

Developed By:



THE MIDDLE EAST MEGA CITY INFRASTRUCTURE ANNUAL REPORT 2019

With insightful contributions from respected organisations and governments in the Middle East and world over including: Abu Dhabi Police, Emirates Green Building Council, Ministry of Emiritisation, Smart City Association, Italy and more.

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Contributors:

Dr. Nasser Alsaedi, Head of Information Security, Abu Dhabi Police

Heading the information security division for Abu Dhabi Police and instrumental in delivering Abu Dhabi Police's pilot projects for the AI roadmap and Centennial Vision 2057.



Carles Agustí i Hernández, Open Government Director, Barcelona Provincial Council

Nominated by World CSR organisation as one of the 50 best experts in Smart Cities at world level, he is the man who launched Barcelona Open Government (governobert.bcn.cat) with his team and helped Barcelona meet 100% of international transparency criteria.



Yarub Hadhrami, Director – Affordable Housing, Supreme Council of Planning, Oman

The man who spearheads the entire affordable housing for Oman and is currently working on a project to deliver 1,000 affordable homes for Omanis.



Dr. Mohammad Aref, OSH Expert, Ministry of HR and Emiratisation

Worked on the project of developing OSH National Policy, Program & Cop's association with ILO



Sarfraz Dairkee, Secretary to the Board, Emirates Green Building Council

Awarded with the prestigious "Fellow Membership of Association of Energy Engineers-USA", he is the first person in MENA and Asia working towards creating a carbon neutral and energy-efficient city with the Green Building Council.



Dr. Mansour Nasr Malik, Environment, Health and Safety Management Specialist, Department of Transport

Manages policies, strategies and plans pertinent to the field of Environment, Health and Safety.



Gagan Seksaria, Director of Global Investments, Red Sea Gateway Terminal

A port infrastructure investment specialist with diverse international experience in emerging markets, he represents Red Sea Gateway Terminal of Saudi Arabia based Xenel Industries, one of the largest and most diverse conglomerates in the Middle East and is responsible for the execution of the company's international investments and expansion strategy



George Newell, Editor, Sustainable Business Magazine

Sustainable Business Magazine is the only industry publication focusing solely on sustainable business development



Raeffaele Gareri, Chief Technology Officer, Brescia & Chairman, the Smart City Association, Italy

With \$50 million in hand, he is currently revamping the energy efficiency of the smart lighting network in 21 municipalities and is responsible of a public project aimed to provide IoT coverage in more than 28 municipalities making Brescia achieve the smart city tag.



Shuchita Gupta, Conference Director, IQPC Middle East



Ritika Mehta, Conference Director, IQPC Middle East



INTRODUCTION

Mega Cities have clearly brought the interdependency of City Infrastructure to the forefront. As innovation and technologies are embraced – from autonomous vehicles to hyperloop – it is evident that roads, transit, connectivity and distribution networks need to be aligned. Governments and project stakeholders can no longer work in silos, instead they need to tackle challenges like 5G and open data adoption cohesively.

Middle East project owners have always taken immense pride with the futuristic deployment of technology and infrastructure. According to the Global Construction Outlook of 2021, The Middle East and Africa will be the best performing construction industry in the world. As a whole the region is spearheading diversification from oil based economy to service and digital economies.

With the billions being invested in the Middle East each year on infrastructure, we conducted a survey with over 300 construction professionals across the globe to gauge their views on current and up-coming projects in the region. The results illustrate a strong outlook towards Middle East Mega City projects and the technologies that would transform these. Artificial Intelligence is definitely a key trend for 2019 with 1 in every 3 respondents choosing it for technologies they are implementing in Roads and Connected Cities. Big Data was also a close contender with Roads and Ports respondents. Further, Autonomous Vehicles are clearly an ambition and aspiration for regional governments.

The demand for sustainable solutions is on the rise with 58% of respondents stating its top of their agenda for 2019. BIM is finally carving a path of adoption and 12% of the respondents are likely to apply it in housing projects. Port Automation is being pursued to enhance and further business, 38% respondents will be applying IoT and Big Data in their port projects.

As technology drives mega city development and the connected cities become a key focus for all countries in the region, cybersecurity is gaining importance. A staggering 58% chose funding and cost as their biggest challenge for developing projects for sustainable cities, highlighting a distinct need for structured products for infrastructure investment and project finance.

These are just top line indicators to the procurement needs of mega city infrastructure projects. As trillion dollar project are launched and developed, we encourage you to deep dive to understand the pulse of the industry from this comprehensive report.

The launch edition of the Middle East Mega City Infrastructure Annual Report will enable you to gain insights and reflect on the challenges, innovations and technologies required to drive mega city infrastructure projects in the Middle East towards excellence.



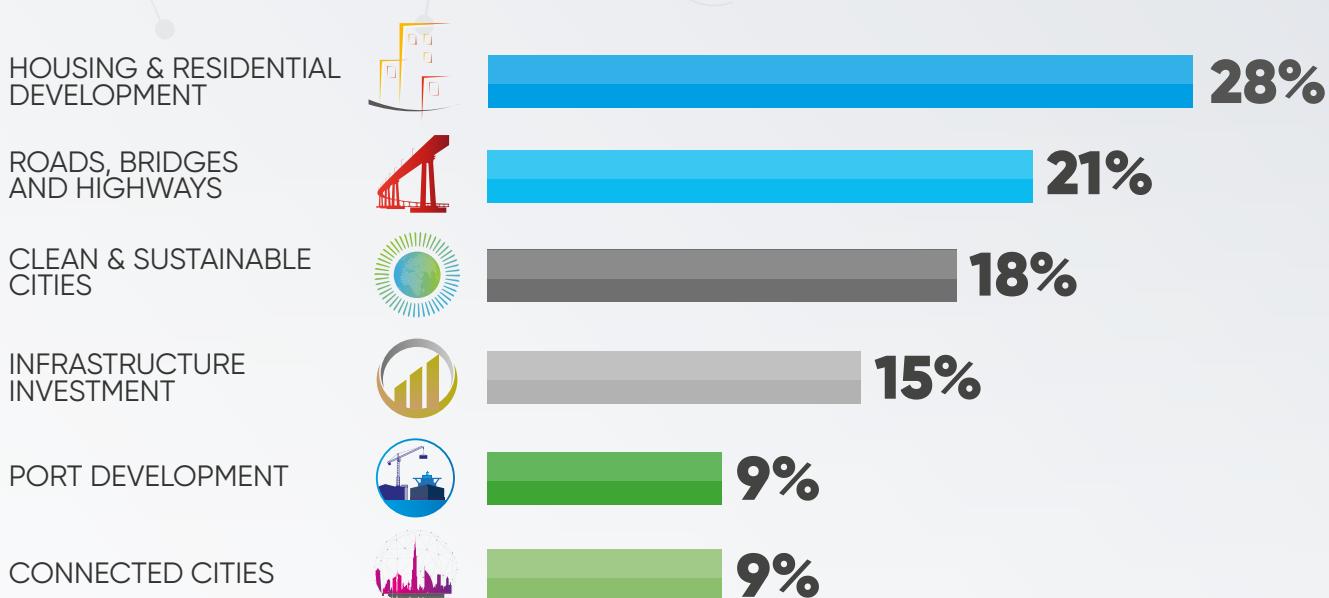
Ayusha Tyagi
Managing Director,
IQPC Middle East



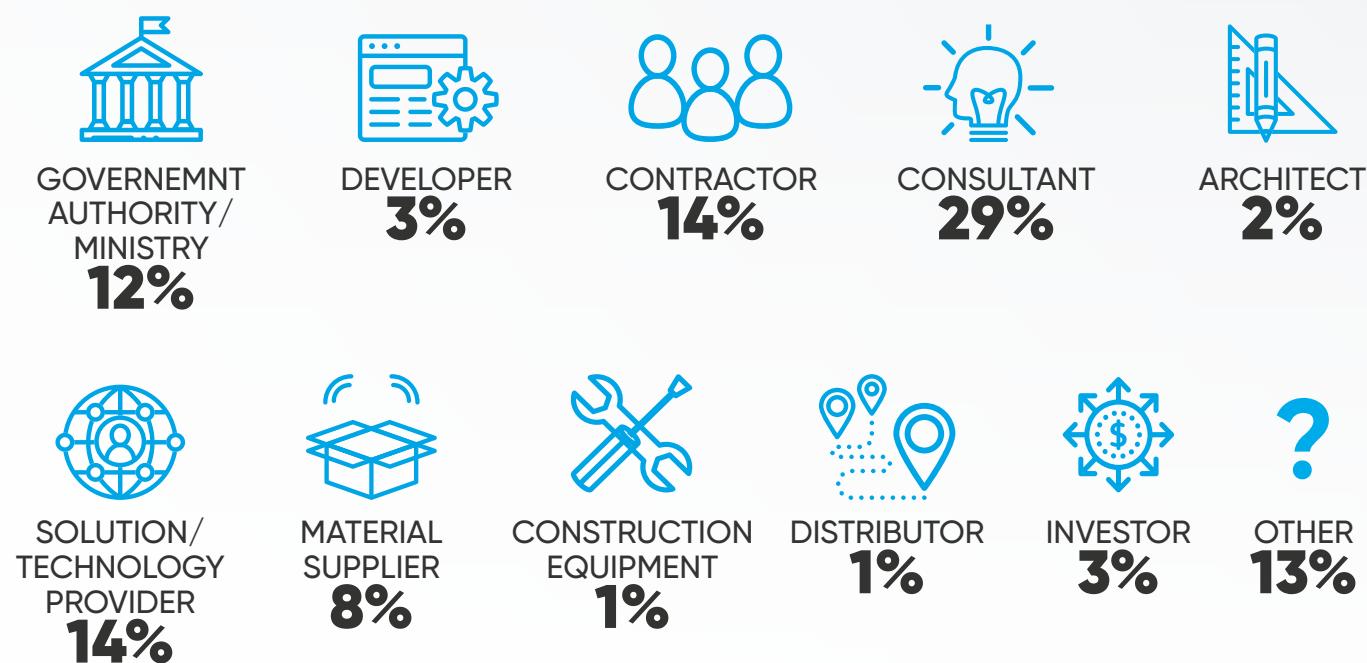
The Mega City Infrastructure Annual Report is the biggest of its kind ever researched in the Middle East with over 300 respondents from around the globe asking them about the challenges faced, initiatives required and technologies being applied in infrastructure projects in the Middle East.

THE RESPONDENTS

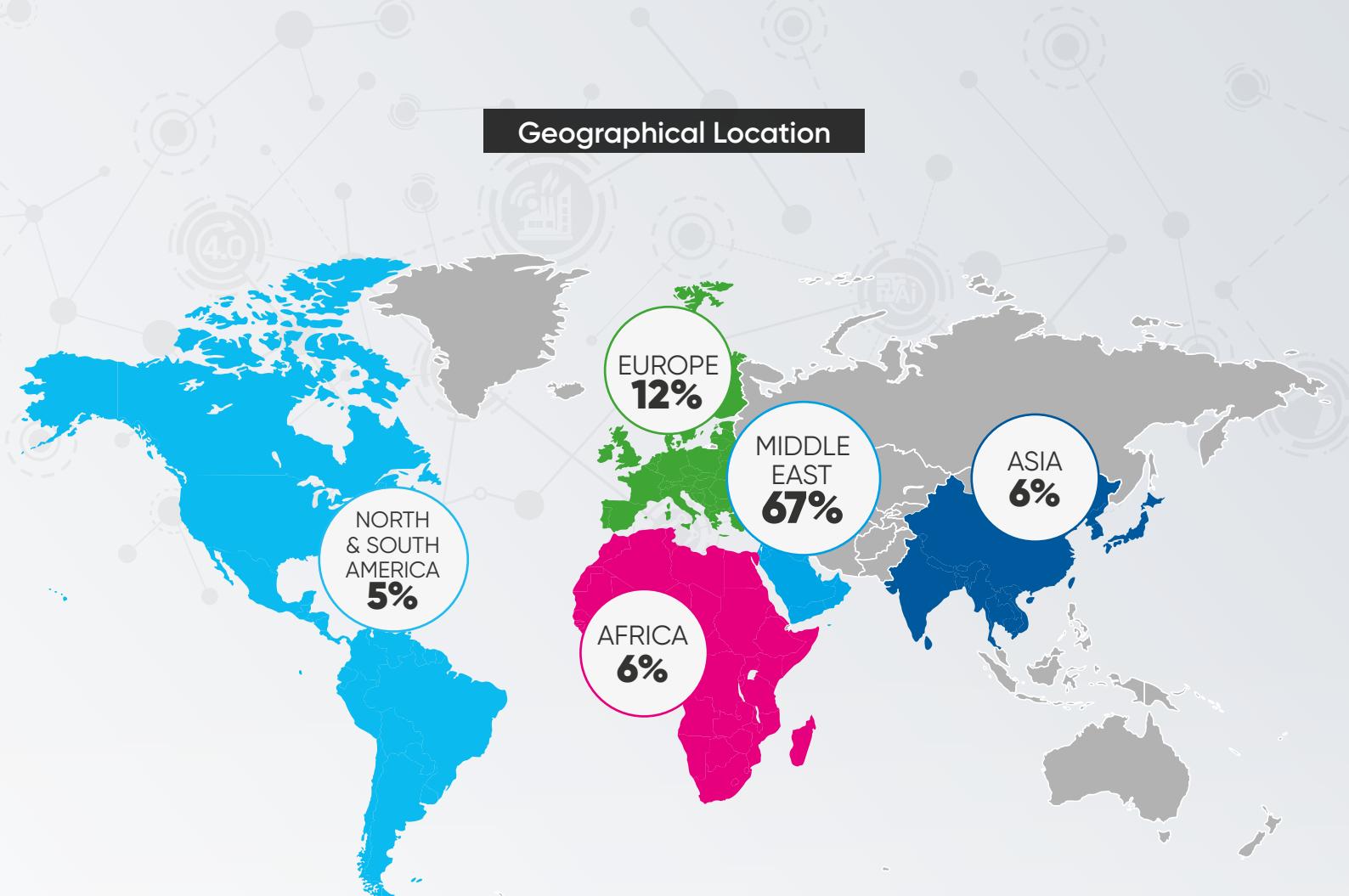
Main Area Of Interest



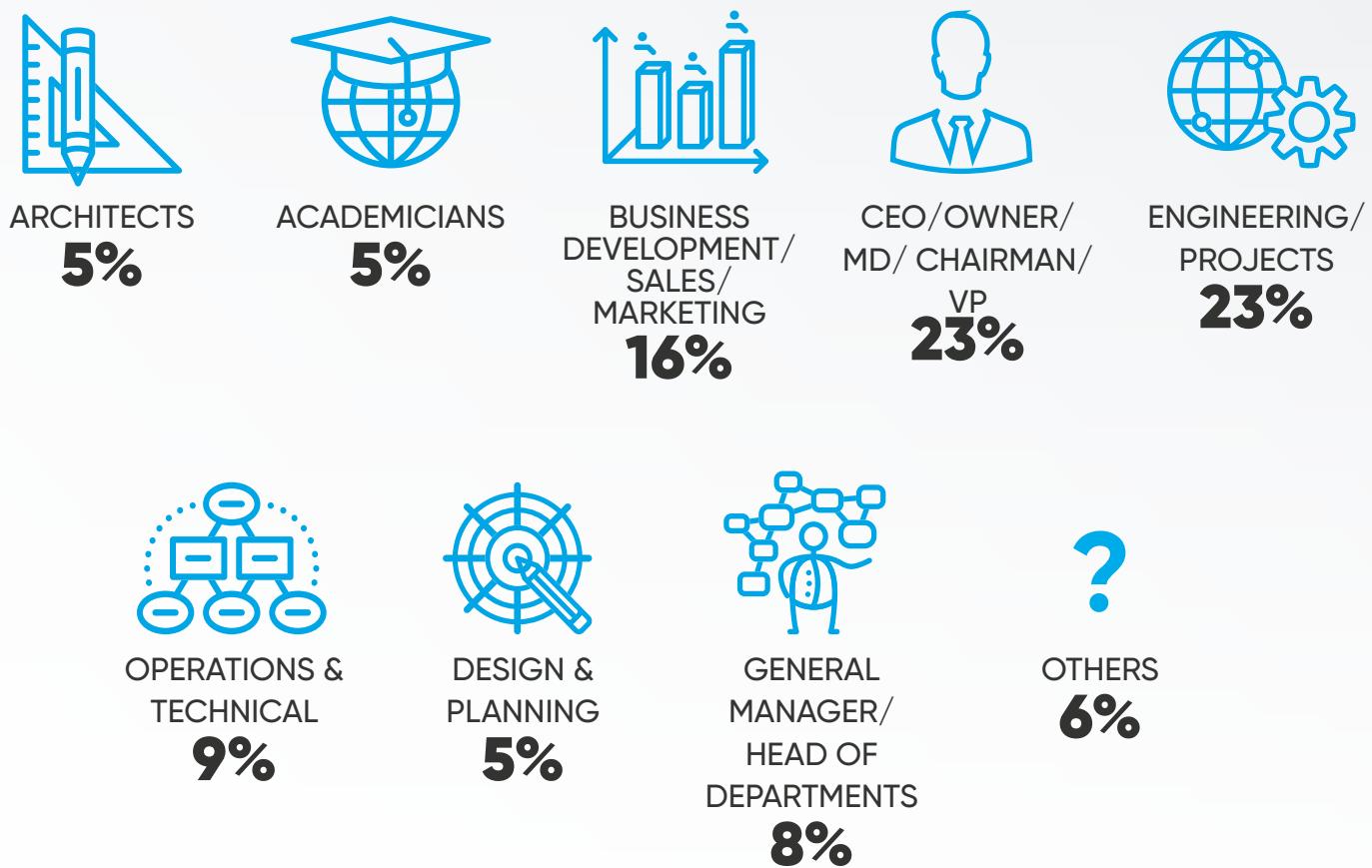
Company Profile



Geographical Location



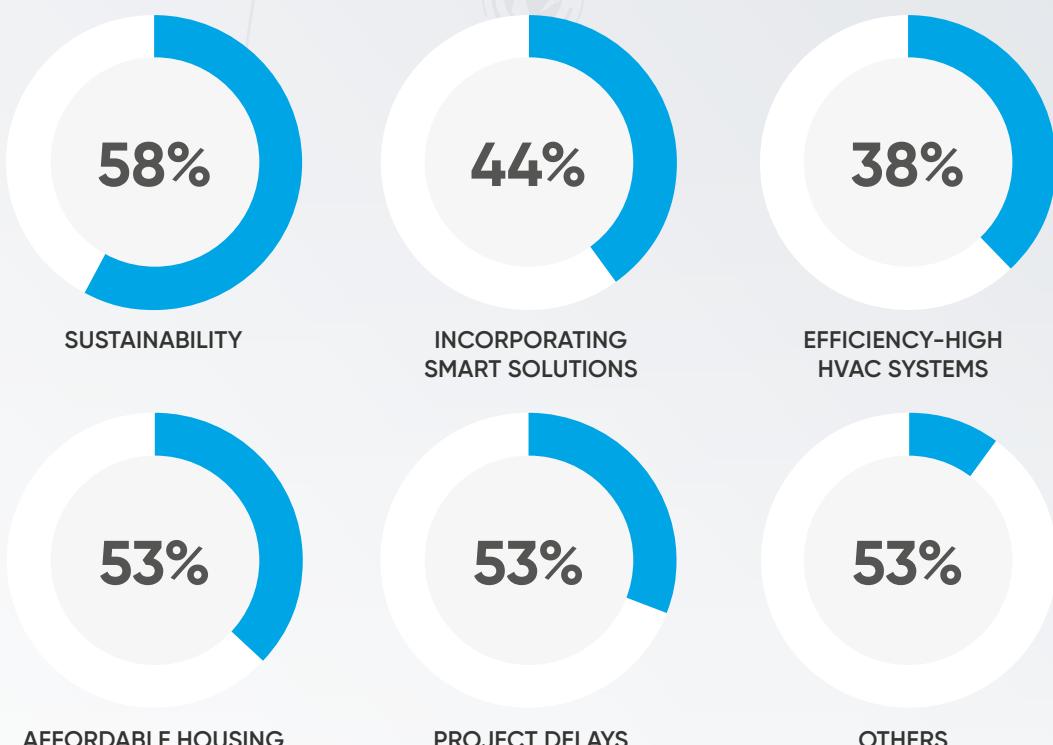
Job Function



FINDINGS

HOUSING AND RESIDENTIAL DEVELOPMENT

What are the challenges faced while working on housing and residential development?

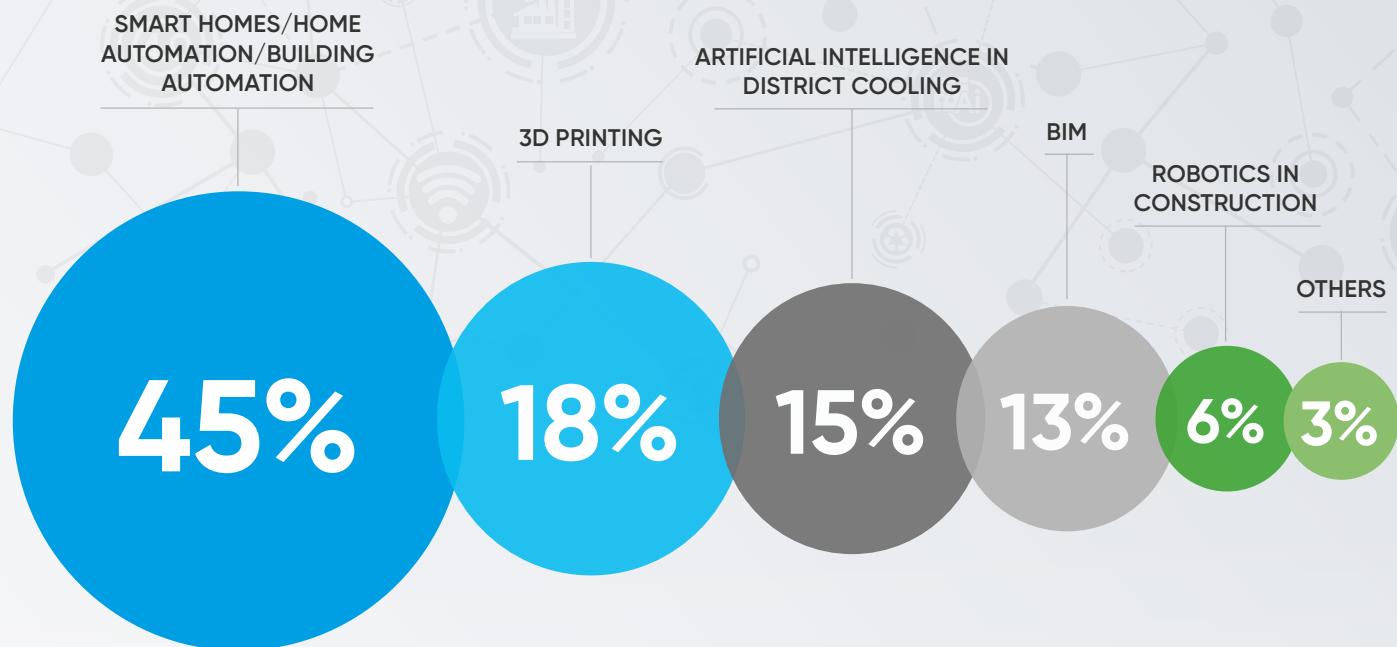


Yarub Hadhrami: If I look at the above question from a government angle I would really rank it differently with the following order starting from the most challenging:

1. Affordable Housing because of the competition with other commercial based residential development as a free hold
2. Sustainability from all aspects including: F&M, Financing, energy saving etc.
3. Incorporating smart solutions In addition, creating resilient cities is another high potential challenge.

Sarfraz Dairkee: My perspective may vary from others on this subject. While it is important that those associated with housing understand the importance of sustainability, there are a few assumptions made in regards to the cost behind it. The concept of "shadow thinking" needs to change and stakeholders need to break out of silo thinking and understand that a little thought process to integrate the systems at the design stage will go a long way in cost-cutting and safe-guarding the environment.

What is the next big innovation or change that will redefine the future for housing and residential development in the Middle East?



Yarub Hadhrami: I agree with the ranking. I would prefer to call it smart communities instead of smart cities, which really need the interaction between the users and the systems. This will redefine the future during the Fourth Industrial Revolution.

Sarfraz Dairkee: It is important that we start adapting the practices that best suit our requirements as opposed to copying what is trending in the market. An investment in thought process is required as the mind set needs to change from solution motive to product motive. Smart homes are the future, all the options in the survey hold weightage, but what brings out the best results is choosing the right application for each product.

Shuchita Gupta: Smart homes/Home automation/Building automation is probably the most common innovation that the region is looking at. Smart homes will be redefining the region for its take on technology and a step forward towards attaining the status of smart city. Smart homes in the near future become a necessity and not a luxury.

Which of the following new solutions or technologies are you looking at to implement in your upcoming or current project?

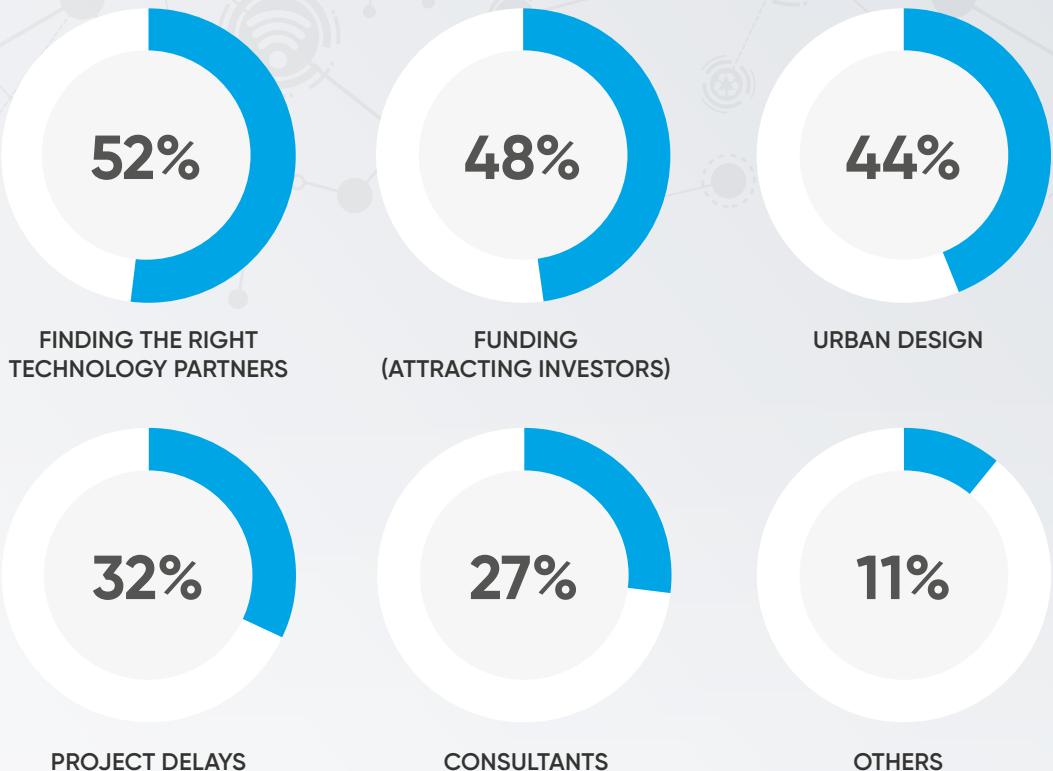


Sarfraz Dairkee: From a vendor approach while looking at choosing the best technology I feel that an integrated thinking approach needs to be used. It is important to understand the following:

- Integration of thermal, acoustic and breathing comfort
- The need for energy conservation
- Understanding of the fundamentals – process and storage of energy

SMART CITIES

What are the challenges faced while working on connected or smart city projects?



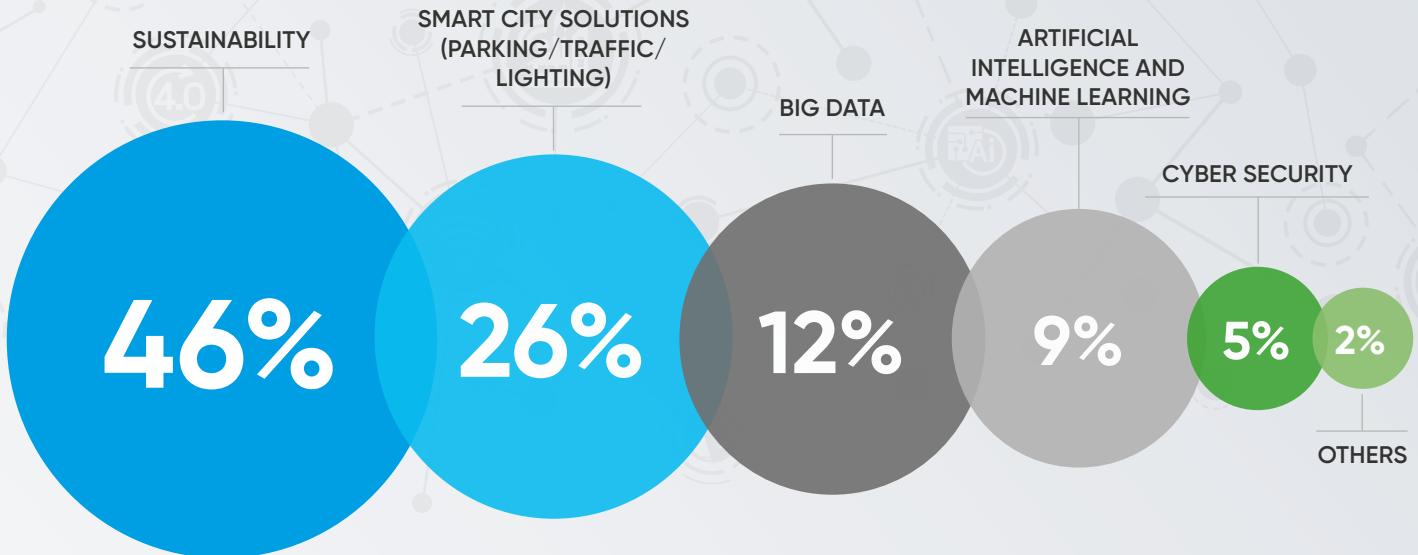
Raeffaele Gareri: Technology is what could make or break projects. It is important to find a technology that could be well integrated in an ecosystem. It is important that the technology is correlated with the stakeholder's complexity and the ability to apply the technology at any given stage of the process from logistics and supply chain to marketing. When we look at the importance of funding we need to understand that new projects have new business models. When we look at traditional businesses, they are not used to additional funding; it is an approach that could work for the new generation of business architecture.

Dr. Nasser Alsaedi: I agree with the results. Funding, finding the right technology partners, urban designs, consultants and of course the project delays which I think is not a challenge rather than a consequence. Other challenges that I would like to add would be government involvement and budgets, integration between different companies and entities in projects.

Carles Agustí i Hernández: The challenges I believe that are being faced is that of funding and Smart Governance / Smart Citizens. These two challenges once dealt with should solve other challenges.



What is the next big innovation or change that will redefine smart cities development in the Middle East?

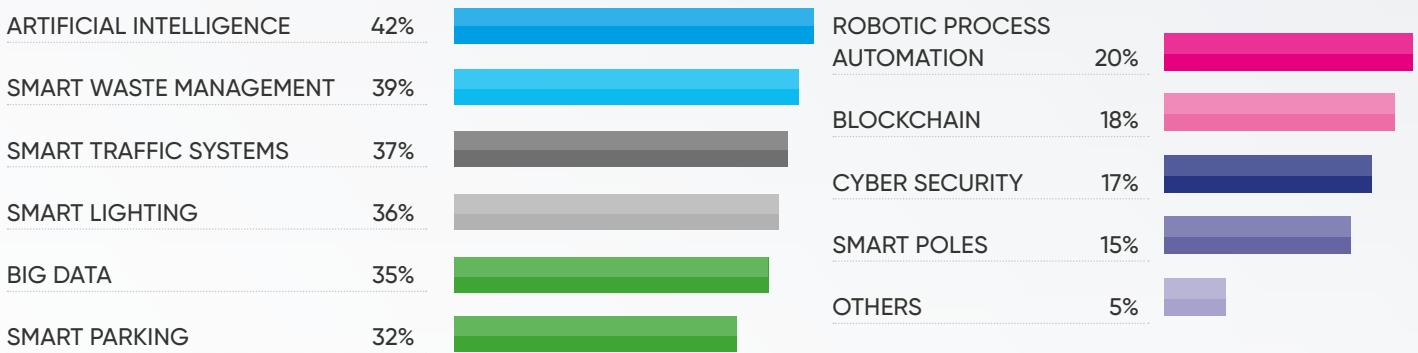


Raeffaele Gareri: The ultimate smart city goal is sustainability and technology will help achieve it. As soon as smart services increase, new opportunities will arise and it is important to redefine data governance to increase the value of your process as well as to provide new sources of innovation to your ecosystem and community.

Dr. Nasser Alsaedi: I was very surprised that sustainability gained over 46%, which shows the importance of sustainability and environmental issues. The second initiative of redefining smart cities is smart cities solutions, which is very rational and understandable. I would definitely add people of determination as an initiative as well.

Carles Agusti i Hernández: Personally the change I see which is going to have a bigger impact and corresponding results will be that of Smart city solutions (parking/traffic/lighting). The right kind of solution can define the future of that smart city.

Which of the following new solutions or technologies are you looking at to implement in your upcoming or current project?



Raeffaele Gareri: As I see the results of this question, it only confirms my opinion on having a designer who can create an integrated ecosystem that will include all aspects of a smart city in a single domain. It is important to introduce innovation in each single domain but it is crucial the orchestration of designing and integration of all verticals. This strategy will change the focus from the ownership of assets to the use and value of services.

Dr. Nasser Alsaedi: Most of the respondents to the survey are looking to implement Fourth Industrial Revolution Technologies such as AI, Big data, smart solutions and blockchain. This in fact enhances and adds greater significance to conferences such as Megacity Infrastructure. The results also show that more awareness is needed in regards to cyber security which I feel is vital with the bi role that technology will play in our future.

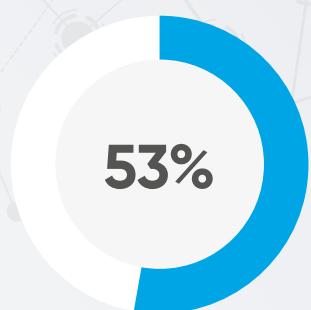
Carles Agusti i Hernández: Big Data for me stands out as a technology that needs to be implemented across verticals. It is the future as it helps in improving the quality of life and in easy decision making.

PORT DEVELOPMENT

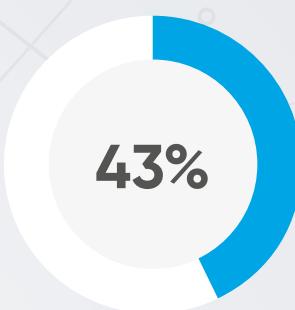
What are the challenges faced while working on port operational, development, and expansion projects?



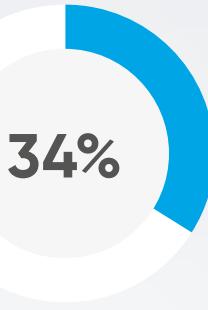
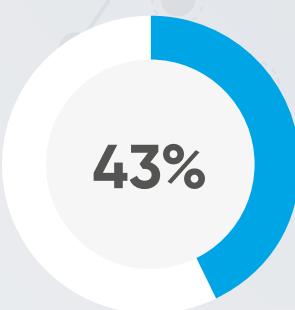
IMPLEMENTING THE LATEST
DIGITISATION AND AUTOMATION
STRATEGIES



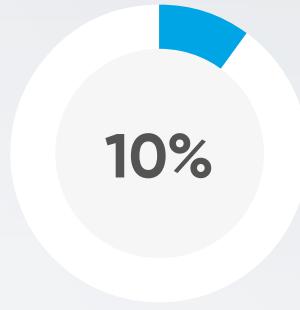
OPERATIONAL
OVERCAPACITY



LACK OF APPROPRIATE
SKILLSET



UNSECURED TRADE ROUTES AND
EXPOSED COMMERCIAL RISKS



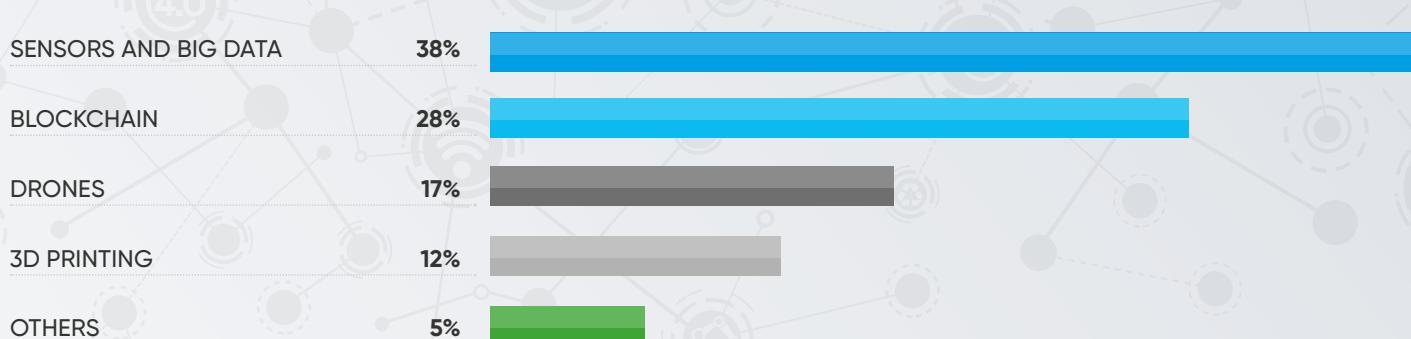
OTHERS

Gagan Seksaria: Just as the Middle East is a loosely used term to refer to a motley of heterogeneous markets, it's challenging to draw a red thread through opportunities, challenges and technologies facing the different port systems in the region. If this is true, they must be quite specific to each port system and need to be addressed as such.

Ritika Mehta: A staggering 53% are facing a challenge in the implementation of the latest digitisation and automation strategies, finding the right technology that can be customized to requirements are vital. The second highest challenge is that of operational overcapacity, which is quite common, but of course there are many ports that have already started increasing port capacity and using technology to decrease turn around times.

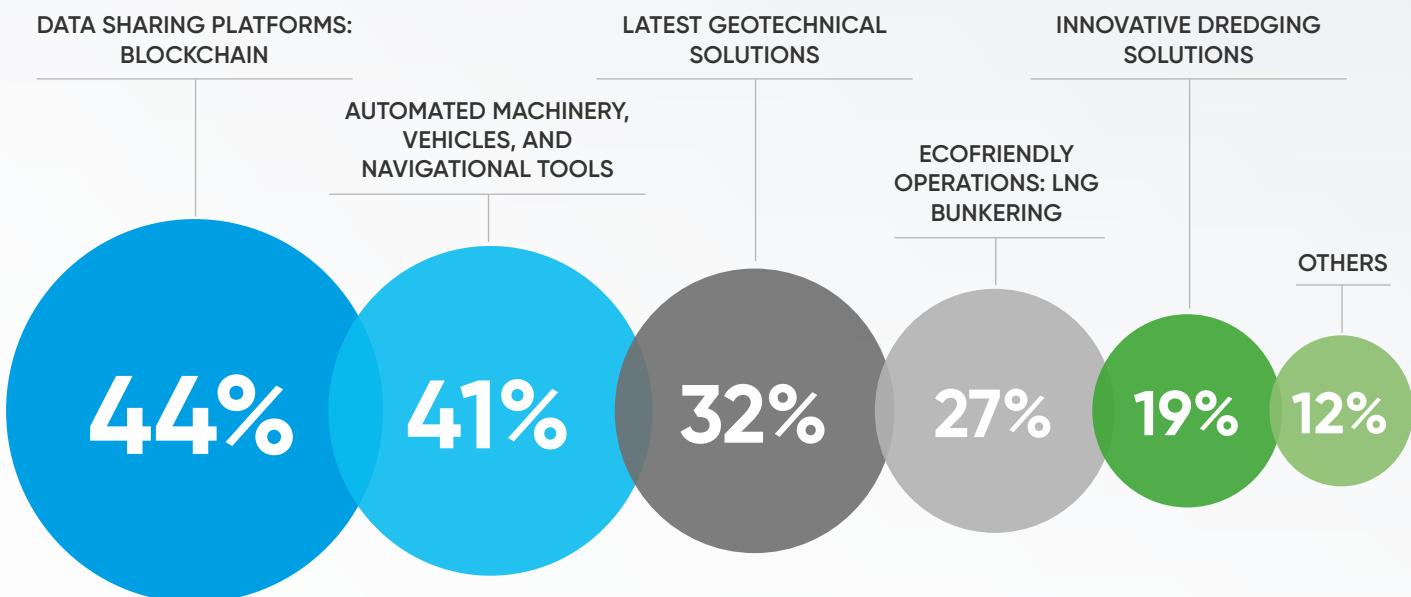


What is the next big innovation or change that will redefine the future for port development in the Middle East?



Gagan: Our mantra at RSGT for instance is to ask customers what they want and prioritise those projects. In addition, customers always desire and deserve the best value possible. So it's important to keep your cost structure sharp. Operational overcapacity, as an instance, found as a regional challenge in the study, obviously works against this agenda. Well then, sit down and check. Do you really need all those machines and must you keep running them just because they are there? Is your Human Resources strategy aligned with your need for a sharp cost structure? And what are you doing now to address the skills scarcity in future as it's likely only going to get worse.

Which of the following new solutions or technologies are you looking at to implement in your upcoming or current project?



Gagan: There are other questions to ask yourselves. Does it give you a clear advantage to join in the 'blockchains for ports' maturing process or could you wait? Does that automation project clearly give you a competitive advantage while providing a reasonable return to your shareholders?

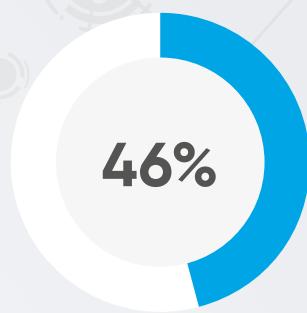
Ritika Mehta: With the application of blockchain at Abu Dhabi port, real-time data is shared between ports which helps in reducing time and increasing efficiency. Jebel Ali port is said to be one of the most digitally forward ports with the usage of updated technology and instruments. The importance of technology and the scope of it with ports are vast. Its potential is still in the exploration stage with the implementation stage being in the near future.

ROADS, BRIDGES AND HIGHWAYS

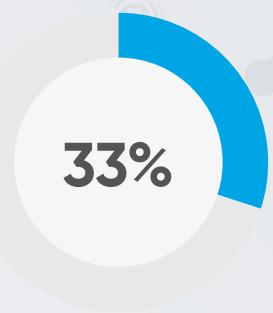
What are the challenges faced while working on roads, bridges or highways projects?



PROJECT DELAYS



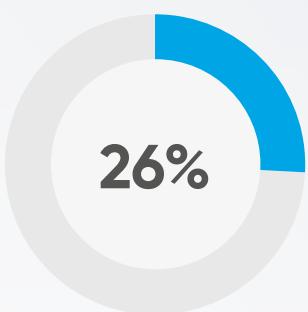
TYPES OF CONTRACTORS INVOLVED



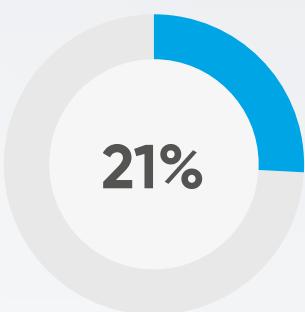
ROAD/BRIDGE DESIGN



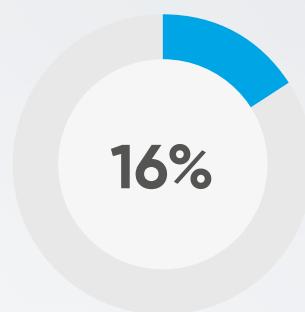
MATERIAL SELECTION



ASSET MAINTENANCE



NON-AVAILABILITY OF SMART MACHINERIES



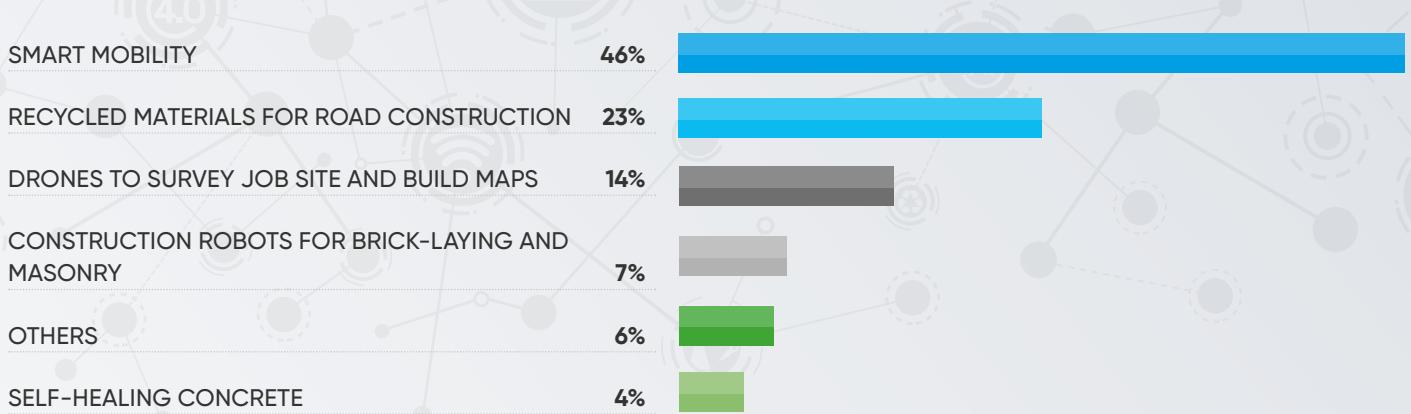
OTHERS

Dr. Nasser Alsaedi: The top challenge being project delays could be due to many reasons, most likely including types of contractors involved, design, material selection or funding. There is always a window of delay for reasons which are unforeseen, hence projects in their initial stages should have well thought of timelines which includes delays.

Shuchita Gupta: More than 50% of the respondents have chosen project delays as one of the challenges faced, followed by types of contractors involved at 46% and design at 33%. Non-availability of smart machineries and asset maintenance seem less of a concern.

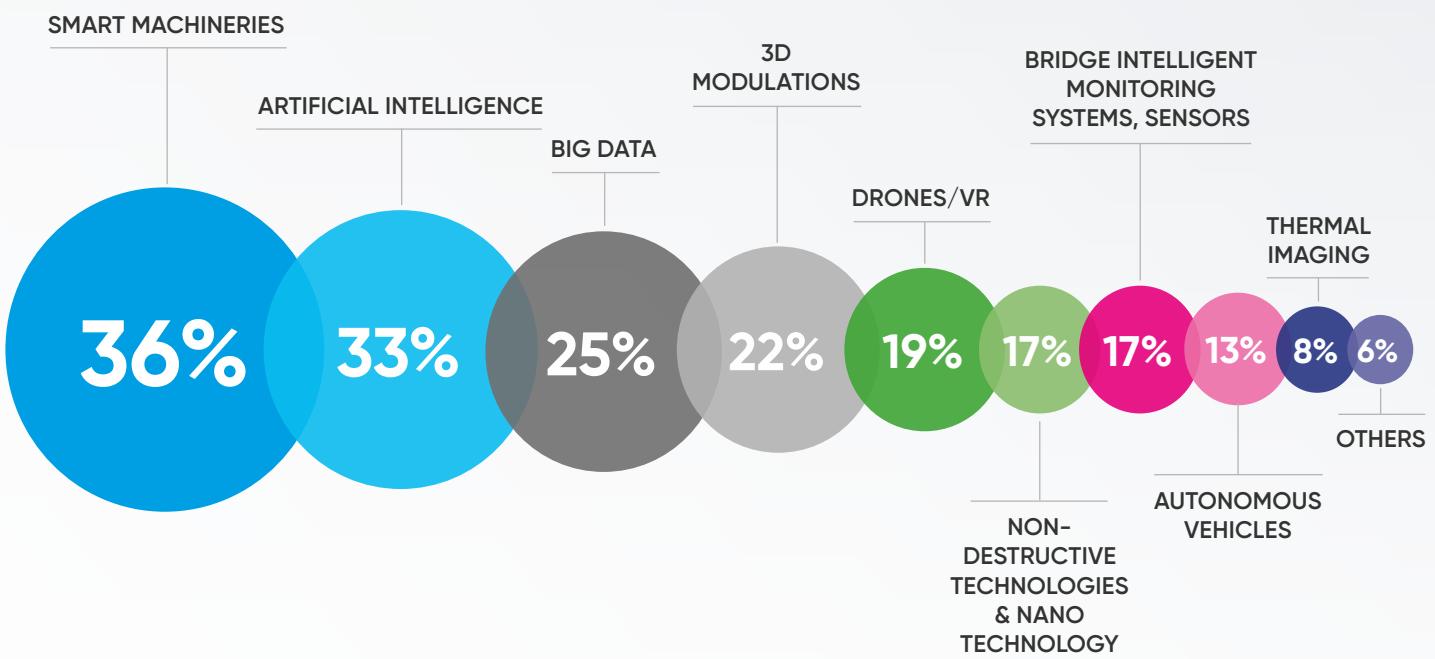


What is the next big innovation or change that will redefine the future of road infrastructure in the Middle East?



Dr. Nasser Alsaedi: Though a very generic option, smart mobility here is a culmination of technologies such Artificial Intelligence and blockchain. Other innovations I feel that are important are the use of sustainable materials or robots instead of humans for building smart projects.

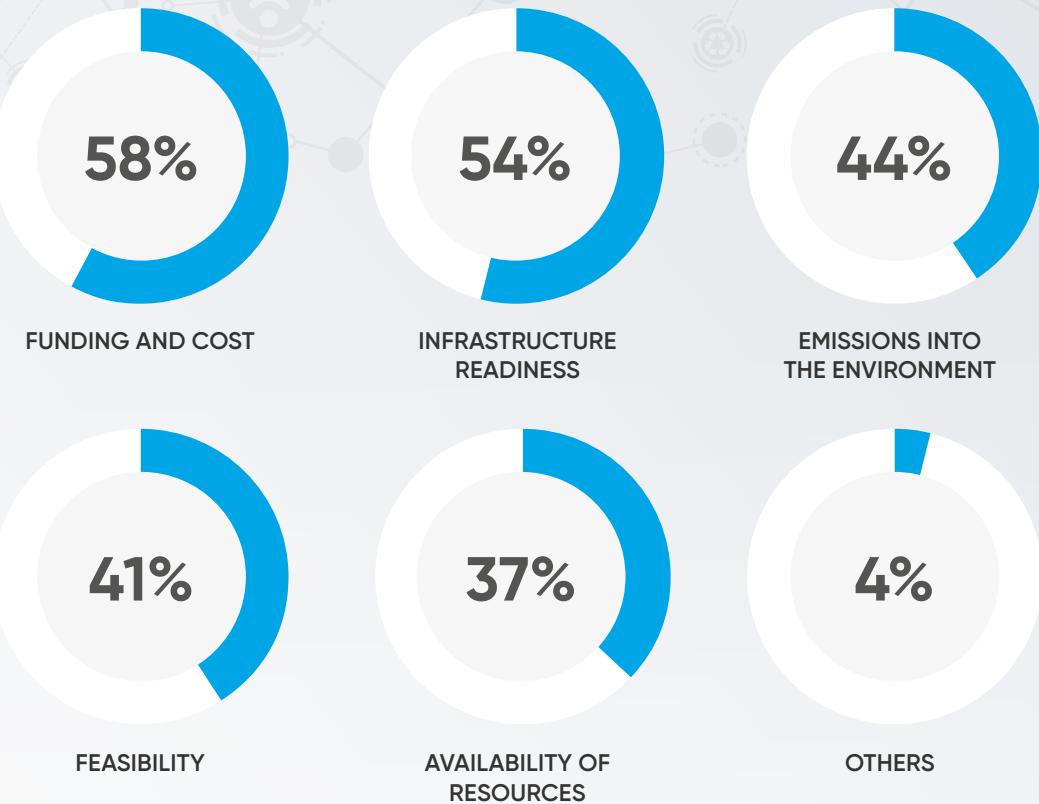
Which of the following new solutions or technologies are you looking at to implement in your upcoming or current project?



Shuchita Gupta: With smart machineries leading the way, followed by artificial intelligence, it is important to understand that Big data is key to leverage to track performances, which could potentially lead to raising public and private investments that would solve the issue of funding as well as project delays.

CLEAN AND SUSTAINABLE CITIES

What are the challenges faced while working on clean energy or sustainability projects?

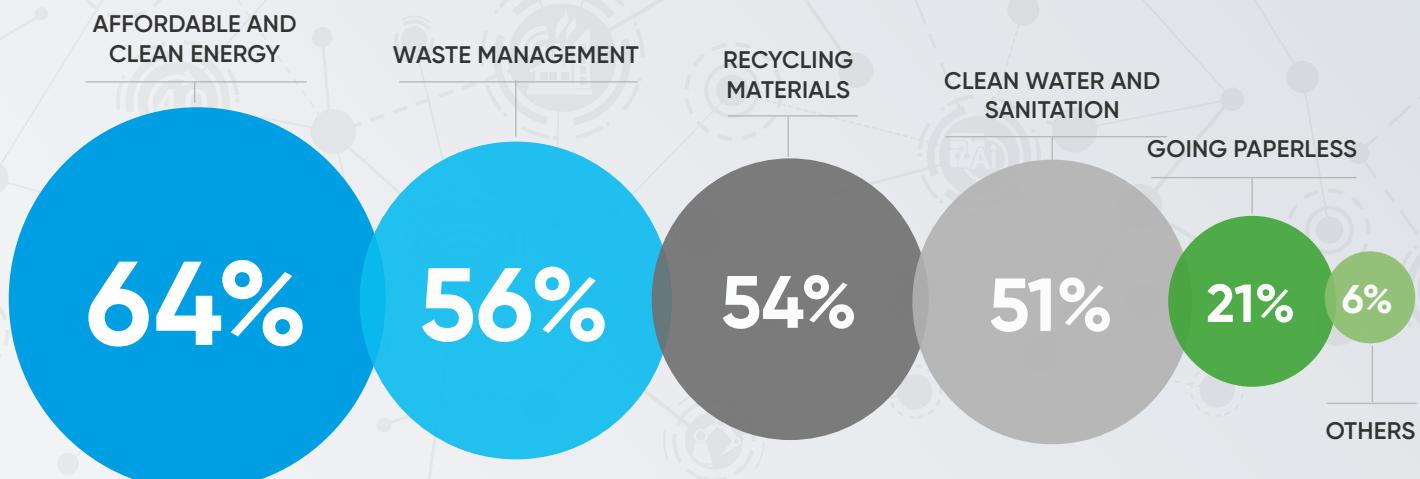


Dr. Mohammad Aref: I do believe one of the key challenges of having clean & sustainable cities in the Middle East is the lack of infrastructure (i.e. Old, not properly settled on or not fit for applying the new sustainability technique), in addition to following factors:

- Availability of resources where these challenges can impact negatively on applying sustainability techniques.
- Lack of renewable energy resources along with its high cost.
- Lack of integrated waste management practices effects on having clean cities.
- Lack of public awareness for sustainability techniques and practices.

Dr. Mansour Nasr Malik: I do believe the responses are rational but looking at it from the transport sector viewpoint, I do think the major challenge, at least in the Emirate of Abu Dhabi, is the exponential increasing rate of population against the existing infrastructure and the need for speed planning and implementing. The Abu Dhabi Department of Transport with its key stakeholders like the Urban Planning Council and the concerned municipalities have developed a set of Surface Transport Master Plans for Abu Dhabi City. Each supported by goals shaped around five key aspects: quality of life, technology, economic success, healthy environment and stakeholder engagement. I would list the challenges as – funding and cost + availability of resources as one; emission to the environment is a main concern for the development of the transport sector in sea, air and land. In collaboration with the urban and rural planning, the laying of infrastructure is a challenge that needs to be addressed with utmost coordination among all concerned parties.

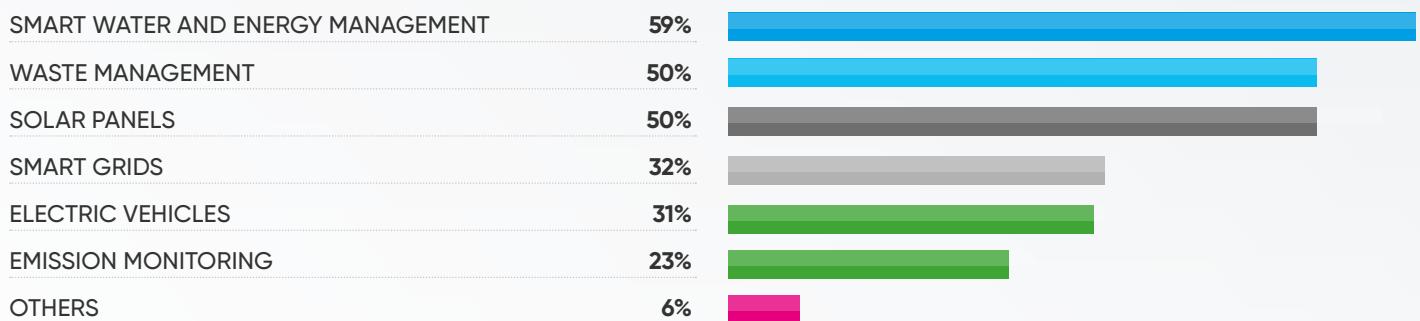
What initiatives do you think companies in the Middle East need to take to implement sustainable development goals (SDGs) on an organisational level?



Dr. Mansour Nasr Malik: The focus of transport planning is to support fast development of economy in the Emirate of Abu Dhabi and thus nationwide. The impact upon the environment is crucial and that is why in the planning stage, serious consideration is taken towards use of energy in transportation which includes; aviation, maritime and land. The aim for metro, tram and rail building is ongoing and towards clean energy, low emission vehicles, hybrid-electric and other initiatives are within both the current and future planning. So, energy is a main challenge followed by protection and conservation of the environmental resources including better use, reduce, reuse, and recycle of material (including paper and water) as possible.

George Newell: Many companies in the Middle East are engaged in ambitious sustainability projects. Some have already invested in 'going paperless', which aligns with the Dubai Paperless Strategy, in which the Dubai government intends to be paper-free by 2021. Clean energy projects by their nature are more complicated than going paperless, but I am pleased to see that the report respondents see these projects as a necessity. My perception is that, with growing corporate and government enthusiasm, many of these technologies and initiatives may be implemented faster than we might expect.

Which of the following new solutions or technologies are you looking at to implement in your upcoming or current project?

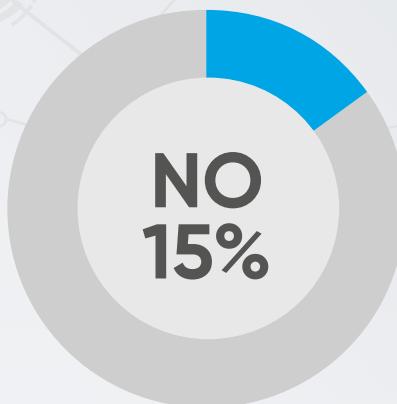
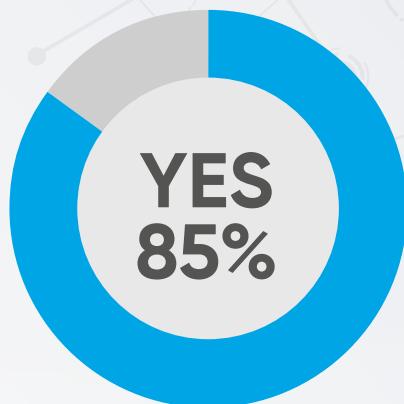


Dr. Mansour Nasr Malik: The key running of the transport sector infrastructure does involve looking into optimal cost of buildings, bus stations, bus depots, maintenance workshops, warehouses and others. So, smart water and energy management is a must but prior to that availability of proper and affordable building materials for roads, bridges, tunnels and other related infrastructure. In a way, the choices given in this report are interconnected and it is hard to disentangle them from each other. If I had to choose it would be in order of- emission monitoring; smart water and energy management; waste management; electrical vehicles; smart grids and will add raw material for road and bridge building.

George Newell: A change I have observed over the years is people going from "what is the need?" to "we must". Today, it is common to implement smart water and energy management systems, sustainable waste management, and solar panels. Green and energy efficient technologies, from smart meters to LED lighting, have drastically reduced in cost over the years as a result of an increase in demand and improvements to the technology. In a decade's time, the technology will have advanced even further, and this report may have a few additional options, or even a completely new list. The results of the report have been very heartening and encouraging. I hope this Clean and Sustainable Cities event leads to more positive developments, and provides encouragement to stakeholders who may be considering integrating new, sustainable technologies into their projects.

THE NEXT BIG THING...

Do you think technologies like AI, robotics, automation, and big data will have a massive impact on all infrastructure projects in the region?



Dr. Nasser Alsaedi: Technology is without a doubt going to play a big role in Middle East infrastructure projects. Artificial Intelligence, blockchain and smart mobility are definitely going to be changing the landscape of infrastructure in the region.

Yarub Hadhrami: I absolutely agree with the findings. Technology such as AI, big data etc. will be redefining infrastructure in the Middle East.

Raeffaele Gareri: Technology is what is going to drive infrastructure in the Middle East. It is crucial to go into the details and understand the problem from its root so apt solutions could be concluded with.

CONCLUSION

The Middle East Megacity Infrastructure Annual Report is our yearly analysis of where the Middle East stands each year in its infrastructure development and its attributors.

As we draw an end to this study, let's understand the underlying requirement for the development of megacities. For a region to grow it is important to stay on par with technological developments as well as consider all the ecological factors being affected. For a successful megacity projects it is vital to have a unified vision that is built on economic objectives such as sustainability, affordable housing and a healthy environment.

Every city has its own challenges varying from funding, right technology partners and sustainability. It is here where one needs to step back and understand the entire picture. It is a constant struggle to strike a balance between economy and ecology, for this the application of holistic

solutions across infrastructures sectors to create interdependency between them is important.

To create an environment of economic attractiveness, environmental protection and quality of life, there is a requirement for the inclusion of comprehensive models and efficient management structures to see the balance among these three factors.

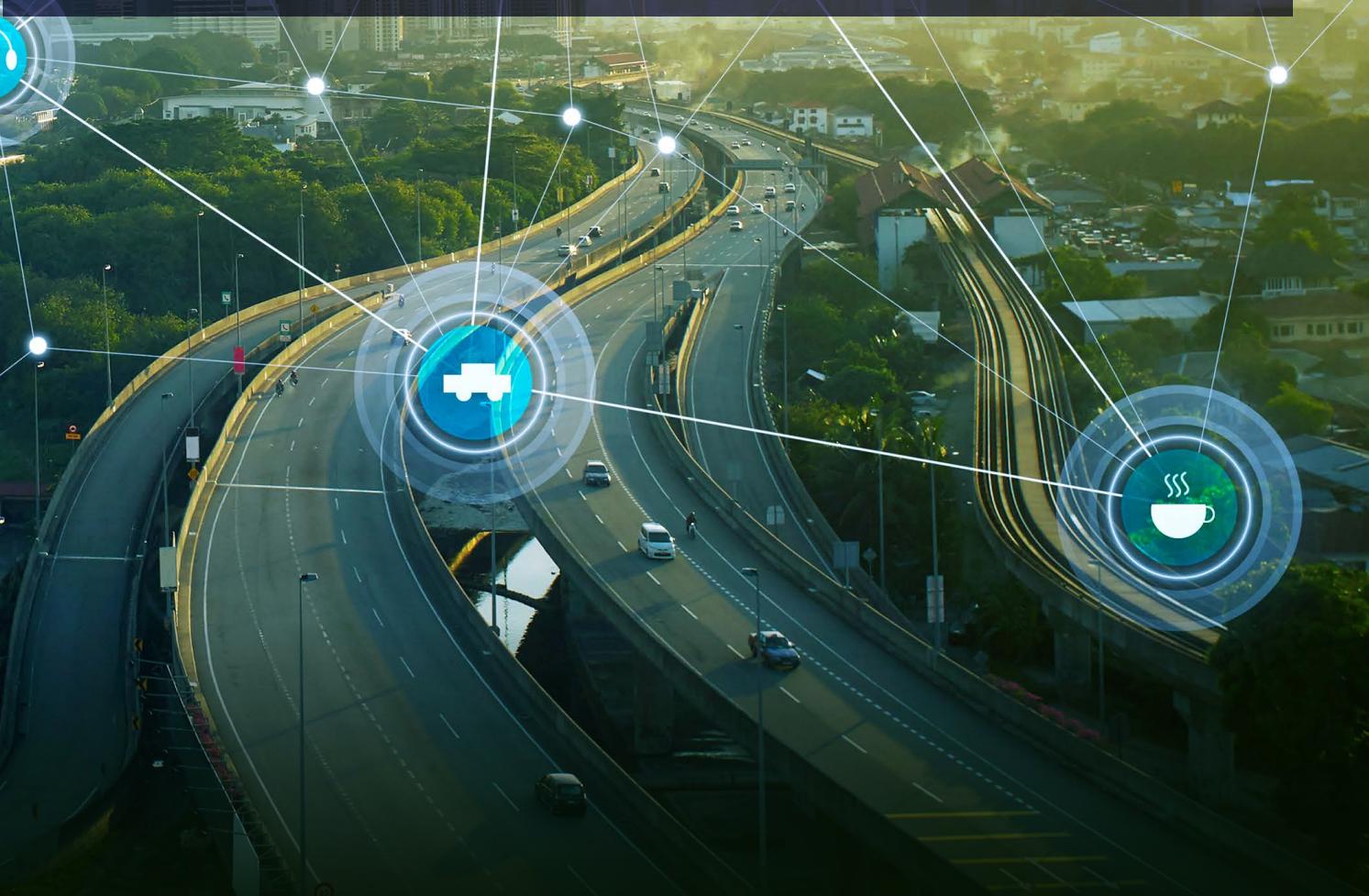
The future of the Middle East's Megacity Infrastructure projects is bright and filled with positive change; hence the **Mega City Infrastructure Week** is a unique conference experience not only in the Middle East but globally that touches upon the need of project owners, contractors, consultants and government entities managing some of the most influential infrastructure projects in the Middle East ranging from **roads, ports, housing, connected cities, clean and sustainable cities**.

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