Going Digital in Construction Sector: One Step at a Time

Abstract

Globalization has driven the use of digital technologies across all industries. While many sectors have adopted the changes as feasible, several are yet to leverage the opportunities arising out of the same. According to different studies, the construction industry is also catching up, albeit slowly, in the drive to leverage the benefits of cloud, Blockchain, IoT, analytics, Big Data, Drones etc.

This paper analyzes the digital interventions across the construction industry, indicates the practical applications and predicted disruptions along the value chain. Some use cases evaluate the impact of digital technologies in a sector struggling with low profit margins and labor shortages. The paper also exhibits a framework that construction companies can leverage to assess risks and benefits throughout the digital value chain.

"The volume of construction output will grow by 85% to $15.5 trillion worldwide by 2030."

PWC Report

The construction industry has been slow in catching up to the opportunities presented by digital technologies. However, with analysts predicting a phenomenal growth in the sector over the next years, many are now turning to advanced technologies to accelerate the construction processes, to imagine and then create the designs of the future.

However, to fully understand the impact of digital technology on the sector and leverage it to stay competitive and drive ROI, it is imperative to first design the industry value chain, mapping technologies to business processes and sub-verticals of the Construction Industry.

Designing the Construction Industry Value Chain

The construction industry has a complex value chain with multiple stakeholders and is characterized by labor intensiveness, low productivity and a slow pace of change. Overall, the value chain comprises six processes, with different stakeholders (see Figure 1).

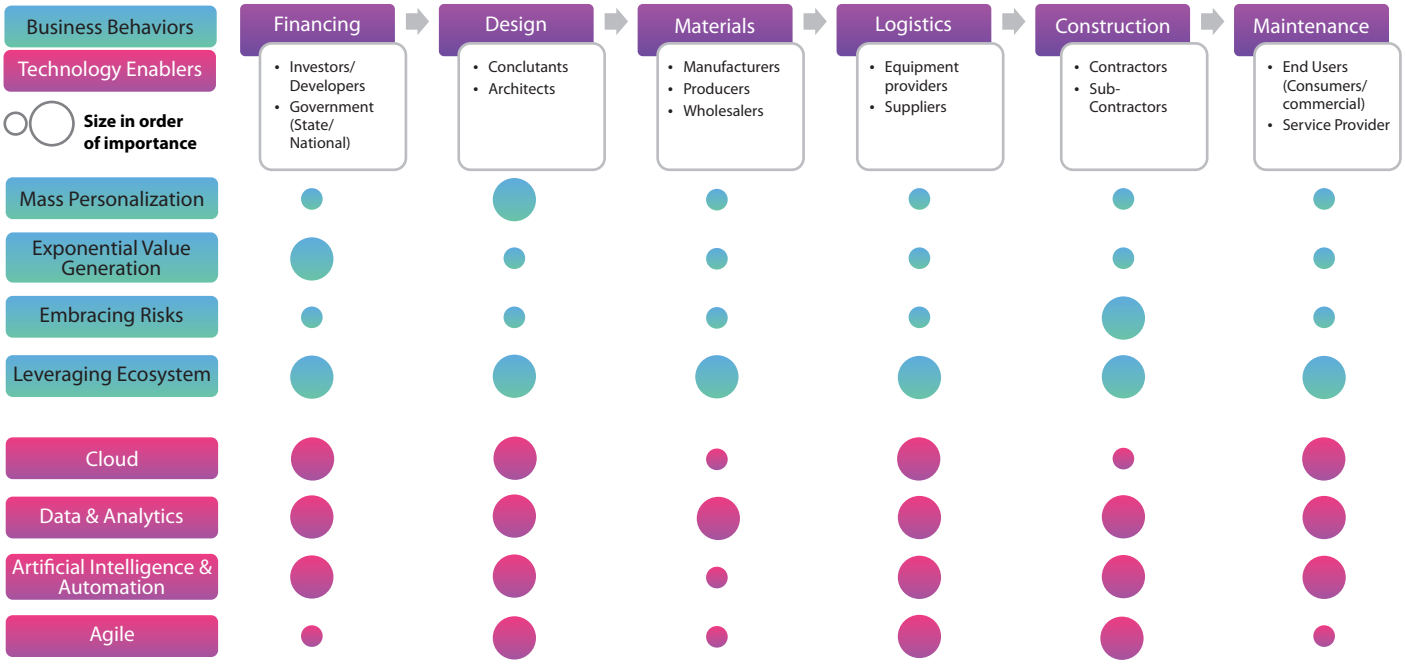

Figure 1: Construction Industry Value chain

Changing business behaviours and technology enablers have helped the industry deliver better services, engage new stakeholders, and meet project deadlines.

- The power of the ecosystem (Academia, start-ups, peers, etc.) is critical for construction companies to be future ready.
- Personalization at scale and expanding in existing markets helps unlock exponential value.
- The ability to build for the future, leveraging disruptive technologies enables organizations to embrace risk and explore new growth avenues.

Leveraging Digital in Construction

In addition to being labor intensive and low productivity the construction sector has a complex value chain with several stakeholders. However, the slew of technologies such as IoT, VR, 3D Printing, Cloud have made construction projects more effective, efficient and environmentally friendly. The figure (see Figure 2) below illustrates the application of different technologies across the value chain and their alignment across key Business 4.0 Levers.

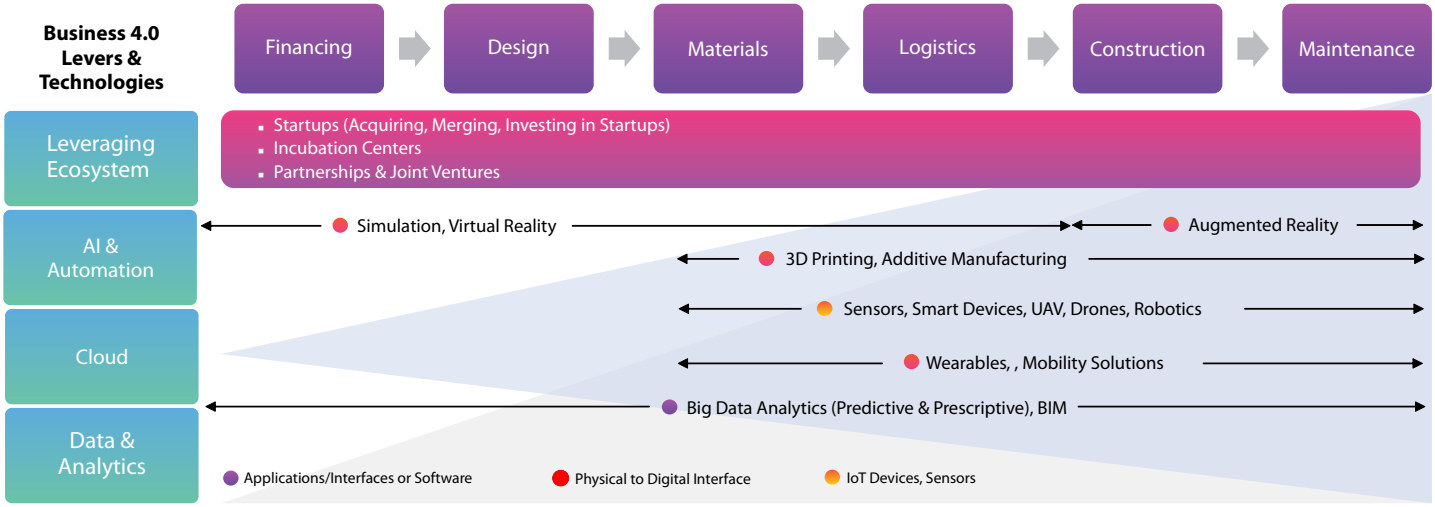

Figure 2: Construction Industry value chain: Technologies across key Business 4.0 levers

Big Data & Analytics play a significant role across the value chain, whereas Simulation, Virtual Reality and Augmented Reality together create a big impact in managing operations and customer experience in the construction industry. Cloud technologies are ubiquitous, enabling several technology integrations.

Backed by technology, a few construction companies have already embarked on their digital journey. Here are some reference use cases:

- **Virtual Reality (VR) and BIM** – A multinational infrastructure group based out of the UK, use VR coupled with BIM to explore, analyze & test various probable construction designs before starting construction of the real/physical buildings. Additionally, engaging stakeholders into the construction process helps make meaningful decisions to enhance security and integrity of the buildings.

- **3D Printing & Ecosystem Leveraging** –A leader in global 3D printing architecture engaged in construction of large-scale buildings was the first company to use the technology to create an office building. The use of environment friendly materials encouraged sustainability, increased productivity, and realized significant cost savings.
- **Data Analytics & IoT** - The Department of transport for a European country partnered with an infrastructure services company, to support and maintain a critical bridge. With two thousand sensors, an event-driven system monitors wind, weather, temperature, corrosion, motion and any strains on the bridge, raising alarms in case of anomalies resulting in cost savings and extended life of the infrastructure.

Delivering Digital Outcomes

Construction Industry is often embroiled in issues related with cyber fraud, siloed data, insufficient cash, shadow IT functions and legacy technology. However, the sector is slowly capitalizing on the power of digital to realize long-term business benefits like:

1. **Transparency across Value Chain** – The use of mobility solutions has resulted in faster communications, integration with sensors, UAVs & Drones, and easy monitoring of the value chain making it more transparent.
2. **Lower Work Risks** –The penetration of digital technologies not only reduces the need for labour but also minimizes health & safety concerns of workers. This is achieved by the use of UAVs or Drones to help with the initial survey, without exposing individuals to hazardous situations.
3. **Operational Savings** – Improved forecasting, reduction in the frequency of production delays, reduced transaction and overhead costs are some of the operational benefits.
4. **Process Standardization** – Customizing platforms to the demands of construction projects helps standardize processes and enables automation to kick off in several areas of the value chain.
5. **Knowledge Sharing** –.By embracing digital technologies, organizations can maintain a record of their best practices and create benchmark practices across the industry, through knowledge sharing.

6. **Improved Health, Safety & Security** – Digital solutions like VR/AR help construction companies involve stakeholders from the start, fostering collaboration and meaningful insights from future operators.

Accelerating Digital- A framework for value chain success

As the construction industry continues to evolve, adopting a proven approach in creating a digital roadmap presents the opportunity to improve their value chain efficiency. A six-step framework (see Figure 3) can help construction companies kick-start or compare their digital journeys. The framework incorporates experiences outlined by different construction companies:

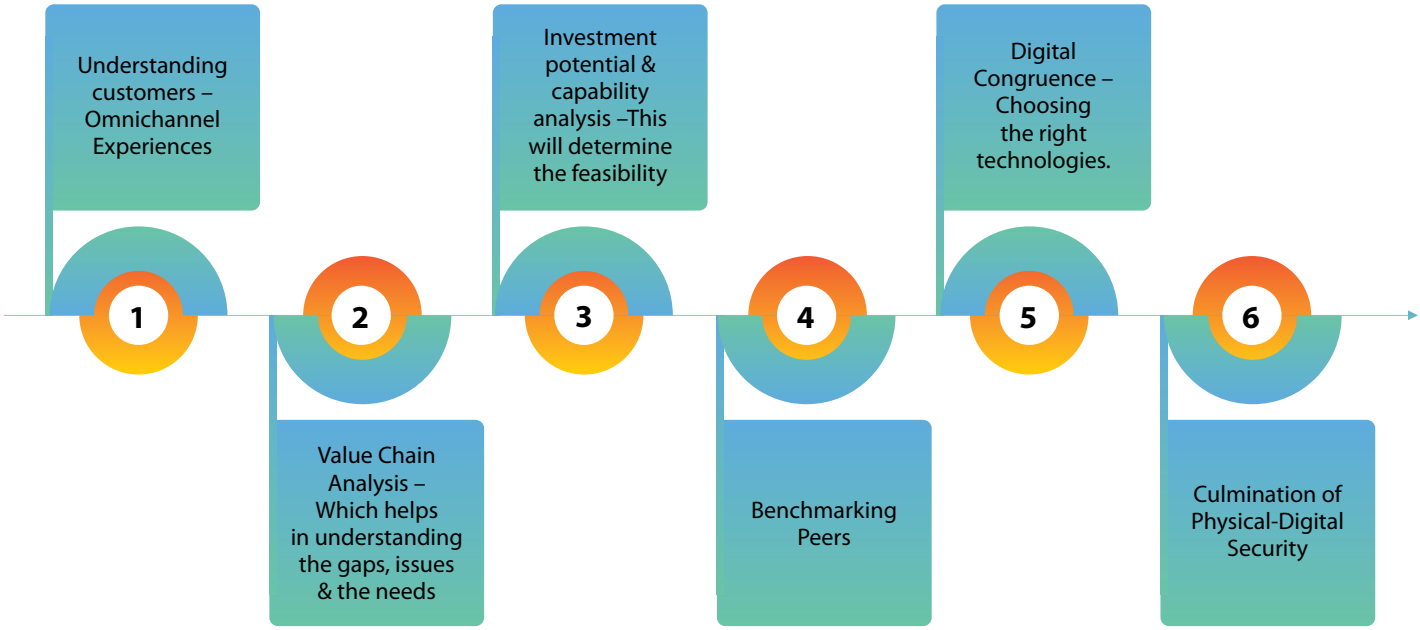

Figure 3: A Six-Step Framework for Digital Adoption

1. **Omni-channel Experiences** – Construction players must first define the target markets and attributes of their stakeholders drawing from their understanding of the needs and requirements of the customers they serve. This helps map the different channels to the target market and subsequently design the most relevant experience for the customers.

2. **Value Chain Prioritization** – The value chain provides a holistic understanding of the construction industry. Identifying complex sub-structures within these processes, the most critical areas, helps select the most appropriate technologies.
3. **Investment Potential & Capability Analysis** – A feasibility analysis that includes in-depth assessments as well as peer comparisons helps determine the right set of capabilities to invest in disruptive technologies.
4. **Benchmarking** – Gathering market intelligence through business/member associations, secondary and primary market research helps assess and align with industry standards and benchmarks. Leading change and establishing disruptive innovation can be challenging and has to be supported by feasibility studies as well to deliver value.
5. **Digital Congruence** – Another important aspect is to determine and evaluate existing resources and the available capabilities before taking the next steps.
6. **All-round Protection** – While security at the site is important, cybersecurity to prevent information leakage needs proper database centres & protection units. Policies, trainings, vendor management and insurance are some of the major enablers for ensuring physical-digital security.

Looking Ahead

Digital transformation in the construction industry is no longer a myth. Many construction companies have embraced the changes and are benefiting from incremental approaches in digital adoption. While investing in digital technologies is an expensive proposition, outsourcing of current IT departments can lead to operational savings and allow companies to invest in the right technologies and not only survive but thrive in the transformative future of the construction industry.

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