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HOW GROWTH IN SMALL SATELLITE ACTIVITY ACROSS AFRICAN NATIONS IS CONTRIBUTING TO TECHNICAL CAPACITY DEVELOPMENT

Abstract

The African Union declared space technologies to be central to growth and development in their Agenda 2063. Accordingly, this study analyzes advances in African space activity in recent years, building on previous work in the domain. The study was conducted using systematic review of public databases, peer-review publications, industry reports, and space agency documentation. We found that in 2019, the number of satellites launched by African nations exceeded the total launch numbers by the rest of the world combined (all nations except USA, Russia, China, and India) with 8 of 13 launches. Given the notable and growing space activity of nations in Asia, the Middle East, and Latin and South America, this is significant. Currently, at least 16 African nations have established space agencies within existing government agencies or as separate entities.

Expanding on the methodology of (Wood Weigel 2014) which details four archetypes for collaborative satellite development, we find that new satellite projects in Africa mostly have archetypes consistent with previous findings. These are (1) turnkey projects with outsourced design and build, (2) local university-led projects, (3) collaborative satellite development with a foreign organization, or (4) training abroad followed by local design and build. We also introduce a novel archetype which is the fully national project that has design, manufacture, and operation of a satellite carried-out within country through local commercial and public partners. This archetype has been successfully executed by Tunisia (Challenge ONE), Egypt (NARSSCube-2), South Africa (SumbandilaSat), and Algeria (AlSat-2B). Trends across nations reveal that the most active foreign partners in the African space industry are China, Russia, and Europe.

Our classification efforts show that five nations (Algeria, Egypt, Morocco, Nigeria, and South Africa) are well established as satellite-active countries with more than 2 satellite launches each. Eight nations (Angola, Ethiopia, Sudan, Rwanda, Ghana, Kenya, Mauritius, and Tunisia) are early satellite nations with 1-2 satellite launches each. Many other nations are entering as nascent space nations with active satellite development plans or establishment of space agencies, such as Uganda, Namibia, Zimbabwe, Burkina Faso, Botswana, and Senegal.

Nanosatellite launches have also seen a distinct proliferation trend in Africa. Where only one had been launched on the continent up until 2015 (South Africa's ZACUBE in 2003), ten nanosatellites have been launched between 2015 and 2021 including the first ever national satellites of Rwanda (RwaSat-1), Tunisia (Challenge ONE), Ghana (Ghanasat-1), Kenya (1KUNS-PF), and Mauritius (MIR-Sat1).