Autonomous vehicles and equipment in construction

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Currently, autonomous vehicles are primarily used in the mining and agricultural industries. For example, Komatsu has autonomously hauled more than two billion tons of surface material and it expects to deploy an additional 150 trucks to the Canadian oil sands over the next seven years.[1] Not to be outdone, Caterpillar is set to deploy a fleet of autonomous trucks and autonomous blast drills for the Rio Tinto Koodaideri iron mine in Western Australia.[2]

In the construction industry, autonomous, semi-autonomous and remote control equipment that are currently being developed include excavators, dozers and robotic bricklayers.[3]

There is evidence that the use of autonomous vehicles and equipment improves productivity, thus increasing profitability. For example, in its 2017 mining operations, Rio Tinto reported that driverless trucks proved to be more efficient than their manned counterparts, as the autonomous vehicles operated on average 700 hours longer and with 15 per cent lower unit costs. Rio Tinto therefore projects that its autonomous truck fleet will add billions of dollars of increased productivity.[4]

In addition to increased productivity, autonomous vehicles and equipment have the potential to help combat the current labour shortages being experienced in the construction industry[5] and may also improve safety on construction sites.[6]

Potential challenges with the use of autonomous technology in the construction industry lie with the inherent complexity and unpredictability of construction sites, challenges that do not usually present themselves on repetitive agricultural or mining sites that involve fewer obstacles and navigational issues. These challenges give rise to both legal and commercial risk. The legal risks associated with the use of autonomous vehicles relate to worker training and safety, the potential damage to property if something goes wrong, and the costs associated with properly maintaining the equipment. Contracts will need to address the allocation of risk as between the projects owners, contractors and manufacturers. This can be a complex issue, particularly because it may not always be easy to determine who may be at fault after damage occurs. Similarly, insurance provisions must be reviewed and consideration given to what types of insurance may be required to respond to losses that arises from the use of such vehicles and equipment.

Some of the commercial risks and factors include a high initial capital investment, the consideration of cost allocation to a project, recovery of capital costs, pricing considerations when submitting bids for projects, especially where a procurement process prioritizes the lowest cost, an unproven effectiveness of these technologies, and an unclear return on investment.

Other risks to consider include the consequences of a breakdown of equipment, including the cost to replace the equipment and any delays as a result. Finally, autonomous vehicles and equipment may create a competitive advantage or disadvantage for large or small contractors with regard to their capacity to make large capital investments. Adopting new technologies represents a risk and can be more difficult for smaller businesses, which may have less financial stability.

In order to promote and facilitate the adoption of autonomous technologies, the construction industry will need to consider which types of projects are most likely to benefit from the use of autonomous vehicles and equipment without creating unmanageable risk that would outweigh the potential benefits.

[1] "Report: 2 Billion Tons Hauled Autonomously" Engineering and Mining Journal (December 2018) at page 106.

[2] "Rio Tinto to buy autonomous mining truck fleet from Caterpillar" Reuters (May 6, 2019).

[3] Rina Diane Caballar, "This Bricklaying Robot Is Changing the Future of Construction" Redshift by Autodesk (May 23, 2019).

[4] "Rio Tinto's autonomous haul trucks achieve one billion tonne milestone" Rio Tinto press release (January 30, 2018).

[5] "Shaping the Future of Construction: An Action Plan to Solve the Industry's Talent Gap" World Economic Forum (February 2018); See also Presse Canadienne, "Quebec construction industry facing a severe worker shortage: report" Montreal Gazette (October 10, 2019).

[6] "Shaping the Future of Construction: A Breakthrough in Mindset and Technology" World Economic Forum (May 2016) at page 21.

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