MARKETSANDMARKETS™

INDUSTRY 4.0 MARKET

GLOBAL FORECAST TO 2026

REPORT BROCHURE WITH SAMPLE PAGES

REPORT CODE: SE 5279

INTRODUCTION

1.1 OBJECTIVES OF THE STUDY

- To define and forecast the size of the Industry 4.0 market based on technology, and region, in terms of value
- To describe and forecast the size of the Industry 4.0 market in four key regions -- North America, Europe, Asia Pacific (APAC), and the Rest of the World (RoW) -- along with their respective countries
- To provide detailed information regarding drivers, restraints, opportunities, and challenges influencing the growth of the market
- To strategically analyze micromarkets with respect to individual growth trends, prospects, and contributions to the overall market size
- To study the complete value chain of the Industry 4.0 market
- To describe in detail the impact of COVID-19 on the Industry 4.0 market
- To highlight the impact of COVID-19 on the market segments and players operating in the Industry 4.0 market
- To analyze opportunities in the market for stakeholders by identifying high-growth segments of the Industry 4.0 ecosystem
- To strategically profile the key players and comprehensively analyze their market position in terms of their ranking and core competencies, and provide a detailed competitive landscape
- To analyze competitive developments in the Industry 4.0 market, such as new product launches, acquisitions, collaborations, agreements, and partnerships

1.2 DEFINITION

The fourth industrial revolution (Industry 4.0) refers to a combination of several important innovations in digital technology that are expected to transform the manufacturing sector. the Industry 4.0 concept encompasses the digitalization of the horizontal and vertical value chain, innovations in products and services, and the creation of new business models. the key business drivers for this transformation include the need to improve customer experience, increase manufacturing speed to market, and reduce operational costs. Industry 4.0 focuses on the end-to-end digitalization of all physical assets and their integration with digital ecosystems of value chain partners.

The Industry 4.0 market comprises 10 technologies: artificial intelligence in manufacturing, blockchain in manufacturing, industrial robotics, machine vision, digital twin, automated guided vehicles, industrial 3D printing, human machine interface, industrial sensors, and machine condition monitoring. Several tier 1 market players provide these technologies. with increasing industrial automation and the creation of a smart factory environment, the Industry 4.0 market is expected to grow significantly in the next five years.

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1.2.1 INCLUSIONS AND EXCLUSIONS

PARTICULARS	INCLUSIONs	EXCLUSIONs
Artificial Intelligence in Manufacturing	Artificial Intelligence by offering, technology, and application in manufacturing sector is included in the study	Use of artificial intelligence in non-manufacturing end-use verticals has been excluded from the study
Automated Guided Vehicles (AGV)	AGV by type, navigation technology, and end use vertical is included in the study	Manual forklifts and forklifts with internal combustion (IC) engines, and use of AGV in shipbuilding industry have been excluded from the study
Blockchain in Manufacturing	Applications of blockchain in the manufacturing sector are included in the study	Applications of blockchain in non-manufacturing sectors are excluded from the study
Industrial Robots	Industrial Robots by type, and end-use vertical are included in the study	NA
Digital Twin	Digital Twin by technology, usage type, application, and end-use vertical is included in the study	NA
Machine Vision	Machine Vision by deployment, component, product and end-use vertical is included in the study	NA
Human Machine Interface	Human Machine Interface by offering, software, configuration, and end-use vertical is included in the study	NA
Industrial 3D Printing	Industrial 3D printing by offering, technology, application, process and end-use vertical is included in the study	Experimental 3D printing materials that are yet to be commercialized are excluded from the study
Machine Condition Monitoring	Machine Condition Monitoring by monitoring technique, deployment, monitoring process, offering, and end-use vertical is included in the study	Service offerings related to condition monitoring are excluded from the study
Industrial Sensors	Industrial Sensors by type and end-use vertical are included in the study	NA

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Geography	The Industry 4.0 market has been studied for North America (the US, Canada, and Mexico), Europe (Germany, the UK, France, Italy, Spain, and the Rest of Europe), APAC (China, Japan, India, and South Korea and the Rest of APAC), and RoW (the Middle East & Africa and South America)	-

1.3 STUDY SCOPE

1.3.1 MARKETS COVERED

The report covers demand- and supply-side analyses of the Industry 4.0 market. the supply-side market segmentation is by technology, while the demand-side segmentation is by region. the following FIGURE provides an overview of the micromarkets covered in the report.

FIGURE 1 INDUSTRY 4.0 MARKET SEGMENTATION

Source: Secondary Research, Expert Interview, and MarketsandMarkets Analysis

INTRODUCTION

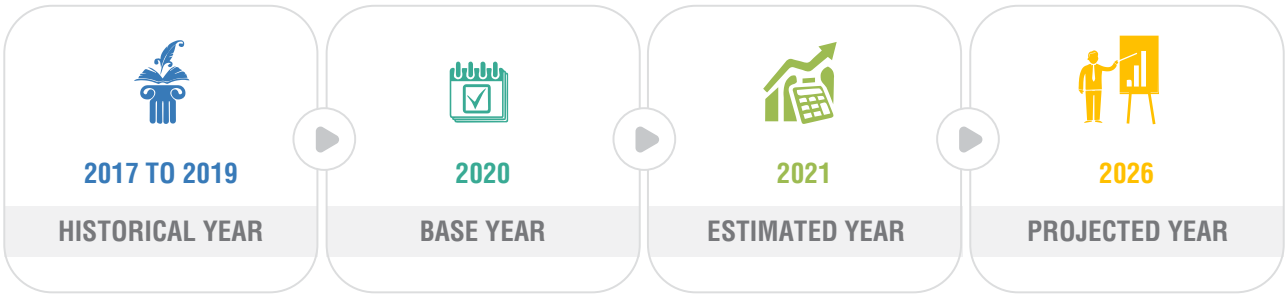
1.3.2 GEOGRAPHIC SCOPE

The following FIGURE indicates the Industry 4.0 market segmentation based on geography.

Note: Rest of Europe includes Sweden, Denmark, Austria, Russia, the Netherlands, Spain, and Italy; while Rest of APAC comprises Australia, New Zealand, Taiwan, Singapore, Malaysia, and Indonesia.

Source: MarketsandMarkets Analysis

1.3.3 YEARS CONSIDERED



Note: the forecast period considered is from 2021 to 2026. for the company profiles 2020 has been considered the base year. Wherever information for the base year was unavailable, information of the previous year has been considered.

1.4 CURRENCY

The currency used in the report is the US dollar (USD), with the market size indicated in USD million/billion.

- ISO 4217 codes have been used to depict currency names; the market size, in terms of value, has been represented in terms of USD.
- The market has mainly been studied in terms of USD million; the denomination of the market size is based on values, enabling uniform accommodation of these values in TABLEs, FIGUREs, or any form of the study of a particular segment.
- Revenues of companies have been obtained from their latest annual reports. for companies that provide revenues in USD, they have been sourced as they are, while for those reporting their revenues in other currencies, the average annual currency exchange rates for that year (from the ofx.com website) have been used to convert the value to USD.

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1.5 LIMITATIONS

- Industry players have kept quantitative information for some of the market segments confidential. for such segments, the qualitative insights gathered during the study have been used to arrive at the market size in terms of value.
- Several micromarkets have been considered to arrive at the total Industry 4.0 market size. . Some the related markets have not been considered to avoid overlapping.
- Only recent and important developments from January 2018 to April 2021 have been considered to analyze strategies adopted by companies to compete in the Industry 4.0 market.
- A limited number of industry experts were available in emerging markets across APAC, the Middle East and Africa, and South America. in such cases, the regional market size has been derived on the basis of weightage assigned to these markets based on qualitative insights gathered from global industry experts and typical technology adoption trends observed in these regional markets.
- The size of the Industry 4.0 market in RoW is an estimation of the size of the market in the Middle East & Africa, and South America. However, the country-wise market sizes for these regions have not been included in the study owing to the granularity of data.

1.6 STAKEHOLDERS

- Semiconductor component manufacturers and distributors
- Industrial automation equipment providers
- Networking component providers
- Companies providing wired and wireless connectivity services
- Software platform providers
- Data analytics and cloud computing solution providers
- Original equipment manufacturers (OEMs)
- Research organizations and consulting companies
- Government bodies such as regulating authorities and policymakers
- Venture capitalists and private equity firms
- Associations, organizations, and alliances related to Industry 4.0
- End-users of Industry 4.0 solutions across various industries such as automotive; aerospace; industrial equipment; electrical & electronics equipment; food & agriculture; chemicals & materials; healthcare; energy & power; and oil & gas.

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1.7 SUMMARY OF CHANGES

- Competitive landscape: the market share of the top five players for 2020 has been provided in the competitive landscape chapter, along with the company evaluation quadrant for the leading market players. A small and medium-sized enterprises (SME) quadrant has also been provided for the respective companies. the section includes a product footprint analysis.
- Changes in the market size: in the previous version of the report, the forecast period for the Industry 4.0 market was from 2018 to 2024, with 2017 as the base year. in the updated version, the market sizing has been carried out from 2017 to 2026, with 2020 as the base year and 2021 to 2026 as the forecast period.
- New and improved representation of the financial information: This version provides updated financial information till 2020 (depending on the data availability) for each listed company in a graphical representation. This is expected to help in the easy analysis of the present status of the profiled companies in terms of their financial strength, profitability, and key revenue-generating region/country, along with the focus of the business on the highest revenue-generating region/country and the highest revenue-generating segment.
- Recent market developments: Recent developments help understand the market trends and growth strategies adopted by the leading players in the Industry 4.0 market. for instance, in this market, the number of product launches has increased from January 2018 to March 2021. the current analysis shows that product launches, partnerships, collaborations, expansions, and acquisitions have become the preferred growth strategies of the market players from January 2018 to April 2021.
- Latest product portfolio: Tracking product portfolios helps analyze the Industry 4.0 offerings available in the market. the new version of the report provides updated product portfolios for the companies profiled.
- Company profiles: Company profiles have been updated according to the present names, headquarters, product portfolios, and revenues.
- COVID-19-related developments: Developments related to the COVID-19 pandemic and their impact have been thoroughly covered throughout this updated edition of the report. the impact of COVID-19 on various applications and geographies pertaining to the Industry 4.0 market has also been provided.
- Changes in segmentation: in the last edition of the report, the main market was segmented based on nine micromarkets. the updated study includes an additional micromarket. Some of the micromarkets studied differ in the updated version to thoroughly encompass the extent of the market and eliminate overlapping ambiguities
- Competitive leadership mapping: the vendor dive matrix has been added to this version of the Industry 4.0 market report. This covers a comprehensive study of the key vendors offering Industry 4.0 systems. These vendors are placed in four categories -- star, pervasive, emerging leader, and participant -- based on the analysis of product offerings and business strategy excellence of the top 25 players in the market.
- New data points/analyses:
  - In the Executive Summary chapter, an analysis of the impact of COVID-19 on the market has been provided. Since the market is principally a summation of individual micromarkets, the pessimistic, realistic, and optimistic scenarios for market growth have not been incorporated.
  - Case study analysis, patent analysis, technology analysis, pricing analysis, Porter's Five Forces analysis, trade analysis, and regulations pertaining to the market have been discussed in the Market Overview chapter.

RESEARCH METHODOLOGY

2.1 RESEARCH DATA

This extensive technical, market-oriented, and commercial study of the Industry 4.0 market involves the use of secondary sources, directories, and databases, such as Hoovers, Bloomberg BusinessWeek, Factiva, and OneSource, to identify and collect relevant information. Primary sources, such as experts from related industries and suppliers, have been interviewed to obtain and verify critical information, as well as to assess the prospects of the market. the key players in the Industry 4.0 market have been identified through secondary research, and their market ranking has been determined through primary and secondary research. This research includes the study of annual reports of the top companies and interviews with key opinion leaders, such as chief executive officers (CEO), directors, and marketing personnel.

FIGURE 2 INDUSTRY 4.0: RESEARCH DESIGN

Source: MarketsandMarkets Analysis

In the secondary research process, various secondary sources have been referred to for identifying and collecting information pertinent to this study. the secondary sources include annual reports, press releases, and investor presentations of companies; white papers, certified publications, and articles by recognized authors; directories; and databases. Secondary research has been mainly carried out to obtain key information about the supply chain of the Industry 4.0

RESEARCH METHODOLOGY

ecosystem, value chain of the market, total pool of the key players, market classification and segmentation according to the industry trends to the bottom-most level, geographic markets, and key developments from both market- and technology-oriented perspectives.

In the primary research process, various primary sources from both supply and demand sides have been interviewed to obtain qualitative and quantitative information relevant to this report. the primary sources from the supply side include industry experts such as chief executive officers, vice presidents, marketing directors, technology and innovation directors, software developers, and related executives from various key companies and organizations operating in the Industry 4.0 market.

After the complete market engineering (including calculations for the market statistics, the market breakdown, the data triangulation, the market size estimations, and the market forecasting), extensive primary research has been conducted to verify and validate the critical numbers obtained.

Primary research has also been conducted to identify segmentation types, industry trends, and key players in the market, as well as to analyze the competitive landscape; key market dynamics such as drivers, restraints, challenges, and opportunities; industry trends; and key player strategies. in the complete market engineering process, the bottom-up approach has been extensively used, along with several data triangulation methods to estimate and forecast the size of the market, as well as of its segments and subsegments as listed in this report. Extensive qualitative and quantitative analyses have been carried out on the complete market engineering process to list the key information/insights throughout the report.

2.1.3.1 KEY SECONDARY SOURCES

PARAMETER	SOURCE
MARKET SIZE (In Terms of Value)	▪ Company Financials ▪ Magazines ▪ Journals ▪ Press Releases ▪ Paid Databases ▪ MarketsandMarkets Data Repository
REVENUE OF COMPANIES	▪ Annual Reports ▪ Company Website ▪ Public Databases ▪ MarketsandMarkets Data Repository
QUALITATIVE INFORMATION (Market Dynamics and Trends)	▪ Company Website ▪ Annual Reports ▪ Press Releases ▪ MarketsandMarkets Data Repository

Source: MarketsandMarkets Analysis

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2.1.1 PRIMARY DATA

In the primary research process, various primary sources from both supply and demand sides were interviewed to obtain qualitative and quantitative information important for this report. Primary sources from the supply side included industry experts such as chief executive officers (CEOs), vice presidents, marketing directors, technology and innovation directors, and related executives from various key companies and organizations operating in the Industry 4.0 market. After the complete market engineering (which includes calculations for the market statistics, market breakdown, data triangulation, market estimation, and market forecasting), extensive primary research was conducted to gather information and verify and validate the critical numbers obtained.

Primary research was also conducted to identify the segmentation types, industry trends, and key players, and to analyze the competitive landscape and key market dynamics such as drivers, restraints, opportunities, and challenges. It also facilitated Porter's Five Forces analysis and helped pinpoint the growth strategies adopted by various key market players. Approximately 45% of primary interviews were conducted with representatives of the demand side while the remaining 55% focused on the supply side.

2.1.1.1 KEY DATA FROM PRIMARY SOURCES

TYPE	PARAMETER	KEY DATA
GEOGRAPHIC SPLIT	▪ Overall Market and Subsegments in 2020 ▪ CAGR of Each Region During Forecast Period (2021–2026)	▪ Industry 4.0 market, by Region—North America, Europe, APAC, and RoW
GLOBAL MARKET SIZE	▪ Global Market Size in 2020 ▪ CAGR for Forecast Period (2021–2026)	▪ Global Industry 4.0 Market ▪ Industry 4.0 Market, by Technology
MARKET SPLIT	▪ By Technology	▪ Artificial Intelligence in Manufacturing ▪ Blockchain ▪ Industrial Robotics ▪ Machine Vision ▪ Digital Twin ▪ Automated Guided Vehicles ▪ Industrial 3D Printing ▪ Human Machine Interface ▪ Industrial Sensors ▪ Machine Condition Monitoring

Source: MarketsandMarkets Analysis

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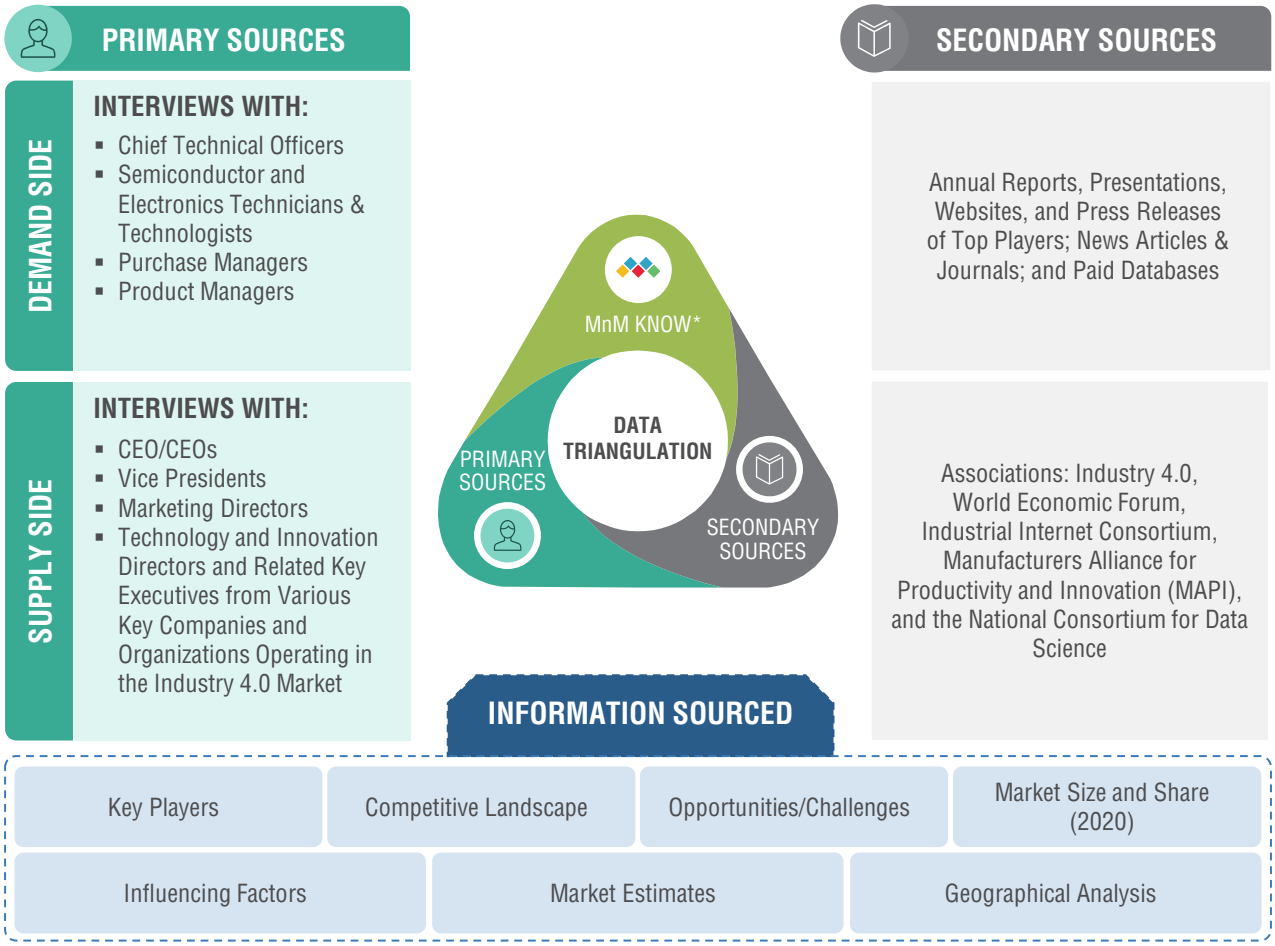
2.2 MARKET BREAKDOWN AND DATA TRIANGULATION

After arriving at the overall market size from the market size estimation process explained above, the total market was split into several segments and subsegments. the market breakdown and data triangulation procedures were employed wherever applicable to complete the overall market engineering process and arrive at the exact statistics for all segments and subsegments. the data was triangulated by studying various factors and trends from both the demand and supply sides.

FIGURE 3 DATA TRIANGULATION



*MnM KNOW stands for MarketsandMarkets' 'Knowledge Asset Management' framework. In this context, it stands for existing market research knowledge repository of over 5,000 granular markets, our flagship competitive intelligence and market research platform "Knowledge Store", subject matter experts, and independent consultants. MnM KNOW acts as an independent source that helps us validate information gathered from primary and secondary sources.

Source: MarketsandMarkets Analysis

RESEARCH METHODOLOGY

2.3 RESEARCH ASSUMPTIONS

The following assumptions have been considered to complete the overall market engineering of the Industry 4.0 market.

PARAMETER	ASSUMPTION
GLOBAL ECONOMIC OUTLOOK	The global economy has a direct impact on any market. Regarding the global economic landscape, no macroeconomic collapses and recessions have been considered while forecasting the market size in this research study.
EXCHANGE RATES AND CURRENCY CONVERSION	For the conversion of various currencies to the US dollars, average historical exchange rates have been used according to the year specified. For all historical and current exchange rates required for calculations and currency conversions, the OANDA website has been used.
GOVERNMENT SPENDING PATTERNS	A stable and moderate government spending pattern has been assumed during the forecast period.
MARKET SATURATION	New markets have been expected to arise in emerging economies such as China, South Korea, Brazil, and India.
DATA AUTHENTICITY	Company revenues and segment-specific information have been derived from the annual reports of the respective companies. The information provided in the annual reports has been assumed to be authentic.

Source: MarketsandMarkets Analysis

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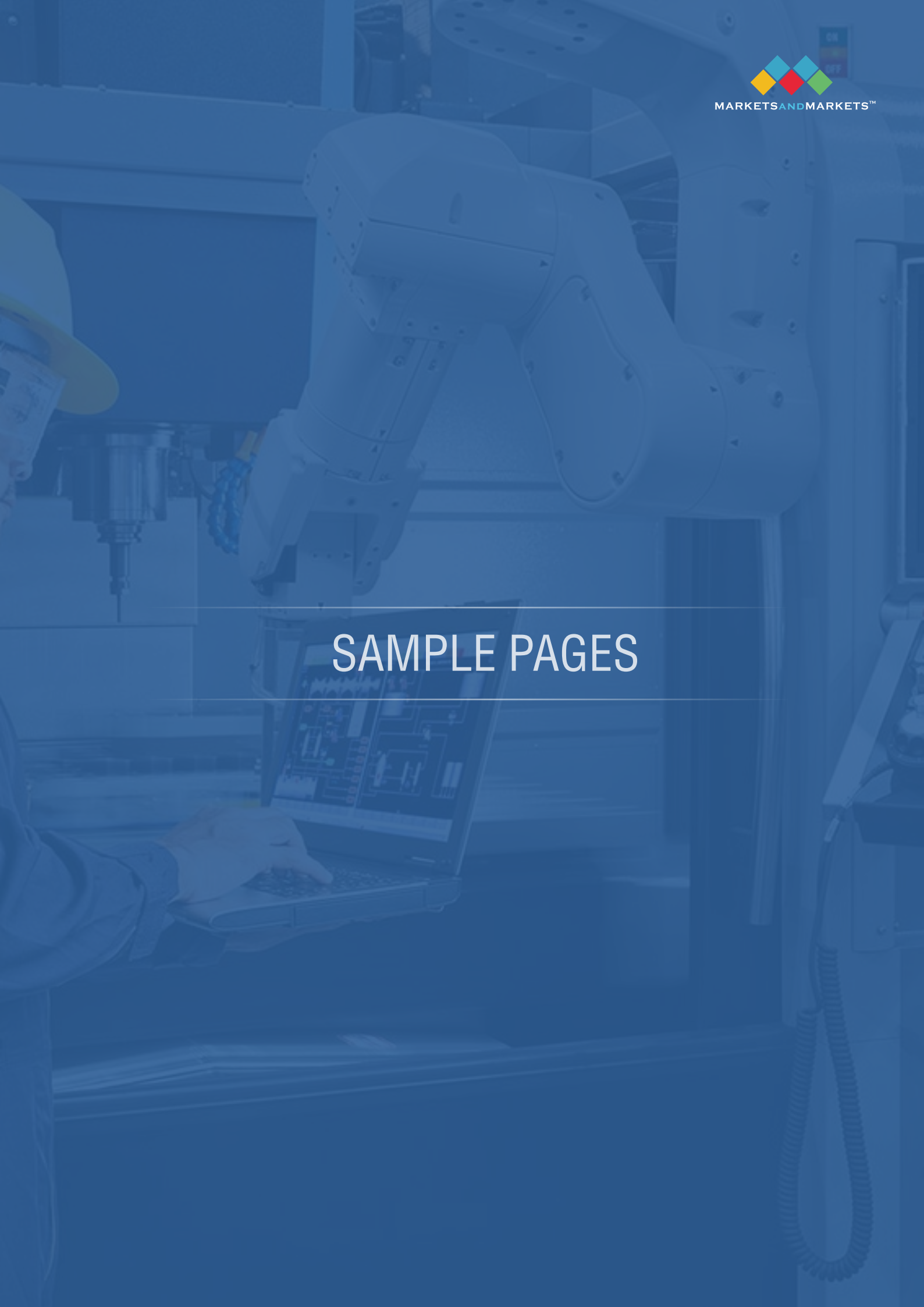

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SAMPLE PAGES

1 EXECUTIVE SUMMARY

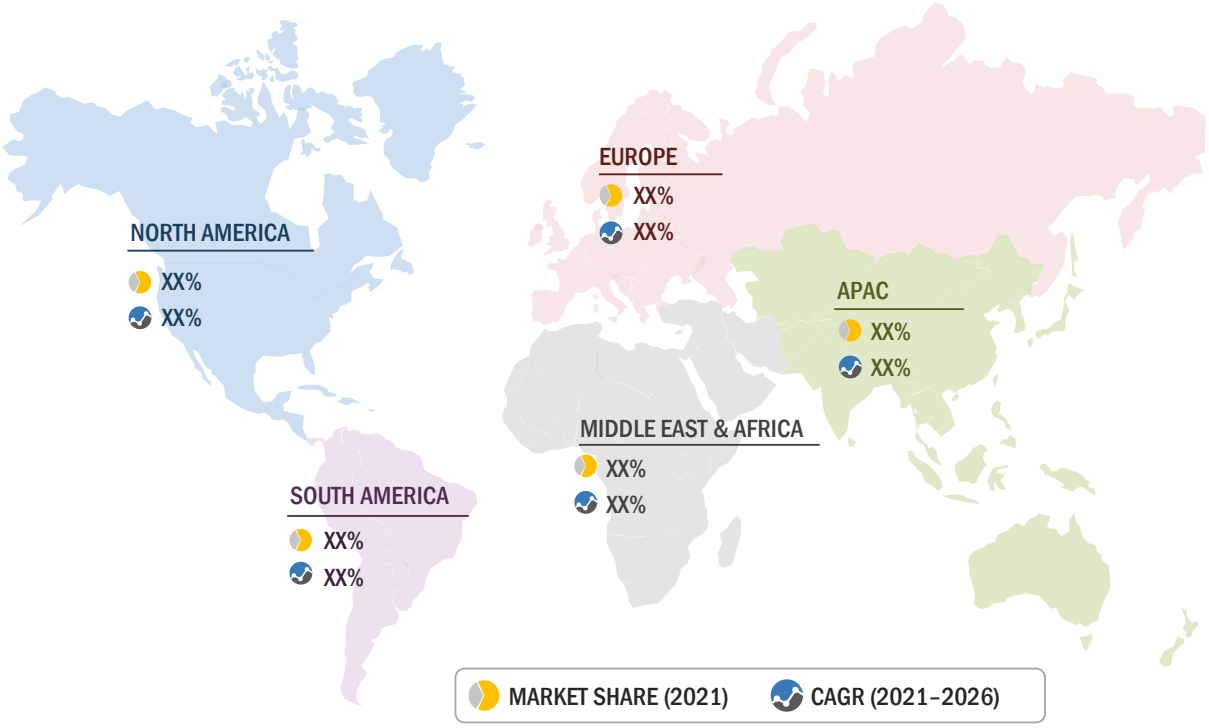
Industry 4.0 is being adopted in manufacturing facilities to maximize asset utilization, minimize downtime, and improve labor efficiency; this in turn will improve productivity. The introduction of Industry 4.0 technologies is expected to enhance the operation of the value chain at all the levels. Installing sensors across the manufacturing lines and connectivity devices to collect real-time performance data will help improve product performance. Data analytics will drive customer intelligence and help put the right products with the right dealers. The adoption of technologies such as 3D printing and artificial intelligence will help reduce product development time through rapid prototyping and product design evaluation. Tracking the movement of goods throughout the supply chain with the help of IoT and blockchain will help improve demand planning, facilitating timely product replenishment. Industry 4.0 is further expected to enhance productivity through quality control by detecting defects and help in the predictive maintenance of factory machinery; these factors are expected to drive the market.

The manufacturing industry is constantly evolving, resulting in the introduction of highly reliable and energy-efficient products and services. This requires new approaches toward product design, as well as modernization of factories and support infrastructure. With improved communication networks and data processing, the manufacturing industry can achieve increased operational efficiency, worker safety, and business sustainability. AI and IoT technologies are expected to fundamentally change the way products are designed, manufactured, transported, and sold.

This study has been carried out to understand the dynamics of the Industry 4.0 market while estimating and forecasting the market size. It also helps identify the key technologies and end-user industries related to Industry 4.0, along with geographical areas that are expected to provide various growth opportunities for the market. The end-user industries of Industry 4.0 include automotive, machinery, food & beverages, chemicals & materials, semiconductor & electronics, pharmaceuticals, energy & power, oil & gas, metals & mining, healthcare/medical, retail, transportation, agriculture, industrial, 3PL, aerospace & defense, e-commerce & retail, printing, wood & paper, textile & clothing, home & commercial, telecommunication, water & wastewater, packaging, jewelry, glass, plastics, and marine.

New product launches and development was the key strategy adopted by players to increase their share in the Industry 4.0 market between January 2018 and April 2021. The Industry 4.0 market is concentrated, with several big players such as Intel (US), ABB (Sweden), GE (US), Emerson (Germany), and Stratasys (Israel) investing heavily in R&D. Partnerships, contracts, agreements, collaborations, and mergers & acquisitions were other major strategies adopted by key players in the Industry 4.0 market.

FIGURE 1 APAC TO HOLD LARGEST SHARE OF INDUSTRY 4.0 MARKET IN 2021



Source: Annual Reports, Press Releases, Investor Presentations, Expert Interviews, White Papers, Association of Asset Management Professionals (US), Sensor Journals and Magazines, and MarketsandMarkets Analysis

The increasing adoption of robotics in China, Japan, and South Korea is the major reason for the growth of the Industry 4.0 market. The low cost of production, enabling various manufacturers to set up manufacturing facilities, is the key driver for the Industry 4.0 market in APAC. Government initiatives, funding for R&D, and an extensive industrial base make Asia Pacific a dynamic region for Industry 4.0, with Japan and China being the major contributors to the market.

North America is the largest market for industrial 3D printing, artificial intelligence, and machine vision systems, which are the integral components of Industry 4.0. Real-time quality control and visibility are driving the growth of the Industry 4.0 market in North America.

2 PREMIUM INSIGHTS

2.1 ATTRACTIVE GROWTH OPPORTUNITIES IN INDUSTRY 4.0 MARKET

FIGURE 2 RAPID ADOPTION OF AI, IOT, AND BLOCKCHAIN TECHNOLOGIES IN MANUFACTURING SECTOR TO FUEL INDUSTRY 4.0 MARKET FROM 2021 TO 2026

APAC is expected to account for the largest share (~XX%) of the Industry 4.0 market in 2021.

XX USD Billion 2021

XX USD Billion 2026

CAGR of XX%

The Industry 4.0 market is projected to grow from USD XX billion in 2021 to USD XX billion by 2026, at a CAGR of XX% during the forecast period.

Increasing demand for industrial robots in pharmaceutical and medical device manufacturing sector is a major factor propelling the growth of the market.

Product launches will offer lucrative opportunities for market players in the next five years.

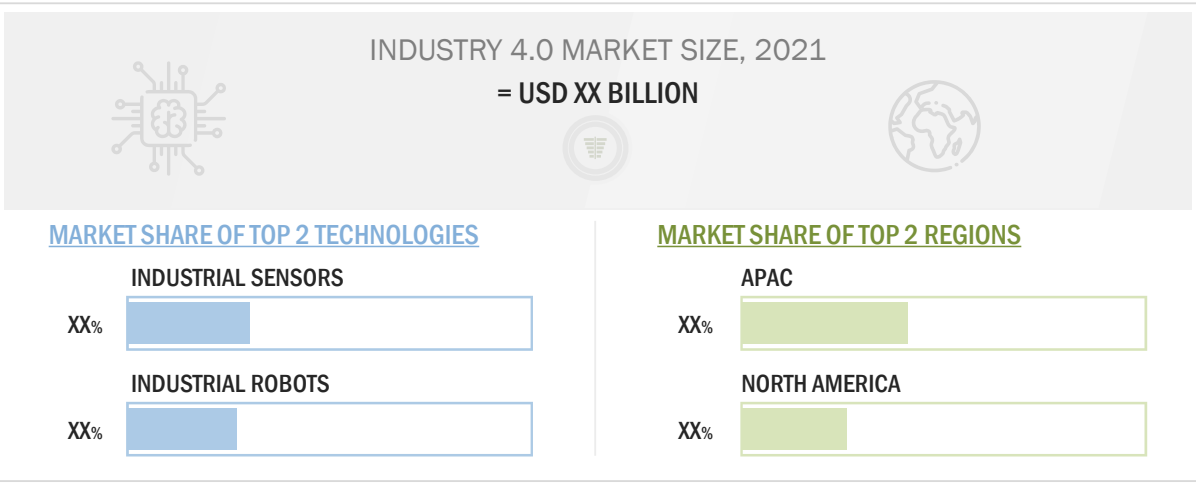
The digital twin segment is expected to record the highest CAGR of XX% during the forecast period.

The market growth in APAC can be attributed to economic growth and expansion of smart factories in the region's manufacturing sector.

Source: Annual Reports, Press Releases, Expert Interviews, and MarketsandMarkets Analysis

2.2 INDUSTRY 4.0 MARKET, BY TECHNOLOGY AND REGION

FIGURE 3 APAC TO HOLD LARGEST SIZE OF INDUSTRY 4.0 MARKET IN 2026



Source: Annual Reports, Press Releases, Expert Interviews, and MarketsandMarkets Analysis

3 MARKET OVERVIEW

3.1 INTRODUCTION

Industry 4.0 represents the interconnection of sensors, machines, and IT systems along the value chain beyond a single enterprise. These interconnected systems interact with each other using standard internet-based protocols and enable companies to analyze data to predict the failure of machinery and accordingly configure the variations in systems in the data. The fourth industrial revolution (Industry 4.0) is expected to make it possible to gather and analyze data from different machines to enable fast, flexible, and efficient processes to produce high-quality products at a reduced cost. This, in turn, is expected to increase manufacturing productivity, shift the economics, and foster industrial growth worldwide. The COVID-19 global pandemic has been a major cause of shifting trends in the Industry 4.0 market. The pandemic has further accelerated the need for efficient automation systems working in tandem with factory machinery.

3.2 MARKET DYNAMICS

This section discusses the drivers, restraints, opportunities, and challenges for the Industry 4.0 market and mentions the impact of these parameters on the market. Rapid adoption of AI and IoT in the manufacturing sector, increased demand for industrial robots in the pharmaceutical and medical device manufacturing sector, and rising government investment in 3D printing and additive manufacturing play a significant role in the growth of the Industry 4.0 market worldwide. However, the lack of skilled engineers conversant with new developments in AI and IoT technologies, and high costs associated with procurement of 3D printing materials are the key factors that inhibit market growth.

FIGURE 4 MARKET DYNAMICS: INDUSTRY 4.0 MARKET, 2020

DRIVERS	▪ Rapid adoption of Artificial Intelligence (AI) and Internet of Things (IoT) in manufacturing sector ▪ Increasing demand for industrial robots in pharmaceutical and medical device manufacturing sector ▪ Rising government investments in 3D printing and additive manufacturing ▪ Growing adoption of blockchain technology in manufacturing industry
RESTRAINTS	▪ Lack of skilled workforce conversant with new developments in AI and IoT technologies ▪ Restricted use of industrial robots in startups due to high implementation costs ▪ High cost of 3D printing materials prevents small companies from competing with big players ▪ Negative health effects of excessive use of AR & VR
OPPORTUNITIES	▪ Increasing application of AI and IoT in medical wearables ▪ Rising popularity of 5G in cloud robotics sector ▪ Surge in use of 3D printing technology for medical equipment and customized drugs during COVID-19 pandemic
CHALLENGES	▪ Susceptibility of IoT and AI technologies to cyberattacks ▪ Interoperability and integration issues of industrial robots ▪ High cost associated with deployment of VR technology

Source: Association of Manufacturing Excellence (AME), Journals, Company Website, Expert Interview, White Paper, and MarketsandMarkets Analysis

3.2.1 DRIVERS

3.2.1.1 Rapid adoption of Artificial Intelligence (AI) and Internet of Things (IoT) in manufacturing sector

Since the inception of Industry 4.0, the penetration of AI and IoT technologies in the manufacturing sector has been increasing rapidly. AI and IoT integrated systems allow optimization of manufacturing processes, send early alerts, contribute to quality control, and forecast equipment failure in machinery. By gathering precise data, manufacturers can develop innovative AI applications, differentiating themselves from their competition.

The outbreak of the COVID-19 pandemic in 2020 has resulting in a testing time for the manufacturing sector. Movement restrictions, forced lockdowns and unavailability of workforce forced manufacturers to improvise their production processes. This has resulted in further acceleration of the use of AI and IoT in manufacturing processes. Activities such as condition monitoring, and equipment maintenance were carried out with the help of AI and Machine Learning (ML) algorithms in the absence of a regular workforce in manufacturing units. Machine vision is being used extensively for manufacturing quality control. It is more efficient and economical, and less time consuming than manual inspection. AI and IoT is also being used for predictive maintenance activities across manufacturing units to determine the need for repairs and spare parts, and the length of the equipment life-cycle. This helps eliminate downtime caused by unscheduled repair and maintenance activities. Considering cost-benefit analysis of leveraging these technologies in the manufacturing sector, it can be concluded that the use of AI and IoT in manufacturing will become mainstream in coming years. Companies such as Cisco, Intel, Honeywell and IBM are already pushing for greater use of AI and IoT in the manufacturing sector.

3.2.1.2 Increasing demand for industrial robots in pharmaceutical and medical device manufacturing sector

When robots were first introduced in pharmaceutical manufacturing, their primary role was to eliminate the deployment of a human workforce on repetitive processes, thus saving time and cutting cost. The role of industrial robots in pharmaceutical manufacturing has evolved over the years, especially with the introduction of cobots (collaborative robots). Cobots are deployed in conjunction with the human workforce to perform various tasks in the manufacturing unit.

The pharmaceutical and medical device manufacturing sector experienced a paradigm shift in the first quarter of 2020 due to the onset of the COVID-19 pandemic. As the demand for medical devices increased around the world, various manufacturers deployed collaborative robots in their manufacturing facilities. This demand was further fueled by the unavailability of a human workforce due to movement restrictions and lockdowns. The deployment of these robots resulted in reduced space utilization and production downtime, better waste management, lower operating costs and increased production yield. Hence, there is an increasing demand for industrial robots in the medical device manufacturing and pharmaceutical sector. Companies such as Universal Robots, Techman Robot, Fanuc, and KUKA are pioneers in the development of industrial robots for the manufacturing sector.

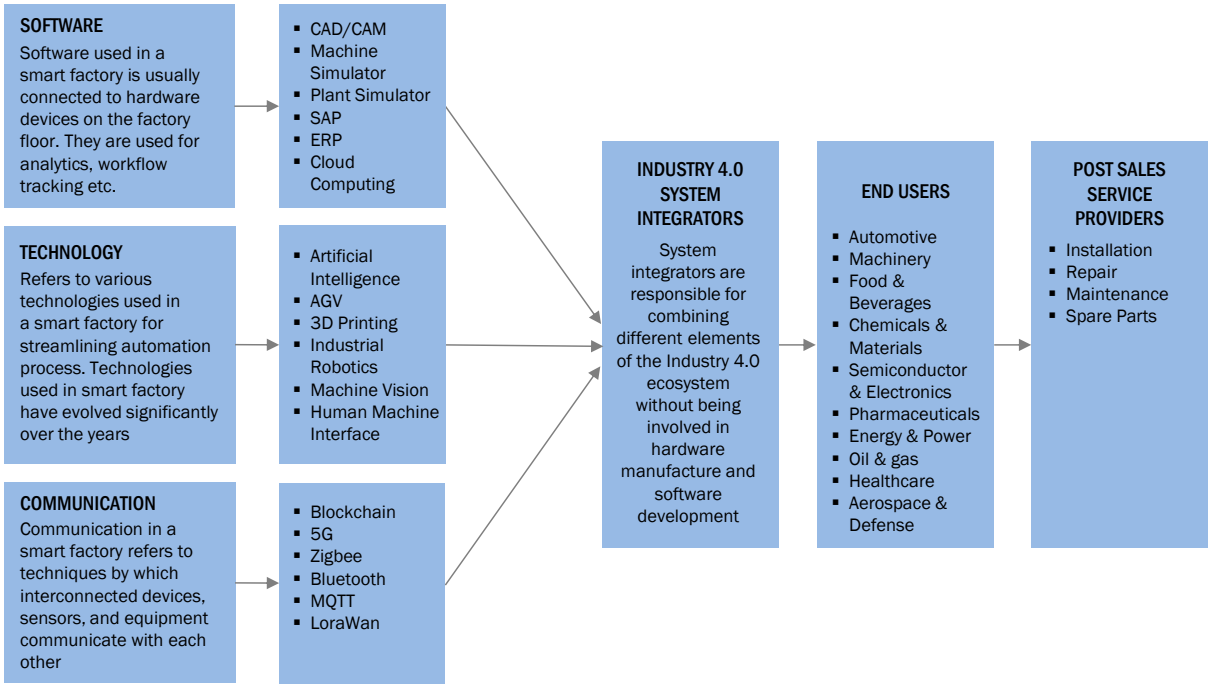
3.2.1.3 Rising government investments in 3D printing and additive manufacturing

3D printing and additive manufacturing is one of the most innovative modern technologies. During the COVID-19 pandemic, 3D printing was being used extensively to fulfill the huge surge in demand for ventilator valves in hospitals around the world. Post the COVID-19 pandemic, 3D printing technology is poised to change various trends in manufacturing industry.

3.3 VALUE CHAIN ANALYSIS

Value chain analysis is a systematic approach to examine all activities occurring throughout the value chain of a market. It helps analyze the sources of competitive advantage among different market players, right from the raw material supplier stage to the end user stage. The model works by segregating a firm into its strategically relevant activities to understand the behavior of costs and identify the sources of differentiation. A firm requires to achieve cost reduction in these strategically important activities to achieve a competitive advantage. The value chain analysis of the Industry 4.0 market gives an insight into the industry by showcasing the interconnections among various industry segments and depicting the flow of value (money or goods/services) among different segments.

FIGURE 5 INDUSTRY 4.0 MARKET: VALUE CHAIN



Source: Secondary Research, Expert Interviews, and MarketsandMarkets Analysis

Software Providers: Software is an integral part of the Industry 4.0 ecosystem. In a smart factory setting, various types of software are used alongside hardware for controlling, streamlining, and tracking various operations in real time. Software is used for design, analysis, simulation, process and plant workflow tracking, and condition monitoring in a typical smart factory. Leading companies providing software solutions include Intel, Nvidia, IBM, Microsoft, Amazon Web Services, and Google.

Technology Providers: Various types of technologies are used in a smart factory to facilitate smooth functioning of automated processes. These technologies have been evolving dynamically over the years. Technology providers include manufacturers of hardware systems required in a factory. These systems can be either electrical or mechanical depending upon their applications. Prominent technology providers for the Industry 4.0 ecosystem include Nvidia, ABB, Emerson Electric, Cisco, Daifuku, Cognex, Stratasys, JBT, and Universal Robots.

Communication: In a smart factory ecosystem, various devices, components, and sensors are interconnected. The devices use different communication protocols to communicate with each other and maintain the proper flow of operations. The proper integration of hardware and software is hugely dependent on effective communication. Leading providers of communication systems in the market include Intel, IBM, Cisco, Sigfox, Comcast. Google, and Huawei.

4 INDUSTRY 4.0 MARKET, BY TECHNOLOGY

4.1 INDUSTRY 4.0 MARKET FOR INDUSTRIAL ROBOTS

There has been an increasing demand from all the industries for robots to automate processes for a better production output. The automotive and electronics industries have shown high adoption of robotics. The general industry is also expected to incline more toward the use of robots, driven by the increasing adoption of robots by small and medium-sized companies. The increasing penetration of technologies, such as big data, artificial intelligence, machine learning, and cloud, in all the industries is expected to shift the emphasis from use of traditional robots toward connectivity and collaboration to improve the manufacturing output.

Two types of industrial robots are covered under the scope of the market -- traditional and collaborative robots. Traditional robots are previous generation robots that are used to carry out repetitive activities on the factory shop floor. Collaborative robots are next generation industrial robots that are programmed to work in tandem with humans on the factory shop floor. Collaborative robots can perform much more complicated tasks than traditional robots without human intervention.

4.1.1 TRADITIONAL INDUSTRIAL ROBOTS

Industrial robots are expected to bring about a revolution in manufacturing processes. Industrial robotics is a reprogrammable, automatically controlled technology that is used in in the manufacturing industry for a number of applications such as welding, painting, fabrication and assembling parts. The benefits of implementing industrial robotics in smart manufacturing processes include increased production, improved productivity, and reduced human errors. Companies that provide robotics are ABB (Switzerland), Aethon (US), and FANUC (Japan).

Traditional industrial robots are segmented into articulated robots, Cartesian robots, Selective Compliance Assembly Robot Arm (SCARA) robots, parallel robots, and others (cylindrical robots and spherical robots (polar)).

Industrial robots are further segmented on the basis of end-use industry into process and discrete industries. Process industries include chemicals, pharmaceuticals, food & beverages, and others. Discrete industries include automotive, semiconductor & electronics, machine manufacturing, and others.

This section includes information about the entire industrial robotics ecosystem, which comprises of sale of robots, and the cost of software, peripherals and systems engineering. Market sizing for industrial robots is derived after considering all these factors.

TABLE 1 INDUSTRY 4.0 MARKET FOR TRADITIONAL ROBOTS, BY PROCESS INDUSTRY, 2017–2020 (USD MILLION)

Process Industry	2017	2018	2019	2020	CAGR (2017–2020)
Chemicals	XX	XX	XX	XX	XX%
Pharmaceuticals	XX	XX	XX	XX	XX%
Food & Beverages	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

TABLE 2 INDUSTRY 4.0 MARKET FOR TRADITIONAL ROBOTS, BY PROCESS INDUSTRY, 2021–2026 (USD MILLION)

Process Industry	2021	2022	2023	2024	2025	2026	CAGR (2021–2026)
Chemicals	XX	XX	XX	XX	XX	XX	XX%
Pharmaceuticals	XX	XX	XX	XX	XX	XX	XX%
Food & Beverages	XX	XX	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

TABLE 3 INDUSTRY 4.0 MARKET FOR TRADITIONAL ROBOTS, BY DISCRETE INDUSTRY, 2017–2020 (USD MILLION)

Discrete Industry	2017	2018	2019	2020	CAGR (2017–2020)
Automotive	XX	XX	XX	XX	XX%
Semiconductor & Electronics	XX	XX	XX	XX	XX%
Machine Manufacturing	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

TABLE 4 INDUSTRY 4.0 MARKET FOR TRADITIONAL ROBOTS, BY DISCRETE INDUSTRY, 2021–2026 (USD MILLION)

Discrete Industry	2021	2022	2023	2024	2025	2026	CAGR (2021–2026)
Automotive	XX	XX	XX	XX	XX	XX	XX%
Semiconductor & Electronics	XX	XX	XX	XX	XX	XX	XX%
Machine Manufacturing	XX	XX	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

Traditional robots are in huge demand particularly in the automotive industry. In a typical automotive manufacturing unit, traditional robots are deployed to perform repetitive tasks on the production lines, thus helping to save on time and the cost of human labor.

4.1.1.1 Articulated robots

The word 'articulated' means 'jointed'; articulated robots are robots with rotary joints. An articulated robot has a 6-7-axis arm, designed to track arbitrary paths in three-dimensional space, with at least three rotary joints due to which it can cover a large work envelope and is also suitable for an irregularly shaped work envelope. Since this type of robot was introduced, it has been used in applications such as assembly,

welding, machine load and unloads. Over time, with increased work envelope, payload, flexibility, and speed, its applications in manufacturing companies have increased. Articulated robots are now also used in applications such as painting, gluing, grinding, packaging, and material handling. In January 2017, Igus (Germany) launched Robolink D 5-axis articulated arm, a pre-assembled jointed arm robot –that helps machine and system builders to rapidly implement their own low-cost robotic automation system.

Some of the key players that provide articulated robots are ABB Ltd. (Switzerland), Kuka AG (Germany), FANUC Corporation (Japan), Yaskawa (Japan), DENSO Robotics (Japan), Adept Technologies (US), and ST Robotics (US).

4.1.1.2 Cartesian Robots

A Cartesian robot has an arm with three prismatic joints, whose axes are in line with a Cartesian coordinate system. This type of robot works from an overhead grid and provides accurate and quick solutions mainly for material handling applications. Its work envelope is in a rectangular shape and is determined by the area covered by the grid. The complete linear movements of Cartesian robots facilitate simple controls, with a high degree of mechanical rigidity, accuracy, and repeatability. These robots can carry heavy loads and their weightlifting capacity does not vary at different locations within the work envelope. However, the rectangular workspace or envelope is a major disadvantage; while the robots require a large space to operate in, the entire space is not utilized. Cartesian robots are commonly used for applications such as assembling, machining operations, adhesive applications, surface finishing, inspection, water jet cutting, welding, and material handling. Some of the major players that supply Cartesian robots are Yamaha Robotics (Japan), Toshiba Machine (Japan), ABB Ltd. (Switzerland), Kuka AG (Germany), FANUC Corporation (Japan), Yaskawa (Japan), DENSO Robotics (Japan), and Adept Technologies (U.S.).

4.1.1.3 Selective Compliance Assembly Robot Arm (SCARA)

SCARA is one of the horizontal configurations of an articulated robot. The compliance of these robots is in line with the X-Y axis. The primary objective of this robot is to yield flexible horizontal motions, while being fixed vertically. SCARA robots are ideally suited for operations required more horizontal motion than vertical motion. They are used for clean room applications such as wafer and disk handling in the electronics sector. SCARA robots have the most versatile configuration so far, and provide a larger work envelope than Cartesian, cylindrical, or spherical configurations. They also offer a more flexible reach than the other configurations, thereby making them ideal for welding and spray-painting operations. The disadvantage of this type of robot is that it requires a sophisticated controller and involves complex programming.

DENSO Robotics (Japan), EPSON Robots (Japan), Stäubli Robotics (Germany), Toshiba Machine (Japan) and Yamaha Motor Co., Ltd. (Japan) are some of the companies that supply SCARA robots. These companies are continuously focusing on developing new products to offer innovative solutions to end users. For instance, in October 2016, Yamaha Motor Co., Ltd. (Japan) announced the launch of a new YKX series of SCARA robots, compatible with its 'Advanced Robotics Automation Platform' integrated control robot system.

4.1.1.4 Cylindrical Robots

A cylindrical robot consists of two orthogonal slides; it is placed at a 90° angle and mounted on a rotary axis. Hence, the axes of these robots form a cylindrical coordinate system. Cylindrical robots have a larger work envelope than Cartesian robots and are ideal for pick and place operations. However, cylindrical configurations have some disadvantages; their overall mechanical rigidity is reduced because robots with a rotary axis must overcome the inertia of an object while rotating. As a result, their repeatability and accuracy are also reduced in such rotary movement. The cylindrical configuration requires a more sophisticated control system than the Cartesian configuration. These robots are used in machine loading and unloading, investment casting, conveyor pallet transfers, foundry, and forging. Some of the major players that supply cylindrical robots are ABB Ltd. (Switzerland), DENSO Robotics (Japan), FANUC Corporation (Japan), Hudson Robotics (U.S.), and Kuka AG (Germany).

4.1.1.5 Other robots

The other robots considered under this segment are parallel, spherical (polar), delta robots, stationary robots and wheeled robots. They have limited application areas due to their functionality and have been replaced by articulated robots over the course of time.

4.1.2 COLLABORATIVE ROBOTS

4.1.2.1 Emerging trend in robotics industry

The workload of people involved in the manufacturing process can be reduced by human–robot collaboration. Collaborative robots are designed to work alongside human workers in a plant to achieve high efficiency in production. They are used in factories to perform repetitive tasks and can stop working if they come in contact with humans.

The robotics industry is currently witnessing an emerging trend of collaborative robots. This trend is further expected to drive the adoption of robots in the manufacturing sector, and subsequently boost the Industry 4.0 market.

Leading players in the robotic industry are coming up with new products for factories, which could increase the adoption of collaborative robots in the manufacturing sector. For instance, in February 2021, FANUC Corporation (Japan)—one of the leading suppliers of robotics and factory automation—launched the CR-10iA collaborative robots for smart manufacturing facilities.

TABLE 5 INDUSTRY 4.0 MARKET FOR COLLABORATIVE ROBOTS, BY PROCESS INDUSTRY, 2017–2020 (USD MILLION)

Process Industry	2017	2018	2019	2020	CAGR (2017–2020)
Chemicals	XX	XX	XX	XX	XX%
Pharmaceuticals	XX	XX	XX	XX	XX%
Food & Beverages	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

TABLE 6 INDUSTRY 4.0 MARKET FOR COLLABORATIVE ROBOTS, BY PROCESS INDUSTRY, 2021–2026 (USD MILLION)

Process Industry	2021	2022	2023	2024	2025	2026	CAGR (2021–2026)
Chemicals	XX	XX	XX	XX	XX	XX	XX%
Pharmaceuticals	XX	XX	XX	XX	XX	XX	XX%
Food & Beverages	XX	XX	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

TABLE 7 INDUSTRY 4.0 MARKET FOR COLLABORATIVE ROBOTS, BY DISCRETE INDUSTRY, 2017–2020 (USD MILLION)

Discrete Industry	2017	2018	2019	2020	CAGR (2017–2020)
Automotive	XX	XX	XX	XX	XX%
Semiconductor & Electronics	XX	XX	XX	XX	XX%
Machine Manufacturing	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

TABLE 8 INDUSTRY 4.0 MARKET FOR COLLABORATIVE ROBOTS, BY DISCRETE INDUSTRY, 2021–2026 (USD MILLION)

Discrete Industry	2021	2022	2023	2024	2025	2026	CAGR (2021–2026)
Automotive	XX	XX	XX	XX	XX	XX	XX%
Semiconductor & Electronics	XX	XX	XX	XX	XX	XX	XX%
Machine Manufacturing	XX	XX	XX	XX	XX	XX	XX%
Others	XX	XX	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

The chemicals industry is set to hold the largest share of the Industry 4.0 market for collaborative robots. A typical chemical manufacturing facility consists of various fragile and hazardous elements spread all over the plant. Deployment of collaborative robots, working in tandem with human workers, is necessary, since traditional robots are incapable of functioning in such environments.

4.2 INDUSTRY 4.0 MARKET FOR BLOCKCHAIN IN MANUFACTURING

4.2.1 DEFINITION

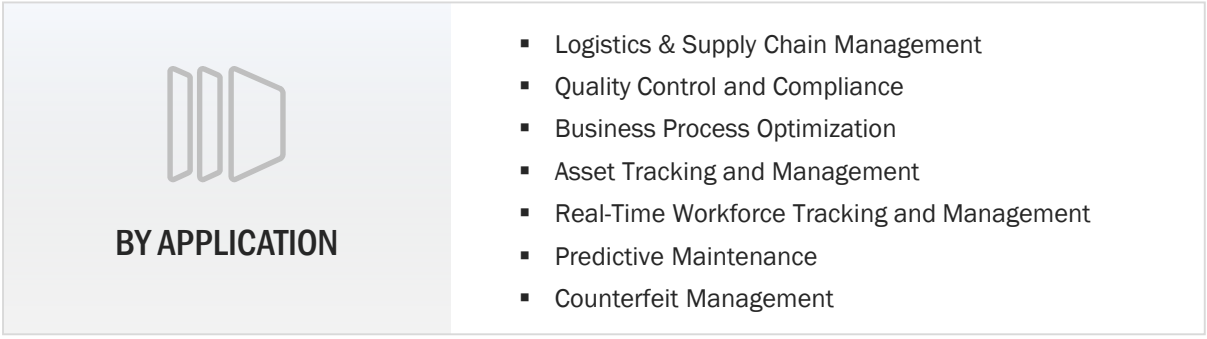
Blockchain is a decentralized and shared digital distributed ledger that was developed to record Bitcoin cryptocurrency transactions in the form of 'blocks' on the network; each new block is added to the chain in a linear and chronological order. A node (computer connected to network), upon joining the peer-to-peer network, receives a copy of the blockchain; the data contained in the blocks is cryptographically hashed with a complex algorithm, which makes it immutable, i.e., it cannot be altered or deleted.

4.2.2 BLOCKCHAIN IN MANUFACTURING

The use of blockchain in the manufacturing industry has urged an industrial revolution and a new wave of technological advancements, triggering a paradigm shift in manufacturing processes. Manufacturers are looking to extract maximum advantage from the use of blockchain solutions. They are continually discovering newer applications to enhance their revenues and provide innovative solutions to shop floor managers. Blockchain in manufacturing is broadly used in logistics and supply chain management, quality control and compliance, business process optimization, asset tracking and management, real-time workforce tracking and management, predictive maintenance, and counterfeit management.

The expanding application areas of blockchain in manufacturing allow manufacturers to enhance business efficiency and improve bottom lines. The growing need for operational efficiency and decreasing costs of hardware for connectivity are expected to drive the future demand for blockchain in manufacturing.

FIGURE 6 TYPICAL APPLICATIONS OF BLOCKACHAIN IN MANUFACTURING SECTOR



Source: Press Releases, Annual Reports, Investor Presentations, Secondary Research, Expert Interviews, Articles, Press Releases, R3CEV Consortium, Hyperledger Foundation, The Association for Manufacturing Excellence (AME), The Association for Manufacturing Technology (AMT), National Association of Manufacturers (NAM), Chamber of Digital Commerce, World Blockchain Association, and MarketsandMarkets Analysis

4.2.2.1 Drivers contributing to growth of industry 4.0 market for blockchain in manufacturing

4.2.2.1.1 Increasing demand for real-time data analyses, enhanced visibility, and proactive maintenance in manufacturing industry

Rapid developments in the manufacturing industry on a global level are creating stiff competition. Manufacturers across key industry verticals such as oil & gas, food & beverages, automotive, and aerospace & defense are constantly looking for solutions that facilitate real-time data analyses and proactive maintenance and help them obtain better visibility into their manufacturing operations.

Blockchain can enable manufacturers access plant floor data in real time. Real-time data analysis helps manufacturers to centralize the business data and multiplant operations in real time, enabling them to adapt to changing production demands and maintain operational efficiency without any downtime. Manufacturers these days also strive for proactive maintenance capabilities that can help them avoid unplanned downtime and production wastes that cause huge losses. Blockchain can enable users identify possible machinery failures well in advance to initiate corrective measures. Post the COVID-19 pandemic, the adoption of blockchain in the manufacturing sector is expected to increase multifold owing to all these factors.

For example, 'VeChain', a blockchain-based platform, helps monitor vaccine production in China and curb the spread of substandard face masks. The platform is working hand in hand with production facilities to make sure that new KN95 masks imported from China are authentic. From materials and codes to packaging, all activities related to vaccine manufacturing are recorded and stored on distributed ledgers.

Walmart (US), JD.com (China), IBM (US), and Tsinghua University (China) have been working on the Blockchain Food Safety Alliance project that aims at improving food tracking, traceability, and safety in China, and to achieve greater transparency across the food supply chain.

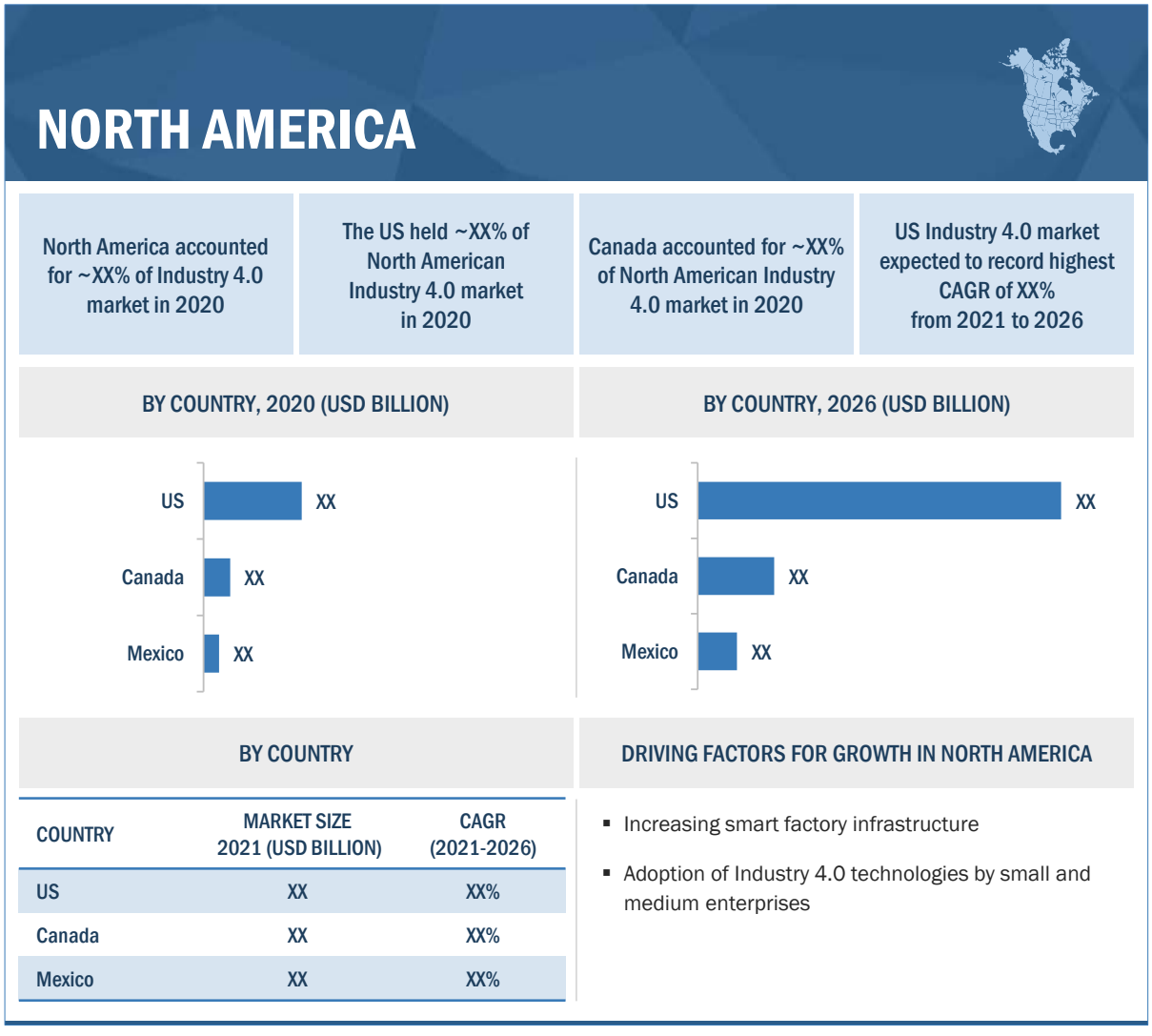
Blockchain technology can be used to improve transparency of data analytical processes. Unlike other algorithms, the blockchain design rejects any input that it can't verify and deems suspicious; as a result, analysts receive data that is completely transparent, accurate and error-free.

5 GEOGRAPHIC ANALYSIS

5.1 NORTH AMERICA

Industries are opting for digitalization and connecting functions and processes, such as supply chain, product development planning, and products, across the value chain. The US has a large industrial base featuring companies with high production capacity; it is thus expected to be the major contributor to the Industry 4.0 market in North America.

FIGURE 7 NORTH AMERICA: SNAPSHOT OF INDUSTRY 4.0 MARKET



Source: Press Releases, Expert Interviews, and MarketsandMarkets Analysis

5.1.1 US

5.1.1.1 Growing manufacturing base accounts for large size of Industry 4.0 market

Manufacturing is one of the important industries in the US. The growing adoption of advanced technologies, such as IoT, big data, DevOps, and mobility, by manufacturing companies; increasing number of SMEs in the field of manufacturing; and surging demand for digitalization in manufacturing by large organizations, such as IBM and General Electric, have collectively contributed to the growth of the manufacturing sector in the US. After the onset of the COVID-19 pandemic, the US has been systematically deploying automation solutions in smart factories across the country so that production in the manufacturing sector does not suffer due to lack of adequate work force. The country's pharmaceutical sector has been experiencing tremendous demand for industrial robots, and machine vision solutions. Many smart factories manufacturing critical medical equipment have leveraged the use of artificial intelligence, blockchain and condition monitoring solutions to streamline production and boost production efficiency. In this way, the US is ramping up its manufacturing base across industries.

5.1.2 CANADA

5.1.2.1 Demand from food & beverage processing industry to drive market

Large enterprises and critical applications have been among the early adopters of Industry 4.0. Since the Canadian market is dominated by small and medium-sized enterprises, the adoption of Industry 4.0 solutions in Canada is low. However, this trend is slowly changing, and more Canadian enterprises have started investing in IoT, AI and blockchain solutions. The food & beverage processing industry is one of the largest manufacturing industries in Canada in terms of the value of production and is expected to be the key contributor to the Industry 4.0 market. After the outbreak of the COVID-19 pandemic, the Canadian food industry was unable to cope with the demand for food products across the country owing to government mandated lockdowns, movement restrictions and limitations on manpower allowed in factory premises. Food & beverage manufacturers across the country accelerated the deployment of industrial robots, machine vision systems, condition monitoring systems, and blockchain solutions in production facilities across the country. The Canadian government subsequently rolled out various schemes and subsidies for these manufacturers to avail state-of-the-art automation solutions. In February 2021, the government dispersed financial support totaling USD XX to the College Centre for Technology Transfer (CCTT) to foster technical innovation. This grant will enable the organization to strengthen its technology transfer capabilities by acquiring digital equipment and advanced software that will be made available to the manufacturing businesses in the Chaudière-Appalaches region. The SMEs in this region will make use of CCTT's services to develop new Industry 4.0-inspired production processes.

5.1.3 MEXICO

5.1.3.1 Growing government impetus propelling demand for Industry 4.0 technologies

Mexico is an emerging economy and is expected to witness growth in the Industry 4.0 market. The country is rapidly evolving as a major industrial hub in North America. Recent structural reforms in the country have helped create optimism among entrepreneurs and investors. Growing impetus from the Mexican Government to increase manufacturing has propelled the demand for technologies such as industrial robotics, and 3D printing. In Mexico, industries such as electronics, food & beverages, chemicals, and mining play an important role in the economic growth, which in turn helps drives the Industry 4.0 market.

Due to the disruption of supply chains around the world after the COVID-19 outbreak, various government schemes to induce rapid adoption of industry 4.0 technologies across the manufacturing sector experienced temporary stagnation. Production in various industries took a massive hit due to this unprecedented crisis. As the effects of the pandemic are slowly diminishing across the country, the government is aggressively pushing the deployment of Industry 4.0 technologies in manufacturing units across the country. It is providing financial and other assistance in the form of waivers and subsidies to SMEs in the country to encourage the replacement of legacy systems with newer Industry 4.0 technologies.

TABLE 9 INDUSTRY 4.0 MARKET IN NORTH AMERICA, BY COUNTRY, 2017–2020 (USD BILLION)

Country	2017	2018	2019	2020	CAGR (2017–2020)
US	XX	XX	XX	XX	XX%
Canada	XX	XX	XX	XX	XX%
Mexico	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

TABLE 10 INDUSTRY 4.0 MARKET IN NORTH AMERICA, BY COUNTRY, 2021–2026 (USD BILLION)

Country	2021	2022	2023	2024	2025	2026	CAGR (2021–2026)
US	XX	XX	XX	XX	XX	XX	XX%
Canada	XX	XX	XX	XX	XX	XX	XX%
Mexico	XX	XX	XX	XX	XX	XX	XX%
Total	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX%**

Source: Press Releases, Investor Relation Presentations, Automation World, Expert Interviews, and MarketsandMarkets Analysis

The US Industry 4.0 market is the largest in North America. In the technological sphere, the US has always been a leader in adopting and implementing technologies. Continuous investment in the manufacturing industry will enable the country to continue to retain its technological superiority. 3D printing is now being widely used by manufacturing industries such as automotive, aerospace, and industrial equipment to develop tools, molds, and casts, as well as to develop and repair machinery parts; this allows manufacturers to maximize functional integration and consistency while minimizing costs.

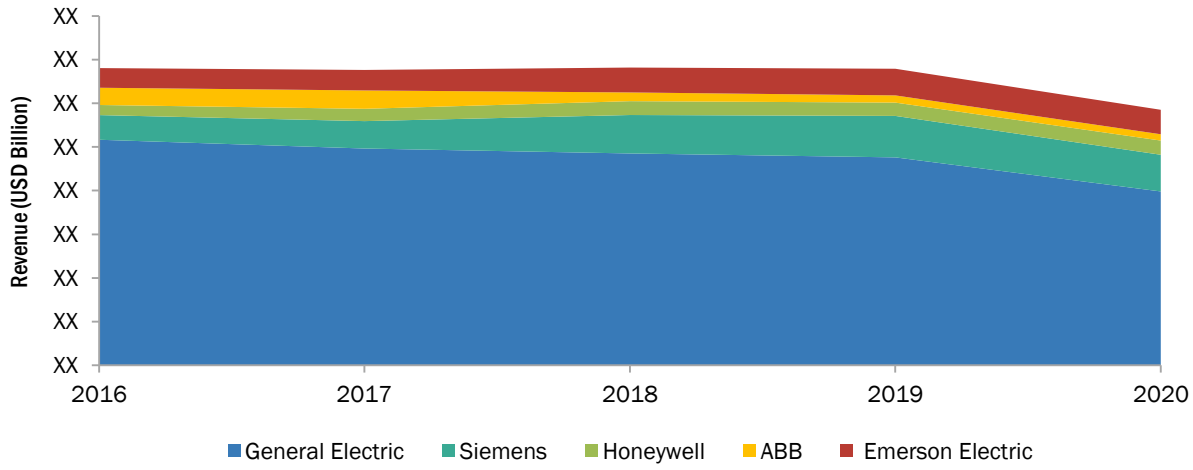
6 COMPETITIVE LANDSCAPE

6.1 OVERVIEW

This section of the report provides an overview of the competitive scenario in the Industry 4.0 market. It analyzes growth strategies adopted by companies to enhance their position in the Industry 4.0 market and ensure their long-term growth and success. A market share analysis has been carried out based on the revenues generated by the key players from various business segments in the overall market. The section also features a benchmarking of the strategies adopted by the key players in the Industry 4.0 market, based on an analysis of developments such as product launches, product developments, agreements, and partnerships.

6.2 TOP 5 COMPANY REVENUE ANALYSIS

FIGURE 8 FIVE-YEAR REVENUE ANALYSIS OF TOP 5 PLAYERS IN INDUSTRY 4.0 MARKET



Note: The figure depicts the revenue analysis of the top 5 players. The revenue of each individual company depicted in the figure pertains to the operational segment through which the company offers Industry 4.0 products and solutions.

The total revenue for General Electric has been considered since the relevant segment in this particular case is not discernable. General Electric operates in the Power, Renewable Energy, Aviation, Healthcare, and Capital segments.

Siemens operates in the Digital Industries segment. The company has changed its organizational structure and adjusted reportable segments. As such, revenues for the Digital Industries segment have been provided for 2019 and 2020, while the revenues for the Digital Factory segment have been given for 2016 and 2017.

Honeywell International offers Industry 4.0 products and solutions through the Safety & Productivity Solutions operational segment.

ABB has changed its organizational structure and adjusted reportable segments. As such, revenues for the Robotics & Discrete Automation segment have been provided for 2018, 2019 and 2020, while revenues for the Robotics & Motion segment have been given for 2016 and 2017.

Emerson Electric offers Industry 4.0 products and solutions through the Automation Solutions operational segment.

Source: Annual Reports, Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

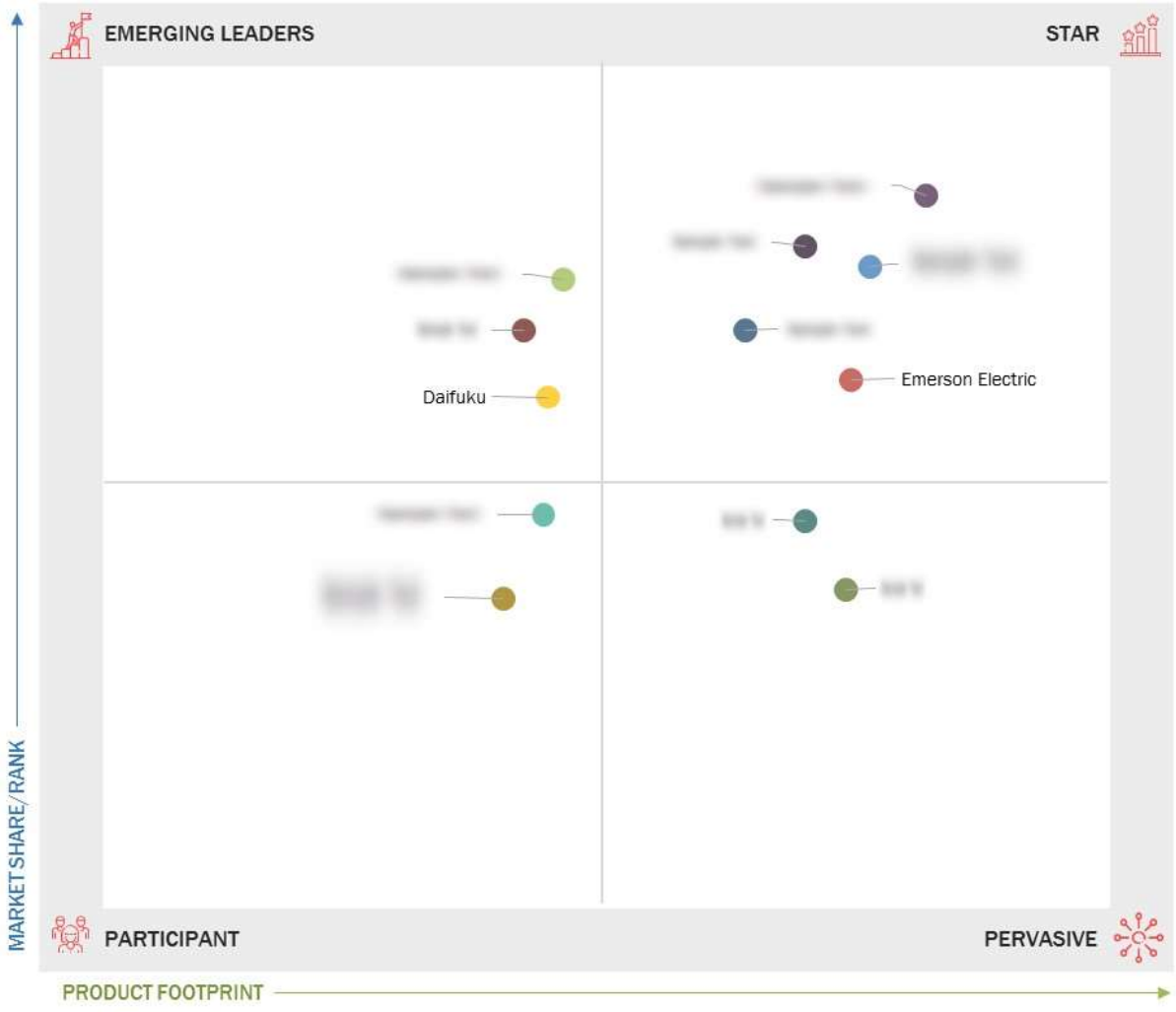
General Electric, Siemens, Honeywell, ABB and Emerson Electric are the top 5 players in the Industry 4.0 market. They offer state-of-the-art Industry 4.0 related products, solutions and services, and contribute significantly to the size of the market. The top 5 players led the market in 2020 owing to their high-end technological advantages, as well as a diverse range of product portfolios. For instance, in July 2020, Siemens launched the Simatic Real-time Locating Systems (RTLS) plus SieTrace software that offers real-time location information, which customers can use to control their manufacturing processes during the COVID-19 crisis and design their operating procedures accordingly.

These companies mainly focus on product launches, product developments, agreements, and partnerships to extend their footprint and expand their business reach. For instance, in January 2020, Honeywell International partnered with Tact.ai to deploy the latter's artificial intelligence digital assistance tool to its global sales team; this will bring more effective and intuitive human machine interfaces (HMI) for operations and maintenance.

6.3 COMPANY EVALUATION QUADRANT, 2020

The company evaluation quadrant section provides an overview of the prevailing competitive scenario in the Industry 4.0 market.

FIGURE 9 INDUSTRY 4.0 MARKET (GLOBAL) COMPANY EVALUATION QUADRANT, 2020



Source: Press Releases, Expert Interviews, and MarketsandMarkets Analysis

7 COMPANY PROFILES

7.1 KEY PLAYERS

7.1.1 3D SYSTEMS

7.1.1.1 Business overview

3D Systems designs, manufactures, and markets 3D printing-centric solutions. The company, through its subsidiaries, operates in the Americas, APAC, Europe, and the Middle East. 3D Systems operates as one business segment and provides advanced and comprehensive 3D printing solutions comprising products, materials, and related services. The company manufactures and assembles various 3D printers at its facilities located in the US, Israel, and France. It also outsources certain printer production, assembly, and refurbishment activities to selected companies and suppliers.

The company produces print materials, including plastic, nylon, metal, composite, elastomeric, wax, polymeric dental materials, and Class IV biocompatible materials, at its own facilties or procures them from third parties. Notable 3D printing material brands from the company include Accura, DuraForm, LaserForm, CastForm, LaserForm, and VisiJet. With the growing technological changes in the 3D printing industry, the company has been focusing on ongoing R&D programs to develop new printers and printing materials as well as improve and expand the capabilities of printers, materials, and software. 3D Systems protects its technology platforms and materials as proprietary through patents, copyrights, trademarks, and trade secrets. As of December 2020, the company held 1,300+ patents and had 300 pending patent applications worldwide.

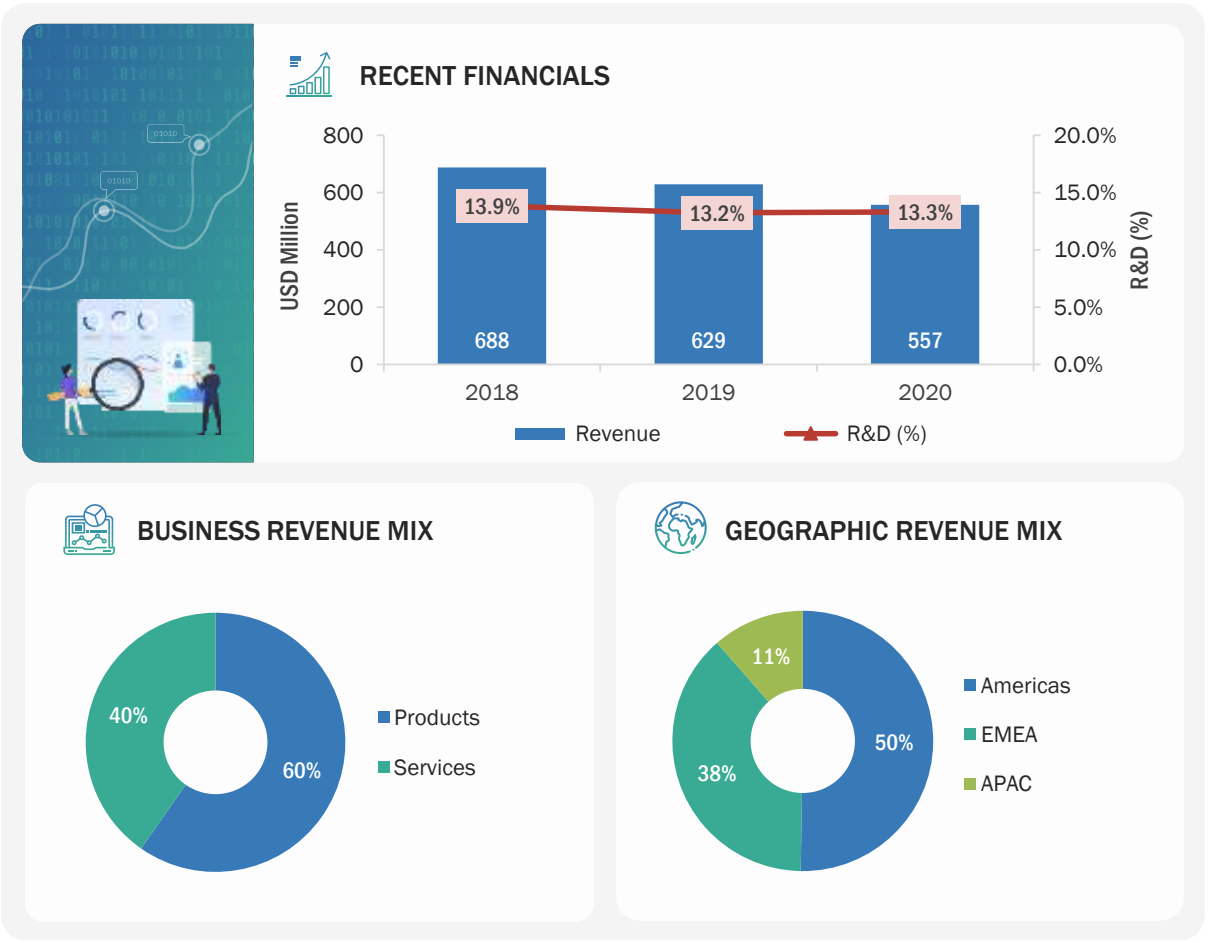
The company has a comprehensive range of 3D printers, print materials, software, haptic devices, scanners, and virtual surgical simulators that are used across a wide range of industries, including aerospace & defense, architecture, arts and entertainment, automotive, culinary, education, energy, healthcare, hobbyist, and jewelry. It offers a broad range of 3D printing technologies including Stereolithography (SLA), Selective Laser Sintering (SLS), Direct Metal Printing (DMP), MultiJet Printing (MJP), and ColorJet Printing (CJP). The company also offers 3D virtual reality simulators and simulator modules for medical applications. The service portfolio of the company comprises warranty, maintenance, and training services; on-demand solutions; software services, including software licensing, maintenance, and others; and healthcare services.

TABLE 11 3D SYSTEMS: BUSINESS OVERVIEW

Founding Year	1986
Country	United States
City/State	Rockhill, South Carolina
Ownership	Public

Source: Company Website

FIGURE 10 3D SYSTEMS: COMPANY SNAPSHOT



Note: The pie chart numbers are rounded off to the nearest unit, and there could be instances where the total might not add up to 100. The company's financial year ends on December 31.

Source: Company Website, Annual Reports, and MarketsandMarkets Analysis

APPENDIX

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GLOBAL FORECAST TO 2027

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In the face of constant technology innovation and market disruption, we help organizations plan and operationalize their future revenue mix decisions by identifying over 30,000 high growth opportunities ranging from $1B to $500B across 90+ industry trends and markets. Organizations choose MarketsandMarkets™ to stay ahead of the curve and accelerate their revenue decisions and implementations by 6 – 12 months, giving them a unique, first-mover advantage.

Our revenue impact methodology provides quantified and actionable insights on converged, granular and connected market eco-systems that result from disruptive technologies and high-growth markets. We provide an extended lens on not only what will impact our client's revenue but also what will impact their clients' revenues, continually uncovering latent opportunities.

We work across all major B2B industries with C-level executives in functions such as Strategy, Marketing, Sales, R&D, Product, and M&A. MarketsandMarkets™ brings exclusive high-growth markets intelligence generated by over 850 SMEs and analysts along with its proprietary Revenue Impact platform (Knowledge Store).