuckerberg navigating privacy concerns at Facebook – each leader demonstrated the importance of perseverance in the face of adversity (Bozdağ, 2023).

The case studies of Steve Jobs, Elon Musk, and Mark Zuckerberg provide valuable insights into the world of entrepreneurial leadership in high-tech industries. Their visionary thinking, risk-taking propensity, and commitment to innovation offer a blueprint for aspiring leaders. The commonalities among these leaders and the lessons learned from their experiences underscore the timeless principles that drive success in the ever-evolving landscape of technology entrepreneurship.

6. Challenges and Potential Pitfalls

The high-tech landscape, characterized by rapid advancements and disruptive innovations, presents unique challenges and potential pitfalls for entrepreneurial leaders (Ahlstrom *et al.*, 2020). In this paper, we explore two significant challenges – technological obsolescence and regulatory/ethical considerations – and discuss strategies to navigate these complex issues. The relentless pace of technological change is a double-edged sword for high-tech industries. While it fuels innovation, it also poses the challenge of managing technological obsolescence. Products or services that were cutting-edge yesterday can become outdated in a remarkably short time. For entrepreneurial leaders, staying ahead of this rapid pace requires continuous vigilance and strategic foresight.

Allocating resources to R&D is crucial for staying ahead. By consistently investing in exploring new technologies and trends, companies can position themselves to adapt quickly to industry disruptions (Olsson and Bosch, 2020). Forming partnerships with research institutions, startups, and other industry players can provide access to cutting-edge technologies and insights. Collaborative efforts often result in shared resources and accelerated innovation. Fostering an organizational culture that values agility and adaptability is essential. This involves encouraging employees to embrace change, fostering a mindset of continuous learning, and establishing mechanisms for quick decision-making.

Anticipating potential future scenarios enables leaders to develop strategic plans that can be deployed as needed. Scenario planning involves considering various technological trajectories and preparing the organization to pivot in response to emerging trends. The high-tech industry operates in a regulatory landscape that is continually evolving to address the complexities of emerging technologies. Leaders must navigate legal challenges, including issues related to data privacy, intellectual property, and cybersecurity. Ethical considerations, such as the responsible use of artificial intelligence and the impact of technology on society, further complicate the landscape (Ashok *et al.*, 2022). To navigate legal challenges, companies must establish robust compliance measures. Staying informed about changing regulations, conducting regular audits, and ensuring that business practices align with legal requirements are essential components of proactive compliance. Developing and adhering to ethical frameworks is crucial for maintaining trust and social responsibility. Establishing clear guidelines for the ethical use of technologies, particularly those with societal implications, helps mitigate potential risks. Actively engaging with stakeholders, including customers, employees, and the broader community, fosters transparency and accountability. Involving stakeholders in decision-making processes

related to ethical considerations can provide diverse perspectives and enhance the legitimacy of corporate actions (Mitchell *et al*., 2022). Embracing technologies that prioritize responsible practices, such as privacy-preserving AI algorithms or sustainable manufacturing processes, demonstrates a commitment to ethical considerations. This not only aligns with societal expectations but also mitigates potential legal and reputational risks.

The challenges and potential pitfalls in high-tech industries are inherent in the pursuit of innovation and growth. Technological obsolescence and regulatory/ethical considerations require a strategic and proactive approach from entrepreneurial leaders. By managing the rapid pace of technological change through investment in R&D, strategic partnerships, and an adaptive organizational culture, leaders can position their companies as industry leaders (Wang *et al*., 2022). Similarly, navigating legal and ethical challenges involves proactive compliance measures, ethical frameworks, stakeholder engagement, and a commitment to responsible technologies. By addressing these challenges head-on, leaders not only safeguard their organizations from potential pitfalls but also contribute to the sustainable and ethical development of the high-tech sector. As high-tech industries continue to evolve, the ability to navigate these complexities becomes a defining factor for entrepreneurial success and long-term sustainability (Lee *et al*., 2023).

7. Future Outlook

The future of entrepreneurial leadership in high-tech industries is shaped by a dynamic interplay of emerging trends, challenges, and opportunities. As technology continues to evolve at an unprecedented pace, anticipating the future landscape becomes critical for leaders aiming to stay ahead of the curve (Rao *et al*., 2023).

The integration of AI and ML technologies is set to redefine how high-tech industries operate. Entrepreneurial leaders will increasingly leverage these technologies for data analysis, decision-making, and automation. The ability to harness the power of AI and ML will become a key differentiator in driving innovation and gaining a competitive edge. Sustainability is emerging as a central theme in high-tech industries. Entrepreneurial leaders are expected to prioritize the development and adoption of eco-friendly technologies. From green energy solutions to sustainable manufacturing practices, incorporating environmental considerations into business strategies will not only meet growing consumer expectations but also contribute to global efforts for a sustainable future. The global shift towards remote work is likely to persist, and entrepreneurial leaders will need to adapt to managing distributed teams effectively. Embracing collaborative technologies, fostering a virtual work culture, and rethinking traditional office structures will be essential for leaders navigating the future of work in high-tech industries (Silveira Jr, 2021). With increasing reliance on digital platforms, the importance of cybersecurity and data privacy is only set to intensify. Entrepreneurial leaders must prioritize robust cybersecurity measures to protect sensitive data and ensure the trust of their users. Proactive strategies for addressing evolving cyber threats will be crucial in maintaining a secure digital ecosystem.

As AI and ML technologies advance, ethical considerations surrounding their use will become more complex. Entrepreneurs will grapple with issues related to bias in algorithms, the impact of AI on employment, and the ethical use of data (Akter *et al., 2021*). Navigating these ethical dilemmas will require a thoughtful approach and proactive engagement with stakeholders. The high-tech sector is likely to face increasing regulatory scrutiny. Entrepreneurial leaders will need to navigate complex and evolving regulations related to data privacy, cybersecurity, and the ethical use of emerging technologies (Lescrauwaet *et al*., 2022). Balancing innovation with regulatory compliance will be a delicate yet crucial task. The demand for skilled professionals in high-tech industries is expected to intensify. Entrepreneurial leaders will face challenges in attracting and retaining top talent, especially in niche areas such as AI, cybersecurity, and sustainable technologies (Aithal, 2023). Strategies that prioritize a positive work environment, continuous learning, and competitive compensation will be essential.

The interconnected nature of high-tech industries presents opportunities for global collaboration and market expansion. Entrepreneurs can leverage digital platforms to engage with a diverse pool of talent, collaborate with international partners, and tap into new markets. Strategic alliances and partnerships can drive innovation and market growth. The ongoing global health challenges have accelerated the focus on health technologies. Entrepreneurial leaders in high-tech industries have the opportunity to drive innovation in areas such as telemedicine, health monitoring devices, and healthcare analytics (Chakraborty *et al*., 2023). The intersection of technology and healthcare presents a vast landscape for impactful solutions. The ability to rapidly prototype and embrace agile development methodologies will be a significant advantage for entrepreneurial leaders. The faster pace of innovation requires a nimble approach to product development, allowing for quick iterations and responsiveness to market demands.

The future outlook for entrepreneurial leadership in high-tech industries is both promising and challenging. Emerging trends like AI integration, sustainable technologies, remote collaboration, and cybersecurity will reshape the industry

landscape. Entrepreneurial leaders who navigate these trends with strategic foresight and agility stand to capitalize on the opportunities presented by a connected, technologically-driven world (Culey, 2021).

Simultaneously, challenges related to ethical considerations, regulatory compliance, and talent acquisition require proactive and thoughtful solutions. The future of high-tech entrepreneurial leadership demands a delicate balance between innovation and responsibility, adaptability, and a commitment to addressing societal needs (Oluwafemi *et al*., 2020). By embracing these opportunities and tackling challenges head-on, entrepreneurial leaders can carve a path towards a future that is both technologically advanced and ethically sound.

8. Conclusion

In the dynamic realm of high-tech industries, entrepreneurial leadership emerges as a linchpin for success. Key traits identified in this review include visionary thinking, risk-taking propensity, adaptability, and resilience. Successful entrepreneurial leaders, such as Steve Jobs, Elon Musk, and Mark Zuckerberg, exemplify these traits through their ability to anticipate industry trends, take calculated risks, adapt to technological changes, and persevere in the face of challenges. Success strategies encompass strategic networking, innovation management, talent acquisition and retention, and a customer-centric approach to market analysis.

Develop the ability to anticipate industry trends and envision the future of technology. Cultivate a visionary mindset that sees opportunities where others see challenges. Understand the importance of taking risks but ensure they are calculated and aligned with strategic goals. Develop risk mitigation strategies to navigate uncertainties effectively. Embrace change and cultivate an organizational culture that values flexibility and adaptability. Stay ahead of technological changes and be open to new ideas and approaches. View failures as stepping stones to success. Cultivate resilience, bounce back from setbacks, and persist in the face of challenges. Learn from failures to drive continuous improvement. Establish meaningful connections within the industry. Collaborate with key players, form partnerships, and leverage networks to gain insights, resources, and collaborative opportunities. Encourage a culture of innovation within the organization. Effectively implement new technologies, invest in research and development, and stay at the forefront of industry advancements. Attract skilled and creative professionals by fostering a positive work environment. Prioritize employee well-being, continuous learning, and career development to retain top talent. Understand market needs and demands. Tailor products and services to meet customer expectations, ensuring a customer-centric approach in decision-making processes.

Entrepreneurial leadership stands as a driving force behind technological innovation in high-tech industries. The reviewed key traits and success strategies provide a roadmap for leaders seeking to navigate the complexities of this dynamic landscape. The ability to envision the future, take calculated risks, adapt to change, and inspire resilience among teams is paramount for success. Entrepreneurial leaders play a pivotal role in shaping the future of technology by fostering a culture of innovation, embracing emerging trends, and addressing challenges with creativity and determination. As high-tech industries continue to evolve, the importance of entrepreneurial leadership becomes increasingly evident in fueling progress, sustaining growth, and contributing to the transformative impact of technology on society.

Aspiring leaders are encouraged to integrate these traits and strategies into their leadership approach, recognizing that the journey towards success in high-tech industries requires a combination of foresight, strategic thinking, and a commitment to continuous improvement. By embodying the essence of entrepreneurial leadership, individuals can not only navigate the challenges but also drive meaningful innovation, leaving an enduring impact on the ever-evolving landscape of high-tech industries.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1]   Aaldering, L.J. and Song, C.H., 2021. Of leaders and laggards-Towards digitalization of the process industries. *Technovation*, *105*, p.102211.

[2] Agustian, K., Pohan, A., Zen, A., Wiwin, W. and Malik, A.J., 2023. Human Resource Management Strategies in Achieving Competitive Advantage in Business Administration. *Journal of Contemporary Administration and Management (ADMAN)*, *1*(2), pp.108-117.

[3] Ahlstrom, D., Arregle, J.L., Hitt, M.A., Qian, G., Ma, X. and Faems, D., 2020. Managing technological, sociopolitical, and institutional change in the new normal. *Journal of Management Studies*, *57*(3), pp.411-437.

[4] Aithal, P.S., 2023. How to Create Business Value Through Technological Innovations Using ICCT Underlying Technologies. *International Journal of Applied Engineering and Management Letters (IJAEML)*, *7*(2), pp.232-292.

[5] Akter, S., McCarthy, G., Sajib, S., Michael, K., Dwivedi, Y.K., D'Ambra, J. and Shen, K.N., 2021. Algorithmic bias in data-driven innovation in the age of AI. *International Journal of Information Management*, *60*, p.102387.

[6] Allioui, H. and Mourdi, Y., 2023. Exploring the full potentials of IoT for better financial growth and stability: A comprehensive survey. *Sensors*, *23*(19), p.8015.

[7] Amoncar, N., 2020. Entrepreneurial marketing and digital political communication–a citizen-led perspective on the role of social media in political discourse. *Journal of Research in Marketing and Entrepreneurship*, *22*(2), pp.145-159.

[8] Anning-Dorson, T., 2021. Organizational culture and leadership as antecedents to organizational flexibility: implications for SME competitiveness. *Journal of Entrepreneurship in Emerging Economies*, *13*(5), pp.1309-1325.

[9] Ashok, M., Madan, R., Joha, A. and Sivarajah, U., 2022. Ethical framework for Artificial Intelligence and Digital technologies. *International Journal of Information Management*, *62*, p.102433.

[10] Attar, M. and Abdul-Kareem, A., 2020. The role of agile leadership in organisational agility. In *Agile business leadership methods for industry 4.0* (pp. 171-191). Emerald Publishing Limited.

[11] Azeem, M., Ahmed, M., Haider, S. and Sajjad, M., 2021. Expanding competitive advantage through organizational culture, knowledge sharing and organizational innovation. *Technology in Society*, *66*, p.101635.

[12] Bareis, J. and Katzenbach, C., 2022. Talking AI into being: The narratives and imaginaries of national AI strategies and their performative politics. *Science, Technology, & Human Values*, *47*(5), pp.855-881.

[13] Benkirane, K. and Benazzi, K., 2023. The role of leader's social intelligence on firms' organizational ambidexterity: literature review. *International Journal of Accounting, Finance, Auditing, Management and Economics*, *4*(6-1), pp.613-625.

[14] Bozdağ, A.A., 2023. Semiotics of a Rivalry: Decoding the Musk-Zuckerberg Phenomenon. *The Journal of Communication and Media Studies*, *8*(2), p.87.

[15] Butler, E., 2020. *An Introduction to Entrepreneurship*. London Publishing Partnership.

[16] Chaker, N.N., Nowlin, E.L., Pivonka, M.T., Itani, O.S. and Agnihotri, R., 2022. Inside sales social media use and its strategic implications for salesperson-customer digital engagement and performance. *Industrial Marketing Management*, *100*, pp.127-144.

[17] Chakraborty, I., Ilavarasan, P.V. and Edirippulige, S., 2023. Critical Success Factors of Startups in the e-health domain. *Health Policy and Technology*, p.100773.

[18] Culey, S., 2021. Thriving in the digital age: The rise of the PAL supply chain and why businesses need a Copernican business revolution. *Journal of Supply Chain Management, Logistics and Procurement*, *3*(4), pp.361-386.

[19] Daradkeh, M., 2023. Navigating the complexity of entrepreneurial ethics: A systematic review and future research agenda. *Sustainability*, *15*(14), p.11099.

[20] Denning, S., 2021. The digital age is transforming job descriptions, especially for CEOs. *Strategy & Leadership*, *49*(5), pp.8-15.

[21] Deshmukh, S., Joshi, A., Shinde, S.C. and Sharma, M., 2023. Role of HR in Talent Acquisition and Recruitment: Best Practices for Hiring Top Talent. *European Economic Letters (EEL)*, *13*(5), pp.1284-1291.

[22] Farjoun, M. and Fiss, P.C., 2022. Thriving on contradiction: Toward a dialectical alternative to fit-based models in strategy (and beyond). *Strategic Management Journal*, *43*(2), pp.340-369.

[23] Groves, K.S. and Feyerherm, A.E., 2022. Developing a leadership potential model for the new era of work and organizations. *Leadership & Organization Development Journal*, *43*(6), pp.978-998.

[24] Gupta, S. and Ramachandran, D., 2021. Emerging market retail: transitioning from a product-centric to a customer-centric approach. *Journal of Retailing*, *97*(4), pp.597-620.

[25] Hajizadeh, A. and Valliere, D., 2022. Entrepreneurial foresight: Discovery of future opportunities. *Futures*, *135*, p.102876.

[26] Ishak, S., Che Omar, A.R. and Abd Manaf, A., 2021. Entrepreneurial leadership in the micro and small enterprises (MSES) research context: a literature review. *International Journal of Academic Research in Business and Social Sciences*, *11*(5), pp.397-404.

[27] Lee, Y.C., Dervishi, I., Mousa, S., Safiullin, K.I., Ruban-Lazareva, N.V., Kosov, M.E., Ponkratov, V.V., Pozdnyaev, A.S., Mikhina, E.V. and Elyakova, I.D., 2023. Sustainable Development Adoption in the High-Tech Sector: A Focus on Ecosystem Players and Their Influence. *Sustainability*, *15*(18), p.13674.

[28] Lescrauwaet, L., Wagner, H., Yoon, C. and Shukla, S., 2022. Adaptive Legal Frameworks and Economic Dynamics in Emerging Tech-nologies: Navigating the Intersection for Responsible Innovation. *Law and Economics*, *16*(3), pp.202-220.

[29] Malik, S., 2022. Emotional intelligence and innovative work behaviour in knowledge-intensive organizations: how tacit knowledge sharing acts as a mediator?. *VINE Journal of Information and Knowledge Management Systems*, *52*(5), pp.650-669.

[30] Meena, A., Dhir, S. and Sushil, S., 2023. Coopetition, strategy, and business performance in the era of digital transformation using a multi-method approach: Some research implications for strategy and operations management. *International Journal of Production Economics*, p.109068.

[31] Mehmood, M.S., Jian, Z. and Akram, U., 2020. Be so creative they can't ignore you! How can entrepreneurial leader enhance the employee creativity?. *Thinking Skills and Creativity*, *38*, p.100721.

[32] Mitchell, J.R., Mitchell, R.K., Hunt, R.A., Townsend, D.M. and Lee, J.H., 2022. Stakeholder engagement, knowledge problems and ethical challenges. *Journal of Business Ethics*, *175*, pp.75-94.

[33] Mohamad, S.J.A.N.S., Nor, N.S.N.M., Fikry, A. and Aziz, M.R.A., 2023. The effect of organizational innovation mediates between knowledge management capabilities and hotel performance: A conceptual analysis. *Information Management and Business Review*, *15*(3 (SI)), pp.510-524.

[34] Moschini, I., 2021. Social media platforms and civic engagement. Exploring the discursive construction of the Facebook Manifesto. *Lingue e Linguaggi*, *42*, pp.151-172.

[35] Olsson, H.H. and Bosch, J., 2020. Going digital: Disruption and transformation in software-intensive embedded systems ecosystems. *Journal of Software: Evolution and Process*, *32*(6), p.e2249.

[36] Oluwafemi, T.B., Mitchelmore, S. and Nikolopoulos, K., 2020. Leading innovation: Empirical evidence for ambidextrous leadership from UK high-tech SMEs. *Journal of Business Research*, *119*, pp.195-208.

[37] Pless, N.M., Murphy, M., Maak, T. and Sengupta, A., 2021. Societal challenges and business leadership for social innovation. *Society and Business Review*, *16*(4), pp.535-561

[38] Popov, A., 2023. The Future of Work: Adapting to Technological Disruptions in the Labor Market. *Journal of Philosophical Criticism*, *6*(02), pp.199-217.

[39] Raji, I.D., Smart, A., White, R.N., Mitchell, M., Gebru, T., Hutchinson, B., Smith-Loud, J., Theron, D. and Barnes, P., 2020, January. Closing the AI accountability gap: Defining an end-to-end framework for internal algorithmic auditing. In *Proceedings of the 2020 conference on fairness, accountability, and transparency* (pp. 33-44).

[40] Rao, P.S., Krishna, T.G. and Muramalla, V.S.S.R., 2023. Next-gen Cybersecurity for Securing Towards Navigating the Future Guardians of the Digital Realm. *International Journal of Progressive Research in Engineering Management and Science (IJPREMS) Vol*, *3*, pp.178-190.

[41] Reid Jr, C.J., 2023. Two There Are That Rule the World: Private Power and Political Authority. *U. St. Thomas LJ*, *19*, p.3.

[42] Sari, S.A. and Ahmad, N.H., 2022. Connecting the dots: Linking entrepreneurial leadership and strategic agility towards SME competitiveness. *Vision*, p.09722629221091658.

[43] Sawaean, F. and Ali, K., 2020. The impact of entrepreneurial leadership and learning orientation on organizational performance of SMEs: The mediating role of innovation capacity. *Management Science Letters*, *10*(2), pp.369-380.

[44] Siderska, J., 2020. Robotic Process Automation—a driver of digital transformation?. *Engineering Management in Production and Services*, *12*(2), pp.21-31.

[45] Siegel, J. and Krishnan, S., 2020. Cultivating invisible impact with deep technology and creative destruction. *Journal of Innovation Management*, *8*(3), pp.6-19.

[46] Silveira Jr, A.S., 2021. Offshore, Inshore, Nearshore, Remote, and Distributed. In *Building and Managing High-Performance Distributed Teams: Navigating the Future of Work* (pp. 19-33). Berkeley, CA: Apress.

[47] Snihur, Y. and Eisenhardt, K.M., 2022. Looking forward, looking back: Strategic organization and the business model concept. *Strategic Organization*, *20*(4), pp.757-770.

[48] Volberda, H.W., Khanagha, S., Baden-Fuller, C., Mihalache, O.R. and Birkinshaw, J., 2021. Strategizing in a digital world: Overcoming cognitive barriers, reconfiguring routines and introducing new organizational forms. *Long Range Planning*, *54*(5), p.102110.

[49] Wang, T., Lin, X. and Sheng, F., 2022. Digital leadership and exploratory innovation: From the dual perspectives of strategic orientation and organizational culture. *Frontiers in Psychology*, *13*, p.902693.

[50] Wood, J., Oh, J., Park, J. and Kim, W., 2020. The relationship between work engagement and work–life balance in organizations: A review of the empirical research. *Human Resource Development Review*, *19*(3), pp.240-262.