

# A Scientometric Analysis of Additive Manufacturing in Latin America

Marisela Rodríguez, Ph.D.  
Ana Marcela Hernández, MSc.  
David Alfredo Arcos, BBA.

Tecnológico de Monterrey  
Centro de Innovación en Diseño y Tecnología

# Agenda



1. Introduction
2. Methodology
3. Results
4. Conclusions

# Introduction

- In this research a **Competitive Technical Intelligence methodology** was developed and applied for the analysis of additive manufacturing technology.
- The **main objective** was to **determine current stage of the technology and make an assessment of its future potential** at a global level compared with the actual development in Latin America. For this purpose, a **scientometric patent and scientific literature** analysis was performed.



Large-Scale Rapid Prototyping Robots:  
Industrial Robot Arm Extruders and  
Building-Scale 3D Printers from:  
<http://www.hizook.com>



Latin America from:  
<http://www.unit4.es/latinoamerica>

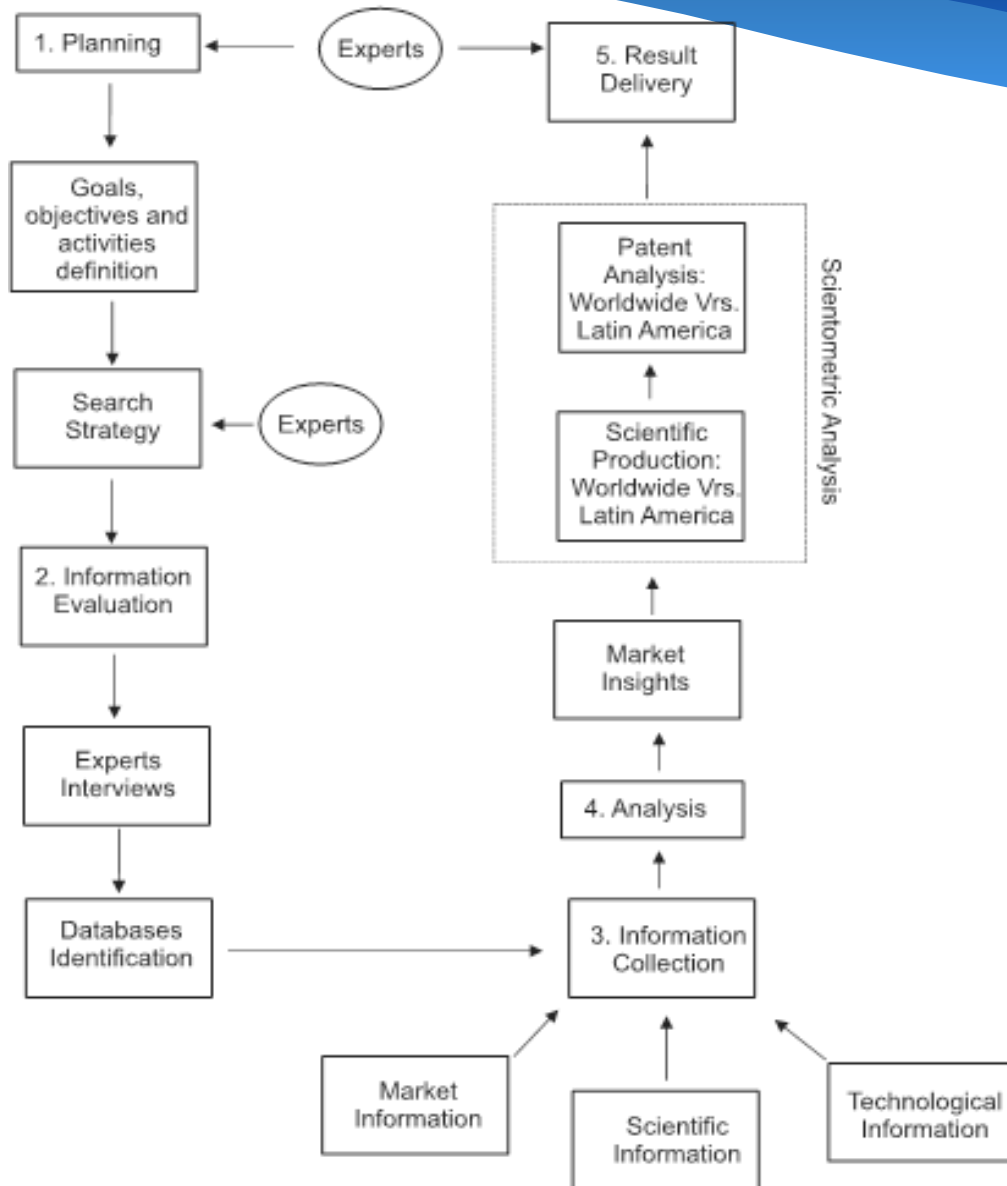
- Additive Manufacturing offers the possibility of having more **green processes**. Besides, **designs can be developed faster** so mass customization is an option for developing innovative and profitable business. Also more **complex and high quality objects** can be built.
- In **Latin America**, the interest in additive manufacturing technology is **increasingly growing**. However, the **adoption** of it is in an **emerging phase**.



5th Annual

# Global TechMining Conference

2015.09.16 • Atlanta, Georgia



# Methodology

# Methodology



## Search strategy

**Market data:** latest information on **specialized databases**, such as **Gartner**, was analyzed. **Roadmaps** were also identified through the web using the search terms and its synonyms:  
a) additive manufacturing and b) 3D printing.

The Gartner logo, consisting of the word "Gartner" in a bold, blue, sans-serif font with a registered trademark symbol.

**Scientific literature:** **Scopus database** was used to retrieve and analyze information for a time period from **1984 to 2015** (May 5).

TITLE-ABS-KEY ( "Additive manufacturing" OR "Additive manufacture" )

TITLE-ABS-KEY ( "3D printing" OR "3D printer" OR "3D print" )

TITLE-ABS-KEY ( "Rapid prototyping" OR "Rapid prototype" )

TITLE-ABS-KEY ( "Additive fabrication" )

TITLE-ABS-KEY ( "Rapid manufacturing" OR "Rapid manufacture" )

**Technological information:** **Patseer software** (with coverage of 102 patent authorities worldwide) was applied to retrieve and analyze patent information for a time period from **1984 to 2015** (June 17).

TAC: (Additive Manufacturing) OR (Additively Manufacturing) OR (Additive Manufacture)

TAC: (3D printing) OR (Three-dimensional Printing) OR (3D Printer)

TAC: (Rapid prototyping) OR (Deposition Modeling)

TAC: (Additive fabrication) OR (Rapid Manufacturing) OR (Dimensional Printer)



# Results (1/4)



Additive manufacturing is in an emerging phase in Latin America. However, there are some organizations that have already adopted this technology:



- Process to design real-world objects.
- 3D printing process is developed by a US organization.



- Research efforts.
- 3D printing services.



- Develops and produces low cost 3D printers.
- 3D printing materials for national market.



- Develops 3D printers.
- Offers printing services.

# Results (2/4)

## Additive Manufacturing Scientific Research Comparison

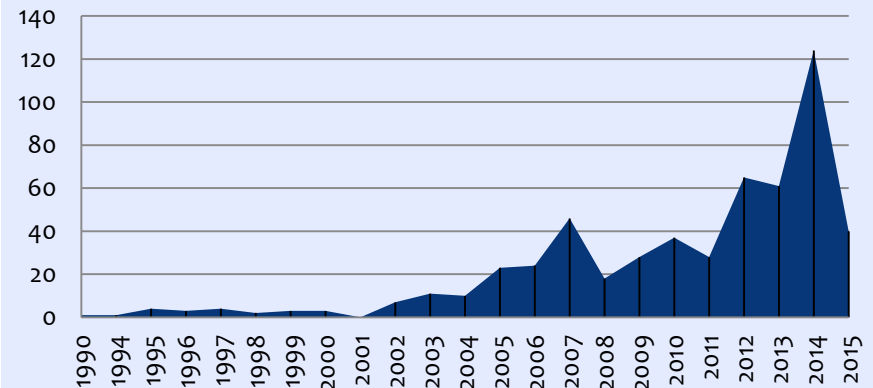
Time period: 1984 to 2015 (May 5)

World total number of papers	Latin American number of papers	Latin America %	Brazil number of papers	México number of papers	Other Latin American countries
25,249	536	2.1	387	64	85

- **Scientific production** related to additive manufacturing technology in Latin America **is in its infancy.**
- Research on additive manufacturing **began in 1990** in Latin America . Brazil is the pioneer.

- The **highest rate** of scientific production has been presented in **recent years**, particularly since 2014.

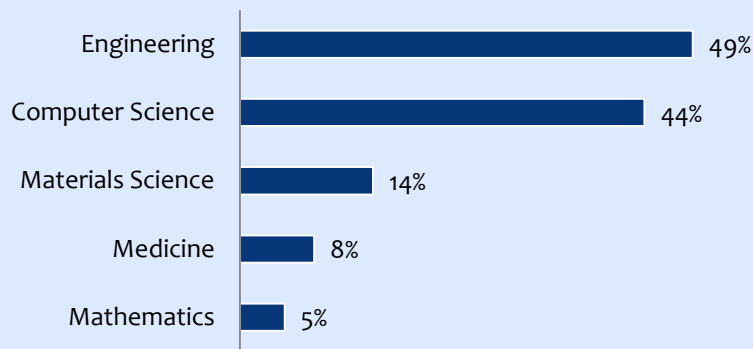
**Documents by year**



# Results (3/4)

## Additive Manufacturing Scientific Research Comparison

Documents by subject area



Documents could belong to more than one area, therefore the sum of percentages exceeds 100%.

- Research focus is mainly on the **Engineering field**, followed by Computer (process optimization) and Material Sciences.

- Some **collaboration efforts** have been developed between Latin America and **Spain, UK, USA, Portugal and Germany.**



- Research leaders are mainly from **Brazilian Universities** such as Universidad de Sao Paulo, Universidad Estadual de Campinas and Universidad Federal de Santa Catarina.



# Results (4/4)

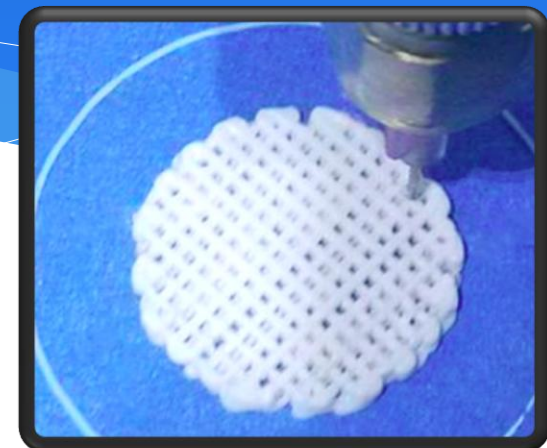
## Additive Manufacturing Patent Production Comparison

Time period: 1984 to 2015 (June 17)

World total number of patents	Latin American number of patents	Brazil number of patents	México number of patents	Chile number of patents	Other Latin American countries
13,864	3	1	1	1	0

- **Mexican** invention is related to a **centrifuge driver** without a circular support.
- **Chilean** patent consists on a **2D printing method on a 3D printing support** comprised of a plurality of colored fibers that follow a printing pattern obtaining printed sheets according to said printing pattern.

- Although there is an **increasing interest** in additive manufacturing in Latin America, the **patent production related is not significant**.
- **Brazil** has an invention on **bone scaffolds** using additive manufacturing.



Biodegradable 3D printing:  
<http://3dprint.com/53551/3d-print-bones-animal/>

# Conclusions

- Additive manufacturing or 3D printing is gaining place in worldwide markets.
- Latin American countries have a slow pace in the adoption of additive manufacturing. A low production rate of papers and patents demonstrates this.
- Brazil and México are leading this adoption process. Other countries of the region will follow them.

- Important challenges must be faced in the adoption process of additive manufacturing:
  - Limited access to knowledge and to qualified human resources.
  - Low public and private investment
  - Lack of governmental stimulus to technological innovation.



Global defoarmers market to grow from:  
<http://www.european-coatings.com/>



Explaining the future: bioprinting from:  
[www.explainingthefuture.com](http://www.explainingthefuture.com)



5th Annual

# Global TechMining Conference

2015.09.16 • Atlanta, Georgia

# Thank you