Digitizing an E&C Company

Larsen & Toubro CEO SN Subrahmanyan sheds light on how he's seen digital technologies, particularly sensors, evolve the major projects industry.

SN Subrahmanyan

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As projects increase in size and complexity, digital technologies are becoming a critical tool in every stage of project delivery. Larsen & Toubro CEO and Managing Director SN Subrahmanyan sat down with McKinsey senior partner Subbu Narayanswamy to discuss how he has seen digital technologies improve productivity, decision-making, and talent attraction throughout the life cycle of a project—ultimately improving the infrastructure asset owner's experience.

McKinsey: *Across the engineering and construction industry, how are projects changing in size and complexity?*

SN Subrahmanyan: Across sectors, the size of projects is definitely going up. At L&T, for example, in the road sector we bid for projects above $120 million in value—and we are considering raising this threshold. In commercial buildings, we bid for projects above $75 million in value, and so on. Even with these standards in place, we're busy; L&T's construction business has about 850 projects running at any point in time, across geographies.

While complexity typically increases as project sizes go up, project complexity is not always related to size. India is going through a development phase, and the country has many ongoing complex projects of various sizes. At least 20 of our projects in India today are technically challenging and risky enough to keep anyone in the world up at night; for example, for the Mumbai Trans Harbour Link, we have to construct complex structures in deep water while preserving the environment.

It is an exciting, challenging phase. A lot of our time is spent on mobilizing resources, overcoming technical challenges, and ensuring customer satisfaction. But working to accommodate large, complex projects is better than not having projects to work on.

McKinsey: *Everybody in the global projects and construction industry is talking about digital technology. To what extent has L&T embraced digital solutions?*

SNS: Five or six years ago, digital solutions were much less prevalent in the construction space than they are today. From 2012 to 2017 when I oversaw L&T's construction division, which forms the bulk of the company, we set out on a mission to change that lack of digital solutions. Our digital team identified about 35,000 pieces of equipment in use across our sites globally, of which 15,000 were suitable for installing data-collection sensors. This effort spanned equipment such as transit mixers, cranes, motor graders, and wheel loaders.

We began connecting this equipment with Internet of Things (IoT) sensors. We integrated these sensors with an IoT platform, implemented a Mosaic platform to collect information and process and analyze data, and put that data on a real-time dashboard. In the past year and a half, we have connected about 6,000 pieces of equipment.

McKinsey: *Have you encountered any challenges throughout the process of implementing digital solutions?*

SNS: It's not been easy. Installing the sensors can be difficult because some of the equipment is more than a decade old, which means it was simply not designed with today's technology—and IoT—in mind. Older equipment was designed to transfer minimal data at relatively slow update rates, whereas IoT and big data hinge upon large volumes of data being transmitted in near real time.

Gateways—that is, centralized equipment that collects data from multiple sensors—were also a problem because construction sites are often remote, and Wi-Fi networks are not always available. We had to identify specific ways of transmitting the pulse to a gateway and find a

software partner to work with our platform, and all of this took time.

Still, we did start collecting data—initially just on fuel and spare parts consumption, as well as GPS locations. We were keen to collect data on productivity, such as how much weight an excavator or tower crane is lifting, but this proved difficult because these types of equipment see a lot of wear and tear.

Consider an excavator: every time the hand scoops up earth or rock, the sensors can get damaged. We eventually discovered a way to gauge weight by measuring the tension on the steel wire that does the lifting, and now we have a display in each operator's cabin that shows the lifted weight.

McKinsey: *What impact have you seen as a result of using digital tools on major projects, and what are some planned initiatives?*

SNS: Digital solutions improve transparency, bring objectivity into decision-making, and boost operational efficiency and productivity. We can work faster to complete projects ahead of schedule—which of course greatly benefits the infrastructure asset owner. Just by using digital technologies—such as sensors, building information modelling (BIM) software, and virtual-reality glasses—at our sites, we hope to increase productivity by 10 percent, which translates to significant annual savings. Our digital centers in Chennai and Mumbai receive a constant stream of objective data to support decision-making—such as how many workers have been deployed and where.

Another benefit has been improved talent attraction. Our expanding use of digital technology has helped us in recruiting the next generation of employees, who are excited about working in a digitally enabled construction atmosphere.

One upcoming effort is to map out our storehouses, which are dispersed across about 850 sites. We are hoping to catalog our ecosystem of vendors and tag all of our parts and materials so we know what is being stored and where. This visibility will allow us to allocate supplies among sites, manage inventory, and cut waste. We are also increasing our use of tools such as LiDAR and drones to map out our sites and measure materials.

McKinsey: *Did you receive any pushback to implementing digital solutions?*

SNS: When we began implementing technology, we received lots of questions: Why are you spending money on this? What is going to come out of it? We knew there were lot of drawbacks. Nobody had done it before, and in an ecosystem where the network or the Wi-Fi is not well-developed you don't get reliable data. While the business case wasn't clear from the start, we knew we had to move in this direction. So we made the decision to push forward, and we're starting to see the return on this investment.

Also, while our methods and processes have necessarily evolved over the years, being an 80-year-old company means that many in the organization are not in tune with the latest digitization efforts. As such, we've identified ambassadors of change in key positions who are charged with breaking us out of our tendency toward the familiar. These individuals have been hugely helpful in converting more believers in digital technologies and helping to fan the flame of support.

Today it's a pleasure seeing our digitization efforts working. Recently, I was at one of our major sites, the Motera stadium at Ahmedabad. When I asked about digital, at least 15 people took out their devices to show me what they were doing.

McKinsey: *Where do you see the future of digital E&C technologies going?*

SNS: We envision the use of digital solutions growing, of course, such as through the increased use of BIM on new projects. We anticipate greater use of virtual-reality tools and drones to monitor projects, and the development of new tools that integrate with location data to track progress. We will also see more analytics and digital procurement platforms being deployed. All of this technology will fundamentally change the way we work, in India and around the world.

Keeping up with training and education will be critical. It is simple: we have to adapt if we are to grow. ■