

Market Forecast

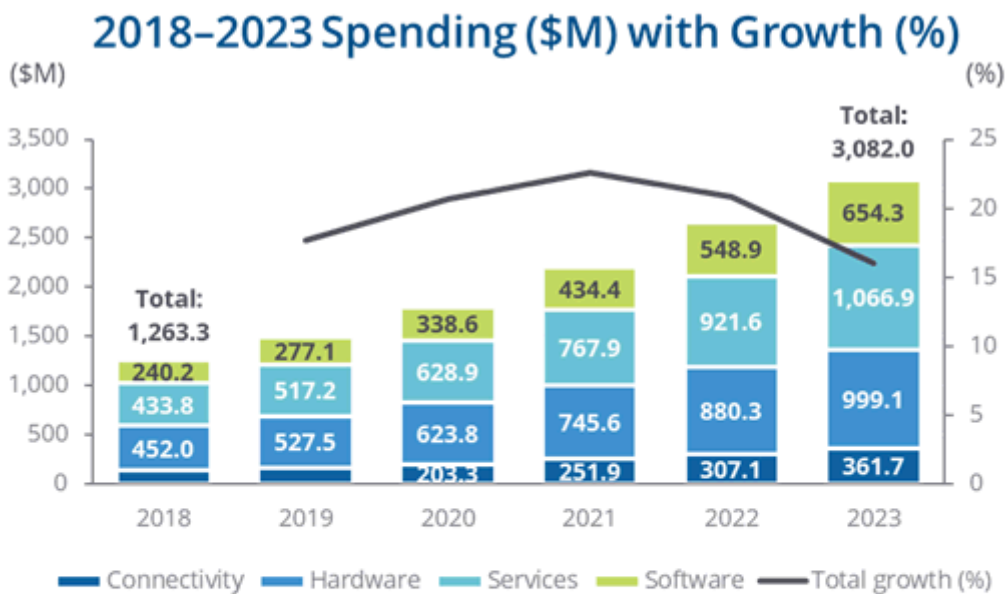
Saudi Arabia Internet of Things Market Forecast and Analysis 2018-2022

Jawad Khalil

IDC MARKET FORECAST FIGURE

FIGURE 1

Saudi Arabia Internet-of-Things Spending Snapshot



| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| <p>Selected Segment Growth Rate</p> <ul style="list-style-type: none"> ▲ Connectivity CAGR 21.4% ▲ Hardware CAGR 17.2% ▲ Services CAGR 19.7% ▲ Software CAGR 22.2% | <p>Total Market CAGR</p> <p>19.5%</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|

Source: IDC, 2019

EXECUTIVE SUMMARY

The Internet of Things (IoT) has been steadily gaining traction among businesses and consumers in Saudi Arabia. By raising connectivity to a new level, IoT is enabling businesses to optimize core operations, increase productivity, and improve profitability – and thus increase the standard of living for the average citizen. IoT now boasts a wide array of use cases, backed by a robust ecosystem of connectivity, hardware, software, and services.

IoT spending in Saudi Arabia is growing rapidly: Spending across all segments and industries is expected to reach \$1.48 billion in 2019, rising at a compound annual growth rate (CAGR) of 19.5% during 2018-2023. This will make Saudi Arabia the largest IoT market in the Gulf Cooperation Council (GCC) and the third-largest IoT market in the Middle East, Turkey, and Africa (META), behind Turkey and South Africa.

This IDC Market Forecast is based on the May 2019 edition of IDC's *Worldwide Semiannual Internet of Things Spending Guide*. It focuses on Saudi Arabia's IoT market size and projected IoT spending by technology, industry, and use case through 2023. The report sheds light on key market drivers and inhibitors and offers guidance to technology providers.

"The need to showcase swift ROI on smart initiatives, and the government's focus on giga-projects like Neom Bay, Qiddiyah entertainment city, Waad Al Shamaal City, King Salman Energy Park, and the Integrated Logistics Bonded Zone at King Khalid International Airport, are driving the adoption of off-the-shelf solutions. Smart parking, lighting, signage, and cleaning systems are scoring quick wins and improving urban life. LPWAN and 5G deployments are adding traction to traffic control and crowd management use cases in the holy cities of Mecca and Medina." – Jawad Khalil, Program Manager, Telecom and IoT, IDC Saudi Arabia

ADVICE FOR TECHNOLOGY SUPPLIERS

IoT is one of the most prominent growth areas in the ICT industry. But the market remains fragmented because of the relative immaturity of use cases, delivery models, products, and off-the-shelf offerings. With more than 20 billion IoT devices projected to be deployed globally by 2022, ICT vendors are scrambling to exploit the opportunity. Public and private sector organizations are looking to scale IoT deployments from proofs of concept (PoCs) to full-fledged projects. Because only a handful of end-to-end solution providers currently operate in Saudi Arabia, projects and PoCs are being realized through the procurement of solutions from a combination of local and global vendors.

Vendors have taken a range of approaches to capture IoT market share. Some have simply put communication chips in their devices and labeled them 'smart'. Some have offered legitimate solutions that have a wide array of features – but their marketing has fallen short in showcasing ROI. Others have invested across the technology stack to create integrated products and services and build a partner ecosystem that can provide solutions for significant market gaps.

To be successful, vendors must demonstrate to customers that the potential ROI of IoT solutions justifies premium pricing and/or substantial investments to modify operations and processes. A strategy that focuses on the benefits – not just the features – of IoT solutions is required. Suppliers should develop an approach that incorporates education and advice for clients and includes roles for technology partners, sales channels, and hardware manufacturers.

Go-To-Market Guidance

IDC urges technology suppliers to consider the following as they take IoT solutions to market:

- Providers should collaborate with a broad range of partners from the technology stack. The technological benefit is that vendors can focus on core strengths while leveraging partner expertise. Partnerships with OEMs can enable vendors to seamlessly integrate hardware with applications, software, and platforms.
- From a business perspective, a robust partnership portfolio increases business opportunities. Having more opportunities expands the ability of vendors to get involved in projects undertaken by partners, enlarging their market footprint.
- Technology vendors should take pride in the successes of their customers and use these deployments as case studies for ROI realization. Success stories and case studies are important for prospective clients interested in knowing about experiences rather than just sales and marketing collateral. IDC advises vendors to start using partner ecosystems to educate existing and potential clients about the value and benefits of IoT solutions.
- Technology vendors should develop long-term strategic partnerships with decision makers and high-level management of public sector and medium- to large-sized organizations. The commitment of top-level management is necessary for successful IoT deployments. Vendors should focus on nontraditional marketing efforts (e.g., speaking at industry events, giving interviews to technology media, and authoring thought leadership articles on IoT solutions).
- IoT vendors in Saudi Arabia should adopt a consultative sales approach that includes educating the customer and other members of the ecosystem. Vendors should invest in pre-sales professionals who can craft a compelling value proposition that showcases added value and ROI. However, this approach can significantly stretch the sales cycle, with considerable implications for sales processes and incentives.
- Explaining use cases is vital to convincing customers about the benefits that can be captured by deploying IoT solutions. Smart devices, for example, collect copious amounts of data while performing their functions – and this data can be leveraged in many ways (e.g., data gathered by smart lighting can be used to improve store layouts; data from connected machinery can be used for predictive and preventive maintenance).
- Vendors should invest in customer segmentation to understand which customers are most likely to benefit from which segment of the IoT ecosystem (i.e., hardware, software, services, connectivity, or an end-to-end solution). Customers can be prioritized based on the value to be gained from each technology segment. They can be prioritized based on operational dynamics, spending behavior, and digitalization plans.

Technology Guidance

IDC urges technology suppliers to consider the following as they develop IoT solutions:

- Vendors should develop a robust strategy for IoT platform and gateway evolution, especially in support of innovation accelerators like artificial intelligence (AI), Big Data analytics (BDA), robotics, 3D printing, machine learning, and edge computing. As the number of IoT devices and amount of telematics data increases, hybrid cloud should be considered a back-end infrastructure option for IoT platforms, applications, and BDA.
- Traditionally, devices used in IoT get bundled behind machine-to-machine network firewalls. As more devices get deployed, securing them – physically and operationally – becomes challenging. Technology vendors should incorporate security modules between connectivity and software layers.
- The value of IoT deployments lies in their ability to collect and process large amounts of data relevant to an organization's operations, enabling cost reductions and enhanced

efficiencies. The rapid transformation of large amounts of data into insights and intelligence can also improve decision making. Technology vendors should start investing in edge computing: Edge usually out-performs traditional cloud in terms of speed and cost). It is common industry knowledge that faster processing means lower latency. Vendors should consider incorporating edge and cloud to meet specific data processing needs.

- Technology vendors should strive to improve their understanding of the unique needs of customers across industries and propose tailored offerings. Technology partnerships are integral to developing industry-specific use cases. Instead of developing in-house solutions, telecom operators, systems integrators, and IT vendors seeking to move products to market quickly and gain traction in specific verticals should consider partnering with vendors specialized in vertical-specific solutions.
- It is important for IoT vendors to offer both the IT and operational technology (OT) components of end-to-end deployments. IT generally includes applications, analytics, and networking infrastructure, while OT includes machines, devices, processes, and operations that can be enhanced through devices and sensors (e.g., utilities, weather monitoring and forecasting, agriculture, and animal tagging).
- AI and BDA have gained marketing momentum in recent years due to their promise to add value and reduce costs. IoT is a key enabler of these next-generation technologies, which together create an ecosystem of automation. IoT devices collect data, which is collated in the cloud, processed for analytics, and used to improve AI algorithms. Providers should ensure that their business clients understand how these technologies interact and improve each other.
- With the advent of 5G and Low Power Wide Area Network (LPWAN) options (including local, country-specific protocols like Narrow Band Fidelity), customers in certain industries and locations will choose the most relevant connectivity option to meet their business requirements. IDC recommends that technology providers develop connectivity options that are not solely reliant on telecom operators. This will help providers gain traction in industries that operate in areas with little to no connectivity.

MARKET FORECAST

The Saudi Arabian IoT market is on an upward trajectory. IoT spending is expected to reach \$1.48 billion in 2019 and grow at a CAGR of 19.5% during 2018-2023. This will make it the largest IoT market in the GCC and the third largest in META, behind Turkey and South Africa.

The government's mega-projects, new regulations, and nationwide access to low-cost, reliable connectivity are helping drive IoT adoption. Several mega-infrastructure projects have large-scale IoT deployments at their core.

Technology Categories

IDC splits the IoT market into four technology groups: software, hardware, services, and connectivity. Spending on services was \$433.77 million in 2018 and is expected to reach \$1,066.92 in 2023 (a CAGR of 19.7%). Services cover technology and processes related to IoT solutions (e.g., IT managed and outsourcing services, application management, hardware deployment and support, hosted application management, hosting infrastructure services, and endpoint outsourcing services). In operational environments, services include IT industry-specific and help/service desk operations. Content as a service and other data services are included in this group.

Hardware was the second-largest spending category in 2018, at \$451.98 million. Hardware spending is expected to reach \$999.12 million in 2023 (a CAGR of 17.2%). Hardware includes

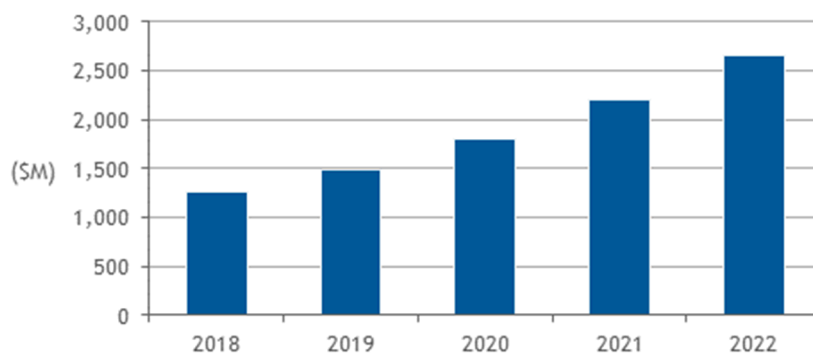
communication and device modules, hubs, controllers, sensors, servers, storage, and other wired or wireless IoT devices. Security hardware includes devices, sensors, network, analytics infrastructure, and edge devices.

Software was the third-largest spending category in 2018, at \$240.19 million. Software spending is expected to increase to \$654.25 million in 2023 (a CAGR of 22.2%). Software includes applications that transform data collected by connection endpoints into actionable insights that decision makers can use to affect change in business processes. Software includes applications to analyze, organize, and access structured and unstructured information and to deliver a specific functionality (either horizontal or industry-specific). Software IoT platforms include horizontal and industry-specific middleware packages that provide device, connectivity, visualization, and data management for connecting endpoints.

Connectivity spending within the Saudi IoT ecosystem reached \$137.38 million in 2018 and is expected to grow to \$361.73 million in 2023 (a CAGR of 21.7%). Connectivity spending includes network access and usage service charges provided by a network service provider to connect an IoT device to a commercial network.

FIGURE 2

Annual IoT Spending

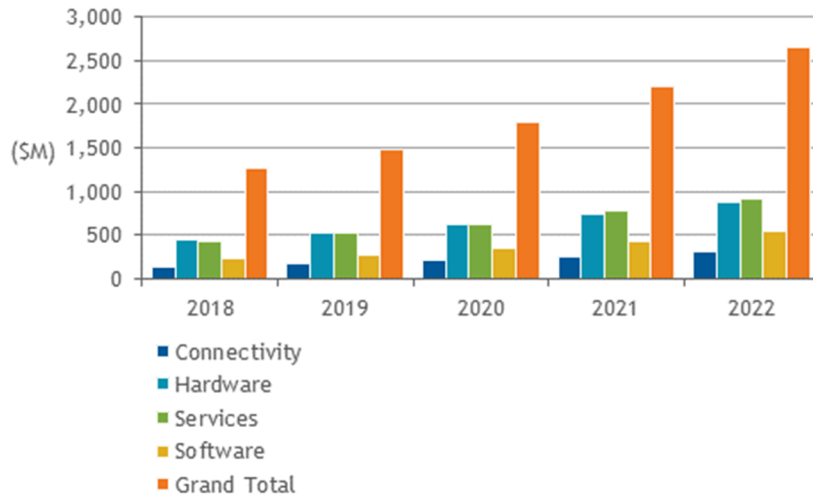


Source: IDC, 2019

IoT solutions spending is expected to double in the next five years. Technological advancements are fostering innovation. Solutions will be deployed across a broad array of industries.

FIGURE 3

Spending by IoT Technology Groups

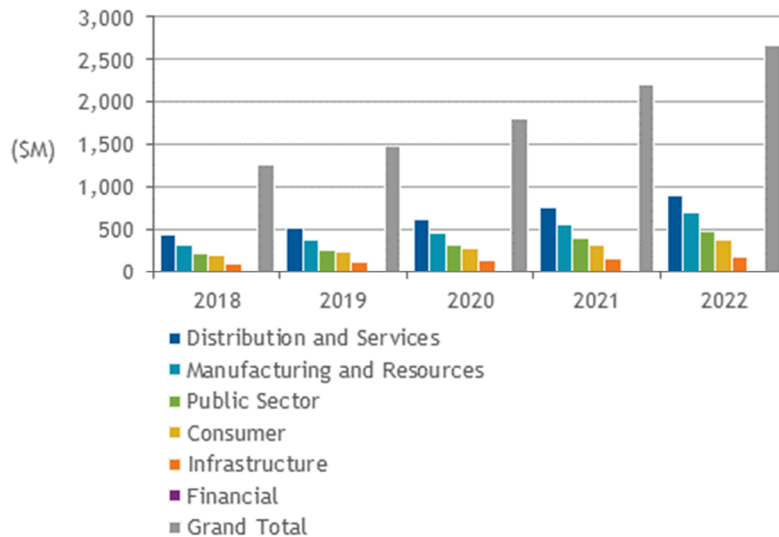


Source: IDC, 2019

Hardware and services constitute almost 70% of IoT-related spending in Saudi Arabia. IoT vendors are forecast to make major hardware and services investments in the next five years.

FIGURE 4

IoT Spending by Sectors

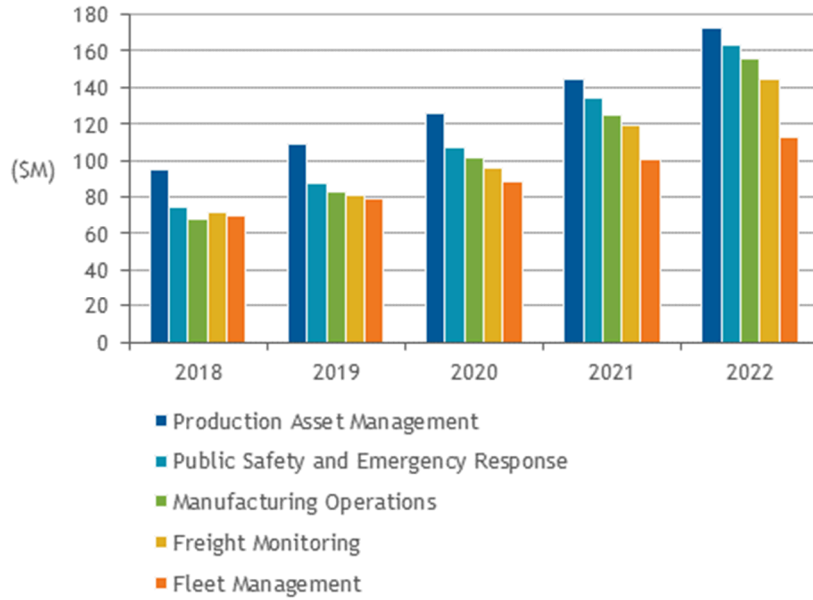


Source: IDC, 2019

Logistics and industrial manufacturing processes are areas where IoT deployments are seeing exponential growth.

FIGURE 5

Top Five Use Case by Spending

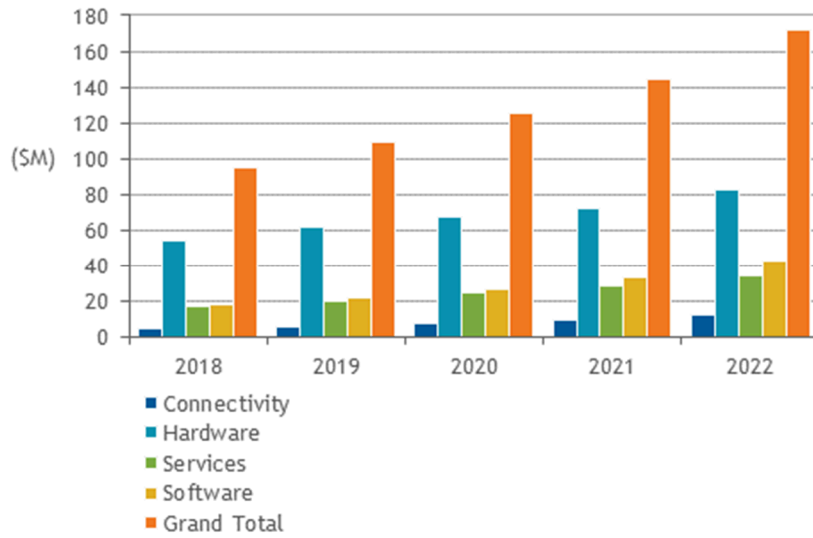


Source: IDC, 2019

The top five IoT use cases are in manufacturing, fleet monitoring, freight management, public safety and emergency response, and production asset management. These areas are expected to lead IoT technology uptake in Saudi Arabia over the next five years.

FIGURE 6

Production Asset Management

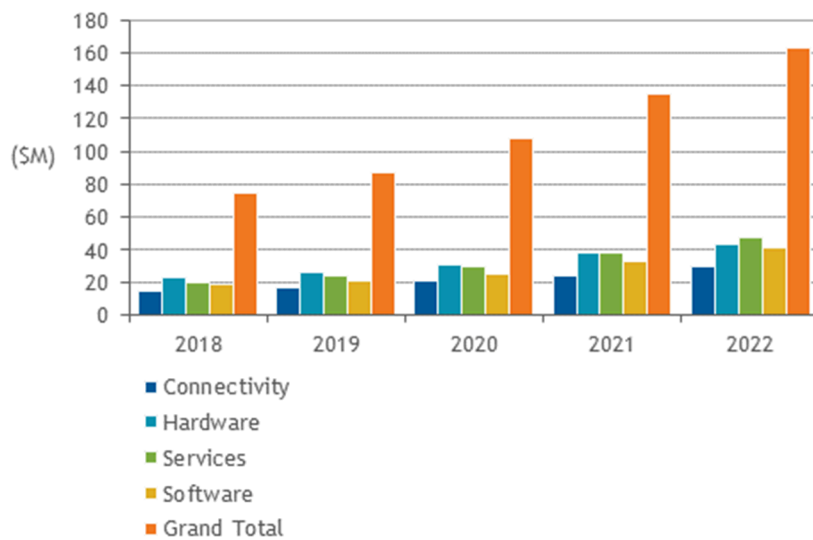


Source: IDC, 2019

IoT solutions that drive process efficiencies are playing a significant role in Saudi manufacturing. Production asset management is a leading use case.

FIGURE 7

Public Safety and Emergency Response

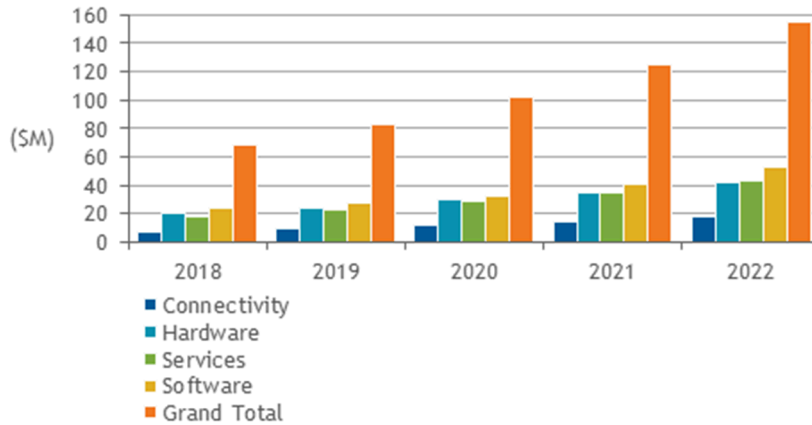


Source: IDC, 2019

IoT solutions that enable real-time monitoring and real-time analytics are helping cities meet their public safety and emergency response goals.

FIGURE 8

Manufacturing Operations

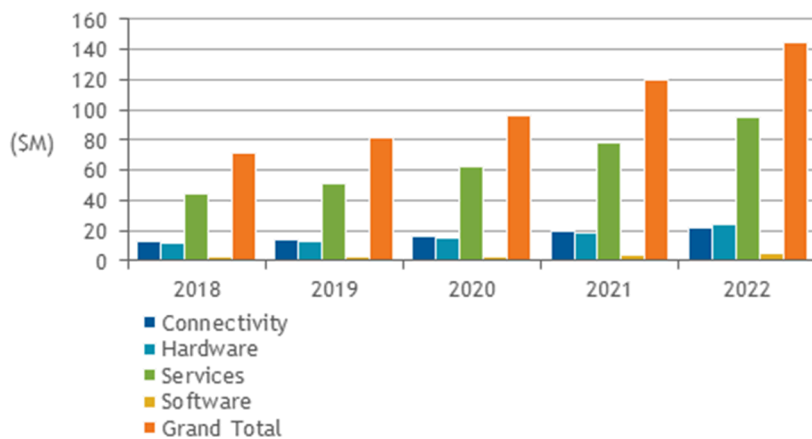


Source: IDC, 2019

Real-time data collection through sensors, and analysis through cognitive computing, is helping industries develop autonomous operations. These technologies are seeing significant adoption in quality and compliance in manufacturing operations. Software, services, and hardware are playing a critical role.

FIGURE 9

Freight Monitoring

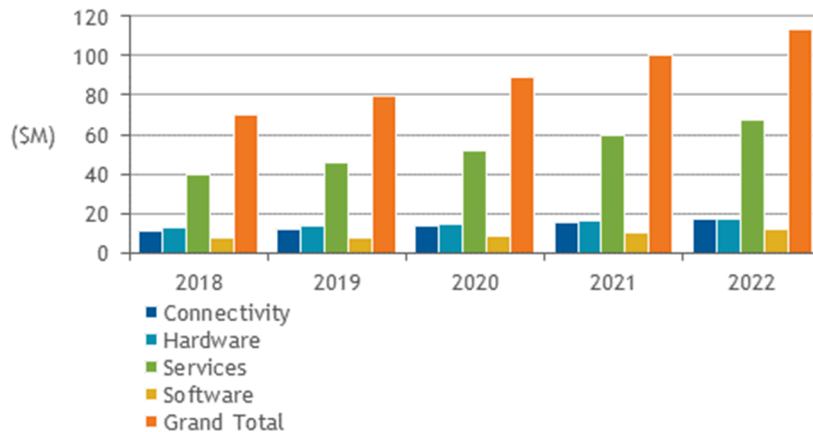


Source: IDC, 2019

IoT freight monitoring solutions perform the intelligent recognition, location, tracking, and monitoring of freight and cargo. They exchange real-time information and communications via wireless, satellite, or other channels. The technology is seeing increased adoption on the back of the growing Saudi oil, gas, and petrochemical sector.

FIGURE 10

Fleet Management



Source: IDC, 2019

IoT fleet management solutions track transportation assets, monitor vehicle conditions, offer route guidance, track idle or stopped time, offer geo-fencing, and can include remote diagnostics for engine and other systems. This use case is seeing increased adoption due to government regulations that mandate that all commercial vehicles be equipped with automatic location or be part of a fleet management system.

MARKET CONTEXT

IoT is a major enabler of digital transformation in Saudi Arabia and is becoming a key element of business operations, processes, and cost and profit optimization. Saudi public and private organizations are embracing IoT and other innovative technologies to meet the digitalization goals of Saudi Vision 2030 and the National Transformation Program 2020.

Drivers and Inhibitors

Drivers

Launch of Giga-Projects and Digital Infrastructure Investments

- Several major economic diversification projects are catalyzing the growth of IoT services in Saudi Arabia. They are supported by low-cost, reliable connectivity and government regulations aimed at fostering IoT adoption. The major projects include the Riyadh Metro, the Riyadh Rapid Bus Transit System, Qiddiya, Amal, Neom, and the Red Sea Project.
- Saudi Arabia was one of the first countries in the GCC to launch a 5G network. Better connectivity, reduced latency, and faster connections means more people can transmit data at the same time. Business and technology providers are rapidly developing IoT solutions that leverage 5G and LPWAN technologies.

Industrial Growth and Evolving Telcos

- More than 60% of Saudi Arabia's largest organizations are at various stages of implementing IoT solutions. Some industries have seen early successes in data-driven innovation, including education, energy, environmental management, healthcare, Smart Cities, smart manufacturing, and e-governance.
- To explore new revenue streams and business opportunities, telecom operators in Saudi Arabia have started to become IT and IoT service providers. They aim to leverage their vast infrastructure and network coverage to provide a broad portfolio of solutions.

Barriers

Safety and Security of Data

- Because IoT connects devices that gather, process, and store sensitive data, the safety and security of data has become the biggest concern for end users in all segments and industries in Saudi Arabia. To gain a competitive edge, technology vendors must offer products and services that adhere to the government's strict national security requirements.

Legacy Systems Overhaul

- The profitability of an IoT solution depends on the scale of the solution and the duration of the service. Concerns about whether a solution helps revenue generation may result in fewer adoptions. Integration with legacy systems and infrastructure is another major barrier to IoT adoption in Saudi Arabia. Legacy systems, devices, and infrastructure must be modified or upgraded to seamlessly integrate with cloud, edge gateways, sensors, and other IoT-related devices.

Standards, Regulations, and Skills

- Because of a lack of turnkey solution providers, platforms and standards vary across the stages of IoT solution development and implementation. Large-scale adoption is hindered by interoperability constraints. IoT-related devices need common, interoperable technical standards to make regional or global IoT markets profitable.
- The vendor landscape is highly fragmented. Regulations and government policy should be streamlined to prevent further uncertainty or delays in investments. Ad hoc provisions and/or deficient policies will generate operational and commercial difficulties.
- Vendors need to address the shortage of IoT skills and the lack of awareness of IoT and its benefits among small and medium-sized businesses. Many in this segment think IoT is too complicated and expensive to deploy. Vendors should develop awareness programs highlighting the ROI and benefits of IoT solutions.

Significant Market Developments

Regulations

The Saudi Ministry of Communications and Information Technology, in partnership with foreign technology experts, has launched dedicated hubs to drive the implementation of innovation accelerators such as AI, machine learning, IoT, and blockchain.

The Saudi Interior Ministry now requires that all commercial premises be equipped with a smart CCTV security and surveillance system. The Transportation Ministry has mandated that all heavy and commercial vehicles be part of a fleet management system. Organizations are investing in fleet management systems to both meet their legal obligations and to achieve efficiencies that improve margins and reduce costs. Supply chain and logistics companies are using route and maintenance optimization to reduce costs.

Healthcare

Saudi Arabia has the largest healthcare sector in the Middle East, with spending of more than \$40 billion in 2018. The sector is experiencing an upsurge in innovative technology deployments. The Ministry of Health (MoH) is piloting an electronic medical health records system to automate workflow management and analyze data collected from hospital assets and health-tracking devices. This system is expected to streamline disease management by helping doctors make quicker patient diagnoses. The MoH is also partnering with leading technology vendors to implement a patient care management system featuring real-time monitoring. This is aimed at reducing the need for medical interventions. IoT is also being used by public and private sector healthcare organizations to optimize inventory management. Smart cabinets are enabling the automatic dispensing of medicines. Hospital asset management solutions are using performance metrics and controls to provide predictive maintenance of medical equipment.

Manufacturing

The manufacturing sector in Saudi Arabia is booming, supported by stabilizing oil prices. To diversify the economy (i.e., make it less reliant on oil and gas exports), the Saudi government is proactively enabling the growth of local manufacturing with grants, subsidies, and other strategic initiatives. Large manufacturing organizations are keen to use data generated by equipment to perform predictive and preventive maintenance and thus reduce costs, downtime, and the risk of equipment failure. Petrochemical industries are using IoT-enabled supply chain management systems to improve their understanding of their performance metrics and better manage resources.

Retail

As the hospitality, entertainment, and retail industries gain more prominence in Saudi Arabia under Vision 2030 and the National Transformation Program, retail giants have started to leverage technology to meet growing business needs. Retailers, cinemas, and entertainment venues are using consumer behavior data, digital identities, and digital signage to drive footfall. IoT-enabled inventory management is enabling shopping malls to drive operational efficiencies and influence buying behavior by making advertising more relevant, targeted, and engaging. Household items (e.g., Bluetooth speakers, personal assistants, security systems, and personal health tracking products) have joined the IoT ecosystem. Data from these devices is being used to drive targeted marketing campaigns and offer new products.

Changes from Prior Forecast

IDC uses a standardized use case approach to size the IoT market and obtain an accurate picture of the market opportunity. In this forecast, IDC has identified 82 use cases and sized them by four technology categories. Many use cases are not included. In updates to the *Semiannual IoT Spending Guide*, IDC will increase the number of use cases sized, thus improving accuracy and strengthening our assessment of the IoT market's potential.

Between the November 2018 and May 2019 updates, the *Worldwide Semiannual IoT Spending Guide* analyst team leveraged primary and secondary research to increase the number of use cases. IDC reexamined regional market use case adoption by validating assumptions for existing named use cases. Assumptions were adjusted for technologies with the same or similar IDC taxonomies and where viable comparisons were possible (e.g., *Worldwide Semiannual IT Spending Guide*). These technology categories included Analytics Software, Applications, Connectivity, Other Hardware, Servers, and Storage. IDC also created a new data dimension called Deployment Type, which provides a Software Category segmentation for On-Premises Software and Public Cloud Services.

No changes were made to the 2018-2022 forecast. The forecast for 2023 has been added and can be found in Figure 1.

MARKET DEFINITION

Internet of Things

IDC defines IoT as a network of uniquely identifiable endpoints – "things" that communicate with each other and their infrastructure autonomously using IP connectivity. The technology consists of an ecosystem of services, hardware, software and connectivity, all of which work in sync to provide businesses, organizations, and consumers with insights that help transform their operations and lives.

IDC divides the *Worldwide Semiannual Internet of Things Spending Guide* into four technology categories to capture details of hardware, software, and services spending by end users.

IDC assesses the potential opportunity for IoT by use cases. This approach establishes a framework to enable meaningful conversations between vendors and end users by specifying the possible end-to-end solution. An IDC use case is a conceptual framework that provides a view of business value that is created when a set of technologies come together. Use cases are not defined by the technology itself. The parameters of a use case are defined by the value being created and recognized by an organization.

IDC's Internet of Things Technology Categories

IDC's standard IoT taxonomy identifies four key categories: hardware, software, services, and connectivity. This taxonomy allows for a coherent and meaningful understanding of the incremental opportunity that the IoT ecosystem presents.

TABLE 1

IDC's Internet of Things Technology Segmentation

| Technology Group | Technology Category | Technology Detail |
|------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connectivity | Connectivity | Connectivity includes any network access and usage services charges provided by a network service provider to connect an IoT device to a commercial network (e.g., wireless, fiber, microwave, satellite, powerline). |
| Hardware | Module/Sensor | This category includes communicating and computing device modules as well as communication hubs or controllers, sensors or other such wired or wirelessly connected IoT devices. |
| | Security Hardware | Physical security appliances and other security hardware used in an IoT solution and network including IoT security domains in device and sensors, network and edge, analytics and enablement infrastructure, and physical safety and security. |
| | Servers | A server is a computer or device on a network that manages network resources. For example, a file server is a computer and storage device dedicated to storing files. Any user on the network can store files on the server. A network server is a computer that manages network traffic. A database server is a computer system that processes database queries. |
| | Storage | Storage is the part of a computer system or connected system or peripheral device that stores information for subsequent use or retrieval in traditional enterprise infrastructure. It can take the form of storage, which is an integral component of functional computer systems, or additional systems and devices. This spending does not include spending on storage software (captured in system infrastructure software) or storage services (captured in IT services). It does not include IaaS, which is considered an ongoing service. |
| | Other Hardware | This category includes enterprise and consumer networking hardware such as switches, routers, repeaters and gateways and industry specific hardware such as RTUs, specialized computing devices (e.g., ruggedized field devices). |
| Services | Ongoing Service or Content as a Service | Services for supporting and managing technology and processes related to IoT solutions, which include traditional IT environments utilizing IT managed and outsourcing services that include application management, hardware deploy and support, hosted application management, hosting infrastructure services, IT outsourcing, network and endpoint outsourcing services. In Operational environments, services include IT industry-specific BPO (e.g., HVAC equipment maintenance, CDC machine configuration) and help/service desk operations (e.g., OnStar for connected vehicles, ADT for home security). Digital services such as content as a service and other data services are included in this category. |
| | IT and Installation Services | Services for designing, planning and implementing IoT solutions, which include traditional IT services environments (servers, storage, security) as well as Operational/IT environments (building/plant equipment, controls systems, production machinery, HVAC equipment, and other non-traditional IT device design and implementations ("things"). Services include traditional IT services such as IT consulting, systems integration, network consulting, custom application development, IT deployment and IT training. |

TABLE 1

IDC's Internet of Things Technology Segmentation

| Technology Group | Technology Category | Technology Detail |
|------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Software | Analytics Software | The software that use the data collected by the connection endpoint to turn it into actionable insights that business decision makers can use to affect change in business processes. This includes PaaS and SaaS spending. |
| | Application Software | The software used to analyze, organize, and access a range of structured and unstructured information. It is used to either extrapolate information produced by the analytics software or serve as an input mechanism, and are designed to deliver a specific functionality, either horizontal or industry-specific, within the IoT solution. |
| | IoT Platform | Software middleware package that provides the a) device management, b) connectivity management, c) data management, d) visualization and e) applications enablement for connecting IoT endpoints. Analytics can be bundled but is not a mandatory feature. To be considered IoT software platform the vendor must have two or more of the key elements offered under one SKU. A horizontal distinction refers to vendor software packages that integrate and support devices, applications, data schemas, and standards in two or more industries. |
| | | Software middleware package that provides the a) device management, b) connectivity management, c) data management, d) visualization and e) applications enablement for connecting IoT endpoints. Analytics can be bundled but is not a mandatory feature. To be considered IoT software platform the vendor must have two or more of the key elements offered under one SKU. A vertical industry distinction refers to vendor software packages that integrate and support devices, applications, data schemas, and standards of a single industry. |
| | Security Software | Software used in an IoT solution and network for IoT security domains in device and sensors, network and edge, analytics and enablement infrastructure, and physical safety and security. This can be an extension or enhancement of pre-existing security software solutions |
| | Other Software | Software that falls outside the above category segment definitions used to implement and operate an IoT solution including and not limited to unbundled software associated with IoT platform, storage management, structured data management, and integration and orchestration middleware. |

Source: IDC, 2019

IDC's Internet of Things Use Cases

The top five use cases were selected to provide a high-level analysis of the IoT market. The selected use cases represent most IoT spending today and in the near term. Definitions of all other use cases are provided in the table below.

TABLE 2

IDC's Internet of Things Use Cases and Use Case Details, 2018

| Industry | Use Case | Use Case Detail |
|------------------------|-----------------------------------|-----------------------------------|
| Banking | ATM Remote Tracking | ATM Remote Tracking |
| Construction | Construction Machinery Management | Construction Machinery Management |
| Consumer | Connected Vehicles | Emergency |
| | Connected Vehicles | Infotainment |
| | Connected Vehicles | Security |
| | Connected Vehicles | V2V/V2I Advanced Solutions |
| | Health and Wellness | Health and Wellness |
| | Personal Wellness | Personal Wellness |
| | Remote Health Monitoring | Remote Health Monitoring |
| | Smart Home | Home Automation |
| | Smart Home | Home Security |
| | Smart Home | Smart Large Appliances |
| | Smart Home | Smart Small Appliances |
| Discrete Manufacturing | Food Traceability | Food Traceability |
| | Maintenance and Field Service | Maintenance and Field Service |
| | Manufacturing Operations | Autonomic Operations |
| | Manufacturing Operations | Quality and Compliance |
| | Manufacturing Operations | Root Cause |
| | Production Asset Management | Production Asset Management |

TABLE 2

IDC's Internet of Things Use Cases and Use Case Details, 2018

| Industry | Use Case | Use Case Detail |
|----------------------------|----------------------------------------|------------------------------------|
| Federal/central Government | Environmental Monitoring Detection | Environmental Monitoring Detection |
| | Health and Wellness | Health and Wellness |
| | Intelligent Transportation Systems | Automated Public Transit |
| | Intelligent Transportation Systems | Parking Management |
| | Intelligent Transportation Systems | Traffic Management |
| | Intelligent Transportation Systems | Traveler Information Systems |
| | Public Infrastructure Asset Management | General Infrastructure |
| | Public Infrastructure Asset Management | Smart Street Lighting |
| | Public Safety and Emergency Response | Body worn cameras |
| | Public Safety and Emergency Response | General Infrastructure |
| | Public Safety and Emergency Response | In-car camera systems |
| | Remote Health Monitoring | Remote Health Monitoring |
| Healthcare Provider | Bedside Telemetry | Bedside Telemetry |
| | Health and Wellness | Health and Wellness |
| | Hospital Asset Tracking | Hospital Asset Tracking |
| | Remote Health Monitoring | Remote Health Monitoring |
| Insurance | Insurance Telematics | Insurance Telematics |
| | Health and Wellness | Health and Wellness |
| | Remote Health Monitoring | Remote Health Monitoring |
| Process Manufacturing | Food Traceability | Food Traceability |
| | Maintenance and Field Service | Maintenance and Field Service |
| | Manufacturing Operations | Autonomic Operations |
| | Manufacturing Operations | Quality and Compliance |
| | Manufacturing Operations | Root Cause |
| | Production Asset Management | Production Asset Management |

TABLE 2

IDC's Internet of Things Use Cases and Use Case Details, 2018

| Industry | Use Case | Use Case Detail |
|------------------------|----------------------------------------|------------------------------------|
| Professional Services | Smart Buildings | Infrastructure |
| | Smart Buildings | Smart Elevators |
| | Staff Identification | Staff Identification |
| Resource Industries | Agriculture Animal Tagging | Agriculture Animal Tagging |
| | Agriculture Field Monitoring | Agriculture Field Monitoring |
| | Connected Oil Field Exploration | Connected Oil Field Exploration |
| Retail | Connected Vending Machines | Connected Vending Machines |
| | Digital Signage | Digital Signage |
| | In-Store Contextualized Marketing | In-Store Contextualized Marketing |
| | NFC Payment/Shopping | NFC Payment/Shopping |
| | Omni-Channel Operations | Omni-Channel Operations |
| | Smart Buildings | Smart Lighting |
| State/local Government | Environmental Monitoring Detection | Environmental Monitoring Detection |
| | Health and Wellness | Health and Wellness |
| | Intelligent Transportation Systems | Automated Public Transit |
| | Intelligent Transportation Systems | Parking Management |
| | Intelligent Transportation Systems | Traffic Management |
| | Intelligent Transportation Systems | Traveler Information Systems |
| | Public Infrastructure Asset Management | General Infrastructure |
| | Public Infrastructure Asset Management | Smart Street Lighting |
| | Public Safety and Emergency Response | Body worn cameras |
| | Public Safety and Emergency Response | General Infrastructure |
| | Public Safety and Emergency Response | In-car camera systems |
| | Remote Health Monitoring | Remote Health Monitoring |

TABLE 2**IDC's Internet of Things Use Cases and Use Case Details, 2018**

| Industry | Use Case | Use Case Detail |
|----------------|----------------------------------------|----------------------------------------|
| Telco | Telecom Base Station Remote Management | Telecom Base Station Remote Management |
| | Telecom Field Services | Telecom Field Services |
| Transportation | Air Traffic Monitoring | Centralized (FANS 1/A) |
| | Air Traffic Monitoring | Decentralized (ADS-B) |
| | Airport facility automation | Passenger traffic flow |
| | Fleet Management | Fleet Management |
| | Freight Monitoring | Freight Monitoring |
| Utilities | Electric Vehicle Charging | Electric Vehicle Charging |
| | Smart Grid (Electricity) | Distribution Automation (Electricity) |
| | Smart Grid (Electricity) | Smart Meters (Electricity) |
| | Smart Grid (Gas) | Distribution Automation (Gas) |
| | Smart Grid (Gas) | Smart Meters (Gas) |
| | Smart Grid (Water) | Distribution Automation (Water) |
| | Smart Grid (Water) | Smart Meters (Water) |

Source: IDC, 2019

METHODOLOGY

IDC's Internet of Things market forecasting and analysis methodology are based on a collaborative effort across several of IDC's research groups. This effort culminated in IDC's Worldwide Internet of Things Spending Guide, which is a quantitative research program updated semiannually that sizes the IoT opportunity by region, country, industry, use case, and technology stack. For this spending guide, IDC uses a bottom-up market sizing effort, with data gathered through various sources such as primary research surveys, vendor and end-user interviews, secondary research, and regional IoT analysis.

The overall IoT spending forecast is created by taking into account both IoT endpoint shipment revenue (recognized in the first year the unit was first connected) and the IoT stack revenue opportunity for all the layers of the technology stack including connectivity, IoT platforms, storage, servers, analytics, security, and services. Each use case forecast is analyzed individually, based on country-specific market potential, IoT adoption rate, and IoT solution pricing model, including deflationary pressures on elements such as hardware or connectivity.

The quantitative approach to the current forecast update was further augmented by analyst briefings with device manufacturers, software vendors, service providers, systems integrators, and other key players participating in the IoT market. Finally, feedback from end users – both consumer and business – provided valuable insight into their awareness of and willingness to invest in IoT solutions.

RELATED RESEARCH

- *IDC's Worldwide Semiannual Internet of Things Spending Guide, Release Version 2H18*
- *MENA ICT Key Market Developments Update, February 2019* (IDC #CEMA44917619)
- *Scaling a Technology Revolution in Saudi Arabia Through Internet of Things (IoT): Key Trends, Use Cases, and Spending in 2019* (IDC #CEMA44902419)

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IDC Saudi Arabia

Office #401, 4thFloor, Gate A1
Riyadh Gallery Mall
Imam Muhammad bin Saud Road
King Fahd District
P.O. 18648, Riyadh 11425
Saudi Arabia
Tel: +966 11 434 8282
Fax: +966 11 434 8200

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