

The Global Market for Quantum Computing 2025-2045

<https://marketpublishers.com/r/M831B682AFFEN.html>

Date: January 2025

Pages: 308

Price: US\$ 1,300.00 (Single User License)

ID: M831B682AFFEN

Abstracts

The quantum computing market is experiencing a transformative phase, marked by significant technological advancements and increasing commercial interest. This growth is driven by multiple factors, including substantial government investments, private sector participation, and accelerating technological breakthroughs. In the current market landscape, hardware development commands the largest share of investment, particularly in superconducting qubits and trapped ion systems. Major technology companies like IBM, Google, and Microsoft continue to advance their quantum programs, while specialized companies such as IonQ, Rigetti, and PsiQuantum are making significant strides in their respective technologies. The market is also seeing increased activity in quantum software and applications, with companies developing quantum algorithms and use-case-specific solutions for industries including finance, pharmaceuticals, and logistics.

Cloud-based quantum computing services represent a rapidly growing market segment, enabling broader access to quantum capabilities without requiring direct hardware investment. Amazon Braket, IBM Quantum, and Microsoft Azure Quantum are leading this transformation, making quantum computing resources available to enterprises and researchers worldwide. This 'quantum-as-a-service' model is expected to drive significant market growth in the near term.

Looking toward the future, the quantum computing market is expected to undergo several crucial transitions. The achievement of quantum advantage in specific applications will likely drive increased enterprise adoption, particularly in industries where quantum computing can provide significant competitive advantages. Financial services, drug discovery, and materials science are expected to be among the first sectors to realize practical quantum advantages. The market is also witnessing a shift from purely research-focused activities to more commercial applications. While early-stage quantum computers currently serve primarily research purposes, the development of error-corrected quantum systems in the coming years will enable more practical applications. This transition is expected to dramatically expand the market, particularly

in the 2025-2030 timeframe.

Government investments continue to shape the market landscape, with major initiatives like the US National Quantum Initiative, China's quantum strategy, and the EU Quantum Flagship providing substantial funding and strategic direction. These programs, along with private sector investments, are creating a robust ecosystem for quantum technology development. Industry consolidation and specialization are expected to become more prominent features of the market as it matures. While some companies focus on full-stack quantum solutions, others are specializing in specific components of the quantum computing stack, from hardware components to application-specific software solutions.

The development of the quantum computing supply chain represents another crucial market aspect. Companies are investing in specialized component manufacturing, from control electronics to cryogenic systems, creating new market opportunities and potential bottlenecks. The market for quantum-specific components and materials is expected to grow significantly as quantum computers scale up. Despite these positive trends, the market faces several challenges. Technical hurdles in achieving fault-tolerant quantum computing, the need for skilled quantum workforce development, and the challenge of identifying near-term commercially viable applications all impact market growth. However, these challenges are driving innovation and creating opportunities for companies offering solutions to these specific problems.

The quantum computing market stands at an inflection point, with technological progress and commercial interest converging to create significant growth opportunities. While the path to widespread quantum computing adoption may be complex, the market's fundamental drivers remain strong, suggesting continued expansion and evolution in the coming years.

The *Global Market for Quantum Computing 2025-2045* provides a comprehensive analysis of the quantum computing industry, market trends, technologies, and key players shaping this transformative sector. The report examines the evolution from the first to second quantum revolution and provides detailed insights into the current quantum computing landscape, including technical progress, persistent challenges, and key market developments. This extensive study covers the complete quantum computing ecosystem, from fundamental technologies and hardware architectures to software platforms and end-user applications. The report includes detailed analysis of various qubit technologies including superconducting, trapped ion, silicon spin, topological, photonic, and neutral atom approaches, with comprehensive SWOT analyses for each technology platform.

Key market segments analyzed include pharmaceuticals, chemicals, transportation, financial services, and automotive industries. The report delivers in-depth analysis of quantum chemistry, AI applications, quantum communications, and quantum sensing

technologies, highlighting crossover opportunities and synergies between these fields. Detailed coverage of materials for quantum computing encompasses superconductors, photonics, silicon photonics, optical components, and various nanomaterials including 2D materials, carbon nanotubes, diamond, and metal-organic frameworks. The report examines material requirements, challenges, and opportunities across the quantum technology stack.

The market analysis section provides comprehensive investment data, including venture capital activity, M&A developments, corporate investments, and government funding initiatives. Global market forecasts from 2025 to 2045 cover hardware, software, and services, with detailed projections for installed base, pricing trends, and revenue streams. The report includes extensive profiling of over 205 companies across the quantum computing value chain, from hardware manufacturers and software developers to end-use application providers. Company profiles include detailed information on technologies, products, partnerships, and market positioning. Companies profiled include A* Quantum, Abaqus, Aegiq, Agnostiq GmbH, Airbus, Aliro Quantum, Alice&Bob, Alpine Quantum Technologies (AQT), Anyon Systems, Archer Materials, Arclight Quantum, Arctic Instruments, ARQUE Systems, Atlantic Quantum, Atom Computing, Atom Quantum Labs, Atos Quantum, Baidu, BEIT, Bleximo, BlueFors, BlueQubit, Bohr Quantum Technology, BosonQ Ps, C12 Quantum Electronics, Cambridge Quantum Computing, CAS Cold Atom, CEW Systems, Classiq Technologies, ColibriTD, Crystal Quantum Computing, D-Wave Systems, Delft Circuits, Diatope, Dirac, Diraq, Duality Quantum Photonics, EeroQ, eleQtron, Elyah, Entropica Labs, Ephos, EvolutionQ, First Quantum, Fujitsu, Good Chemistry, Google Quantum AI, g2-Zero, Haiqu, HQS Quantum Simulations, HRL, Huayi Quantum, IBM, Icosa Computing, ID Quantique, InfinityQ, Infineon Technologies, Inflection, Intel, IonQ and many others (complete list in report).

Key features of the report include:

Comprehensive analysis of quantum computing technologies and architectures

Detailed market forecasts 2025-2045

Analysis of government initiatives and funding landscape

Examination of quantum computing infrastructure requirements

In-depth material analysis and supply chain considerations

Extensive company profiles and competitive landscape analysis

Assessment of market challenges and opportunities

Analysis of key application areas and end-user industries

Contents

1 EXECUTIVE SUMMARY

- 1.1 First and Second quantum revolutions
- 1.2 Current quantum computing market landscape
 - 1.2.1 Technical Progress and Persistent Challenges
 - 1.2.2 Key developments
- 1.3 Investment Landscape
- 1.4 Global Government Initiatives
- 1.5 Market Landscape
- 1.6 Challenges for Quantum Technologies Adoption
- 1.7 Market Map
- 1.8 Market Challenges
- 1.9 SWOT analysis
- 1.10 Quantum Computing Value Chain
- 1.11 Market Outlook
- 1.12 Quantum Computing and Artificial Intelligence
- 1.13 Global market forecast 2018-2045
 - 1.13.1 Revenues
 - 1.13.2 Quantum Computing Installed Base Forecast (Number of Systems)
 - 1.13.3 Pricing

2 INTRODUCTION

- 2.1 What is quantum computing?
- 2.2 Operating principle
- 2.3 Classical vs quantum computing
- 2.4 Quantum computing technology
 - 2.4.1 Quantum emulators
 - 2.4.2 Quantum inspired computing
 - 2.4.3 Quantum annealing computers
 - 2.4.4 Quantum simulators
 - 2.4.5 Digital quantum computers
 - 2.4.6 Continuous variables quantum computers
 - 2.4.7 Measurement Based Quantum Computing (MBQC)
 - 2.4.8 Topological quantum computing
 - 2.4.9 Quantum Accelerator
- 2.5 Competition from other technologies

3 QUANTUM ALGORITHMS

3.1 Quantum Software Stack

- 3.1.1 Quantum Machine Learning
- 3.1.2 Quantum Simulation
- 3.1.3 Quantum Optimization
- 3.1.4 Quantum Cryptography
 - 3.1.4.1 Quantum Key Distribution (QKD)
 - 3.1.4.2 Post-Quantum Cryptography

4 QUANTUM COMPUTING HARDWARE

4.1 Qubit Technologies

- 4.1.1 Overview
- 4.1.2 Noise effects
- 4.1.3 Logical qubits
- 4.1.4 Quantum Volume
- 4.1.5 Algorithmic Qubits
- 4.1.6 Superconducting Qubits
 - 4.1.6.1 Technology description
 - 4.1.6.2 Materials
 - 4.1.6.3 Market players
 - 4.1.6.4 Swot analysis
- 4.1.7 Trapped Ion Qubits
 - 4.1.7.1 Technology description
 - 4.1.7.2 Hardware
 - 4.1.7.3 Materials
 - 4.1.7.3.1 Integrating optical components
 - 4.1.7.3.2 Incorporating high-quality mirrors and optical cavities
 - 4.1.7.3.3 Engineering the vacuum packaging and encapsulation
 - 4.1.7.3.4 Removal of waste heat
 - 4.1.7.4 Market players
 - 4.1.7.5 Swot analysis
- 4.1.8 Silicon Spin Qubits
 - 4.1.8.1 Technology description
 - 4.1.8.2 Quantum dots
 - 4.1.8.3 Market players
 - 4.1.8.4 SWOT analysis

- 4.1.9 Topological Qubits
 - 4.1.9.1 Technology description
 - 4.1.9.1.1 Cryogenic cooling
 - 4.1.9.2 Market players
 - 4.1.9.3 SWOT analysis
- 4.1.10 Photonic Qubits
 - 4.1.10.1 Technology description
 - 4.1.10.2 Hardware Architecture
 - 4.1.10.3 Market players
 - 4.1.10.4 Swot analysis
- 4.1.11 Neutral atom (cold atom) qubits
 - 4.1.11.1 Technology description
 - 4.1.11.2 Market players
 - 4.1.11.3 Swot analysis
- 4.1.12 Diamond-defect qubits
 - 4.1.12.1 Technology description
 - 4.1.12.2 SWOT analysis
 - 4.1.12.3 Market players
- 4.1.13 Quantum annealers
 - 4.1.13.1 Technology description
 - 4.1.13.2 SWOT analysis
 - 4.1.13.3 Market players
- 4.2 Architectural Approaches

5 QUANTUM COMPUTING INFRASTRUCTURE

- 5.1 Infrastructure Requirements
- 5.2 Hardware agnostic platforms
- 5.3 Cryostats
- 5.4 Qubit readout

6 QUANTUM COMPUTING SOFTWARE

- 6.1 Technology description
- 6.2 Cloud-based services- QCaaS (Quantum Computing as a Service).
- 6.3 Market players

7 MARKETS AND APPLICATIONS

- 7.1 Pharmaceuticals
 - 7.1.1 Market overview
 - 7.1.1.1 Drug discovery
 - 7.1.1.2 Diagnostics
 - 7.1.1.3 Molecular simulations
 - 7.1.1.4 Genomics
 - 7.1.1.5 Proteins and RNA folding
 - 7.1.2 Market players
- 7.2 Chemicals
 - 7.2.1 Market overview
 - 7.2.2 Market players
- 7.3 Transportation
 - 7.3.1 Market overview
 - 7.3.2 Market players
- 7.4 Financial services
 - 7.4.1 Market overview
 - 7.4.2 Market players
- 7.5 Automotive
 - 7.5.1 Market overview
 - 7.5.2 Market players

8 OTHER CROSSOVER TECHNOLOGIES

- 8.1 Quantum chemistry and AI
 - 8.1.1 Technology description
 - 8.1.2 Applications
 - 8.1.3 Market players
- 8.2 Quantum Communications
 - 8.2.1 Technology description
 - 8.2.2 Types
 - 8.2.3 Applications
 - 8.2.4 Market players
- 8.3 Quantum Sensors
 - 8.3.1 Technology description
 - 8.3.2 Applications
 - 8.3.3 Companies

9 MATERIALS FOR QUANTUM COMPUTING

9.1 Superconductors

9.1.1 Overview

9.1.2 Types and Properties

9.1.3 Temperature (T_c) of superconducting materials

9.1.4 Superconducting Nanowire Single Photon Detectors (SNSPD)

9.1.5 Kinetic Inductance Detectors (KIDs)

9.1.6 Transition Edge Sensors (TES)

9.1.7 Opportunities

9.2 Photonics, Silicon Photonics and Optical Components

9.2.1 Overview

9.2.2 Types and Properties

9.2.3 Vertical-Cavity Surface-Emitting Lasers (VCSELs)

9.2.4 Alkali azides

9.2.5 Optical Fiber and Quantum Interconnects

9.2.6 Semiconductor Single Photon Detectors

9.2.7 Opportunities

9.3 Nanomaterials

9.3.1 Overview

9.3.2 Types and Properties

9.3.2.1 2D Materials

9.3.2.2 Transition metal dichalcogenide quantum dots

9.3.2.3 Graphene Membranes

9.3.2.4 2.5D materials

9.3.2.5 Carbon nanotubes

9.3.2.5.1 Single Walled Carbon Nanotubes

9.3.2.5.2 Boron Nitride Nanotubes

9.3.2.6 Diamond

9.3.2.7 Metal-Organic Frameworks (MOFs)

9.3.3 Opportunities

10 MARKET ANALYSIS

10.1 Key industry players

10.1.1 Start-ups

10.1.2 Tech Giants

10.1.3 National Initiatives

10.2 Investment funding

10.2.1 Venture Capital

10.2.2 M&A

10.2.3 Corporate Investment

10.2.4 Government Funding

11 COMPANY PROFILES 166 (208 COMPANY PROFILES)

12 RESEARCH METHODOLOGY

13 TERMS AND DEFINITIONS

14 REFERENCES

List Of Tables

LIST OF TABLES

- Table 1. First and second quantum revolutions.
- Table 2. Applications for Quantum Computing.
- Table 3. Quantum Computing Business Models.
- Table 4. Quantum Computing Investments (2018-2024).
- Table 5. Global government initiatives in quantum technologies.
- Table 6. Quantum computing industry developments 2020-2025.
- Table 7. Business Models in Quantum Computing.
- Table 8. Market challenges in quantum computing.
- Table 9. Quantum computing value chain.
- Table 10. Global market for quantum computing-by category, 2023-2045 (billions USD).
- Table 11. Global Revenue from Hardware Sales (Billions USD).
- Table 12. Installed Base Forecast (2025-2045)-Units.
- Table 13. Installed Base by Technology (2025-2045)-Units.
- Table 14. Quantum Computer Pricing Forecast (Millions USD).
- Table 15. Quantum Computer Architectures.
- Table 16. Applications for quantum computing
- Table 17. Comparison of classical versus quantum computing.
- Table 18. Key quantum mechanical phenomena utilized in quantum computing.
- Table 19. Types of quantum computers.
- Table 20. Comparison of Quantum Computer Technologies.
- Table 21. Comparative analysis of quantum computing with classical computing, quantum-inspired computing, and neuromorphic computing.
- Table 22. Different computing paradigms beyond conventional CMOS.
- Table 23. Applications of quantum algorithms.
- Table 24. QML approaches.
- Table 25. Commercial Readiness Level by Technology.
- Table 26. Qubit Performance Benchmarking.
- Table 27. Coherence times for different qubit implementations.
- Table 28. Quantum Computer Benchmarking Metrics.
- Table 29. Logical Qubit Progress.
- Table 30. Superconducting qubit market players.
- Table 31. Initialization, manipulation and readout for trapped ion quantum computers.
- Table 32. Ion trap market players.
- Table 33. Initialization, manipulation, and readout methods for silicon-spin qubits.
- Table 34. Silicon spin qubits market players.

- Table 35. Initialization, manipulation and readout of topological qubits.
- Table 36. Topological qubits market players.
- Table 37. Pros and cons of photon qubits.
- Table 38. Comparison of photon polarization and squeezed states.
- Table 39. Initialization, manipulation and readout of photonic platform quantum computers.
- Table 40. Photonic qubit market players.
- Table 41. Initialization, manipulation and readout for neutral-atom quantum computers.
- Table 42. Pros and cons of cold atoms quantum computers and simulators
- Table 43. Neural atom qubit market players.
- Table 44. Initialization, manipulation and readout of Diamond-Defect Spin-Based Computing.
- Table 45. Key materials for developing diamond-defect spin-based quantum computers.
- Table 46. Diamond-defect qubits market players.
- Table 47. Commercial Applications for Quantum Annealing.
- Table 48. Pros and cons of quantum annealers.
- Table 49. Quantum annealers market players.
- Table 50. Quantum Computing Infrastructure Requirements.
- Table 51. Modular vs. Single Core.
- Table 52. Quantum computing software market players.
- Table 53. Markets and applications for quantum computing.
- Table 54. Total Addressable Market (TAM) for Quantum Computing.
- Table 55. Market players in quantum technologies for pharmaceuticals.
- Table 56. Market players in quantum computing for chemicals.
- Table 57. Automotive applications of quantum computing,
- Table 58. Market players in quantum computing for transportation.
- Table 59. Quantum Computing in Finance.
- Table 60. Market players in quantum computing for financial services
- Table 61. Automotive Applications of Quantum Computing.
- Table 62. Applications in quantum chemistry and artificial intelligence (AI).
- Table 63. Market players in quantum chemistry and AI.
- Table 64. Main types of quantum communications.
- Table 65. Applications in quantum communications.
- Table 66. Market players in quantum communications.
- Table 67. Comparison between classical and quantum sensors.
- Table 68. Applications in quantum sensors.
- Table 69. Companies developing high-precision quantum time measurement
- Table 70. Materials in Quantum Technology.
- Table 71. Superconductor Value Chain in Quantum Technology.

Table 72. Superconductors in quantum technology.

Table 73. SNSPD Players companies.

Table 74. Single Photon Detector Technology Comparison.

Table 75. Photonics, silicon photonics and optics in quantum technology.

Table 76. Materials for Quantum Photonic Applications.

Table 77. Nanomaterials in quantum technology.

Table 79. Synthetic Diamond Value Chain for Quantum Technology.

Table 80. Quantum technologies investment funding.

Table 81. Top funded quantum technology companies.

List Of Figures

LIST OF FIGURES

- Figure 1. Quantum computing development timeline.
- Figure 2. Quantum investments 2012-2024 (billions USD).
- Figure 3. National quantum initiatives and funding 2015-2023.
- Figure 4. Quantum computing Market Map.
- Figure 5. SWOT analysis for quantum computing.
- Figure 6. Global market for quantum computing-Hardware, Software & Services, 2023-2035 (billions USD).
- Figure 7. An early design of an IBM 7-qubit chip based on superconducting technology.
- Figure 8. Various 2D to 3D chips integration techniques into chiplets.
- Figure 9. IBM Q System One quantum computer.
- Figure 10. Unconventional computing approaches.
- Figure 11. 53-qubit Sycamore processor.
- Figure 12. Interior of IBM quantum computing system. The quantum chip is located in the small dark square at center bottom.
- Figure 13. Superconducting quantum computer.
- Figure 14. Superconducting quantum computer schematic.
- Figure 15. Components and materials used in a superconducting qubit.
- Figure 16. Superconducting Hardware Roadmap.
- Figure 17. SWOT analysis for superconducting quantum computers:.
- Figure 18. Ion-trap quantum computer.
- Figure 19. Various ways to trap ions
- Figure 20. Trapped-Ion Hardware Roadmap.
- Figure 21. Universal Quantum's shuttling ion architecture in their Penning traps.
- Figure 22. SWOT analysis for trapped-ion quantum computing.
- Figure 23. CMOS silicon spin qubit.
- Figure 24. Silicon quantum dot qubits.
- Figure 25. Silicon-Spin Hardware Roadmap.
- Figure 26. SWOT analysis for silicon spin quantum computers.
- Figure 27. Topological Quantum Computing Roadmap.
- Figure 28. SWOT analysis for topological qubits
- Figure 29 . SWOT analysis for photonic quantum computers.
- Figure 30. Neutral atoms (green dots) arranged in various configurations
- Figure 31. Neutral Atom Hardware Roadmap.
- Figure 32. SWOT analysis for neutral-atom quantum computers.
- Figure 33. NV center components.

- Figure 34. Diamond Defect Supply Chain.
- Figure 35. Diamond Defect Hardware Roadmap.
- Figure 36. SWOT analysis for diamond-defect quantum computers.
- Figure 37. D-Wave quantum annealer.
- Figure 38. SWOT analysis for quantum annealers.
- Figure 39. Quantum software development platforms.
- Figure 40. Tech Giants quantum technologies activities.
- Figure 41. Quantum Technology investment by sector, 2023.
- Figure 42. Quantum computing public and industry funding to mid-2023, millions USD.
- Figure 43. Archer-EPFL spin-resonance circuit.
- Figure 44. IBM Q System One quantum computer.
- Figure 45. ColdQuanta Quantum Core (left), Physics Station (middle) and the atoms control chip (right).
- Figure 46. Intel Tunnel Falls 12-qubit chip.
- Figure 47. IonQ's ion trap
- Figure 48. IonQ product portfolio.
- Figure 49. 20-qubit quantum computer.
- Figure 50. Maybell Big Fridge.
- Figure 51. PsiQuantum's modularized quantum computing system networks.
- Figure 52. SemiQ first chip prototype.
- Figure 53. Toshiba QKD Development Timeline.
- Figure 54. Toshiba Quantum Key Distribution technology.

I would like to order

Product name: The Global Market for Quantum Computing 2025-2045

Product link: <https://marketpublishers.com/r/M831B682AFFEN.html>

Price: US\$ 1,300.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/M831B682AFFEN.html>