Ethiopia has made great strides in the development of its manufacturing sector. The IMF describes the Ethiopian manufacturing sector as ‘booming’ and lauds it as a sector that is ‘performing particularly well’. The growth of the sector registered in the 2010-2011 fiscal year was an impressive 18.6%. While this is from a low base and its impact may not be widely felt and far from game-changing, it is a massive uptick for the economy as a whole and a validation of the government’s national development plan - the Growth and Transformation Plan (GTP) now in its second phase.

The corresponding growth in the contribution of the manufacturing sector to the GDP is equally remarkable despite the expansion of the service sector at the expense of the manufacturing sector in Africa in general. The low impact on poverty reduction and unemployment of the otherwise impressive recent growth in Africa as a whole has, in turn, been attributed to the low contribution of the manufacturing sector. Manufacturing has stagnated and contracted while the service sector continues to grow at a strong rate. This has led some economists to contemplate whether Africa is undergoing ‘a premature de-industrialisation’. In Ethiopia, the sector’s contribution to GDP was 21.7% in 2014 and 15.2% in 2015.

These figures are encouraging and indicate that the government is on the right track in trying to reverse the general trend of decline and stagnation of the sector on the continent. However, the government is not resting on its laurels celebrating these achievements. Acknowledging the fact that they are worked out from a significantly low base, the government’s own overall assessment of the growth of the manufacturing sector characterises the impact of the growth as an ‘unfinished agenda’: GTP II that the government published states that ‘rapid industrialization and visible shift in the structure of the economy remains Ethiopia’s unfinished agenda’. It will indeed remain an ‘unfinished agenda’ not only for the reasons mentioned in
GTP II but also due to the fast changing global manufacturing landscape instigated by advances in science, technology and innovation.

Africa was expected to benefit from the migration of more manufacturing jobs from China due to rising wages in China and China’s transition to high-value, high-skill manufacturing. But the likelihood of attracting these jobs is likely to suffer setbacks as a result of the rapid rise of digital manufacturing, especially 3D printing. Of the 100 million jobs expected in developing countries as a result of China’s transition to high-value, high-skill manufacturing, Africa is to land none or very few. The 2015 UN ECA Economic Report on Africa warned that the destination of these jobs remains unknown.

The ‘insourcing boom’ in developed countries should be disquieting for developing countries awaiting their manufacturing moment: it is a trend that marks the beginning of a reversal of the migration of jobs to low-wage regions like Ethiopia where low cost labour is abundant. Ethiopia should quickly and seriously revisit this ‘unfinished agenda’ as the uncertainties and threats from looming disruptions in the manufacturing sector are of greater magnitude than were thought earlier. The spectre of technology-induced mass unemployment has recently grabbed the headlines.

A report published by the Oxford Martin School and Citi on automation of jobs, Technology At Work v2.0: The Future is Not what It Used to Be, was widely cited for its projection of the impact of automation. The report indicated that in Ethiopia, close to 85 per cent of jobs can be automated, ushering in an age of ‘technological unemployment’. This is no theoretical conjecture as it is happening right now, leading to speculation that, as the Financial Times put it, ‘China may be one of the last nations to ride the wave of industrialisation to prosperity’. These developments are compelling reasons to rethink our industrial policies.

Among the emerging automation technologies that is radically changing global manufacturing is 3D printing, also known as additive/digital manufacturing. It is a process for making a physical real world object from a virtual digital model. The interdisciplinary technology relies on contributions from research in software and hardware, material science, design engineering and other areas of research. Currently, over 300 materials ranging from plastics to titanium and from chocolate to human tissue are used as the raw feedstock for the printing. Items that have already been printed include spare human body parts, prosthetics, aircraft and automotive parts,
medical devices and implants, guns, toys and the list is endless. In principle everything is printable.

The fate of manufacturing in Ethiopia and the rest of the developing world is increasingly tied to emerging technologies, particularly 3D printing technology, that The Economist called as “the third industrial revolution”. The value of the global 3D printing industry is expected to hit the 7 billion USD mark this year and is projected to grow into 20.2 billion USD in three years’ time. In order to have a slice of the value and to remain economically relevant and competitive, Ethiopia should accelerate the process of transitioning to high-value manufacturing by acquiring and developing capabilities in the transformative technology of 3D printing - one of the technologies of Industry 4.0. This transition cannot be realised by merely repeating what China has done by relocating Chinese plants to Africa. It is not too early to contemplate copying China in real time or even consider leapfrogging opportunities to bypass China or the countries that China is emulating. Such opportunities are realistic and puts Africa at a critical juncture in its industrialisation process. As Calestous Juma, professor of international development at Harvard, argues Africa is presented with a unique chance: ‘the rise of 3D printing could do for Africa what semiconductors did for Taiwan in the 1960s’.

Ethiopia needs to take advantage of 3D printing, drawing lessons from the developed world’s engagement with the technology. In 2013, President Obama celebrated the return of manufacturing jobs back to the United States from Japan and Mexico hailing the potential and contribution of 3D printing technology to resuscitate and revolutionise manufacturing in the country. Despite the low capital outlays that the technology requires, industries in the advanced countries were reluctant to adopt the technology and this has resulted in decades long adoption lag. The technology remained the preserve of academic and research institutes for long. In Ethiopia, the trend is otherwise. Industry has taken the lead and academic institutions have been slow in engaging the technology. Among the institutions that acquired 3D printers in Ethiopia are METEC and MoST with Ethiopian Airlines preparing to join the 3D printing revolution on a big scale. The low level of engagement by academic institutions will lead to the worsening of the skills shortage. There will be a hike in demand for a skilled workforce and it is the core responsibility of academic institutions to train the new workforce and re-train the existing workforce that can handle the technology. To explore and examine the opportunities challenges and risks associated with 3D printing technology the University of Gondar in collaboration with the Ministry of Science and Technology (MoST) and the
Science, Technology Information Centre (STIC) is organising a two-day international conference and exhibition.

The interdisciplinary conference and exhibition on 3D printing and allied technologies will feature speakers from diverse institutions from academia, industry and policy makers and funding agencies. A hands-on experience with the building of 3D printers and the printing of sample items will be presented by the globally acclaimed Nairobi based social enterprise, AB3D (African Born 3D) in addition to the printers and consumables to be displayed by exhibitors including the work underway by Ministry of Science and Technology (MoST) researchers.

**Objectives and expected outcomes of the conference and exhibition**

The conference and exhibition entitled ‘The 3D Printing Revolution and Ethiopia’s unfinished agenda on manufacturing’ will examine the state of the technology and its current and future uptake in Ethiopia. It will in particular address the issue of the decline of the manufacturing sector in Africa in light of the development of 3D Printing technology. The conference will bring together 80 participants drawn from government, the private sector, international development organisations, academia, and civil society to explore and share ideas on the opportunities and challenges that 3D printing brings to the Ethiopian manufacturing sector.

The two-day conference will have plenary sessions with keynote speakers, thematic parallel sessions on specific scientific and technical topics, and poster sessions by researchers and entrepreneurs who are developing their concepts and products that involve the actual or potential use of 3D printing. An exhibition featuring 3D printing firms, research institutes and exhibitors from industry will be opened for conference participants and the public.

The conference and exhibition will facilitate the technology exchange in 3D printing capabilities between the involved stakeholders and will help raise awareness among potential beneficiaries of the technology. It will create the platform for networking and partnership building between private and public sectors, industry and academia, and between other actors. What we want to achieve with the conference is the acceleration of the uptake of the technology in Africa seizing the unprecedented opportunities now made possible with 3D Printing.
Accelerating the uptake of the technology: The uptake of 3D Printing technology in Africa in general has been slow and the various impressive but small-scale activities have not been coordinated or scaled-up to an industrial size or even a start-up phase. In GTP II, the government of Ethiopia has stressed that in expanding the manufacturing sector, the government will focus on identifying new investment areas including biotechnology, petrochemicals, electricity and electronics, and ICTs. 3D printing falls under these areas of focus.

Ethiopia needs to take advantage of the technology without delay drawing lessons from the developed world’s engagement with the technology. To harness the benefits of 3D printing by facilitating transfer from research to innovation, there is an urgent need to boost the awareness and capacity of industry leaders, policy makers and other stakeholders to guide and accelerate the uptake of the technology to ensure not only that Ethiopia is not negatively impacted by this revolutionary technology but also that it will not miss out on the benefits of the technology.

Raising awareness and capacity: The main focus of the Conference and Exhibition is to create a dedicated forum that will bring together researchers, innovators, policy makers, the private sector, technology end-users, entrepreneurs, communities and other stakeholders to exchange not only their experience, knowledge and skills but also their wish lists that will be crucial in driving innovation. There is an urgent need to boost the awareness and capacity of industry leaders, policy makers and other stakeholders to guide and accelerate the uptake of the technology by facilitating transfer from research to innovation. The dialogue with development partners should begin right now. With the successful running of the conference, the establishment of a forum for dialogue for stakeholders will be proposed.

Creating networking opportunities: The Conference aims to examine the state of the technology and the opportunities that 3D printing offers to the manufacturing sector in Ethiopia. Alongside the conference, the exhibition will provide first-hand experience with 3D Printing machines, 3D printed products and services, research on 3D printing and related fields by exhibitors from around the world. The Exhibition will create a networking opportunity for 3D Printing firms and other industry players.