QDB
بنك قطر للتنمية
Qatar Development Bank

Qatar's 3D Printing Sector

Executive Summary

SME Industry Series 2024

As part of Qatar's efforts to strengthen the private sector and advance the country's entrepreneurship, SME, and innovation ecosystems in line with its National Vision 2030, Qatar Development Bank (QDB) continues to play a central role as a growth partner for entrepreneurs—supporting them from ideation to execution.

Through its SME Industry Series, QDB publishes sector-focused reports that provide Qatari entrepreneurs with valuable insights such as market demand analysis, competitive landscape assessments, and information on existing market players, enabling them to make informed decisions regarding market entry and business development.

This summary presents an overview of Qatar's 3D printing sector, which stands at the forefront of innovation and industrial growth. It provides key market insights, emerging trends, an overview of the local ecosystem, and highlights potential opportunities for SMEs to adapt to market changes and strengthen their competitive edge in Qatar's evolving economy.

The detailed report, on which this summary is based, is available on the QDB website.

The advent of 3D printing has transformed manufacturing by enabling a more efficient and versatile approach to producing finished products and components across various industries

3D PRINTING MARKET SEGMENTATION

END-USE INDUSTRY	DESCRIPTION	APPLICATIONS
CONSTRUCTION	Rapid production of customized architectural components, cutting construction time, labor costs, and material waste.	• Architectural Models • 3D Printed Buildings & Bridges
CONSUMER GOODS	Customizable fashionable accessories and clothing prototypes, as well as personalized toys, souvenirs and collectibles.	• Jewelry • Furniture • Fashion Accessories & Clothing
HEALTHCARE	Used to create implants, prosthetics and metal devices. Uses materials such as biomaterials, metals and polymers.	• Customized Prosthetics • Surgical Devices
MANUFACTURING	Focuses on machinery parts, tools, fixtures and industrial components.	• Complex Assemblies • Product Prototypes
OIL & GAS	Aids the oil & gas sector by producing complex parts and minimizing downtime.	• Replacement Machinery Parts • Specialized Tools Bridge
AEROSPACE	Creates lightweight, high-strength aircraft components critical for performance.	• Customized Facades • Integrated Hydraulic Systems
EDUCATION	Plays a role in education by enhancing experiential learning through hands-on tools and aids research.	• Educational Models & Aids • Custom Laboratory Equipment

This report segments the 3D printing market based on seven key end-use industries, prioritized for their regional relevance.

The rise of 3D printing, or Additive Manufacturing (AM), has revolutionized industries by enabling on-demand production, directly converting digital designs into finished products. This shift replaces traditional multi-step supply chains with a streamlined, efficient, and flexible manufacturing model

TRADITIONAL MANUFACTURING VS 3D PRINTING SUPPLY CHAINS

TRADITIONAL SUPPLY CHAIN

RAW MATERIALS → MULTIPLE SUPPLIERS → MANUFACTURERS → MULTI-STAGE DISTRIBUTION → RETAILER → CONSUMER

3D PRINTING - ENABLED SUPPLY CHAIN

DESIGN FILE/ RAW MATERIALS → LOCAL 3D PRINTING FACILITY/SERVICE PROVIDERS → CONSUMER

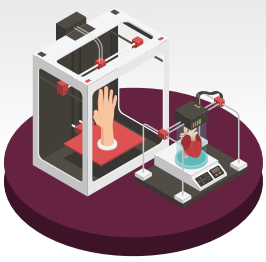
3D printing enables decentralized, on-demand production with high customization capability.

BENEFITS AND LIMITATIONS

Benefits	Limitations
Enables intricate and custom designs quickly.	Fewer material options available.
Reduces waste and environmental impact.	May lack strength for high-stress uses.
Speeds up production by avoiding tooling.	Often needs post-processing.
Economical for low to medium volumes.	Expensive equipment and materials.

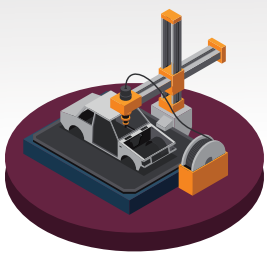
To appreciate the impact of 3D printing, it is important to examine the core technologies that form its foundation, each offering unique capabilities and applications within the evolving landscape

3D PRINTING TECHNOLOGIES



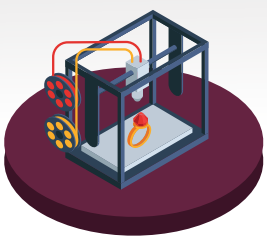
POLY JET PRINTING

This process creates detailed, multi-material, full-color models by jetting and curing photopolymer resin with UV light. It's ideal for high-accuracy prototypes in consumer goods, medical devices, and automotive industries.



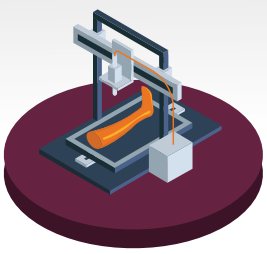
FUSED DEPOSITION MODELING (FDM)

FDM melts plastic filament to build parts layer by layer. It is commonly used in aerospace, automotive, consumer goods, and education. Key raw materials include polylactic acid (PLA), Acrylonitrile Butadiene Styrene (ABS), Polyethylene Terephthalate Glycol (PETG), and Nylon.



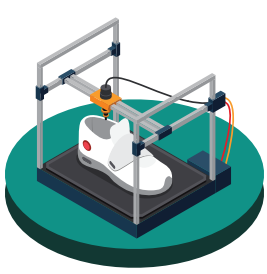
STEREOLITHOGRAPHY (SLA)

Uses a laser to cure liquid resin into high-detail, solid layers. It excels in creating intricate, transparent prototypes for jewelry, dental, automotive, and consumer goods, though it has a limited build size. The raw material is liquid photopolymer resin.



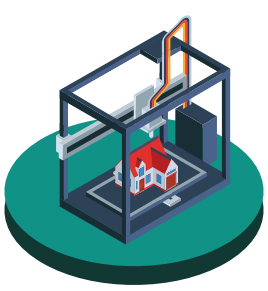
SELECTIVE LASER SINTERING (SLS)

Fuses powdered materials with a laser to produce strong, complex parts. It's efficient for durable components and functional parts used in aerospace, automotive, healthcare, and consumer goods, using plastic or metal powders.



MULTI-JET FUSION (MJF)

Employs heating and inkjet-style agents to fuse plastic powder and is commonly used for detailed prototypes and end-use parts. It is suitable for aerospace, automotive, healthcare, and consumer goods, with PA 12 as a common material.

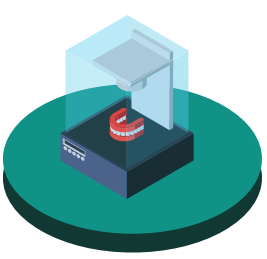


DIRECT METAL LASER SINTERING (DMLS)

Uses lasers to fuse metal powders into strong, detailed parts, ideal for high-performance applications in aerospace, automotive, and medical sectors. It uses metals like titanium, stainless steel, and aluminum.

ELECTRON BEAM MELTING (EBM)

Melts metal powders with an electron beam to produce strong parts quickly. Useful for high-performance industrial uses such as aerospace and medical applications. Key materials include titanium alloys.



DIGITAL LIGHT PROCESSING (DLP)

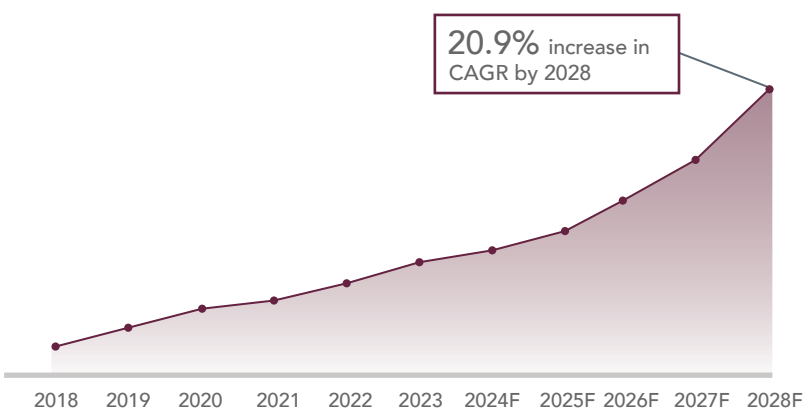
Cures resin with UV light for fast, high-resolution printing, perfect for jewelry, dental, and detailed small parts. It uses photopolymer resin but has a limited material range.

The highlighted technologies are best suited for SMEs, given their inherent advantages in cost-effectiveness, agility, and rapid prototyping for small-scale production.

Consequently, the global 3D printing market is expanding rapidly across the entire value chain

GLOBAL 3D PRINTING MARKET SIZE

Global 3D Printing Market
(QAR Bn, 2018-2028F)

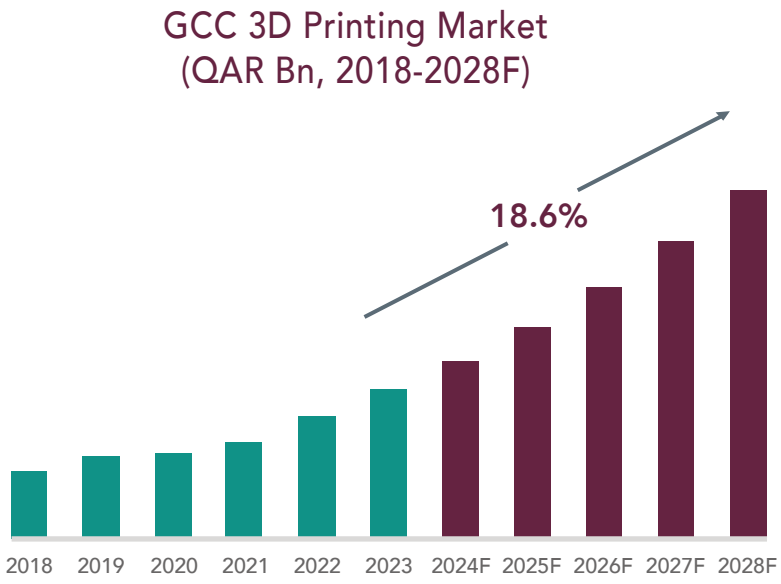


The 3D Printing Market is projected to surpass **QAR 200 Billion** by **2028** with a **of 20.9%**

Source: Protolabs

In line with global trends, the GCC's 3D printing sector is thriving, driven by increased venture capital funding

GCC's 3D PRINTING MARKET



KEY INSIGHTS

- Growth in the GCC is led by **Saudi Arabia (KSA)** and the **United Arab Emirates (UAE),** driven by manufacturing activity and national prioritization, with the inclusion of **3D printing** targets in national strategic goals.
- **3D printing** has versatile applications across various manufacturing sectors including **fashion, luxury goods,** and **pharmaceuticals.**

The GCC's 3D printing industry is expected to surge from **QAR 1.08 billion** in **2017** to **QAR 2.12 billion** by **2028**

This expansion is fueled by growing adoption across **construction, healthcare and consumer goods**

Source: Protolabs, World Bank

GCC member states have acknowledged the potential of advanced manufacturing technologies and have begun to incorporate it into their national long-term plans. This indicates a growing awareness and interest in exploring the potential of this technology within the region

3D PRINTING STRATEGIC DIRECTION IN THE GCC

GCC State	Strategic Vision	Industry Adoption	Academic/Research Developments
Qatar	**Qatar National Vision 2030** promotes advanced manufacturing technologies*	**Qatar Airways** used 3D printing for curtain comfort header	**Qatar University** used 3D-printed World Cup stadium models
UAE	**Dubai 3D Printing Strategy** aims for 25% of buildings to be 3D printed by 2030	**Emirates Airlines** used 3D printing for aircraft parts	**Sinterex** produced 3D printed dental implant bridges
KSA	**Vision 2030** includes 3D printing as key technology for manufacturing sector	**Saudi Aramco** used 3D printing for parts of new oil processing facility	**Forsan Real Estate** produced a 3D printed mosque
Oman	**Oman Vision 2040** includes AM technologies to diversify the economy	**Immensa** partnered with **Intaj Suhar** to use 3D printing to manufacture high-tech spare parts	**GUtech** and **COBOD** used 3D printing to produce buildings
Bahrain	**Economic Vision 2030** alludes to 3D printing as a tool for achieving low-cost manufacturing	**Avenco 3D** used 3D printing to produce concrete structures	**AUBH** has partnered with **Go Fab 3D** to launch a 3D printing facility
Kuwait	**Kuwait Vision 2035** emphasizes technological innovation including 3D printing	**Kuwait United Poultry Company** used 3D printing to build water tanks	**KCST** has a Fab Lab through which it offers programs in 3D printing

Source: Government Websites

*QNV emphasizes investment in advanced technologies that minimize environmental degradation. 3D printing offers environmental advantages by reducing waste and lowering the environmental impact compared to traditional manufacturing methods.

Qatar's 3D printing ecosystem fosters a diverse network of stakeholders. The collaborative effort aims to drive innovation and economic growth

LOCAL 3D PRINTING ECOSYSTEM

Sector Developers

Commercial Registration & Regulators

Ministry of Commerce and Industry
QFZ
Qatar Financial Centre
Ministry of Communications and Information Technology

Academic & Research Entities

Hamad Bin Khalifa University
Qatar Foundation
Qatar University
QRDI Council

Funding & Support Network

QDB
invest Qatar
Scale 7
Qatar Business Incubation Center

Sector Enablers

Technology Support

TASMU
Digital Incubation Center
Qatar Science & Technology Park
Digital Center of Excellence

Raw Materials and Equipment Procurement

Qatalum
Almana & Partners
QATAR STEEL

Delivery Stakeholders

Major Service Providers

GORD 3D
Verse
VECTORIZE

Niche Service Providers

Tebyan
Q3DPrints
Voltaat

Source: Primary Research. Company Websites
*Please note that the list of entities provided is not exhaustive.

Sector Developers

Formulate policies that lay the groundwork for industry standards and ensure regulatory compliance along with licensing platforms. Academic and research entities drive research and educational programs to nurture talent, fostering a skilled workforce. Collaboration between these entities, government, and SMEs helps create a robust ecosystem that encourages innovation and growth. Funding and support entities guide entrepreneurs and startups on their journey to become recognized commercially viable brands. Notably, Scale 7 leverages 3D printing technology across various creative and manufacturing applications and offers training programs to support its adoption.

Sector Enablers

This group boosts Information and Communications Technology (ICT) innovation through cutting-edge technology and essential materials vital for innovation and commercialization. Enablers also ensure that SMEs in the 3D printing space have access to technological advancements and have the potential to provide raw materials. Their contributions are key to turning research and ideas into viable, market-ready innovations.

Delivery Stakeholders

These entities play a key role in the application and commercialization of 3D printing technologies. Major service providers offer large-scale solutions, utilizing their extensive resources to serve a wide range of industries and promote adoption in Qatar. In contrast, niche providers deliver specialized solutions tailored to specific markets and help raise awareness of the benefits and use cases of 3D printing. For example, Tebyan provides 3D printing services in educational and manufacturing contexts. Currently, there are no 3D printer manufacturers based in Qata

Qatar's growing 3D printing sector benefits from a strong ecosystem, fostering innovation and industry adoption.

The following covers Qatar's 3D printing value chain, detailing its key stages and current players

LOCAL VALUE CHAIN

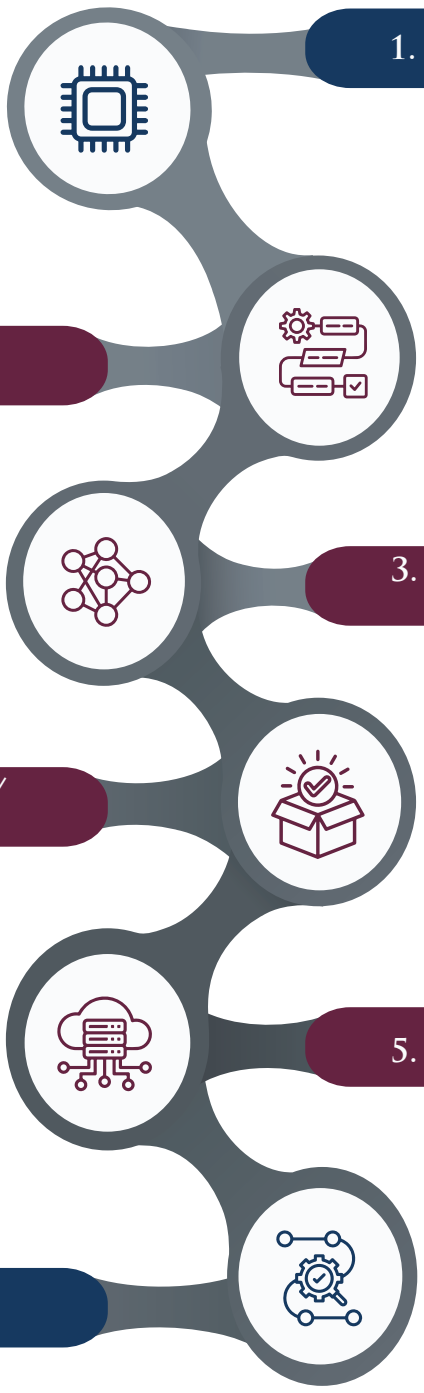
1. Research — Low Opportunity
2. Design & Development — Moderate Opportunity
3. Materials & Equipment Procurement — Moderate Opportunity
4. Production Facilities/ Service Provision — High Opportunity
5. Post-Processing — High Opportunity
6. End-Use Applications — Low Opportunity

Raw Material Provider

Equipment Provider

Potential Focus Areas for SMEs

*Please note the list of entities provided is not exhaustive



1. Research

The **Research** phase drives research and education programs to nurture talent, with Hamad Bin Khalifa University (HBKU), Qatar University, and Qatar Research, Development and Innovation (QRDI) Council as contributors to advanced research, specialized education, and awareness initiatives.

This segment presents limited opportunities for local SMEs. Dominated by established institutions, this sector necessitates substantial capital investment and specialized expertise, creating high barriers to entry. SME engagement may be facilitated through strategic collaborations with these participants. This segment presents limited opportunities for local SMEs. Dominated by established institutions, this sector necessitates substantial capital investment and specialized expertise, creating high barriers to entry. SME engagement may be facilitated through strategic collaborations with these participants.

2. Design & Development

The **Design and Development** phase encompasses conceptualization, 3D modeling and software design services for 3D-printed products. Entities like Qatar University, GORD3D and Scale 7 contribute to this phase and provide value added services.

This segment presents medium-level opportunities for local SMEs. While established entities are active, SMEs can strategically focus on specialized offerings, such as design optimization and software customization, leveraging the local demand for rapid prototyping with precise digital modeling in end-product development.

3. Materials & Equipment Procurement

The **Materials and Equipment Procurement** phase involves acquiring raw materials and 3D printers. Key materials like customized aluminum powder and specialized thermoplastics (TPU, PVA) support spare parts production in the aviation and oil & gas industries, ensuring durability and functionality.

This phase offers a moderate opportunity to localize thermoplastic and metal filament production, reducing lead times and import reliance by leveraging Qatar's plastic resources. SMEs can contribute by establishing local production. The Qatar National Manufacturing Strategy 2023-2030 identifies these materials as investment opportunities, supporting efforts to expand manufacturing and industrial self-sufficiency.

4. Production Facilities / Service Provision

The **Production Facilities / Service Provision** phase represents the core of AM & 3D printing. Entities like GORD3D and 3DVerse operate within this stage, managing state-of-the-art 3D printing facilities or offering comprehensive production services, including prototyping and small-batch manufacturing.

This high-opportunity phase is crucial to the value chain and requires the largest investment, as efficiencies and competitive advantages here enhance market positioning. Furthermore, the Qatar National Manufacturing Strategy 2023-2030 identifies opportunities to establish accredited metal and plastic 3D printing factories for spare parts, supporting industrial growth and self-sufficiency.

5. Post-Processing

Following the printing process, parts often undergo **Post-Processing** to meet final specifications. Companies like GORD3D and Qatar Technical operate in this phase, providing advanced services such as surface finishing, thermal treatment and rigorous quality assurance.

Post-processing offers a high opportunity for local SMEs as it is closely tied to service provision. In-house processing enhances efficiency and provides greater quality control.

6. End-Use Applications

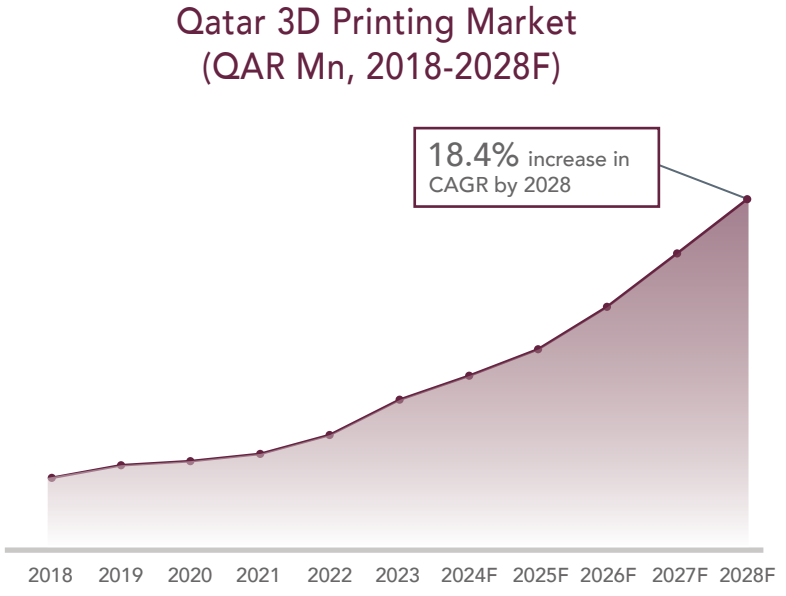
The **End-Use Application** phase involves the integration and application of 3D-printed components into end-use products. Qatar Airways, Qatar Energy, and Sidra Medicine have deployed 3D printed products in critical sectors such as oil and gas, aerospace, and healthcare. Qatar Foundation uses 3D printers for educational purposes and STEM curriculum.*

This phase generally offers limited opportunity as large buyers dominate this segment for their industrial applications. SMEs could gain a foothold by adopting 3D printing technologies themselves, enabling them to offer niche, customized, or rapid-turnaround solutions that differentiate them from traditional suppliers.

*Education entities, such as those under Qatar Foundation, use 3D printers for educational purposes. Unlike others in this phase, their focus is on the printers themselves rather than the 3D-printed objects.

Though in the early stages of adoption, Qatar's 3D printing market is poised for growth, supported by strategic national initiatives

LOCAL 3D PRINTING MARKET



Qatar's 3D printing market is projected to reach **QAR 182 million** by **2028,18.4% CAGR**

3D printing enables mass customization, reduces **costs** and streamlines **production** while minimizing **waste**

SUPPORT FOR SMES IN QATAR

Advisory & Mentorship Services

The entities listed under the support network sector developers in Qatar's Local Ecosystem above provide support to SMEs. For example, QDB's Scale 7 and QBIC offer assistance through acceleration programs, innovation hackathons, incubators, prototype development, and mentorship for startups and creative industries.

Access to Funding

In addition to retail banking institutions, QDB provides support services for SMEs, including "Technology and Digitalization Solution Financing" to promote the adoption of innovative technologies. Additionally, Invest Qatar facilitates foreign investment into the region.

Focus on Advanced Manufacturing

Advanced Manufacturing is a key pillar of Qatar's Digital Agenda 2030, driving economic diversification through increased R&D investment in innovative technologies. Initiatives like AM Hub serve as platforms for knowledge exchange, partnership building, and cross-Hub collaboration.

Innovation & R&D Support

Universities like HBKU and Qatar University support with access to R&D facilities and research projects. Incentives, including tax breaks and grants, encourage private sector-led R&D activities, a key driver of innovation in the sector.

Talent and Infrastructure Support

The Ministry of Communication and Information Technology's National Skilling Program focuses on advanced digital upskilling of Qatar's workforce to drive innovation. HBKU and Qatar University also offer educational programs to raise awareness.

Source: Primary Interviews, Entity Websites

3D Printing's disruption potential in Qatar offers SMEs the chance to identify new opportunities. By tapping into transformative, promising, and emerging applications, particularly in construction, consumer goods and healthcare

DISRUPTION POTENTIAL FOR SMES IN QATAR

Transformative Potential

- Healthcare
- Consumer Goods
- Construction

Promising Potential

- Manufacturing
- Oil & Gas

Emerging Potential

- Education
- Aerospace

Analysis indicates that healthcare, consumer goods, and construction hold the greatest potential for disruption in Qatar's 3D printing sector.

The SWOT analysis of Qatar's 3D printing sector reveals strategic strengths and growth opportunities for SMEs amid unique challenges and competitive pressures

SWOT ANALYSIS

Strengths

The sector benefits from government support through a strong ecosystem that fosters innovation, a high degree of customization to meet business needs, and significant collaborations in research and infrastructure.

Threats

SMEs face threats from global and regional competition, as well as competition from traditional manufacturing and economic fluctuations. Adapting to new 3D printing technologies and materials can be challenging and costly for SMEs.

Weakness

The 3D printing sector in Qatar faces limited private sector R&D, a shortage of local expertise, and a heavy reliance on imports for raw materials and equipment. The sector also lacks systems to effectively assess 3D printing demands.

Opportunites

The sector presents transformative potential across the consumer goods, healthcare and construction sectors and opportunities for innovation in the education sector. Maximizing this potential requires investment in R&D, a skilled workforce, and industry awareness.

As Qatar's 3D printing sector is gaining momentum, it offers potential opportunities for SMEs to establish a presence in this emerging market. The following recommendations aim to support these enterprises in addressing challenges and exploring opportunities within Qatar's 3D printing ecosystem

WAY FORWARD AND STRATEGIC RECOMMENDATIONS

LEVERAGE GOVERNMENT SUPPORT & INCENTIVES

SMEs could leverage support from Qatar's sector enablers and developers, such as SCALE 7 and QSTP. These entities offer access to acceleration programs, mentorship, prototype development, R&D facilities, and funding. Platforms like AM Hub promote knowledge exchange and collaboration, driving SME growth and innovation in Qatar's 3D printing sector.

TARGET HIGH-GROWTH & HIGH-IMPACT SECTORS

To maximize their impact and growth potential, SMEs could prioritize sectors like construction, healthcare and consumer goods. Additionally, sectors such as education present potential opportunities for innovation and efficiency gains through 3D printing. By focusing on niche solutions and leveraging Qatar's established market presence in these areas, SMEs can capitalize on existing demand and gain a competitive edge.

DEVELOP LOCAL CAPACITY & RESOURCES

The development of local capabilities is essential for long-term success in Qatar's 3D printing sector. SMEs can prioritize the cultivation of technical expertise by investing in talent and collaborating with academic institutions. Moreover, enhancing supply chain resilience by sourcing or developing alternative materials locally is crucial. This approach will reduce reliance on imports, mitigate risks and strengthen the overall supply chain, making businesses more adaptable to market changes.

FOSTER COLLABORATION & INDUSTRY PARTNERSHIPS

Collaboration is key to thriving in Qatar's 3D printing sector. SMEs could actively engage in partnerships with local recycling companies which can provide access to raw materials and academic institutes that can provide access to cutting-edge 3D printing design software. These collaborations will not only bolster their capabilities but also position them at the cutting edge of industry advancements. Additionally, aligning with 3D printing global best practices and adopting international standards will enhance their credibility, broaden their market reach, and ensure SMEs remain competitive in local and global markets.

In conclusion, by adopting these strategic recommendations, SMEs have the potential to drive innovation, strengthen their market position, and contribute significantly to Qatar's growth and development by becoming key players in the nation's growing 3D printing sector.