Golden Sun-Rise
International Journal of Multidisciplinary on Science and Management
ISSN: 3048-5037/ Volume 3 Issue 1 Jan-Mar 2026 / Page No: 117-131
Paper Id: IJMSM-V3I1P113/ Doi:10.71141/30485037/V3I1P113

*Review Article*

# Strategies for Managing Environmental Uncertainty: An Overview

**Paul Adogbeji Oduvwu**

*Nigerian Institute of Management (Chartered), Lagos, Nigeria.*

Received: 13 January 2026 Revised: 17 January 2026 Accepted: 22 January 2026 Published: 27 January 2026

***Abstract -*** *Environmental uncertainty affects organizations around the world with negative consequences if not well managed. To manage environmental uncertainty in an organization, certain strategies are necessary ab initio as part of organizational policy. This article is a narrative review. The aim is to explore the literature and bring together strategies that may be used to manage environmental uncertainty. Qualitative research method was used wherein information was synthesized using data obtained from research articles written in English and published in international peer-reviewed journals, books and other publications related to the topic. Google search engine was used. It was found that strategies to manage environmental uncertainty include establishing a culture of supportive relationships, risk management, establishing an emergency preparedness and response program, turning challenges into opportunities, retrenchment, environmental scanning, resource redeployment, flexibility and adaptation to change, strategic partnerships, capacity building, creativity and innovation, distributed work arrangements, leveraging technologies and digital transformation, investment in research and development, green human resource management, among others. It was observed that the strategies for managing environmental uncertainty are interwoven and interrelated, one leading to another. The strategy to apply in a particular situation depends on the nature of the uncertainty. This review concludes that high performance of an organization and its sustainability in the face of environmental uncertainty are dependent on the organization's adoption of appropriate strategies.*

***Keywords -*** *Environmental Uncertainty, High Performance, Managing, Strategies, Sustainability.*

## I. INTRODUCTION

Environmental uncertainty has been defined as the inability to accurately predict future changes in the factors which affect an organization's operation and performance due to a lack of adequate and reliable information (Oduvwu et al., 2025). Environmental uncertainty is both internal and external to the organization and is due to unexpected or unpredictable events affecting organizations and their employees. Sources, scope and nature of environmental uncertainty are many and varied (Oduvwu et al., 2025). The source of uncertainty can be associated with the domain of the environment which the decision-maker is uncertain about (e.g., competitors, technology, economy, etc.), while the type of uncertainty delineates the nature of the uncertainty being experienced. Uncertainty in the environment has implications for an organization's structures, strategies and processes (Milliken, 1987; Regan, 2012).

Four different sources of uncertainty have been described by Wernerfelt and Karnani (1987). They are demand structure, supply structure, competitors, and externalities. On the demand side, uncertainty may arise from factors such as the size of the market and sales projections. Supply uncertainty may be exogenous or endogenous.

Put in another way, on the supply side, uncertainty may arise from the internal operations of the firm itself as well as from external developments in technology. For example, key executives may leave, and fraud or accidents may occur. Competitive uncertainty covers unpredictable circumstances relating to competitors, including new entrants, and externalities refer to effects of external factors such as social pressures and government intervention (Wernerfelt and Karnani, 1987). Furthermore, unexpected events such as natural disasters, financial crises, industrial accidents, trade embargoes, and even terrorist attacks have occurred frequently, and sudden "black swans" and "gray rhinoceroses" have led to a business environment that has become full of

volatility, uncertainty, complexity, and ambiguity (VUCA) (Hosseini et al., 2021, & Lu & Sang, 2021, as cited in Yu et al., 2022). In recent years, unexpected events, some of which transcend past human experience in terms of global scale and scope, have occurred and these include climate change, pandemics, and the unforeseen consequences of present technologies. The world has witnessed numerous political crises, wars and conflicts in many parts, and what is notable is that political instability is no longer confined to emerging economies (Kwong et al., 2021).

According to Oduvwu et al. (2025), the impact of environmental uncertainty is largely negative and can be devastating if not well managed. For this reason, and for the fact that new challenges emerge from time to time, organizations need to continually seek new strategies to mitigate uncertainty in order to thrive in a turbulent environment (Oduvwu et al., 2025). This article is a narrative review. The aim is to explore the literature and bring together strategies that may be used to manage environmental uncertainty. It is intended to help organizations and individuals not only to survive, but also to thrive in the face of uncertainty.

## II. METHODOLOGY

A qualitative research method was used wherein information was synthesized using data obtained from 131 research articles written in English and published in international peer-reviewed journals, books and other publications related to the topic. Articles not related to the topic were excluded. Google search engine was used.

## III. RESULTS

The results of this review are presented as strategies for managing environmental uncertainty.

### *A. Strategies for managing environmental uncertainty*

To manage environmental uncertainty in an organization, certain strategies are necessary ab initio as part of organizational policy. The strategies for managing environmental uncertainty found in this review include establishing a culture of supportive relationships, risk management, establishing an emergency preparedness and response program, turning challenges into opportunities, retrenchment, environmental scanning, resource redeployment, flexibility and adaptation to change, strategic partnerships, capacity building, creativity and innovation, distributed work arrangements, leveraging technologies and digital transformation, investment in research and development, green human resource management, among others. Strategies for managing environmental uncertainty are interwoven and interrelated, one leading to another. The strategies are presented in detail, as contained in various publications.

#### *a. Establishing a Culture of Supportive Relationships*

A culture of supportive relationships is an effective strategy for managing environmental uncertainty. This is because, in times of uncertainty, strong social structures and positive relationships foster cooperative and productive behaviours which improve an organization's ability to respond to and mitigate uncertainty. There is a positive relationship between organizational culture and employee commitment. A supportive culture is characterized by positive attitude, commitment of time and resources, openness and respect. Put in another way, a culture of supportive relationships promotes trust, open communication, team work and motivation (Ardebilpour et al., 2024; Hawrysz et al., 2024; Karlsen, 2011; Manekar, 2024; Myasnikov, 2025).

There is a strong positive and direct relationship between organizational culture and work-life balance as supportive organizational cultures that value flexibility, open communication, employee well-being, and family-friendly policies tend to have a positive impact on work-life balance (Chaurasia, 2023; Kapoor & Pandey, 2024; Umesh et al., 2023). Furthermore, a collaborative and supportive culture, according to Pittman (2024), is one in which individuals feel valued, supported and motivated to contribute their best.

They feel comfortable expressing their ideas, concerns and feedback and work together, support one another and share a common goal. Pittman (2024) further states that a collaborative and supportive culture promotes employee satisfaction and ultimately leads to innovative solutions, increased creativity and productivity, and long-term success for the individuals and the organization.

*b. Risk Management*

Risk management is a fundamental strategy for managing environmental uncertainty. Risk has been defined as the possibility of loss or injury. It is the likelihood of harm occurring. It is also regarded as someone or something that creates or suggests a hazard (Husain, 2024; Merriam-Webster, n.d.). Risk management is a systematic process of identifying, assessing, prioritizing and responding to potential threats in the environment, their likelihood and potential impact. It provides for risk control which seeks to implement measures to eliminate, reduce, or control identified risks.

It also provides a framework for monitoring the effectiveness of these measures. This helps organizations to reduce uncertainty, build resilience and survive challenging situations (Altomonte, 2024; Döll & Romero-Lankao, 2017; Gibson, 2023; Kulinich et al., 2023; McGrath & Jonker, 2025). According to Husain (2024), risks can also result from a company's operations, services, or products, and managing these risks is essential for any sustainable business as it not only helps businesses mitigate their environmental footprint, but also enhances their competitiveness and resilience. This is in line with the concept of environmental risk assessment (ERA) which, according to Breitholtz et al. (2006), is the link between environmental science and risk management. The term "ecological risk assessment" is sometimes used.

The ultimate aim of ERA is to provide sufficient information for decision-making with the purpose of protecting the environment from unwanted effects of chemicals. Breitholtz et al. (2006) further state that the European Commission has outlined four steps in ERA: hazard identification, dose-response assessment, exposure assessment, and risk characterization. Furthermore, on climate change, Döll and Romero-Lankao (2017) posited that Earth's future depends on how we manage the manifold risks of climate change, and that risk reduction requires participatory management involving a broad range of stakeholders and scientists. McGrath and Jonker (2025) asserted that by adopting a comprehensive and proactive approach to risk management, businesses can protect themselves and respond when threats are present.

*c. Establishing an Emergency Preparedness and Response Program*

An emergency preparedness and response (EPR) program is a fundamental strategy for managing environmental uncertainty. An emergency preparedness and response program mitigates uncertainty by providing structure and clear actions before, during, and after a crisis or disaster. It creates plans, conducts training, involving repeated drills and rehearsals, and allocates resources before disaster strikes. In other words, in EPR, a recurring cycle of assessing, planning, training, exercising, and revising is vital. EPR offers a sense of control, reduces fear, and allows for timely decision-making and faster and more effective response, minimizing hardship and loss (Colling & York, 2010; Herstein et al., 2021; Juergensen, 2024; Khan et al., 2018).

In times of emergency, knowing what to do and where to go can lessen the fear of the unknown and give you the confidence to manage the situation effectively and this can help all those involved reach safety faster. In such cases, it is preparedness that keeps you sane not willpower (Paul, n.d.; Walden, n.d.). Emergency preparedness programs have evolved over the last several decades as communities have responded to natural, intentional, and accidental disasters. This evolution has resulted in a comprehensive all-hazards approach centered around four fundamental phases spanning the entire disaster life cycle: mitigation, preparedness, response, and recovery (Herstein et al., 2021). And according to the United Nations Office for Disaster Risk Reduction (UNDRR, 2021), well-conceived emergency preparedness and response plans not only save lives and property, they often also contribute to resilience and post-disaster recovery by lessening the impact of a disaster.

*d. Turning Challenges into Opportunities*

Turning challenges into opportunities involves a change of mindset which allows organizations to turn obstacles into stepping stones for progress. It fosters a proactive, adaptive and learning-oriented culture that shifts focus from threats to potential gains. This approach encourages firms to embrace change and explore new market opportunities. This means that environmental uncertainty presents not only threats but also opportunities and companies must neutralize the threats and take advantage of the opportunities in order to maintain their competitive position. To exploit opportunities resulting from environmental changes, a firm requires flexibility (Basit & Ejaz, 2023; Cakmak, 2023; Carbonara & Caiazza, 2010; Dreyer & Grønhaug, 2004;

Parker, 2025). Challenges are opportunities in disguise. The most successful leaders view challenges as opportunities to learn, innovate, and grow. Transforming challenges into opportunities and building a culture of resilience require that we view obstacles as chances to uncover new solutions or improve existing processes, treat setbacks as valuable lessons that inform future strategies, and remind ourselves and our teams that improvement often comes through adversity (Parker, 2025). According to Deep (2023), resilient leaders demonstrate the ability to bounce back from setbacks, leveraging challenges as opportunities for growth. Furthermore, López-Gamero et al. (2011) posited that uncertainty can offer advantages to companies, such as identifying competitive opportunities, making new investments and important commitments and benefiting from innovative approaches.

*e. Retrenchment*

Retrenchment is a strategic approach for managing environmental uncertainty. Retrenchment is sometimes referred to as cutback management, restructuring, downsizing, or downscoping. It involves cost and asset reductions as a response to financial downturns or a turbulent external environment. It helps to control cash flow and stabilize a firm in a shrinking market. It is a pullback strategy adopted when a challenging external environment, such as a recession or major decline in sales, forces businesses to consolidate on or withdraw from certain areas to survive. Adverse effect of competitors, technological transformation, or government budget cuts for nonprofit organizations that rely heavily on government funding, can also lead to retrenchment. By eliminating non-essential expenses through workforce reductions or other strategic cuts, companies can focus on core competencies and survive turbulent times (Cheng & Deng, 2023; Robbins & Pearce, 1992).

When firms face declining financial performance, cost and asset retrenchment can lead to improved financial performance among such poorly performing firms (Morrow et al., 2004; Ochieno, 2013). Retrenchment inevitably brings harm (e.g., loss of jobs) to some people. However, periods of retrenchment, if wisely leveraged, are opportunities for strategic reflection, restructuring, and mapping pathways to recovery or transformation. It means reevaluating the skill sets, competencies, and perspectives required at all levels of the organization (from line staff to management to board members) to fit a culture of adaptability and innovation.

It means removing deadwood from boards of directors and ensuring that those who remain have accountability for both their fiduciary responsibilities and their obligations regarding institutional support, among others (Cheng & Deng, 2023). According to Amobi (2022), Nyaberi and Kiriago (2013), Ulebor (2022), retrenchment has a negative effect on the morale and job security of surviving staff and this can negatively impact productivity if not well managed. Therefore, according to Kwong et al. (2021), although retrenchment is a popular mitigation strategy that reduces HR functioning costs, it is arguably a short-term strategy.

*f. Environmental Scanning*

Environmental scanning is a systematic way of monitoring the external and internal environments to detect changes, identify opportunities and threats, and then formulate adaptive strategies. It is a core strategy for managing environmental uncertainty. Environmental scanning involves gathering of information about the environment. Environmental scanning may be described as intelligence gathering which involves examining data on the external and internal environments for the purpose of identifying forces for change, often in the form of problems, potential problems, or opportunities.

To be successful and to retain competitiveness, organizations must regularly detect external signals, systematically process and use information gathered to overcome threats and grasp opportunities (McGaughey, 2001; Zhang et al., 2012). By providing timely information, environmental scanning helps organizations understand potential future challenges and risks, enabling them to develop effective countermeasures and increase their resilience. Thus the information gathered from environmental scanning assists management in planning the organization's future course of action.

Information literacy skills are required to conduct effective and efficient environmental scanning activities as it is an information intensive process. The development of information technology and telecommunication

provides various channels and applications for accessing, processing and distributing information (Choo, 2001; Robinson & Simmons, 2018; YahiaMarzouk & Jin, 2022; Zhang et al., 2010; Zhang et al., 2011).

Furthermore, according to Zhang et al. (2011), environmental scanning is the radar to detect environmental signals, serving as an effective way for organizations to cope with uncertainties by formulating adaptive strategies, and effective environmental scanning helps organizations to achieve better alignment with rapidly changing external factors and hence improve their performance.

*g. Resource Redeployment*

Resource redeployment is the strategic process of reallocating a company's resources such as assets, skills and knowledge to areas where they are most needed as a result of new threats or opportunities created by changes in the environment. Resource redeployment involves a partial or complete withdrawal of tangible, intangible, and human capital resources from one use and reallocation to another use internal to the firm.

The resources are reallocated or reassigned to new or different uses in order to improve efficiency, capitalize on opportunities, and adapt to changing market conditions. This practice creates value and enhances a firm's resilience and competitive advantage (Chauvin et al., 2024; Folta, 2021; Folta et al., 2016; Levinthal & Wu, 2024). Resource redeployment aligns with the Resource-Based View (RBV) Theory which posits that a firm's competitive advantage stems from its internal resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN).

In line with this theory, resource redeployment allows firms to put their unique and valuable resources to work in new ways or in new areas, creating new value and achieving a competitive advantage (Madhani, 2010; Mailani et al., 2024). Sometimes, the resources are described as valuable, rare, inimitable resources and organization (VRIO). Cardeal and António (2012) have argued that the “O” in VRIO refers to dynamic capabilities (DCs), and that DCs are the “organization” needed to transform bundles of resources into competitive advantage. According to Levinthal and Wu (2024), what makes resource redeployment within a firm attractive is the presence of a "new best use".

*h. Flexibility and Adaptation to Change*

Flexibility is believed to be one of the most important requirements for firms to survive and prosper in a turbulent and unpredictable environment. Flexibility gives an organization the ability to quickly adjust its course when faced with significant environmental changes, and effective adaptation to environmental changes relies heavily on a cohesive strategy that integrates strategic foresight, operational agility, and a continuous learning culture. Firms that can adapt and change more quickly than their competitors can achieve a competitive advantage (Cingöz & Akdoğan, 2013; Deep, 2023; Dreyer & Grønhaug, 2004; Nandakumar et al., 2012; Shafizadeh, 2024; Skačkauskienė & Leonavičiūtė, 2025). Flexibility and adaptability are possible when organizations are agile. Agility is the ability to move quickly and easily and change direction or easily adapt to new situations.

When applied to organizations, organizational agility requires organizations to rapidly adapt and evolve in response to changes in the market, technology, and customer demands through a combination of flexible strategies, structures, processes, and a culture of continuous improvement. The ability of organizations to quickly sense and respond to environmental changes is an important determinant of organizational success. Organizational agility further extends to the organization's capacity to be resilient, innovative, and forward-thinking, ensuring that not only can it withstand the challenges of a volatile business environment, but also seize new opportunities that arise (Anderson, 2024; Cakmak, 2023; Nafei, 2016).

Organizational agility can lead to job enrichment, job enlargement and job intensification. This is because agility often requires employees to take on new tasks, gain more autonomy, and adapt to a new work environment. This promotes organizational performance provided that it is well managed and employee burnout is avoided (Gunti, 2025; Hussein et al., 2022; Ludviga & Kalvina, 2023; Saleem et al., 2012). Furthermore, Anderson (2024) has explained that organizational agility signifies a profound transformation that permeates

every layer of an organization and calls for a shift from rigid, hierarchical structures to more fluid, decentralized models where empowered teams can swiftly respond to emerging challenges and opportunities.

*i. Strategic Partnerships*

Strategic partnerships are an effective strategy for managing environmental uncertainty. This is because a strategic partnership allows a company to share resources, mitigate risks, reduce costs, and increase flexibility in turbulent environments by forming alliances with other businesses, helping it to gain access to new information, capabilities, and market knowledge, which assist to better understand the business environment and adapt to unpredictable external factors such as market volatility, competitive pressure, and regulatory changes (Abdollahbeigi & Salehi, 2021; Dubrovski, 2020; Kenton, 2025; Mutambik, 2024; Shabani et al., 2017).

The business model based on isolated competition has given way to establishing alliances between companies, allowing them to face the uncertainty and complexity of the changing environment more easily (Afonso & Franco, 2024). In a strategic alliance, two or more firms agree to work together and share their capacities and resources, promoting synergy to achieve a competitive advantage, while maintaining their independence. Forming strategic alliances allows firms to pool resources, share expertise and risks, and access new markets and technologies. Strategic partnerships have become a pivotal element for growth, innovation, and competitive advantage.

These collaborations are characterized by mutual benefit and long-term objectives, enabling organizations to leverage each other's strengths and resources (Abdollahbeigi & Salehi, 2021; Išoraitė, 2009; Kenton, 2025; Mbabu & Ombok, 2024). By working together, partners can achieve outcomes that would be more difficult or costly to accomplish independently. In other words, strategic partnerships enable partners to achieve what an individual company would not be able to achieve on its own. Thus strategic partnerships lead to better performance for each of the partners (Dubrovski, 2020; García-Pérez, 2012; Nwokocha & Madu, 2020; Yang et al., 2022).

However, Mbabu and Ombok (2024) have argued that while alliances offer substantial benefits, including resource sharing, risk mitigation, and innovation enhancement, they also pose significant challenges such as management complexities, opportunistic behaviour, and knowledge spillovers. Mbabu and Ombok (2024) therefore posited that effective governance, trust-building, and intellectual property protection are critical for maximizing the benefits and mitigating the risks of strategic alliances.

*j. Capacity Building*

Capacity building involves training and infrastructural development. By building knowledge, skills and infrastructure, capacity building strengthens the ability of individuals, organizations, and societies to adapt to changing environmental conditions and this promotes proactive response, better decision-making, and improved resilience to environmental challenges. Capacity building enhances dynamic capabilities, fostering strategic foresight, scenerio planning, and innovation. Focus is shifted from just reacting to situations to effectively preparing and shaping outcomes.

Capacity building equips people and organizations with the skills, knowledge, expertise, equipment, and resources needed to deal with unpredictable environmental changes, increasing their ability to survive and thrive in a turbulent environment (Babarinde, 2022; Gupta, 2025; Haarhaus & Liening, 2020; Maiese, 2005; Okwara et al., 2025; United Nations, n.d.). According to the United Nations, capacity building is defined as the process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need in order to survive, adapt, and thrive in a fast-changing world.

Similarly, Gupta (2025) defines capacity building as the process of developing the resources, skills, knowledge, and capabilities while strengthening organizational infrastructure to overcome workplace challenges and deliver better project outcomes. Gupta (2025) explains that capacity building involves implementing initiatives such as infrastructure upgrades, mentorship programs, soft and technical skills training, etc, and that capacity building

positions the organization to seize new opportunities, and this enables the company to remain agile, respond to change, and tackle market challenges effectively.

*k. Creativity and Innovation*

Creativity is the process of generating new ideas (novel and useful ideas), while innovation is the process of implementing those new ideas to create value. Creativity is about imagination and thinking outside the box, while innovation is about practical application, execution, or putting those ideas to work leading to a new product, service, or process or refining what already exists to make it more effective or efficient (Amabile & Pratt, 2016; Becker, 2024; Stone, 2022).

Although often used together, creativity and innovation are different and serve distinct but complementary roles. Creativity and innovation prompt an organization not only to identify new possibilities, but also to execute real-world solutions needed in a turbulent environment. Creativity and innovation contribute to a dynamic evolution that prevents companies from stagnating and enables them to stay competitive in an ever-changing marketplace (Al-Zubaidi et al., 2025; Gold & Jones, 2023; Han et al., 2023; McCarthy et al., 2018; Nobari et al., 2020; Peek, 2024; Saeed et al., 2021; YahiaMarzouk & Jin, 2022).

However, the relationship between creativity and innovation and environmental uncertainty is complex. It has been shown that environmental uncertainty negatively impacts creativity and innovation because, in an uncertain environment, there is an increase in perceived risk, which leads managers to adopt conservative strategies and to reduce investment in research and development (R&D) (Chen et al., 2021; Darvishmotevali et al., 2020; Oduvwu et al, 2025).

Nevertheless, in certain situations, especially when organizations are proactive and entrepreneurially oriented, environmental uncertainty can stimulate creativity and innovation and become a driving force by inducing a sense of urgency and prompting organizations to adapt and seek new opportunities in a bid to survive and thrive (Akpolat et al., 2013; Dağdeviren & Mirza, 2024; Gold & Jones, 2023; Han et al., 2023; McCarthy et al., 2018).

Agbor (2008) has argued that while culture, strategy, technology, and other management tools are important in generating effectiveness in the 21st century, creativity and innovation are what drive organizational success in many sectors. Agbor (2008) posited that for creativity to take place, leaders must establish a conducive environment and actively implement strategies that encourage it.

*q. Distributed Work Arrangements*

A distributed work arrangement (DWA) is a strategy for managing environmental uncertainty because it enables organizations to function effectively with employees working remotely. A distributed work arrangement is a work model where employees are not required to be in a single, central office or location but can work from various locations outside the office, such as home, co-working spaces, or different cities or countries. The work is said to be "distributed" to various locations or sites, and the workforce is called a distributed workforce.

A distributed workforce therefore refers to a company with a mix of office-based, remote, and deskless employees. However, terms like remote work or telecommuting are sometimes used interchangeably with distributed work. The terms on-site and off-site, online and virtual work have also been used. It may also be a hybrid work model where employees split their time between working remotely and in an office (Herman, 2025; Schäfer et al., 2023; Sia et al., 2004; Sin & Kathiarayan, 2023; Roper & Ha Kim, 2007). DWA relies on information and communication technologies (ICTs) for collaboration and connecting with employees, allowing teams to function effectively across different geographical areas and time zones.

The global COVID-19 pandemic has made distributed work arrangements more common, and with the emergence of virtual organizations, team members have become comfortable using distributed workforce tools like Slack, Zoom and many others to keep in touch with co-workers and complete their projects (Chychun et al., 2023; Herman, 2025; Sia et al., 2004; Sin & Kathiarayan, 2023; Roper & Ha Kim, 2007). DWA provides flexibility to manage changes and disruptions in the external environment using technology to maintain productivity and adapt to challenges, allowing operations to continue during times of crisis where a physical office becomes

difficult or impossible. Put in another way, in a turbulent or hostile environment, DWA helps organizations respond to unforeseen circumstances by decentralizing some functions and leveraging technology to connect remote workers (Pokojski et al., 2022; Roper & Ha Kim, 2007). Thus, according to Sia et al. (2007), distributed work arrangement is an organizational innovation that has the potential to enable a firm to meet the challenges of an uncertain environment more effectively.

*r. Leveraging Technologies and Digital Transformation*

Leveraging technologies is a key strategy for managing environmental uncertainty because technology provides the tools to study, understand, monitor, and address environmental challenges, which in turn help organizations and societies to adapt, innovate, and respond effectively to unpredictable and complex changes in the environment. Effectively leveraging digital tools and technologies can help overcome uncertainty, foster organizational trust, and strengthen job involvement to achieve sustainable growth. Digital transformation is a catalyst for business model innovation and growth, and can significantly improve organizational resilience and performance, and is essential for enterprise to obtain a competitive advantage in the digital economy (Adama & Okeke, 2024; Chen & Tian, 2022; Gandra et al., 2025; Hawrysz et al., 2024; Syahnur, 2024; Tumpa et al., 2025; Zhang et al., 2025).

Digital transformation is fundamentally changing the way businesses work by using new technologies. Advancements in digital technologies, such as artificial intelligence (AI), cloud computing, Internet of Things (IoT), and big data analytics, have revolutionized various aspects of business operations, including customer engagement, operational efficiency, and revenue generation (Adama & Okeke, 2024; Gandra et al., 2025). Nevertheless, the relationship between digital transformation and environmental uncertainty is complex. This is because environmental uncertainty negatively affects digital transformation by inducing managerial myopia, hindering research and development (R&D) investment, and exacerbating financial constraints that make it harder to allocate resources for digital transformation projects (Luo & Tang, 2024; Li et al., 2025; Oduvwu et al., 2025; Xu & Ao, 2025).

However, according to Luo and Tang (2024), these negative effects can be mitigated by increasing management shareholding, which aligns managers' interests with long-term goals, providing digital transformation subsidies to lower financial barriers, and fostering a favorable legal environment to protect digital investments and innovation. According to Shestakovska et al. (2025), using digital technologies helps a company streamline workflows, enhance decisions based on data analytics, and improve its competitiveness in local and global markets. Shestakovska et al. (2025) further state that businesses that recognize that they need to adopt digital transformation will enjoy a drastic advantage as they go through a breakneck pace of technological advancement and stand to cut costs, increase productivity, and expand new revenue streams.

*s. Investment in Research and Development*

Investment in research and development (R&D) is a key strategy for managing environmental uncertainty because R&D generates knowledge and enables the development of new technologies, products, and processes that allow companies to navigate and mitigate environmental challenges more effectively. R&D provides firms with dynamic capabilities to adapt, innovate, and thrive in turbulent environments. Investing in research and development helps to offset the negative impacts of environmental volatility. In times of crisis, innovation management and specifically R&D investments are critical to temper company losses and stimulate higher revenues (Magerakis & Theodoraki, 2025; Petti et al., 2024).

Benefits from R&D investments capitalize as improved profitability over longer time horizons (Magerakis & Theodoraki, 2025). On eco-innovation and financial performance, Lee and Min (2015) found that green R&D investment for eco-innovation improves financial performance at the firm level. And according to O'Connell et al. (2025), R&D is a key driver of future environmental innovation but excessive investment should be avoided as over-investment has a diminishing effect.

Thus the relationship between R&D investment and environmental uncertainty is complex. Uncertainty can sometimes lead firms to be risk-averse and delay R&D investments. This complexity is also found in connection

with creativity and innovation and with leveraging technologies and digital transformation, both of which are associated with R&D investment (Chen et al., 2021; Darvishmotevali et al., 2020; Li et al., 2025; Luo & Tang, 2024; Oduvwu et al., 2025; Xu & Ao, 2025). Jung and Kwak (2018) found that a negative relationship exists between uncertainty and R&D investment, but the size and innovation capacity of a firm positively moderate this relationship. Furthermore, according to Patnaik (2016), the degree of competition plays an important role in the link between uncertainty and investment in that firms in highly competitive industries increase investment in response to higher uncertainty, supporting the argument that competition can erode the option value of deferring investment. This, according to Oduvwu et al. (2025), is necessary for such firms to remain competitive in such environments.

*t. Green Human Resource Management*

Green human resource management (GHRM) is the practice of integrating environmental concerns and sustainable principles into all aspects of human resource management. This involves implementing policies that encourage environmentally responsible behaviours from employees to create a more sustainable and socially responsible organization. GHRM refers to the policies, practices and systems that make employees of an organization green for the benefit of the individual, society, natural environment, and the business (Ahmad et al., 2025; Cherif, 2023; Opatha & Arulrajah, 2014). GHRM helps manage environmental uncertainty by building an environmentally conscious organization, promoting a corporate culture of environmental responsibility, and building a sustainable workforce that can act as a catalyst in achieving sustainable development goals.

This is achieved through specific practices such as recruiting and retaining eco-friendly personnel, performance management that includes green metrics, providing environmental education to employees, which includes training employees on energy conservation and waste reduction, and promoting environmentally beneficial actions with sustainability objectives in mind. These practices reduce a company's carbon footprint and give the organization a green competitive advantage and increased resilience to environmental challenges, market and regulatory shifts (Ahmad et al., 2025; Bangura, 2025; Coelho et al., 2024; Lee, 2020; Mustafa et al., 2023; Opatha & Arulrajah, 2014).

According to Opatha and Arulrajah (2014), green or greening means being a nature-lover or eco-activist, and green or greening has at least four meanings in the context of managing people at work: preservation of the natural environment (preservationist, to protect), conservation of the natural environment (conservationist, to save), avoidance or minimization of pollution (non-polluter), and generation of gardens and looking-like natural places (maker), which are essential to avoid or minimize global warming and natural disasters, owing to informal, harmful and greedy usage of natural resources for production and consumption.

Opatha and Arulrajah (2014) further state that greening also helps us to avoid or minimize diseases owing to pollution, as well as harm to animals and other natural creatures, and to ensure appropriate balance of relationships among plants, animals, people, and their environment, and the survival of humans and business organizations for a prolonged period of time. Furthermore, Hussein and Zakhem (2024) found that green HRM practices lead to an increase in organizational pride, which positively influences brand citizenship behaviour and negatively affects turnover intention, and that individual green values positively moderate the aforementioned relationships.

## IV. DISCUSSION

The results of this review imply that managing environmental uncertainty requires concerted efforts by individuals and organizations to be proactive, build capacity, adopt flexibility and other strategies to shape outcomes. This assertion is comparable to the view expressed in Haarhaus and Liening (2020) that companies require dynamic capabilities to flexibly respond to and shape uncertain environments.

Many strategies are available for managing environmental uncertainty and these strategies have been brought together and discussed in detail in this review. Oduvwu et al. (2025) found that the consequences of environmental uncertainty are interwoven and interrelated. Similarly, it was found in this work that the strategies for managing environmental uncertainty are interwoven and interrelated.

## V. CONCLUSION

Environmental uncertainty affects organizations around the world with negative consequences if not well managed. Strategies for managing environmental uncertainty are interwoven and interrelated, one leading to another. The strategy to apply in a particular situation depends on the nature of the uncertainty. This review concludes that high performance of an organization and its sustainability in the face of environmental uncertainty are dependent on the organization's adoption of appropriate strategies.

## VI. REFERENCES

1. B. Abdollahbeigi, and F. Salehi, "A Study of Strategic Alliance Success Factors," *International Journal of Economics and Management Systems*, vol. 6, no. 2, pp. 408–418, 2021. Google Scholar | Publisher Link
2. H.E. Adama, and C.D. Okeke, "Digital Transformation as a Catalyst for Business Model Innovation: A Critical Review of Impact and Implementation Strategies," *Magna Scientia Advanced Research and Reviews*, vol. 10, no. 2, pp. 256–264, 2024. Google Scholar | Publisher Link
3. M. Afonso, and M. Franco, "Business Alliances, Shared Resources and Environmental Uncertainty: A Qualitative Study," *Journal of General Management*, vol. 0, no. 0, 2024. Google Scholar | Publisher Link
4. E. Agbor, "Creativity and Innovation: The Leadership Dynamics," *Journal of Strategic Leadership*, vol. 1, no. 1, 2008. Google Scholar | Publisher Link
5. S. Ahmad, U. Javed, C. Sharma, and M.S. Siddiqui, "Green Human Resource Management: Analyzing Sustainable Practices and Organizational Impact Through a Word2Vec Approach," *GRETS*, vol. 3, no. 4, p. 100224, 2025. Google Scholar | Publisher Link
6. K. Akpolat, F. Soliman, and J. Schweitzer, "Understanding Perceived Environmental Uncertainty and Its Impact on Innovation," *Global Business Conference at Tignes, France*, 2013. Google Scholar | Publisher Link
7. L. Altomonte, "Risk Control: What It Is and How It Works," *SafetyCulture*, September 25, 2025. Google Scholar | Publisher Link
8. R. Al-Zubaidi, A. Ateeq, A. Abdulsamad, S.B. Ibrahim, H.R.H.A. Ahmed, and M. Milhem, "Market Orientation and SMEs Performance: Unraveling the Mediating Effects of Innovation Capability Amidst Environmental Uncertainty," *Tech Fusion in Business and Society*, vol. 234, pp. 859–872, 2025. Google Scholar | Publisher Link
9. T.M. Amabile, and M.G. Pratt, "The Dynamic Componential Model of Creativity and Innovation in Organizations: Making Progress, Making Meaning," *Research in Organizational Behavior*, vol. 36, pp. 157–183, 2016. Google Scholar | Publisher Link
10. M.U. Amobi, "Effect of Retrenchment on Workers' Productivity: A Study of Ecobank Plc. Abia State," *Journal of Emerging Trends in Management Sciences and Entrepreneurship*, vol. 4, no. 2, pp. 129–144, 2022. Google Scholar | [suspicious link removed]
11. J. Anderson, "Organizational Agility - A Complete Guide + Best Examples in 2024," *Agile By Design*, March 8, 2024. Google Scholar | Publisher Link
12. M. Ardebilpour, A. Ardebilpour, P. Kerry, and M. Falahat, "Impact of Organizational Culture on Employee Commitment: Mediating Role of Employee Engagement and Perceived Organizational Support," *Journal of Infrastructure, Policy and Development*, vol. 8, no. 8, p. 4997, 2024. Google Scholar | Publisher Link
13. S.A. Babarinde, "Capacity Building: A Strategic Tool for Innovation and Sustainability in Selected Food and Beverages Companies in Southwest Nigeria," *Journal of Research in Business and Management*, vol. 10, no. 5, pp. 30–40, 2022. Google Scholar | Publisher Link
14. S. Bangura, "Barriers and Facilitators to the Implementation of Green Human Resource Management in Organisations," *International Journal of Management, Accounting and Economics*, vol. 12, no. 5, pp. 794–807, 2025. Google Scholar | Publisher Link
15. Basit, and S. Ejaz, "Turning Challenges into Opportunities: The Role of Leadership Qualities in Adopting Social Entrepreneurship Initiatives During COVID-19," *Journal of Management*, vol. 5, no. 1, pp. 20–38, 2023. Google Scholar | Publisher Link
16. E. Becker, "The Real Difference Between Innovation and Creativity in the Business World," *Innosabi*, October 24, 2024. Google Scholar | Publisher Link
17. M. Breitholtz, C. Rudén, S.O. Hansson, and B. Bengtsson, "Ten Challenges for Improved Ecotoxicological Testing in Environmental Risk Assessment," *Ecotoxicology and Environmental Safety*, vol. 63, no. 2, pp. 324–335, 2006. Google Scholar | Publisher Link
18. Z. Cakmak, "Adapting to Environmental Change: The Importance of Organizational Agility in the Business Landscape," *Florya Chronicles of Political Economy*, vol. 9, no. 1, pp. 42–53, 2023. Google Scholar | Publisher Link
19. G. Carbonara, and R. Caiazza, "How to Turn Crisis into Opportunity: Perception and Reaction to High Level of Uncertainty in Banking Industry," *Foresight*, vol. 12, no. 4, pp. 37–46, 2010. Google Scholar | Publisher Link

20. N. Cardeal, and N. António, "Valuable, Rare, Inimitable Resources and Organization (VRIO) Resources or Valuable, Rare, Inimitable Resources (VRI) Capabilities: What Leads to Competitive Advantage?" *African Journal of Business Management*, vol. 6, no. 37, pp. 10159–10170, 2012. Google Scholar | Publisher Link
21. S. Chaurasia, "The Role of Organizational Culture in Promoting Work-Life Balance: An Empirical Review," *International Journal of Research Publication and Reviews*, vol. 4, pp. 2834–2837, 2023. Google Scholar | Publisher Link
22. J. Chauvin, C. Inoue, and C. Poliquin, "Resource Redeployment as an Entry Advantage in Resource-Poor Settings," *Strategic Management Journal*, pp. 1–32, 2024. Google Scholar | Publisher Link
23. H. Chen, and Z. Tian, "Environmental Uncertainty, Resource Orchestration and Digital Transformation: A Fuzzy-Set QCA Approach," *Journal of Business Research*, vol. 139, no. 3, pp. 184–193, 2022. Google Scholar | Publisher Link
24. J. Chen, W. Shu, X. Wang, M.S. Sial, M. Sehleanu, and D. Badulescu, "The Impact of Environmental Uncertainty on Corporate Innovation: Empirical Evidence from an Emerging Economy," *International Journal of Environmental Research and Public Health*, vol. 19, no. 1, p. 334, 2021. Google Scholar | Publisher Link
25. Y. Cheng, and S. Deng, "Retrenchment Strategies," *Elgar Encyclopedia of Nonprofit Management, Leadership and Governance*, pp. 498–501, 2023. Google Scholar | Publisher Link
26. S. Cherif, "Green Human Resources Management: Concept and Practices," *Green Human Resource Management Practices: Future Aspirations Towards Sustainability*, 2023. Google Scholar | Publisher Link
27. C.W. Choo, "Environmental Scanning as Information Seeking and Organizational Learning," *Information Research*, vol. 7, no. 1, 2001. Google Scholar | Publisher Link
28. V. Chychun, N. Chaplynska, O. Shpatakova, A. Pankova, and V. Saienko, "Effective Management in the Remote Work Environment," *Journal of Systems and Management Sciences*, vol. 13, no. 3, pp. 244–257, 2023. Google Scholar | Publisher Link
29. Cingöz, and A.A. Akdoğan, "Strategic Flexibility, Environmental Dynamism, and Innovation Performance: An Empirical Study," *Procedia - Social and Behavioral Sciences*, vol. 99, pp. 582–589, 2013. Google Scholar | Publisher Link
30. J.P. Coelho, A.I. Couto, and A.T. Ferreira-Oliveira, "Green Human Resource Management: Practices, Benefits, and Constraints—Evidence from the Portuguese Context," *Sustainability*, vol. 16, no. 13, p. 5478, 2024. Google Scholar | Publisher Link
31. R.L. Colling, and T.W. York, "Emergency Preparedness—Planning and Management," *Hospital and Healthcare Security*, pp. 591–619, 2010. Google Scholar | Publisher Link
32. I.E. Dağdeviren, and S. Mirza, "The Mediating Role of Environmental Uncertainty in the Impact of Information Technology on Supply Chain Performance," *Sustainability*, vol. 16, no. 17, p. 7667, 2024. Google Scholar | Publisher Link
33. M. Darvishmotevali, L. Altinay, and M.A. Köseoglu, "The Link Between Environmental Uncertainty, Organizational Agility, and Organizational Creativity in the Hotel Industry," *International Journal of Hospitality Management*, vol. 87, no. 3, p. 102499, 2020. Google Scholar | Publisher Link
34. G. Deep, "The Power of Resilience and Flexibility in Business Leadership: Adapting to Change," *Magna Scientia Advanced Research and Reviews*, vol. 9, no. 2, pp. 086–091, 2023. Google Scholar | Publisher Link
35. P. Döll, and P. Romero-Lankao, "How to Embrace Uncertainty in Participatory Climate Change Risk Management—A Roadmap," *Earth's Future*, vol. 5, no. 1, pp. 18–36, 2017. Google Scholar | Publisher Link
36. B. Dreyer, and K. Grønhaug, "Uncertainty, Flexibility, and Sustained Competitive Advantage," *Journal of Business Research*, vol. 57, no. 5, pp. 484–494, 2004. Google Scholar | Publisher Link
37. D. Dubrovski, "Characteristics of Strategic Partnerships Between Differently Successful Companies," *Journal of Financial Risk Management*, vol. 9, no. 2, pp. 82–98, 2020. Google Scholar | Publisher Link
38. T.B. Folta, "Resource Redeployment," *Oxford Bibliographies Online in Management*, 2021. Google Scholar | Publisher Link
39. T.B. Folta, C.E. Helfat, and S. Karim, "Examining Resource Redeployment in Multi-business Firms," *Resource Redeployment and Corporate Strategy*, pp. 1–17, 2016. Google Scholar | Publisher Link
40. P.K. Gandra, V.P. Palanisamy, B.M. Rao, M.B. Koteswari, A.K. Pathak, and S.R. Krishnan, "Digital Transformation as a Catalyst for Business Model Innovation: Balancing Challenges and Opportunities," *Journal of Marketing and Social Research*, vol. 2, no. 9, pp. 23–30, 2025. Google Scholar | Publisher Link
41. A.M. García-Pérez, "Perceived Environmental Uncertainty and Strategic Alliances in Small and Medium-Sized Enterprises," *International Journal of Entrepreneurship and Small Business*, vol. 17, no. 3, pp. 355–377, 2012. Google Scholar | Publisher Link
42. K. Gibson, "What is Risk Management & Why is It Important?" *HBS Online*, 2023. Google Scholar | Publisher Link

43. J. Gold, and O. Jones, "Finding Innovation Opportunities in SMEs Through Futures and Foresight Learning: An Action Learning Approach," *Action Learning: Research and Practice*, vol. 20, no. 2, pp. 132–148, 2023. Google Scholar | Publisher Link
44. S. Gunti, "Job Enrichment: A Guide for Recruiters," *Adaface*, March 31, 2025. Google Scholar | Publisher Link
45. M. Gupta, "10 Key Capacity Building Strategies to Drive Business Growth," *Saviom*, July 9, 2025. Google Scholar | Publisher Link
46. T. Haarhaus, and A. Liening, "Building Dynamic Capabilities to Cope with Environmental Uncertainty: The Role of Strategic Foresight," *Technological Forecasting and Social Change*, vol. 155, p. 120033, 2020. Google Scholar | Publisher Link
47. X. Han, B. Yue, and Z. He, "Thriving in Uncertainty: Examining the Relationship Between Perceived Environmental Uncertainty and Corporate Eco-innovation Through the Lens of Dynamic Capabilities," *Frontiers in Environmental Science*, vol. 11, p. 1196997, 2023. Google Scholar | Publisher Link
48. L. Hawrysz, M. Kludacz-Alessandri, A.Z. Kluczka, A. Zabłocka-Kluczka, and K. Żak, "Perceived Environmental Uncertainty and Job Involvement: The Mediating Role of Digital Technology and Organizational Trust - A Cross-sectional Study in Primary Care Facilities in the UK," *BMC Health Services Research*, vol. 24, p. 1151, 2024. Google Scholar | Publisher Link
49. M. Herman, "What is a Distributed Workforce and How to Manage It?" *Lumapps*, June 20, 2025. Google Scholar | Publisher Link
50. J.J. Herstein, M.M. Schwedhelm, A. Vasa, P.D. Biddinger, and A.L. Hewlett, "Emergency Preparedness: What is the Future?" *Antimicrobial Stewardship & Healthcare Epidemiology*, vol. 1, no. 1, p. e29, 2021. Google Scholar | Publisher Link
51. N.N. Husain, "Environmental Risk Management: A Practical Guide for Businesses," *Institute of Sustainability Studies*, March 18, 2024. Google Scholar | Publisher Link
52. N.H.Y. Hussein, M.M. El-Shahate, and N.A.A.A. Mohamed, "Organizational Agility: The Pathway to Job Enrichment Among Nurses," *Egyptian Journal of Health Care*, vol. 13, no. 3, pp. 529–540, 2022. Google Scholar | Publisher Link
53. S.H. Hussein, and N.B. Zakhem, "The Impact of Green Human Resource Management Practices on Brand Citizenship Behavior and Employee Turnover Intention: A Mixed Methods Approach," *Sustainability*, vol. 16, no. 15, p. 6528, 2024. Google Scholar | Publisher Link
54. M. Insoraite, "Importance of Strategic Alliances in Company's Activity," *Intellectual Economics*, vol. 1, no. 5, pp. 39–46, 2009. Google Scholar | Publisher Link
55. J.C. Juergensen, "Integration — The Key to Effective Emergency and Disaster Management," *Centre for Public Safety Management, LLC*, 2024. Google Scholar | Publisher Link
56. S. Jung, and G. Kwak, "Firm Characteristics, Uncertainty and Research and Development (R&D) Investment: The Role of Size and Innovation Capacity," *Sustainability*, vol. 10, no. 5, p. 1668, 2018. Google Scholar | Publisher Link
57. M. Kapoor, and V. Pandey, "Importance of Organisational Culture in Achieving Work-Life Balance," *Frontiers in Health Informatics*, vol. 13, no. 6, pp. 712–719, 2024. Google Scholar | Publisher Link
58. J.T. Karlsen, "Supportive Culture for Efficient Project Uncertainty Management," *International Journal of Managing Projects in Business*, vol. 4, no. 2, pp. 240–256, 2011. Google Scholar | Publisher Link
59. W. Kenton, "Strategic Alliances Explained: Types, Benefits, and Examples," *Investopedia*, August 24, 2025. Google Scholar | Publisher Link
60. Y. Khan, T. O'Sullivan, A. Brown, S. Tracey, J. Gibson, M. Généreux, B. Henry, and B. Schwartz, "Public Health Emergency Preparedness: A Framework to Promote Resilience," *BMC Public Health*, vol. 18, p. 1344, 2018. Google Scholar | Publisher Link
61. T. Kulinich, R. Andrushko, O. Prosovych, O. Sternyuk, and Y. Tymchyna, "Enterprise Risk Management in an Uncertain Environment," *International Journal of Professional Business Review*, vol. 8, no. 4, p. e01700, 2023. Google Scholar | Publisher Link
62. C. Kwong, M. Demirba, G. Wood, and F.L. Cooke, "Human Resource Management in the Context of High Uncertainties," *International Journal of Human Resource Management*, vol. 32, no. 17, pp. 3569–3599, 2021. Google Scholar | Publisher Link
63. H. Lee, "The Role of Environmental Uncertainty, Green HRM and Green SCM in Influencing Organization's Energy Efficacy and Environmental Performance," *International Journal of Energy Economics and Policy*, vol. 10, no. 3, pp. 332–339, 2020. Google Scholar | Publisher Link
64. K. Lee, and B. Min, "Green R&D for Eco-innovation and Its Impact on Carbon Emissions and Firm Performance," *Journal of Cleaner Production*, vol. 108, no. A, pp. 534–542, 2015. Google Scholar | Publisher Link
65. D. Levinthal, and B. Wu, "Resource Redeployment and the Pursuit of the New Best Use: Economic Logic and Organizational Challenges," *Strategy Science*, vol. 10, no. 1, pp. 32–47, 2024. Google Scholar | Publisher Link

66. J. Li, N. Ding, S.B. Park, and Z. Zhang, "How Does Digital Transformation Impact ESG Performance in Uncertain Environments?" *Sustainability*, vol. 17, no. 10, p. 4597, 2025. Google Scholar | Publisher Link
67. M.D. López-Gamero, J.F. Molina-Azorín, and E. Claver-Cortés, "Environmental Uncertainty and Environmental Management Perception: A Multiple Case Study," *Journal of Business Research*, vol. 64, no. 4, pp. 427–435, 2011. Google Scholar | Publisher Link
68. Ludviga, and A. Kalvina, "Organizational Agility During Crisis: Do Employees' Perceptions of Public Sector Organizations' Strategic Agility Foster Employees' Work Engagement and Well-being?" *Employee Responsibilities and Rights Journal*, pp. 1–21, 2023. Google Scholar | Publisher Link
69. F. Luo, and C. Tang, "Navigating Uncertainty: The Impact of Environmental Instability on Enterprise Digital Transformation," *PLoS ONE*, vol. 19, no. 12, p. e0314688, 2024. Google Scholar | Publisher Link
70. P.M. Madhani, "Resource Based View (RBV) of Competitive Advantage: An Overview," *Resource Based View: Concepts and Practices*, pp. 3–22, 2010. Google Scholar | Publisher Link
71. E. Magerakis, and C. Theodoraki, "Environmental Uncertainty and Corporate Performance: Can R&D Investments Provide a Silver Lining to This Cloud?" *Review of Managerial Science*, 2025. Google Scholar | Publisher Link
72. M. Maiese, "Capacity Building," *Beyond Intractability*, 2005. Google Scholar | Publisher Link
73. D. Mailani, M.Z.T. Hulu, M.R. Simamora, and S.A. Kesuma, "Resource-Based View Theory to Achieve a Sustainable Competitive Advantage of the Firm: Systematic Literature Review," *International Journal of Entrepreneurship and Sustainability Studies*, vol. 4, no. 1, pp. 1–15, 2024. Google Scholar | Publisher Link
74. A.U. Manekar, "Impact of Organizational Culture on Human Resource Management: A Critical Analysis," *International Journal of Innovative Science, Engineering and Management*, vol. 3, no. 2, pp. 106–112, 2024. Google Scholar | Publisher Link
75. M.M. Mbabu, and B. Ombok, "The Role of Strategic Alliances in Enhancing Firm Competitiveness: A Comparative Analysis," *Greener Journal of Economics and Accountancy*, vol. 11, no. 1, pp. 42–45, 2024. Google Scholar | Publisher Link
76. D. McCarthy, S. Puffer, and A. Lamin, "Entrepreneurial Orientation in a Hostile and Turbulent Environment: Risk and Innovativeness among Successful Russian Entrepreneurs," *European Journal of International Management*, vol. 12, no. 1-2, pp. 191–221, 2018. Google Scholar | Publisher Link
77. R.E. McGaughey, "Application of Multimedia in Agile Manufacturing," *Agile Manufacturing: The 21st Century Competitive Strategy*, pp. 279–295, 2001. Google Scholar | Publisher Link
78. McGrath, and A. Jonker, "What is Risk Management?" *IBM Think*, 2025. Google Scholar | Publisher Link
79. Merriam-Webster, "Risk," *Merriam-Webster.com Dictionary*, December 13, 2025. Google Scholar | Publisher Link
80. F.J. Milliken, "Three Types of Perceived Uncertainty About the Environment: State, Effect, and Response Uncertainty," *Academy of Management Review*, vol. 12, no. 1, pp. 133–143, 1987. Google Scholar | Publisher Link
81. J.L. Morrow, R.A. Johnson, and L.W. Busenitz, "The Effects of Cost and Asset Retrenchment on Firm Performance: The Overlooked Role of a Firm's Competitive Environment," *Journal of Management*, vol. 30, no. 2, pp. 189–208, 2004. Google Scholar | Publisher Link
82. K. Mustafa, M.B. Hossain, F. Ahmad, F. Ejaz, H.G.A. Khan, and A. Dunay, "Green Human Resource Management Practices to Accomplish Green Competitive Advantage: A Moderated Mediation Model," *Heliyon*, vol. 9, no. 11, p. e21830, 2023. Google Scholar | Publisher Link
83. Mutambik, "The Role of Strategic Partnerships and Digital Transformation in Enhancing Supply Chain Agility and Performance," *Systems*, vol. 12, no. 11, p. 456, 2024. Google Scholar | Publisher Link
84. Myasnikov, "Shaping an Adaptive Project Environment Under Uncertainty: The Role of Culture and Human Capital," *Èkonomika Upravlenie: Problemy Rešeniâ*, vol. 5/1, no. 158, pp. 12–22, 2025. Google Scholar | Publisher Link
85. W.A. Nafei, "Organizational Agility: The Key to Organizational Success," *International Journal of Business and Management*, vol. 11, no. 5, pp. 296–309, 2016. Google Scholar | Publisher Link
86. M.K. Nandakumar, S. Jharkharia, and A. Nair, "Environmental Uncertainty and Flexibility," *Global Journal of Flexible Systems Management*, vol. 13, pp. 121–122, 2012. Google Scholar | Publisher Link
87. N. Nobari, A. Dehkordi, M. Akbari, and H. Padash, "Innovation Intelligence and Its Role in Environmental Uncertainty Management: A Conceptual Framework," *VINE Journal of Information and Knowledge Management Systems*, vol. 52, no. 4, pp. 594–611, 2020. Google Scholar | Publisher Link
88. V. Nwokocha, and I. Madu, "Strategic Alliance and Its Influence on the Performance of Small-and Medium-Scale Enterprises in Enugu State, Nigeria," *Global Journal of Emerging Market Economies*, vol. 12, no. 1, pp. 22–31, 2020. Google Scholar | Publisher Link
89. D.N. Nyaberi, and A.N. Kiriago, "Effects of Retrenchment on the Morale and Job Security of Surviving Employees of Telkom Kenya Limited," *International Journal of Academic Research in Business and Social Sciences*, vol. 7, no. 5, pp. 16–23, 2013. Google Scholar | Publisher Link

90. C.N. Ochieno, "Effects of Retrenchment on Organizational Performance at the Telkom Kenya, Eldoret Branch," *Journal of Emerging Trends in Economics and Management Sciences*, vol. 4, no. 4, pp. 409–416, 2013. Google Scholar | [suspicious link removed]
91. V. O'Connell, N.M. AbuGhazaleh, O. Browne, M. Farrell, M. Gleeson, and E. McGeown, "Enhancing Sustainability: The Impact of Research and Development Expenditure on Future Environmental Innovation in European Firms," *Sustainability*, vol. 17, no. 12, p. 5412, 2025. Google Scholar | Publisher Link
92. P.A. Oduvwu, P.S.O. Erhijakpor, and C.O. Kembigha, "Impact of Environmental Uncertainty on Human Resources and Organizational Performance: A Narrative Review," *JOHASAM*, vol. 9, no. 1, pp. 114–124, 2025. Google Scholar | Publisher Link
93. C.A. Okwara, C.E. Udensi, and A.N. Onoh, "Grappling with the Challenges of Social Sustainability in Nigerian Food & Beverage Industry: How Engaged Are the Employees?" *IIARD International Journal of Economics and Business Management*, vol. 11, no. 9, pp. 1–18, 2025. Google Scholar | Publisher Link
94. H.H.D.N.P. Opatha, and A.A. Arulrajah, "Green Human Resource Management: Simplified General Reflections," *International Business Research*, vol. 7, no. 8, pp. 101–112, 2014. Google Scholar | Publisher Link
95. T. Parker, "Turning Challenges into Opportunities: Resilience in Action," *NorthCo*, January 18, 2025. Google Scholar | Publisher Link
96. R. Patnaik, "Competition and the Real Effects of Uncertainty," *Social Science Research Network*, 2016. Google Scholar | Publisher Link
97. Paul, "What to Do During an Emergency Situation: How to Prepare for an Emergency and Stay Calm and Confident," *Emergency Response Africa*, Accessed December 20, 2025. Google Scholar | Publisher Link
98. S. Peek, "Creativity vs Innovation: What's the Difference?" *Business News Daily*, January 30, 2024. Google Scholar | Publisher Link
99. C. Petti, D. Lepore, O. Liakh, and G. Elia, "When is Research and Development More Effective in Times of Crisis? The Role of Environmental Policies," *European Journal of Innovation Management*, vol. 27, no. 6, pp. 2066–2083, 2024. Google Scholar | Publisher Link
100. M. Pittman, "How to Create a Collaborative and Supportive Culture," *Brandon Hall Group*, 2024. Google Scholar | Publisher Link
101. Z. Pokojski, A. Kister, and M. Lipowski, "Remote Work Efficiency from the Employers' Perspective—What's Next?" *Sustainability*, vol. 14, no. 7, p. 4220, 2022. Google Scholar | Publisher Link
102. P. Regan, "Making Sense of Uncertainty: An Examination of Environmental Interpretation," *International Journal of Business and Management*, vol. 7, no. 6, pp. 18–29, 2012. Google Scholar | Publisher Link
103. D.K. Robbins, and J.A. Pearce, "Turnaround: Retrenchment and Recovery," *Strategic Management Journal*, vol. 13, no. 4, pp. 287–309, 1992. Google Scholar | Publisher Link
104. C.V. Robinson, and J.E.L. Simmons, "Organising Environmental Scanning: Exploring Information Source, Mode and the Impact of Firm Size," *Long Range Planning*, vol. 51, no. 4, pp. 526–539, 2018. Google Scholar | Publisher Link
105. K.O. Roper, and J. Ha Kim, "Successful Distributed Work Arrangements: A Developmental Approach," *Journal of Facilities Management*, vol. 5, no. 2, pp. 103–114, 2007. Google Scholar | Publisher Link
106. M. Saeed, H. Tabassum, M. Zahid, Y. Jiao, and S. Nauman, "Organizational Flexibility and Project Portfolio Performance: The Roles of Environmental Uncertainty and Innovation Capability," *Engineering Management Journal*, vol. 34, no. 1, pp. 1–16, 2021. Google Scholar | Publisher Link
107. S. Saleem, W.A. Shaheen, and R. Saleem, "The Impact of Job Enrichment and Job Enlargement on Employee Satisfaction Keeping Employee Performance as Intervening Variable: A Correlation Al Study from Pakistan," *Arab Journal of Business and Management Review (Kuwait)*, vol. 1, no. 9, pp. 145–265, 2012. Google Scholar | [suspicious link removed]
108. B. Schäfer, L. Koloch, D. Storai, M. Gunkel, and S. Kraus, "Alternative Workplace Arrangements: Tearing Down the Walls of a Conceptual Labyrinth," *Journal of Innovation & Knowledge*, vol. 8, no. 2, p. 100352, 2023. Google Scholar | Publisher Link
109. H. Shabani, A. Shabani, and E. Elezaj, "Strategic Alliances and Changes in the Competition Environment," *International Journal of Pharmaceutical Sciences Review and Research*, vol. 45, no. 2, pp. 272–277, 2017. Google Scholar | Publisher Link
110. H. Shafizadeh, "Decision-making Under Uncertainty: How Organizations Adapt to Environmental Changes?," *Journal of Resource Management and Decision*, vol. 3, no. 1, pp. 4–10, 2024. Google Scholar | Publisher Link
111. T. Shestakovska, O. Liashenko, O. Dluhopolskyi, A. Duka, O. Mykhailovska, and N. Filipova, "The Role of Business Process Innovation in Sustainable Economic Growth: Integrating Technology, Efficiency, and Resilience," *European Journal of Sustainable Development*, vol. 14, no. 2, p. 823, 2025. Google Scholar | Publisher Link

112. C. Sia, H.H. Teo, B.C.Y. Tan, and K. Wei, "Effects of Environmental Uncertainty on Organizational Intention to Adopt Distributed Work Arrangements," *IEEE Transactions on Engineering Management*, vol. 51, no. 3, pp. 253–267, 2004. Google Scholar | Publisher Link
113. J.C.C. Sin, and V. Kathiarayan, "The Evolution of Remote Work: Analyzing Strategies for Effective Virtual Team Management and Collaboration," *International Journal of Management, Commerce and Innovation*, vol. 11, no. 1, pp. 91–101, 2023. Google Scholar | Publisher Link
114. Skačkauskienė, and V. Leonavičiūtė, "Change Management in Aviation Organizations: A Multi-method Theoretical Framework for External Environmental Uncertainty," *Sustainability*, vol. 17, no. 15, p. 6994, 2025. Google Scholar | Publisher Link
115. S. Stone, "What's the Real Difference Between Creativity and Innovation?," *Ideascale*, June 16, 2022. Google Scholar | Publisher Link
116. H. Syahnur, "Leveraging Technology and Innovation for Effective E-business Management," *Advances in Business and Industrial Marketing Research*, vol. 2, no. 2, 2024. Google Scholar | Publisher Link
117. R.J. Tumpa, L.M. Naeni, F. Afzal, and A.N. Ghanbaripour, "Leveraging Digital Technology to Improve Environmental, Social, and Governance Performance of Infrastructure Projects," *Management Decision*, vol. 63, no. 13, pp. 455–496, 2025. Google Scholar | Publisher Link
118. E.l. Ulebor, "Effects of Retrenchment on the Morale of Employees of Glo Nigeria Limited," *Wukari International Studies Journal*, vol. 6, no. 2, p. 6, 2022. Google Scholar | Publisher Link
119. U. Umesh, S. Brindha, S.A. Sait, M.S. Sharma, and K.S. Kumar, "The Role of Organizational Culture in Promoting Work-Life Balance: A Literature Review," *Journal of Harbin Engineering University*, vol. 44, no. 8, pp. 1301–1309, 2023. Google Scholar | Publisher Link
120. United Nations, "Capacity Building," 2025. Google Scholar | Publisher Link
121. United Nations Office for Disaster Risk Reduction, "Essential Nine: Ensure Effective Disaster Response," 2021. Google Scholar | Publisher Link
122. Walden University, "Why Emergency Preparedness Matters," Assessed December 30, 2025. Google Scholar | Publisher Link
123. B. Wernerfelt, and A. Karnani, "Competitive Strategy Under Uncertainty," *Strategic Management Journal*, vol. 8, no. 2, pp. 187–194, 1987. Google Scholar | Publisher Link
124. Y. Xu, and Q. Ao, "Digital Transformation, New Quality Productive Forces, and Corporate Environmental Investment: Empirical Evidence from Chinese A-Share Listed Companies," *Economies*, vol. 13, no. 8, p. 236, 2025. Google Scholar | Publisher Link
125. Y. YahiaMarzouk, and J. Jin, "The Relationship Between Environmental Scanning and Organizational Resilience: Roles of Process Innovation and Environmental Uncertainty," *Frontiers in Environmental Science*, vol. 10, p. 966474, 2022. Google Scholar | Publisher Link
126. Y. Yang, Y. Zheng, G. Xie, and Y. Tian, "The Influence Mechanism of Strategic Partnership on Enterprise Performance: Exploring the Chain Mediating Role of Information Sharing and Supply Chain Flexibility," *Sustainability*, vol. 14, no. 8, p. 4800, 2022. Google Scholar | Publisher Link
127. J. Yu, L. Yuan, G. Han, H. Li, and P. Li, "A Study of the Impact of Strategic Human Resource Management on Organizational Resilience," *Behavioral Sciences*, vol. 12, no. 12, p. 508, 2022. Google Scholar | Publisher Link
128. J. Zhang, H. Li, and H. Zhao, "The Impact of Digital Transformation on Organizational Resilience: The Role of Innovation Capability and Agile Response," *Systems*, vol. 13, no. 2, p. 75, 2025. Google Scholar | Publisher Link
129. X. Zhang, S. Majid, and S. Foo, "Environmental Scanning: An Application of Information Literacy Skills at the Workplace," *Journal of Information Science*, vol. 36, no. 6, pp. 719–732, 2010. Google Scholar | Publisher Link
130. X. Zhang, S. Majid, and S. Foo, "The Contribution of Environmental Scanning to Organizational Performance," *Singapore Journal of Library and Information Management*, vol. 40, pp. 65–88, 2011. Google Scholar | Publisher Link
131. X. Zhang, S. Majid, and S. Foo, "Environmental Scanning An Emerging Discipline for LIS Education," *Library and Information Science Trends and Research: Asia-Oceania*, vol. 2, 2012. Google Scholar | Publisher Link