SMART CITIES

EUROPEAN MARKET OVERVIEW AND FORECASTS

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MARKET RESEARCH

MARKET OVERVIEW

More than 55% of the world's population currently live in cities (1980: 39%). In Europe, the figure is even higher – about 75% of the continent's population are city dwellers. And cities are not the only popular places to live. They are also economic powerhouses, logistics hubs, administrative centers, drivers of innovation, forerunners of trends, and attractive destinations for talent.

According to the market report by maximizing, the smart city IoT market in Europe is valued at USD 32.5 billion in 2020 and is expected to reach USD 90.2 billion by 2027, at a CAGR of 15.7% 2020. The forecast period is from 2021 to 2027.

The world's urban population increased from 751 million in 1950 to 4.2 billion in 2018 and is estimated by the United Nations to reach 7.7 billion by 2050. This is 68% of the world's population. Smart cities can provide a way to manage demographic change using technology and data. Many of the most promising cities are in Europe.

International Data Corporation (IDC) estimates that Europe's smart city spending will reach his $19 billion (£15 billion) in 2018, with the continent placing in Singapore-based Eden Strategy's smart city rankings.

As of early 2020, 13 percent of industry professionals surveyed felt that Barcelona and London could be regarded as pioneers of using smart city immersive technologies. A further 12 percent of respondents suggested Amsterdam was pioneering in its use of smart city immersive

technologies. A smart city is a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of both residents and businesses.

Catalysts and collaboration

Major technological, economic, and environmental changes have generated increased interest in smart cities, including climate change, the coronavirus (COVID-19) outbreak, aging populations, urban population growth, and pressures on public finances. In Europe, the European innovation partnership on smart cities and communities (EIP-SCC) is an initiative supported by the European Commission that brings together cities, industry, small businesses (SMEs), banks, and research institutions. It aims to improve urban life through more sustainable integrated solutions and addresses city-specific challenges from different policy areas such as energy, mobility and transport, and ICT.

Barcelona is a smart city

Barcelona is often regarded as being one of the world's 'smartest' cities. Following a period of economic stagnation and unemployment in the 1990s, the authorities in Barcelona recognized the need to transform the city's economy, promoting a new economy based on knowledge industries, modern-city tourism, and quality infrastructure for all. Technology was a key feature of this transformation, supporting the city's strategy and focus to become properly recognized as a smart city in 2010. To support this, Barcelona played host to the first 'Smart City Expo and World Congress in 2011 which further helped to launch and promote the city's smart city policy.

FRANCE

The smart city is a response to the challenges posed by growing urbanization and climate change. It brings a new dimension to the concept of a sustainable city by highlighting measures and practices brought about by the digital transition, thanks to an intelligent network of connected objects and tools that transmit their data via wireless technology and the cloud. Smart cities bring a new perspective to urban development in its entirety and are composed of a framework that revolves around several axes - telecommunication services, energy management, intelligent mobility, but also infrastructure such as smart homes.

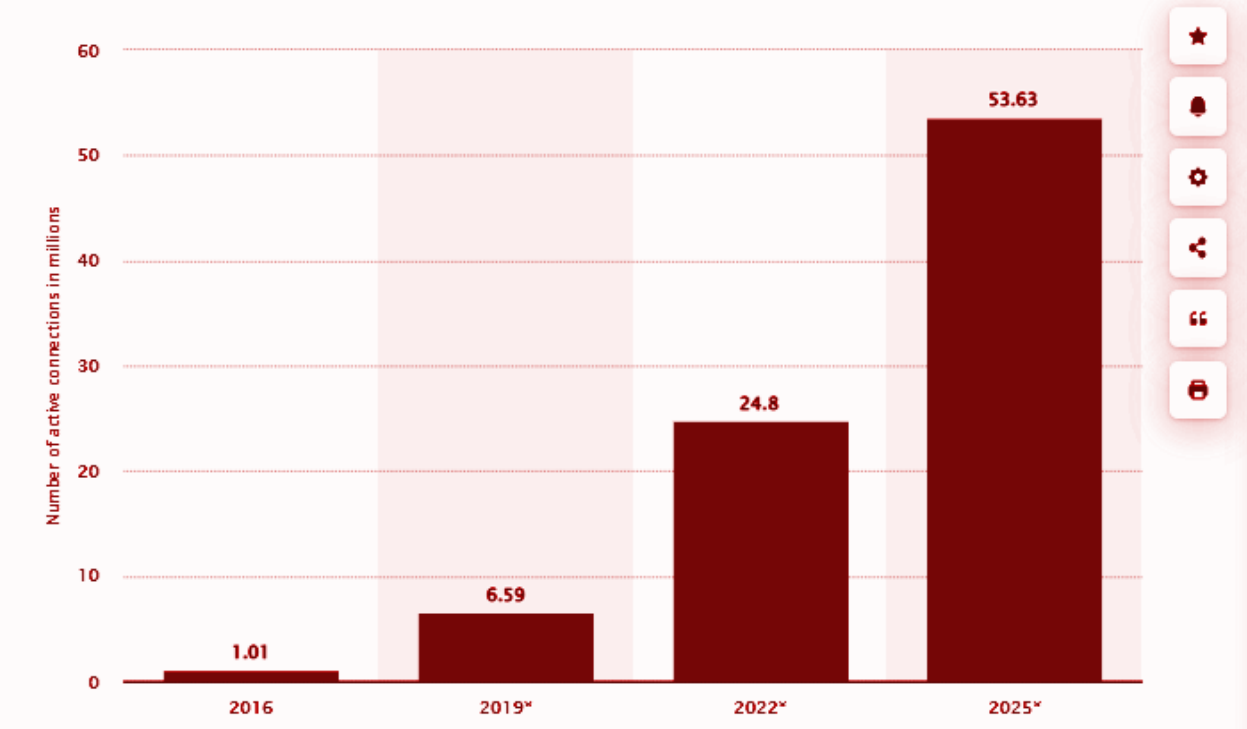
As smart cities rely so much on wireless technology and the cloud, access to a high-quality, ultra-fast connection and telecommunication services is vital for smooth operation. Therefore, the implementation of 5G in French cities is one of the milestones for these projects. Although decried, 5G is now a reality in France and the first network was activated in November 2020. Marseille is the French city with the most 5G antennas in the country and has almost twice as many as Paris and Montpellier. As for mobile operators, Orange is the leader in the sector and has installed a total of 367 5G antennas throughout France. The 5G will noticeably improve the quality and speed of the connection currently offered by the 4G, which covers almost the entire population.

Energy management is a major challenge for smart cities, whether managing waste, monitoring air quality, or CO2 emissions. Smart meters for electricity, gas, and water consumption would allow consumers to reduce their costs based on their actual consumption and adapt to their needs. The installation of smart grids in particular is one of the most carried out projects in France. These grids are a network that enables better distribution of electricity through communication between consumers and suppliers. The flow of electricity is managed in real-time in order to limit losses.

Smart mobility is at the crossroads of different industries: transportation, energy, environment, and digital. Moreover, it extends to peripheral sectors such as transport management or road safety. This complexity is at the heart of the challenges posed by this issue, which revolves around both service and infrastructure. Smart cars are a perfect example of the dilemma posed by this new technology, as many users question the safety of these new types of vehicles. However, these cars are designed to assist with driving, managing control in case of danger or risk of accident, and parking. In France, the fleet of intelligent cars is growing rapidly and is becoming more and more popular on French streets.

Number of Internet of Things (IoT) active connections in smart cities in the European Union (EU) in 2016, 2019, 2022 and 2025(in millions)

This statistic shows the number of active Internet of Things (IoT) connections in European Union (EU) smart cities in 2016, 2019, 2022, and 2025. The number of active connections in IoT smart cities will increase year by year. There were 1.01 million connections in 2016, and it is expected to grow to 53.63 million connections by 2025.



Top 10 smart cities in Europe

Eden Strategy Institute reports that with over half the planet living in cities, more than two-thirds of the world's population will be urbanized by 2050.

With this in mind, smart city innovations around the world provide new ways of engaging with citizens, increase the quality of life and drive sustainability.

Business Chief EMEA takes a look at the top 10 ranked smart cities in Europe from the Eden Strategy Institute's research report.

Helsinki

Ranking at number two in Europe and fifth in the world, Helsinki received its highest marks for its budget, talent readiness, and its track record.

Helsinki is part of Finland's six-city strategy — an open innovation platform. Helsinki has also established a smart innovation district known as Kalasatama. The district is working on over 25 infrastructure, building, and experimental projects.

Barcelona

Ranking at number three in Europe and ninth in the world, Barcelona received its highest marks for its track record.

The city has invested heavily in its IT infrastructure and the internet of things (IoT), which has reportedly saved the city US$58mn on water, generated US$50mn in parking revenue (per year), and created 47,000 jobs.

Vienna

Ranking at number four in Europe and Twelfth in the world, Vienna ranked highest for its vision and track record.

In 2013, the city established its Aspern Smart City Research (ASCP) project, which is reported to be one of the largest urban development schemes in the continent.

Amsterdam

Ranking number five for Europe and thirteenth in the world, Amsterdam received its highest marks for its financial incentives and smart policies.

Supporting over 40 projects, the city's 'Amsterdam Smart City (ASC)' public-private partnership brings together businesses, authorities, universities, and citizens to develop digital solutions for social, economic, and environmental impact.

Stockholm

Ranking number six for Europe and fifteen in the world, Stockholm received its highest marks for its vision.

The city utilizes a forward-thinking approach called design fiction. The approach creates speculative future scenarios, such as the potential for Stockholm in 2040.

Copenhagen

Ranking at number seven in Europe and twenty-fifth in the world, Copenhagen received its highest marks for its people-centricity and innovation ecosystem.

By 2025, Copenhagen aspires to become the world's first carbon-neutral capital, this goal is the focal point of its smart city strategy.

Berlin

Ranking number eight in Europe and twenty-ninth in the world, Berlin received its highest marks for its leadership.

In 2015, Berlin established its smart city strategy to drive creativity and culture to foster a high quality of life when it comes to urban development. Objectives within the strategy are centered around increasing competitiveness, increasing resource efficiency, and becoming carbon neutral.

Dublin

Ranking at number nine in Europe and forty-first in the world, Dublin ranks highest for its innovation ecosystem. The cities strategy is centered around open data and testing innovative urban solutions in the metropolitan areas.

Reykjavik

Ranking at number 10 in Europe and forty-fourth in the world, Reykjavik ranks highest for its innovation ecosystem.

The city's smart city strategy is aligned with the government's wider strategies to make city services more efficient, accessible, and environmentally friendly.

European ICT Investments

According to International Data Corporation's (IDC) Worldwide ICT Spending Guide Enterprise and SMB by Industry, ICT spending in Europe will reach $1.1 trillion in 2022 and will get close to $1.4 trillion by 2026, growing at a 5% five-year 2021–2026 CAGR.

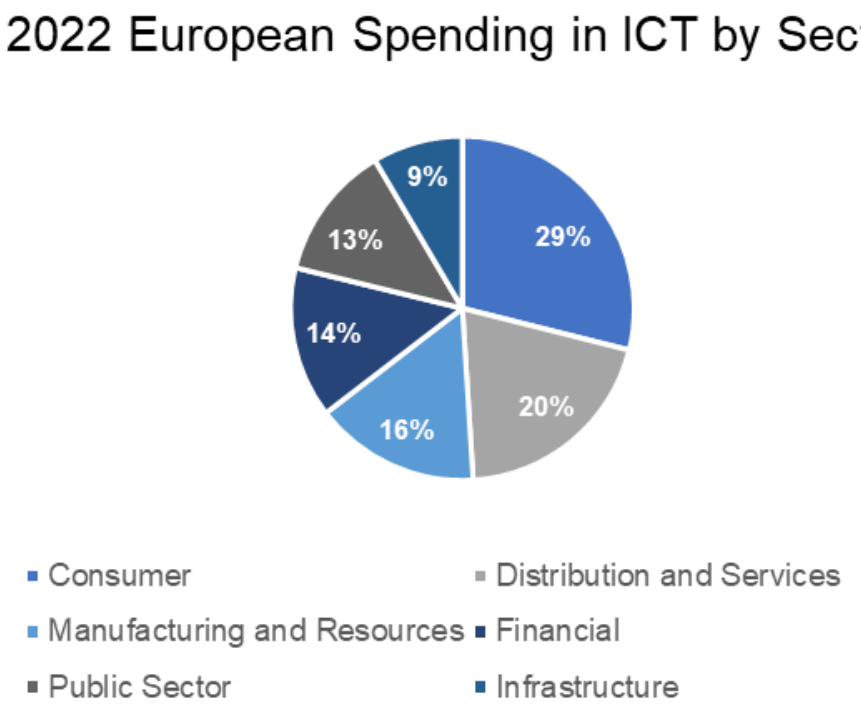
Investments in the software will drive most technology spending in Europe in 2022 and software will be the fastest-growing technology group by year-on-year growth, supported by fast growth in artificial intelligence platforms, collaborative applications, and software quality and life-cycle tools. With investments in cloud-first solutions, the software market has remained resilient to factors that impacted the hardware market, which is expected to decline by 0.1% this year. Inflationary pressures, an expected recession, and the Russia-Ukraine War are dampening demand for hardware in Europe. Spending on devices will be the most impacted by the increasing cost of living, product shortages, and suspended shipments.

Consumer, banking, and discrete manufacturing will be among the top spenders in ICT, absorbing almost 46% of overall ICT spending in 2022. Europe is affected by supply chain disruptions, many of which are linked to the war in Ukraine. This is affecting many industries, which are turning to automation to optimize processes and minimize disruption. Banking will be focusing on transformative processes that focus on automation and customer-centricity to redefine how financial services deliver employee and customer experiences, supporting and

reimagining core banking services, risk management, HR and talent management, and audit and compliance through automation. On the manufacturing side, a shortage of skilled staff is wreaking havoc in the supply chain. Many companies will invest in tech to reduce pressure on existing staff, automate processes, and reduce their reliance on human-based labor when resources are not available.

The situation in Russia is less bright, with an overall 23% decline in ICT spending expected for 2022. This will be driven by a strong reduction in hardware spending related to many hardware-supplying companies pulling out of Russia. Nonetheless, software and IT services will continue to grow due respectively to the resilience of the technology and the reliance on domestic businesses.

"European companies are caught in a series of challenges including skill shortages, supply chain disruptions, post–COVID-19 recovery, high inflation, rising costs of living, and armed conflict in Eastern Europe. Technology has proved to be a solution to many of these challenges as organizations are looking at automation and real-time decision making to maximize their performance in such challenging times," said Andrea Minonne, research manager, IDC UK.



What makes Europe an interesting market for IoT services outsourcing?

Europe is the third largest adopter of IoT after the Asia-Pacific region and North America. However, the annual growth of the European IoT market is in the double digits (more than 10%). What makes Europe particularly interesting next to its growing market size is that both consumer and industrial IoT offer opportunities and that these opportunities can be found in many vertical industries. The growing IoT market combined with skills shortages means there is extra room for outsourcing.

The European market continues to increase

As IoT becomes more mainstream, the related technology becomes cheaper and therefore more accessible to people and companies worldwide. Due to the considerable increase in the number of IoT

devices, the IoT market continues to grow. European Internet of Things spending was estimated to reach €184 billion in 2021 (forecasted in 2021 and converted from USD). And it is expected to experience double-digit growth through 2025.

Even though experts expected the market to be put on hold temporarily because of the COVID-19 pandemic, the market never really slowed down significantly. On the contrary: IoT proved to be more relevant than ever. A global industry survey revealed that 84% of the respondents had accelerated, or intended to accelerate the adoption of IoT in response to the challenges related to the COVID-19 pandemic.

According to IDC's Worldwide Internet of Things Spending Guide, in 2019, Europe was responsible for 23% of global IoT spending. Europe is herewith the third largest market after the Asia-Pacific and North American regions, which respectively account for 35.7% and 27.3% of worldwide IoT spending. However, the Asia-Pacific region saw the fastest growth (17%, followed by North America (15%) and then Europe (10%).

In 2021, there were more than 10 billion active IoT devices in the world. This number is expected to surpass 25.4 billion in 2030. By 2030, approximately 23% of the devices will be located in Europe. 26% in China and 24% in North America.

Smart City strategies offer solutions to cities' problems

Its popularity poses many challenges to cities: congestion, pollution, high energy demand, large amounts of waste, pressure on green spaces, and space for buildings and roads. There is no silver bullet for all these problems. However, increasing digitization offers a powerful solution: smart cities. This integrated approach combines and

coordinates a wide range of digital solutions, from urban planning to mobility and environmental services.

Medium-sized cities are ripe for smart city solutions

There are many studies on smart city approaches in large cities. But small townspeople have been largely ignored. The focus on these cities is of particular interest. Medium-sized cities in the EU are defined as urban areas. Photo: shuoshu/Getty Images; Cover photo: shuoshu/Getty Images In any city he lives between 100,000 and 500,000 people, and more than 50,000 live in his third of the EU population I'm in. Medium-sized cities often lack the strategic, planning, and financial resources available to large cities, which are critical to developing and implementing smart city solutions. In addition, medium-sized cities face the challenge of coping with different infrastructures arising from their rural environments and networks with neighboring cities.

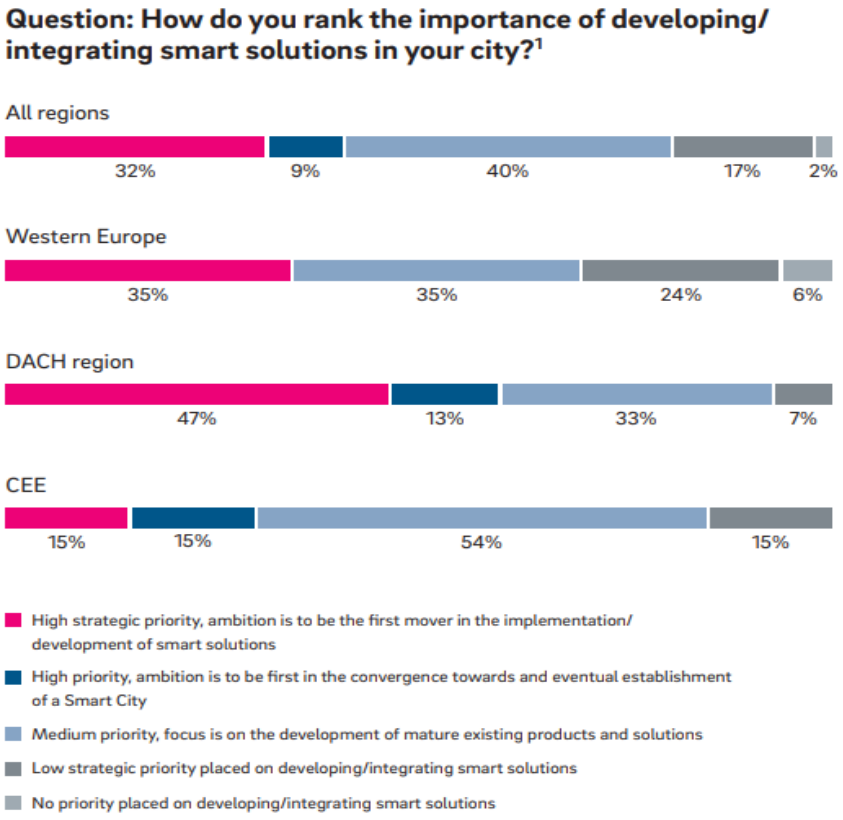
Utilities are 'natural' partners in supporting mid-sized cities with smart city strategies.

In addition, they have experience in providing financial resources and coordinating different stakeholders and can ensure the profitability of smart city projects. The study sheds light on smart city strategies for medium-sized cities in the EU. We look at how energy providers can support these cities with their smart city strategies and open up new mega-markets for such organizations

Smart City solutions are at the top of the agenda in many mid-sized EU cities

Nearly a third of the decision makers and professionals surveyed give smart city solutions a high strategic priority and claim to be pioneers in implementing smart solutions. More than 80% of his respondents see smart city strategies as a medium or high priority. The will to act is

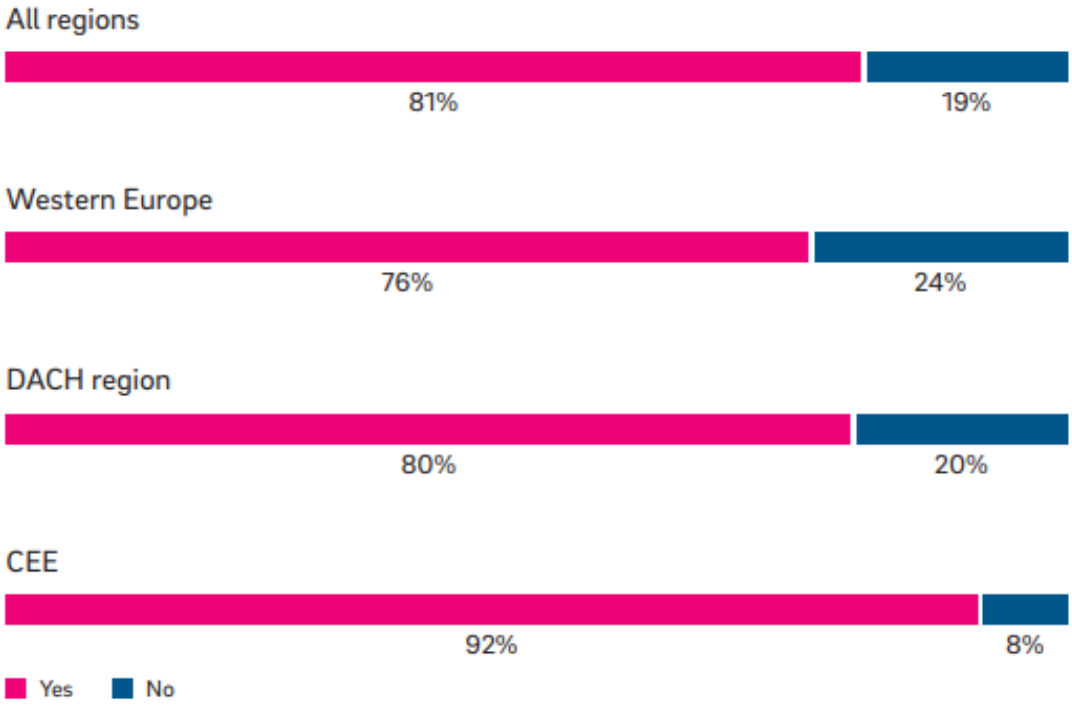
there, and a great opportunity opens up for outside support. The numbers are the most promising in the DACH region, but the CEE region lags behind.



So far, only standalone smart technologies are being piloted in EU medium-sized cities.

4 out of 5 medium-sized cities in the EU have smart technology. However, when we asked respondents specifically about the technology, most only mentioned stand-alone pilot projects, mainly related to the implementation of Smart His technology in the mobility sector.

Question: Do you have smart technologies already implemented in your city?



Selected smart technologies piloted

Western Europe

- Smart mobility and parking
- Smart lighting
- Data centers
- Waste management

DACH region

- Car and e-bike sharing
- Charging stations for electric vehicles (EVs)
- Intelligent traffic

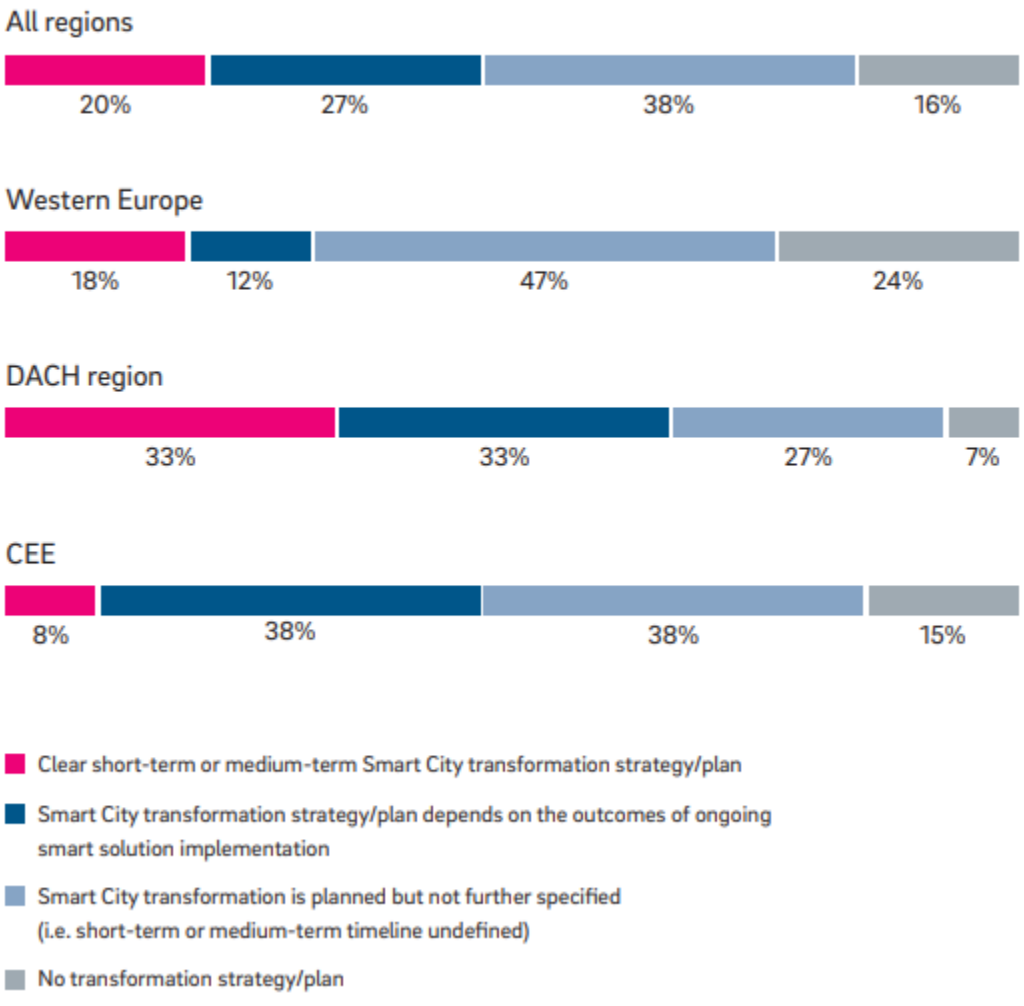
CEE

- Traffic management
- Dynamic passenger information systems
- E-services for residents, investors

Most mid-sized EU cities lack a clear Smart City strategy

Despite bold ambitions for smart solutions, most medium-sized EU cities do not have clear short-/medium-term smart city transformation strategies. Only 20% have such a strategy. This also indicates the need for external support. The DACH region is playing a leading role in Europe regarding the transition to smart cities.

Question: Do you have a short-term or medium-term Smart City transformation strategy/plan?[1]



Cities greatly value support from utilities, presenting huge market opportunities

More than half of the cities surveyed believe energy providers will play a key role in their smart city transformation. They believe that utilities are likely to be the most important sector or key to implementing the smartest city solutions. Few respondents believe that utilities do not have a significant role. Cities' high expectations for public works are not only high in number (the EU has over 280 medium-sized cities), but they also offer an excellent opportunity to enter a very promising market in terms of its size and duration. It means you have an opportunity. project.

Both consumer and industrial IoT offer opportunities

In 2020, consumer devices accounted for 63% of all IoT devices, with industrial devices accounting for the rest. This ratio is expected to remain the same in the coming years. This makes consumer IoT an interesting market for you but IIoT also offers good opportunities, as the spending is much higher. Although consumer devices comprise almost two-thirds of all connected devices, they only make up 19% of Europe's IoT expenditure. In 2019, revenues from the consumer segment were estimated at €28.5 billion.

For IIoT adaptation, the biggest concern remains a lack of in-house skills (38%), together with the lack of solutions (30%). This is a gap that IIoT service providers can tap into. The most in-demand skills that are needed for IIoT projects are:

- security skills (50%)
- analytical/data science skills (49%)
- technical support skills (48%)

- connectivity technology skills (47%)
- project management skills (42%)
- strategic skills (39%)
- procurement skills (33%)
- database management skills (27%

In the coming years, consumers are expected to purchase increasingly more expensive connected things, making the gap between consumer IoT and industrial IoT spending likely to decrease. Nevertheless, industries will remain the greater spenders.

An expected 60% of the connected devices will be cross-industry devices and 40% will be vertical-specific devices. Cross-industry devices are those devices that are used in multiple industries mainly to save costs, such as in building management systems. Vertical-specific devices are used in specific industries, such as healthcare and manufacturing, to improve efficiency and accuracy.

There are many promising vertical industries

IoT is expected to affect all vertical European markets but markets that have traditionally invested more in IT are the front runners. Promising vertical industries for the next five years include:

Manufacturing

Research by McKinsey states that the manufacturing industry will account for the largest amount of potential economic value from IoT, growing to an estimated 26% in 2030. McKinsey believes that the greatest potential for value creation in the factory setting will be optimising operations in manufacturing. This means: making the various day-to-day management of assets and people more efficient.

Healthcare

According to the same McKinsey research, healthcare is the second largest industry, representing around 10 to 14% of the estimated IoT value in 2030. Over the past five years, the value of IoT solutions within healthcare has increased, both among healthcare professionals and customers. IoT solutions are not only used by individual customers. They are also provided by insurance companies and governments to improve health and to streamline the processes that patients go through. The COVID-19 pandemic has accelerated the use of IoT solutions in healthcare, as the world wrestled with both virus containment and a safe return to the workplace.

Healthcare is increasingly linked to big databases and medical advice is provided by doctors supported by artificial intelligence. Smart health is an explicit example of how IoT is linked with big data, artificial intelligence, machine learning and robotics.

Retail

The retail industry has witnessed particularly significant growth over the last two years (2020 and 2021), mostly due to the massive expansion of the e-commerce industry. Read more about the opportunities in the retail segment in Exporting retail tech services to Europe.

Agriculture

The Agriculture IoT market is another very interesting vertical industry. According to research company Meticulous, the agriculture IoT market is expected to reach €20.4 billion* by 2028, at a Compound Annual Growth Rate (CAGR) of 10.8% from 2021 to 2028 (*converted from USD).

The growth of the agriculture IoT market is fuelled by the growing utilization of precision farming techniques and the increasing adoption

of IoT and cloud-based solutions and of course in increasing the understanding of the benefits that agriculture IoT can offer farmers. The major restraining factors for this industry are the lack of connectivity and infrastructure and the financial costs of IoT solutions for agriculture.

Despite the identification of these key markets, there are tangible business opportunities for IoT, cloud, artificial intelligence, machine learning, and big data technologies across all smart environments, including smart cities, smart homes, smart utilities, smart transport, and smart governments.

Which European countries offer the most opportunities for IoT services outsourcing?

There are two European countries among the top five countries worldwide that have seen the highest IoT revenue. These are Germany and the UK. The Nordic countries and the Netherlands are interesting markets because of their growth in IoT adoption, but also due to their openness to outsourcing. The UK remains interesting both despite and because of Brexit. Central and Eastern European countries show significant growth in IoT adoption, making them interesting markets too.

Germany: Europe's IoT champion

Revenue in the German IoT market is projected to reach €1.31 billion* in 2022. That makes it the third largest IoT revenue market in the world, behind the United States of America (€4.31 billion*) and China (€4.13 billion*), (*converted from USD). The majority of Germany's IoT spending is in enterprise and industrial IoT, with the automotive and manufacturing sectors leading the country's IoT adoption rate. The IoT solution market in Germany is strongly driven by mid-market companies.

Germany has a strong interest and history in industrial IoT, having made constant industrial investments and innovations in the past decades. It is therefore no surprise that Germany is a pioneer in utilizing 5G to further increase the use of industrial IoT. In December 2021, German carrier Deutsche Telekom said over 87% of the German households can access its 5G network.

Initially, German companies saw IoT as a mechanism to develop new services and business opportunities, but the perception is changing more recently to increasing the use of IoT to generate higher efficiency in existing processes leading to cost reductions. Despite Germany's large IoT market size, cybersecurity is gaining importance too. When offering IoT solutions, it is recommended to focus on minimizing vulnerabilities by, for instance, combining IoT solutions with blockchain and edge processing technologies.

Germany is a very interesting market due to its large market size, but Germany remains risk-sensitive and less open to offshore outsourcing compared to other European countries, such as the United Kingdom and the Netherlands. This is changing as German companies face skill shortages and become more experienced in offshore outsourcing. The COVID pandemic has also created more opportunities for outsourcing companies, as the pandemic has been a crucial moment in showing what is possible with remote working and outsourcing. The COVID crisis has softened Germany's generally stiff corporate culture.

German companies naturally prefer to work and collaborate in German, which is why they prefer nearshoring when they do outsource. You can increase your chances of success in Germany by collaborating with a local German-speaking partner rather than approaching end users directly. Increase your chances of success in Germany by focusing on mid-market companies in the industrial sectors, which drive IoT adoption.

France: a large market where language matters

The French IoT market is large and growing quickly. In 2020, the market had a value of €2,678 million – almost a 60% increase from 2019, when the market value was estimated at €1,680 million.

The French IoT market is driven by the booming IT and Telecommunication industry in the country. Besides this, the increasing adoption of big data analytics and cloud computing solutions is expected to fuel the market even more. France also sees an increase in smartphone users and an increase in investments and new product launches related to IoT.

The hardware sector is expected to remain dominant for the next few years. In the vertical industries, consumer electronics is expected to dominate the market. Major players in the French (I)IoT market are Intel Corporation, Compagnie IBM France, Amazon Webservices France, Robert Bosch France SAS, Cisco Systems, SAP France SA, Microsoft France, Oracle France, SAS, and General Electric Company and Hewlett Packard France SAS.

Although France has a large IoT market size, the French prefer to collaborate and work in their own language. Speaking French or finding a partner able to do so will increase your chances of success when entering the French market.

The Nordics: most open to outsourcing

The Nordic markets are very much open to outsourcing. Although the combined markets of Sweden, Finland, Denmark, Norway, and Iceland are smaller than the markets of Germany, the United Kingdom, France, and Italy, their combined spending almost reached €13 billion in 2019. And their growth was expected to reach €17 billion in 2021 (the actual numbers for 2021 were not yet available when we published this study).

The Nordic growth in IoT spending is fuelled by the increasing adoption of IoT solutions by enterprises. There are three factors that will enhance the market growth in the upcoming years: the need for effective monitoring of business processes, the need for improvement in business values, and the need for a significant increase in efficiency. In 2021, companies in the Nordic countries were the most frequent users of IoT devices.

Due to their openness to outsourcing, these growing markets could be interesting for you. Experts believe that the competition in Nordic markets will be less strong than in the United Kingdom, making them easier targets to consider.

The Netherlands: late starter, ready for a sprint

The Netherlands has not been an early adaptor of IoT solutions. For example, in 2021 the European average of IoT usage in enterprises stood at 29%, and the Netherlands performed below average at 21%. However, this is changing, the number of connected IoT devices is growing and the advantages and importance are increasingly recognized by Dutch companies.

The Netherlands is more on the forefront when it comes to consumer IoT use. The Netherlands ranks third in the list of countries with the most consumer IoT appliances in Europe.

The 5G network was launched in April 2020, with a key focus on Amsterdam, Eindhoven, Groningen, and Rotterdam areas. However, in December 2021, only 6% of Dutch people were actually using 5G. The Netherlands is also the first country to have nationwide LoRa network coverage. A LoRa network (Lower Power Wide Area) is particularly interesting for IoT applications, as it is good for the battery life of the connected devices.

Because of the increasing ofe in innovative technology, the Netherlands is gaining the position of ‘guiding country’ when it comes to IoT

initiatives. Other countries that have been marked ‘guiding IoT countries’ are Germany, Sweden and the United Kingdom.

Companies in the Netherlands are traditionally fairly open to outsourcing. Language barriers for doing business in the Netherlands are generally low, as the Dutch are very proficient in English.

Romania: competition and opportunities

Romania was previously mostly seen as a competitive destination. However, they are faced with a talent shortage and they are increasingly looking for companies to partner with. This could be your company.

Romania is following the European trend, where COVID-19 accelerated the adoption of digital solutions in most sectors. In 2021, a little more than 10% of Romanian enterprises were using IoT devices. That is relatively low compared to the European average of 29%, but with a high growth percentage and increasing interest in IoT solutions, there is a lot of work to be done

SOURCES

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