



MIDOCEAN UNIVERSITY

College of Entrepreneurship & Innovation

Master of Entrepreneurship

GRADUATION RESEARCH

Study of Entrepreneurial Leadership Models in Science Centers

How Adopting Entrepreneurial Thinking Transforms Science Center Management and Sustainability

An Applied Study on Mishkat Interactive Center

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Dedication

To my family, who have been my unwavering foundation throughout this journey — your patience, encouragement, and belief in me made every challenge surmountable.

To my colleagues at Mishkat Interactive Center, whose daily dedication to inspiring curiosity and igniting a love for science in the hearts of visitors continuously reminds me why this work matters.

To every leader who dares to think differently — who sees in a science center not just an institution, but an ecosystem of possibility, innovation, and community impact.

And to the Kingdom of Saudi Arabia's vision of a knowledge-driven future: may this research contribute, however modestly, to the transformation being built.

To all of you, I dedicate this work with deepest gratitude and admiration.

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In the name of Allah, the Most Gracious, the Most Merciful. All praise be to Allah who taught by the pen, taught mankind what it did not know. I ask Him to make this work sincerely for His sake and beneficial to those who seek knowledge.

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Finally, I acknowledge that any errors or shortcomings in this work are entirely my own responsibility.

Abstract

Science centers occupy a unique space in the educational and cultural landscape — they are neither traditional schools nor entertainment venues, yet they serve the functions of both. As these institutions face mounting pressures from declining public funding, digital disruption, and intensifying competition, traditional management approaches have proven insufficient. This research investigates how entrepreneurial leadership models can transform the management and long-term sustainability of science centers, using Mishkat Interactive Center in Riyadh, Saudi Arabia, as an applied case study.

The study adopts a qualitative case study methodology, drawing on semi-structured interviews with leadership and program teams at Mishkat, alongside document analysis of institutional strategies and observational insights from within the center. Data were analyzed using thematic analysis with an inductive coding approach, and findings were cross-referenced against established theoretical frameworks including entrepreneurial leadership theory, transformational leadership, institutional theory, and social enterprise models.

Findings reveal that while Mishkat demonstrates significant entrepreneurial characteristics in its programming and visitor engagement, its formal leadership and organizational structures remain largely traditional. Key barriers to entrepreneurial transformation include resource dependency, risk-averse governance cultures, and limited institutional frameworks for innovation measurement. However, the study identifies concrete pathways through which entrepreneurial leadership — characterized by opportunity recognition, adaptive decision-making, and value creation — can enhance financial sustainability, programmatic innovation, and community impact.

The research proposes a practical Entrepreneurial Leadership Framework tailored to science centers, outlining five strategic pillars: visionary leadership, revenue diversification, community co-creation, talent cultivation, and impact measurement. The findings contribute to an underexplored area at the intersection of educational leadership and entrepreneurial thinking,

particularly within the Arab world context, and offer actionable recommendations for science center leaders, policymakers, and educational administrators.

Keywords: Entrepreneurial Leadership, Science Centers, Institutional Sustainability, Informal Learning, Vision 2030, Mishkat Interactive Center, Innovation Management

الملخص بالعربية

تحتل المراكز العلمية مكانةً فريدةً في المشهد التعليمي والثقافي، إذ تجمع بين أدوار المؤسسات التعليمية و المراكز الترفيهية في آن واحد. ومع تصاعد الضغوط الناجمة عن تراجع التمويل الحكومي، والتحول الرقمي، وزيادة المنافسة، حيث باتت النماذج الإدارية التقليدية قاصرةً عن تلبية متطلبات هذه المؤسسات. تسعى هذه الدراسة إلى استكشاف كيفية تحويل نماذج القيادة الريادية لإدارة المراكز العلمية وتعزيز استدامتها على المدى البعيد، متخذةً من مركز مشكاة التفاعلي في الرياض بالمملكة العربية السعودية دراسة الحالة التطبيقية.

اعتمدت الدراسة منهجية دراسة الحالة النوعية، مستندةً إلى مقابلات شبه منظمة مع فريق القيادة والبرامج في مركز مشكاة، إلى جانب تحليل الوثائق المؤسسية والملاحظات الميدانية. وقد جرى تحليل البيانات باستخدام التحليل الموضوعاتي والتميز الاستقرائي، مع مقارنة النتائج بالأطر النظرية المعتمدة، كنظرية القيادة الريادية، والقيادة التحويلية، والنظرية المؤسسية، ونماذج المشاريع الاجتماعية.

كشفت النتائج أن مركز مشكاة يُظهر سمات ريادية واضحة في برامجهِ وتفاعله مع الزوار، غير أن هياكله القيادية والتنظيمية الرسمية لا تزال تقليدية في معظمها. وتُفترح في هذه الدراسة إطارٌ عملي للقيادة الريادية مصمَّم خصيصاً للمراكز العلمية، حيث يركز على خمسة محاور استراتيجية: القيادة الاستشرافية، وتنويع مصادر الإيرادات، والتشارك المجتمعي، وتنمية الكفاءات، وقياس الأثر.

الكلمات المفتاحية: القيادة الريادية، المراكز العلمية، الاستدامة المؤسسية، التعلم التفاعلي، رؤية 2030، مركز مشكاة التفاعلي، إدارة الابتكار.

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Chapter One: Introduction

1.1 Background of the Study

Science centers have long served as a bridge between scientific knowledge and public understanding, fostering curiosity, creativity, and a culture of lifelong learning. Yet in an era defined by rapid technological advancement, shifting visitor expectations, and increasing entertainment demand, the traditional management models governing these institutions are being fundamentally challenged. The question is no longer simply how to educate — but how to lead, innovate, and most importantly, sustain.

The concept of entrepreneurial leadership has emerged as a compelling response to this challenge. Rooted in the principles of opportunity recognition, risk-taking, innovation, and value creation, entrepreneurial leadership has historically been associated with the business world. However, its principles are increasingly being applied to non-profit and educational institutions seeking to remain relevant, impactful, and financially viable in a highly competitive landscape.

Science centers, by their very nature, are spaces of exploration and unconstrained discovery — making them uniquely positioned to embrace entrepreneurial thinking not just in their programming, but in their leadership and organizational culture. The intersection of creative learning environments and entrepreneurial management models represents a largely underexplored area of academic inquiry, particularly within the Arab world.

This research was motivated by a dual purpose: a professional immersion in the field of creative learning as a practitioner within a science center, and an academic pursuit of understanding how leadership models can be reimaged to drive institutional transformation. The researcher's direct experience at Mishkat Interactive Center provided both the inspiration and the practical lens through which this study was conceived.

Historically, science centers evolved from natural history museums and world exhibitions of the 19th century, gradually shifting toward interactive and participatory experiences throughout the 20th century. This evolution demanded not only a change in programming philosophy, but a fundamental rethinking of institutional leadership — one that is agile, innovative, and entrepreneurially minded.

Against this backdrop, this study seeks to examine how entrepreneurial leadership models can transform science center management and sustainability, using Mishkat Interactive Center as an applied case study — contributing to a growing body of knowledge at the crossroads of educational leadership and entrepreneurial thinking.

1.2 Research Problem

Despite their critical role in advancing scientific literacy and public engagement, science centers around the world face mounting institutional pressures — from declining public funding and rising operational costs, to intensifying competition from digital entertainment platforms and evolving visitor expectations. Traditional management approaches, often bureaucratic and program-driven, have proven increasingly insufficient in addressing these complex and dynamic challenges.

In the Arab world, and within the Saudi context specifically, science centers are at a pivotal crossroads. While national agendas such as Vision 2030 have amplified the demand for knowledge-based institutions and innovation-driven environments, there remains a significant gap in leadership frameworks that can translate this ambition into sustainable institutional practice.

This research identifies a critical problem: the absence of clearly defined entrepreneurial leadership models tailored to science centers, and the limited understanding of how such models can practically transform management structures and long-term sustainability. Mishkat Interactive Center serves as the focal applied case through which this problem is examined.

1.3 Significance of the Study

This study holds significance on multiple levels:

- **Academically, it contributes to a largely underexplored area at the intersection of entrepreneurial leadership theory and informal education management — particularly within the Arab academic landscape.**
- **Practically, it offers science center leaders, policymakers, and educational administrators actionable insights into leadership transformation, providing a replicable framework for similar institutions.**
- **Nationally, it aligns with Saudi Arabia's Vision 2030 objectives of fostering innovation, entrepreneurship, and a knowledge-driven economy — positioning science centers as active contributors to this transformation.**
- **Institutionally, the findings directly serve Mishkat Interactive Center as an evidence-based foundation for leadership and strategic development.**

1.4 Research Questions

This study is guided by the following central question:

How can entrepreneurial leadership models transform the management and sustainability of science centers?

This is further explored through the following sub-questions:

1. What are the defining characteristics of entrepreneurial leadership models applicable to science centers?
2. To what extent does current leadership practice at Mishkat Interactive Center reflect entrepreneurial thinking?
3. What are the key institutional barriers to adopting entrepreneurial leadership in science centers?

4. How does entrepreneurial leadership influence the financial sustainability and programmatic innovation of science centers?
5. What leadership framework can be proposed to guide science centers toward entrepreneurial transformation?

1.5 Research Objectives

1. To examine and define the characteristics of entrepreneurial leadership models relevant to science centers.
2. To assess the current leadership practices at Mishkat Interactive Center against entrepreneurial leadership principles.
3. To identify institutional barriers and enablers of entrepreneurial transformation in science centers.
4. To analyze the relationship between entrepreneurial leadership and institutional sustainability.
5. To develop a practical entrepreneurial leadership framework applicable to science centers in the Arab world.

1.6 Scope and Limitations

This study is geographically focused on Saudi Arabia, with Mishkat Interactive Center in Riyadh serving as the primary case. It is temporally bounded to the period 2025–2026. The study focuses thematically on leadership models, institutional management, and sustainability within the science center context.

Limitations include the single-case study design, which may restrict the generalizability of findings. The qualitative approach, while appropriate for depth, does not yield statistical representativeness. Access to certain institutional documents may have been restricted, and participant responses may be subject to social desirability bias.

1.7 Structure of the Research

This research is organized into five chapters:

- Chapter One: Introduction — background, problem, significance, research questions, and objectives.
- Chapter Two: Literature Review & Theoretical Framework — prior studies, key theories, and analytical model.
- Chapter Three: Research Methodology — research design, data collection, analysis approach, and ethical considerations.
- Chapter Four: Results & Discussion — presentation and interpretation of findings.
- Chapter Five: Conclusion & Recommendations — summary, practical recommendations, and future research directions.

Chapter Two: Literature Review & Theoretical Framework

2.1 Overview of Entrepreneurial Leadership

Entrepreneurial leadership sits at the intersection of entrepreneurship and leadership theory. Gupta, MacMillan, and Surie (2004) define it as the ability to influence others to enact a vision that enhances value creation by successfully managing uncertainty and exploiting opportunities. Unlike traditional leadership, which operates within defined structures, entrepreneurial leadership is characterized by proactivity, risk tolerance, opportunity-seeking, and the mobilization of resources in novel ways.

Ireland, Hitt, and Sirmon (2003) further develop this concept within a strategic entrepreneurship framework, arguing that entrepreneurial leaders simultaneously pursue opportunity and manage advantage — two dimensions that are particularly relevant to resource-constrained institutions like science centers. Drucker (1985) laid early groundwork by asserting that innovation and entrepreneurship are learnable disciplines applicable to any institution, not merely commercial enterprises.

More recently, scholars have explored entrepreneurial leadership in non-profit and public sector contexts. Kearney, Harber, and Kearney (2009) found that entrepreneurial behaviors in public organizations positively correlate with organizational performance and service innovation — findings directly applicable to publicly-funded science centers.

2.2 Science Centers: Evolution and Management Challenges

Science centers emerged from natural history museums in the 19th century and underwent significant transformation during the 20th century, particularly following the launch of Sputnik in 1957 which triggered global investment in science education infrastructure (Falk & Dierking, 2000). The founding of the Exploratorium in San Francisco in 1969 by Frank Oppenheimer marked a paradigm shift toward hands-on, inquiry-based learning environments.

Today, science centers face a complex operational environment. The Association of Science and Technology Centers (ASTC) reports that the global science center sector includes over 3,000 institutions serving hundreds of millions of visitors annually. Yet many operate under chronic financial pressure, relying heavily on government grants and philanthropic support that have become increasingly uncertain (Anderson et al., 2003).

Management literature on science centers highlights several recurring challenges: the tension between educational mission and financial sustainability; the difficulty of measuring impact and demonstrating return on investment to funders; talent management in specialized, interdisciplinary environments; and the challenge of staying relevant in an era of rapidly evolving digital entertainment alternatives (Bradburne, 1998).

2.3 Informal Learning Theory and Science Centers

Science centers operate primarily within the domain of informal learning — learning that occurs outside formal educational settings and is characterized by choice, personal relevance, and intrinsic motivation (Falk & Dierking, 2000). The Contextual Model of Learning developed by Falk and Dierking emphasizes the interplay of personal, sociocultural, and physical contexts in shaping learning outcomes in museums and science centers.

This theoretical grounding is significant for entrepreneurial leadership, as it establishes the unique value proposition of science centers: the ability to create powerful, memorable, and self-directed learning experiences at scale. Entrepreneurial leaders in this context must understand how to leverage this distinctiveness as a competitive advantage while innovating the delivery, reach, and sustainability of these experiences.

2.4 Transformational Leadership in Educational Institutions

Bass (1985) introduced transformational leadership as a style that motivates followers to exceed expected performance by appealing to higher ideals and moral values. Subsequent research has

consistently linked transformational leadership with innovation, employee creativity, and organizational change — qualities essential for entrepreneurial transformation.

In educational and non-profit contexts, transformational leadership has been shown to facilitate the development of shared vision, enhance staff commitment, and foster a culture of continuous improvement (Leithwood & Jantzi, 2000). Science center leaders who adopt transformational approaches are better positioned to inspire their teams to embrace entrepreneurial behaviors and experiment with new models of value creation.

2.5 Sustainability Models for Non-Profit Organizations

Dees (1998) introduced the concept of the social enterprise as an organization that uses business methods to achieve social goals — a framing directly applicable to science centers. Oster (1995) advanced strategic management frameworks for non-profits that emphasize revenue diversification, stakeholder management, and competitive positioning as keys to long-term sustainability.

More recently, hybrid organizational models have gained attention — entities that blend mission-driven purpose with market-oriented revenue strategies (Battilana & Lee, 2014). Science centers increasingly operate as hybrid organizations, generating earned revenue through admissions, memberships, event rentals, and commercial partnerships while maintaining their core educational mission.

2.6 Science Centers in the Saudi Arabian Context

Saudi Arabia's Vision 2030 framework explicitly identifies knowledge economy development, scientific literacy, and innovation capacity as national priorities. The establishment of institutions like Mishkat Interactive Center reflects this ambition, as does the broader investment in cultural and educational infrastructure across the Kingdom.

However, academic literature on science center leadership and management within the Saudi and Arab regional context remains sparse. Most existing research on Arab science education focuses on school-based formal learning, leaving a significant gap in understanding how informal learning institutions can be managed and sustained entrepreneurially in this cultural and economic context.

2.7 Analytical Framework

This study synthesizes the above theoretical threads into an integrated analytical framework with four dimensions:

- **Entrepreneurial Leadership Characteristics:** opportunity recognition, risk tolerance, innovation orientation, resource leveraging, and visionary communication.
- **Institutional Context:** governance structures, funding models, mission clarity, organizational culture, and staff capabilities.
- **Sustainability Dimensions:** financial sustainability, programmatic innovation, community relevance, and impact measurement.
- **Enabling Conditions:** leadership development, stakeholder engagement, strategic planning, and policy environment.

This framework guides both the data collection instrument design and the analytical approach applied in Chapters Three and Four.

Chapter Three: Research Methodology

3.1 Research Design

This study adopts a qualitative case study approach, selected for its appropriateness in exploring complex, context-dependent phenomena within real-world institutional settings (Yin, 2018). The case study methodology allows for rich, in-depth investigation of how entrepreneurial leadership manifests — or could manifest — within the specific organizational context of Mishkat Interactive Center.

A qualitative design is particularly suitable here given the exploratory nature of the research questions, the limited prior literature on science center entrepreneurial leadership in the Arab world, and the need to capture nuanced institutional dynamics that quantitative methods would fail to surface.

3.2 Case Study Rationale: Mishkat Interactive Center

Mishkat Interactive Center was selected as the research site for several reasons: it is one of Saudi Arabia's leading science centers, operating for 15 years and within the context of Vision 2030; the researcher has direct professional experience within the institution, facilitating access and contextual understanding; and the center represents a microcosm of the broader challenges and opportunities facing science centers in the Arab world.

Mishkat's dual mandate — to deliver world-class interactive science experiences while operating sustainably within national education frameworks — makes it an ideal site for examining the intersection of entrepreneurial leadership and institutional management.

3.3 Data Collection Methods

3.3.1 Semi-Structured Interviews

The primary data source consists of semi-structured interviews conducted with key informants across Mishkat's organizational hierarchy. Participants include senior leadership (Director-level

and above), program development managers, operations staff, and external stakeholders including education partners and corporate sponsors. The interview guide covers five thematic areas:

- Current leadership philosophy and decision-making processes
- Revenue generation, financial management, and sustainability strategies
- Innovation processes and barriers to change
- Community engagement and stakeholder relationships
- Vision for institutional transformation and entrepreneurial potential

Interviews were conducted in Arabic and English based on participant preference, audio-recorded with consent, and transcribed for analysis.

3.3.2 Document Analysis

Secondary data was gathered through analysis of institutional documents including strategic plans, annual reports, program portfolios, funding agreements, and marketing materials. This triangulation approach enhances the validity and depth of findings.

3.3.3 Observational Field Notes

The researcher's embedded position within Mishkat provided opportunities for naturalistic observation of leadership behaviors, team interactions, decision-making processes, and organizational culture. Field notes were systematically recorded and integrated into the analysis.

3.4 Data Analysis

Data were analyzed using thematic analysis following the six-phase process outlined by Braun and Clarke (2006): familiarization with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report.

An inductive coding approach was adopted, allowing themes to emerge organically from the data rather than being imposed from pre-existing frameworks. In a second analytical pass, emergent themes were cross-referenced against the established theoretical frameworks outlined in Chapter Two to identify areas of alignment, divergence, and novel contribution.

NVivo qualitative analysis software was used to manage and code data systematically, ensuring auditability and analytical rigor.

3.5 Validity and Reliability

Several strategies were employed to enhance trustworthiness: member checking (sharing preliminary findings with key participants for validation); triangulation of data sources; maintaining a detailed audit trail of analytical decisions; and reflexivity — the researcher's awareness of and accounting for their insider position within the organization.

3.6 Ethical Considerations

All participants provided informed consent prior to participation. Confidentiality was maintained through anonymization of individual responses. Data were stored securely and used exclusively for academic purposes. The research was conducted in compliance with Midocean University's ethical guidelines for research involving human participants.

Chapter Four: Results & Discussion

4.1 Overview of Findings

Analysis of interview data, institutional documents, and field observations yielded five overarching themes that illuminate the current state of leadership at Mishkat Interactive Center and the pathways toward entrepreneurial transformation. These themes are presented below, followed by discussion of their implications in relation to the research questions and theoretical frameworks.

4.2 Theme 1: Visionary Intent Without Structural Enablement

Across all interview participants, there was a clear and consistent articulation of ambitious vision — a desire to position Mishkat as a regional hub for scientific curiosity, innovation, and community engagement. Senior leaders described aspirations to expand programming, forge international partnerships, and leverage digital technologies to amplify reach.

However, a notable gap emerged between this visionary intent and the structural mechanisms needed to realize it. Organizational hierarchies were found to be relatively rigid, decision-making authority was concentrated at senior levels, and formal innovation processes were largely absent. As one program manager noted, creative ideas frequently emerged from frontline staff but lacked institutional channels through which they could be developed and piloted.

This finding aligns with Gupta et al.'s (2004) observation that entrepreneurial leadership requires not only visionary individuals but organizational architectures that enable distributed initiative and rapid experimentation. The gap between vision and structure represents perhaps the most significant barrier to entrepreneurial transformation at Mishkat.

4.3 Theme 2: Financial Sustainability as Both Challenge and Catalyst

Financial sustainability emerged as the dominant operational concern across all participant groups. Mishkat's revenue model relies heavily on government funding and institutional partnerships, with

earned revenue from store sales constituting a relatively modest proportion of total income.

Participants identified several untapped revenue opportunities: corporate education programs and STEM training partnerships, premium experiential events and specialized camps, content licensing and intellectual property development, and international touring exhibitions. These opportunities reflect precisely the entrepreneurial revenue diversification strategies recommended by Dees (1998) and Oster (1995) for mission-driven organizations.

Importantly, financial pressure was not uniformly perceived as a constraint — several participants described it as a catalyst for creative problem-solving and entrepreneurial thinking. This paradox is consistent with resource scarcity literature, which suggests that constraint can drive innovation when accompanied by psychological safety and leadership permission to experiment.

4.4 Theme 3: Community Co-Creation as Underutilized Asset

Analysis revealed that Mishkat has developed strong community relationships through school programs, and family events. However, these relationships are predominantly transactional — Mishkat delivers experiences and the community consumes them.

Entrepreneurial leadership literature increasingly emphasizes co-creation — the active involvement of community members, educators, and local organizations in designing, delivering, and evaluating programs (Prahalad & Ramaswamy, 2004). Several participants expressed enthusiasm for more participatory models but noted the absence of frameworks, incentives, or leadership mandate to pursue them systematically.

In the Vision 2030 context, community co-creation represents a particularly powerful strategy, as it aligns with national objectives around social cohesion, citizen participation, and the development of community-based innovation ecosystems.

4.5 Theme 4: Talent Development and Entrepreneurial Culture

Human capital emerged as a critical dimension of entrepreneurial capacity. Mishkat employs a diverse team of educators, designers, engineers, and administrators — a multidisciplinary talent pool with significant entrepreneurial potential. However, formal professional development programs were found to be limited, and there was no systematic approach to cultivating entrepreneurial mindsets or leadership capabilities among staff.

Participants described a culture that valued reliability and quality execution over experimentation and risk-taking. While this culture has served operational consistency, it presents a barrier to the adaptive, opportunity-seeking orientation that characterizes entrepreneurial leadership. Transformational leadership theory (Bass, 1985) suggests that cultural shift requires deliberate leadership modeling, recognition systems that reward innovation, and safe spaces for experimentation and failure.

4.6 Theme 5: Impact Measurement and Strategic Learning

A consistent finding across participant groups was the limited sophistication of impact measurement systems. While Mishkat tracks visitor numbers, program attendance, and satisfaction scores, there was limited evidence of systematic measurement of deeper learning outcomes, community impact, or return on programmatic investment.

This gap is significant for entrepreneurial sustainability for two reasons. First, robust impact data is increasingly required by funders and partners to justify investment. Second, strategic learning — the capacity to gather, analyze, and act on performance data — is a core competency of entrepreneurially-led organizations (Ireland et al., 2003). Developing more sophisticated measurement frameworks would simultaneously strengthen Mishkat's evidence base and support more agile, data-driven decision-making.

4.7 Proposed Entrepreneurial Leadership Framework for Science Centers

Drawing on the thematic findings above and the theoretical frameworks reviewed in Chapter Two, this study proposes a five-pillar Entrepreneurial Leadership Framework for Science Centers:

Pillar	Description	Key Actions for Mishkat
1. Visionary Leadership	Articulating and embedding a compelling, entrepreneurially-oriented institutional vision	Develop a 5-year innovation strategy; establish distributed leadership model
2. Revenue Diversification	Building multiple earned revenue streams	Launch corporate STEM programs; develop IP licensing; introduce premium experiences
3. Community Co-Creation	Actively involving community in program design and delivery	Establish educator advisory boards; launch community maker spaces
4. Talent Cultivation	Developing entrepreneurial mindsets and leadership capacity across the organization	Implement innovation training; create internal incubator; reward experimentation
5. Impact Measurement	Building sophisticated systems to measure, communicate, and learn from outcomes	Develop learning outcome frameworks; implement visitor journey analytics

This framework is intended as a practical tool for science center leaders rather than a prescriptive model — its application should be contextually adapted to each institution's specific circumstances, resources, and community context.

Chapter Five: Conclusion & Recommendations

5.1 Summary of Findings

This research set out to examine how entrepreneurial leadership models can transform the management and sustainability of science centers, using Mishkat Interactive Center as an applied case study. The findings reveal a nuanced picture: Mishkat possesses significant entrepreneurial potential, expressed through its programming creativity, community relationships, and the visionary aspirations of its leadership. Yet it has not yet developed the structural conditions, cultural orientation, or strategic frameworks needed to fully actualize this potential.

Five key themes emerged from the analysis: the gap between visionary intent and structural enablement; financial sustainability as both challenge and catalyst; community co-creation as an underutilized asset; the need for talent development and entrepreneurial culture; and the importance of impact measurement and strategic learning. Together, these themes paint a picture of an institution at a pivotal inflection point — one that is ready for entrepreneurial transformation but requires intentional leadership commitment to make it happen.

5.2 Conclusions

The central argument of this research is that entrepreneurial leadership is not a luxury for science centers — it is a strategic necessity. As public funding becomes less reliable, competition intensifies, and societal expectations of educational institutions evolve, science centers that fail to embrace entrepreneurial thinking risk irrelevance and institutional decline.

At the same time, entrepreneurial transformation in science centers must be mission-aligned. The goal is not to turn a science center into a commercial enterprise, but to apply entrepreneurial tools — opportunity recognition, adaptive management, value creation, and strategic resource leveraging — in service of the educational and community mission that gives the institution its purpose and legitimacy.

Within the Saudi Arabian context, this transformation is both timely and strategically aligned. Vision 2030's emphasis on innovation, knowledge economy development, and social entrepreneurship creates a policy environment that actively supports and rewards the kind of institutional evolution this research describes. Mishkat Interactive Center, as one of the Kingdom's flagship science education institutions, is uniquely positioned to pioneer this model.

5.3 Recommendations

5.3.1 For Mishkat Interactive Center

1. Develop and adopt a formal Innovation & Entrepreneurship Strategy as a complement to the existing institutional strategic plan, with clear targets, accountabilities, and timelines.
2. Establish a distributed leadership model that empowers department heads and program managers to make and implement decisions within defined parameters, reducing bottlenecks and accelerating innovation cycles.
3. Launch a Revenue Diversification Initiative with dedicated resources to develop corporate education programs, premium experiences, membership products, and intellectual property licensing arrangements.
4. Create a Community Co-Creation Platform that systematically involves educators, families, and community organizations in the design and evaluation of programs and experiences.
5. Invest in a Talent Development Program focused on entrepreneurial mindset, design thinking, and innovation management, with external benchmarking against leading global science centers.
6. Implement a comprehensive Impact Measurement Framework that goes beyond attendance metrics to capture learning outcomes, community impact, and return on programmatic investment.

5.3.2 For Science Center Leadership More Broadly

1. Actively engage with entrepreneurial leadership theory and practice, seeking professional development opportunities that bridge educational leadership and business innovation.

2. Build peer networks with other science centers globally to share best practices, collaborative programming, and joint fundraising opportunities.
3. Advocate for enabling policy environments that give science centers greater operational flexibility and commercial freedom while maintaining accountability for educational mission.

5.3.3 For Policymakers and Funders

1. Move toward outcome-based funding models that reward innovation, impact, and sustainability rather than simply activity metrics.
2. Create dedicated capacity-building programs for science center leaders that develop entrepreneurial competencies alongside educational expertise.
3. Facilitate public-private partnership frameworks that enable science centers to engage corporate partners, generate earned revenue, and develop commercial opportunities without jeopardizing their non-profit status.

5.4 Future Research Directions

This study opens several avenues for future research:

- Comparative case studies across multiple Arab science centers to test the generalizability of the proposed framework and identify context-specific enablers and barriers.
- Quantitative studies measuring the relationship between entrepreneurial leadership behaviors and science center performance indicators.
- Longitudinal research tracking institutional transformation over time as science centers implement entrepreneurial leadership practices.
- Investigation of the role of digital transformation and technology innovation in enabling entrepreneurial science center models.

5.5 Closing Reflection

Science centers stand at a unique convergence point — between science and wonder, between education and entertainment, between mission and market. This convergence is not a tension to be resolved but a creative space to be inhabited with entrepreneurial courage and educational wisdom.

The leaders who will define the future of science centers are those who can hold both dimensions simultaneously — who can run a surplus and inspire curiosity, who can satisfy a funder and delight a child, who can build sustainable institutions and nurture the next generation of scientists, innovators, and citizens.

This research is offered as a contribution to that leadership — a small but earnest attempt to connect theory with practice, and to help Mishkat and institutions like it build the futures they envision.

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— End of Research —