Additive manufacturing: importance and challenges for Latin America

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Background

Additive Manufacturing is the process of joining materials to produce three-dimensional objects from computer digital models by using a machine; the process is usually developed layer upon layer. The term 3D printing is much more popular, and is commonly used as a synonym for additive manufacturing (Wohlers & Caffrey, 2013).

On March 11, 1986, in the United States was granted the first patent related to the additive manufacturing; the register number 4,575,330 corresponds to an "Apparatus for production of three-dimensional objects by Stereolithography", and its inventor is Charles Hull (Hull, 1986).

The growth of this technology was slow during its first two decades; however, the 3D printing market has expanded dramatically since 2012, with the participation of independent creators, hobbyists and early adopters (Basiliere, 2014). As an example of this great interest, 3D printing publications on specialized journals grew nearly 1,600 to 16,000 articles, since 2011 to 2012, i.e. 10 times more in a single year (Wohlers & Caffrey, 2013).

Industries that are already taking advantage of these technologies are: education, aerospace and defense, architecture, engineering, automotive, consumer products, electronics, food and beverages, heavy industry, sciences, medical devices and process' industries (Basiliere, Halpern, Burt & Shanler, 2014).

Despite this great progress, Wohlers & Caffrey (2013) point out that it just has been seen the tip of the iceberg of what is possible to do with the additive manufacturing knowledge. According to the authors, many believe that this technology is the next "big thing", similar to the development of semiconductor, computer and Internet.

Considering the industrial and commercial opportunities surrounding the additive manufacturing, this research presents an analysis of this technology in order to identify its global presence and possible effects and challenges to Latin America.

Method

A Competitive Technical Intelligence methodology was applied to determined current status of additive manufacturing worldwide. On the other hand, in order to know the participation of Latin American individuals and/or institutions in the development of this technology, a patent analysis was conducted from the WIPO website (2015). For this purpose, the eight largest economies from Latin America were determined considering the GDP at 2014 established by IMF (2015). And challenges were identified.

Findings

Market projections

The first marketable 3D printing machines belong to stereolithography and material extrusion technologies, these devises entered to the market about 30 and 25 years ago, respectively. Currently, the global market for 3D printers has reached its tipping point; this means that unit shipments of these items

will grow at a compound annual growth rate of 106.6% through 2018, while the corresponding average annual cost will only grow at 87.7% in the same period. Sales will exceed 13.4 billion US dollars in 2018, as both households and businesses will quickly adopt 3D printers for everyday use (Basiliere, 2014).

Global Presence

Additive manufacturing was originated in the United States in the early 1980s, however, the rapid growth of the industry has led to the adoption of these technologies in Europe, and also in countries such as China and Singapore, in which Governments have made important investments in research on this topic. North America (40%) is the world leader in the adoption of the additive manufacturing technology; Europe is second (29%) followed by Asia/Pacific region (26%); 3D Printing systems installed in other regions has a participation of 5% (Wohlers & Caffrey, 2013).

Presence of Additive Manufacturing technology in Latin America

Latin America experiences its first effects at market level more than technical one. Brazil is a country that has implemented this technology mainly in the automotive sector. Although important multinational additive manufacturing companies have entered, Metamaquina and Cliever highlights as local capital companies that manufacture their own devices for the Brazilian market (Wohlers & Caffrey, 2013). Additionally, in Chile the local Thinker Thing company developed an innovative process for designing real-world objects by considering preferences of the consumers, and applying the "evolutionary computation"(Basiliere, Halpern, Burt & Shanler, 2014).

Results obtained in patent analysis indicated that while 12,283 patents were submitted worldwide during last 30 years only 5 patents correspond to Latin America, i.e. 0.04%. The patenting activity in this region starts from 2010, i.e. 26 years after the first patent application worldwide. Majority of these patents belong to Brazilian.

Conclusions

Applications related to additive manufacturing technologies are increasingly growing, many innovative companies are adopting this new technology worldwide. Future expectations are even more promising. Latin America is in an incipient stage, important challenges should face in this regard.

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