Algo Capital's
TREND BREAKDOWNS
FUTURE OF AUTOMATION
Industry 4.0

Overview

In a previous report from Algo Capital titled *Trend Breakdowns*, we discussed how important and revolutionary the implementation of 3D printing systems could be for the industrial sector. But 3D printing is only one of the transformations that the industrial sector will face, another of which is automation (although in reality, we can call 3D printing itself an automation process).

In the history of mankind, machines have taken up a critical role in most production processes, especially after the first industrial revolution, which historically marks the beginning of the technological era. From that moment onward, in fact, machines were integrated into the economy and society, initiating the era of mechanization, that is, the use of machines operated by man, with the aim of supporting him in certain activities. More than 250 years have passed, and mankind has come a long way from then: we are no longer talking about mechanization, but automation. First mechanization and now automation represent a long cultural and scientific path that has continuously transformed the relationship between the worker and the means of production.

Artificial Intelligence, Data Science and IoT (Internet Of Things) are improving at an exponential rate, leading man to continuously ask himself what should be automated and what should not.

In this report, we will analyze what is meant by automation, what are the advantages and disadvantages of such technology, the possible implications in industry and the ways in which automation is already being applied, finally we will select companies that could play a key role in this space. The **Global Robotic Process Automation Market** is expected to grow at a **CAGR of 20%-30%** during the forecast period 2021-2027, with Asia-Pacific likely to have a higher growth margin, while the industrial automation market alone is expected to grow at a CAGR of 10/15%.

What do we mean by automation?

The term Automation is derived from the Greek word '*Automatos*', that is *'Which acts of its own will'*. Generalizing, automation can be understood as the evolution of mechanization, that is the process in which man used machines as support in his work, especially during the first and second industrial revolution.

Today we no longer speak of mechanization, but rather of automation. However, these two concepts are often confused, and it is important to understand what distinguishes them. Mechanization must be understood as the use of motorized machinery to help the human operator in activities that are too tiring or dangerous for him, but also to improve quality and productivity. In fact, it preserves the use of force and physical labor for humans, and it replaces human physical labour. This was exactly what was needed during the first and second industrial revolutions.

Automation, on the other hand, also preserves the use of judgment, and represents the partial replacement of human thinking with computers and devices capable of reading complex data, wireless signals, symbols, interpreting external and internal variables, adjusting their behavior in relation to these variables, finding new solutions and performing activities similar to human 'thinking'. Very important in this context are the technological advances in subjects such as *Artificial Intelligence, Machine Learning and IoT (Internet Of Things),* which will not be treated specifically in this report, but could certainly be the subject of subsequent pieces.

One event that has accelerated the implementation of automation in many companies is most certainly the global pandemic of COVID-19. In fact, this unprecedented shock has affected back-office and front-office operations, leading to long response times, decreased headcount and supply chain disruptions. Thus, implementing an automation solution was critical to optimizing costs and delivering services to customers faster. Automation is expected to define post-pandemic work as organizations are witnessing structural changes in organizational processes.

Applications

As you may have already guessed, the concept of automation is quite difficult to define, and you'll agree that the best way to grasp it is to understand what the actual applications of the technology are:

- **Industrial Automation** was first applied when mechanical engineering and manufacturing engineering developed machine tools and conveyors in the automotive industry in the first half of the 1900s, resulting in an embryonic automation system called *'Detroit Automation'*, which consisted of motor-driven assembly lines moved without human effort. Since that time, automation has introduced revolutions in assembly, packaging, bottling and various manufacturing industries. Since the 1960s and 1970s, major developments in electronics and computer science have dramatically improved automatic machinery control innovations. In recent decades, many manufacturing companies are increasing productivity by implementing automation technology, which can be applied in virtually all types of manufacturing.

   The main benefits of industrial automation are:

- **Increased productivity**, reduced costs, improved product quality, reduced workplace accidents and improved worker health, reduced human error, and most importantly, better

control of production processes, as machines, especially in repetitive jobs, are more efficient from both a production and organizational perspective.

- **Unmanned Factory**, literally *'Industries without man'*, that is, places where production processes do not require the physical presence of human operators, if only minimally to monitor processes. It is estimated that a robotic arm can replace 6 to 8 operators, and more and more companies are aiming to decrease the number of human workers in favor of robots. On the web you can find many videos of entire warehouses managed by fully automated mechanical arms and transports, connected to each other through IoT technologies, i.e. the network that allows objects (so not only computers or cell phones) to be constantly connected to each other to collect and exchange data, and in the case of Unmanned Factories to organize as efficiently as possible the work for which they have been programmed.

- **Self-Driving Cars**: Traffic is expected to increase almost threefold by 2030, resulting in higher emissions and more mobility congestion, especially in large metropolises. Autonomous cars could be a good solution to this problem. We could even write a whole report on the autonomous car trend, as it could be one of the biggest areas of interest to watch over the next decade, and potentially the biggest evolution in transportation since the introduction of railroads. Should this technology continue to advance at the same rate over the next 5 to 10 years, autonomous electric cabs could have a huge impact on the global economy and could disrupt the automotive industry.

  From research by *ARK*, it's estimated that a ride in a Google autonomous cab costs about $0.35/mile on average, compared to $0.70/mile for a personal car (Considering costs like insurance, maintenance etc.), $2.5/mile for Uber in S. Francisco and $3.5 for an average cab in New York. In addition to this, traffic accidents could also decrease by 80% if mass adoption is achieved.

- **Delivery Drones**: Did you ever think that one day, instead of going downstairs to pick up a delivered package from a stranger, you would see a drone outside your window waiting for you? If your answer was no, then you should get used to this idea, because although they have not yet been fully commercialized, many companies are in favor of this kind of change in the delivery of packages and food, but also to assist people in case of illness, accidents or other, as quickly and accurately as possible.

- **Healthcare**: Automation will play a major role in global healthcare. More and more robots are being used in surgery with really interesting human-machine cooperation. Although it is very unlikely that these surgical robots can fully replace doctors, they are very precise, effective and minimally invasive.

- Other examples of automation, which we are already used to seeing in our daily lives, are: In the tourism sector, where we are now used to booking hotels, airplanes and restaurants in total autonomy, without the need to talk to human operators anymore. In the banking sector, where a simple example of automation can be an automatic teller machine, where operations can be performed that were previously handled by human employees (such as bank transfers, withdrawals, deposits).
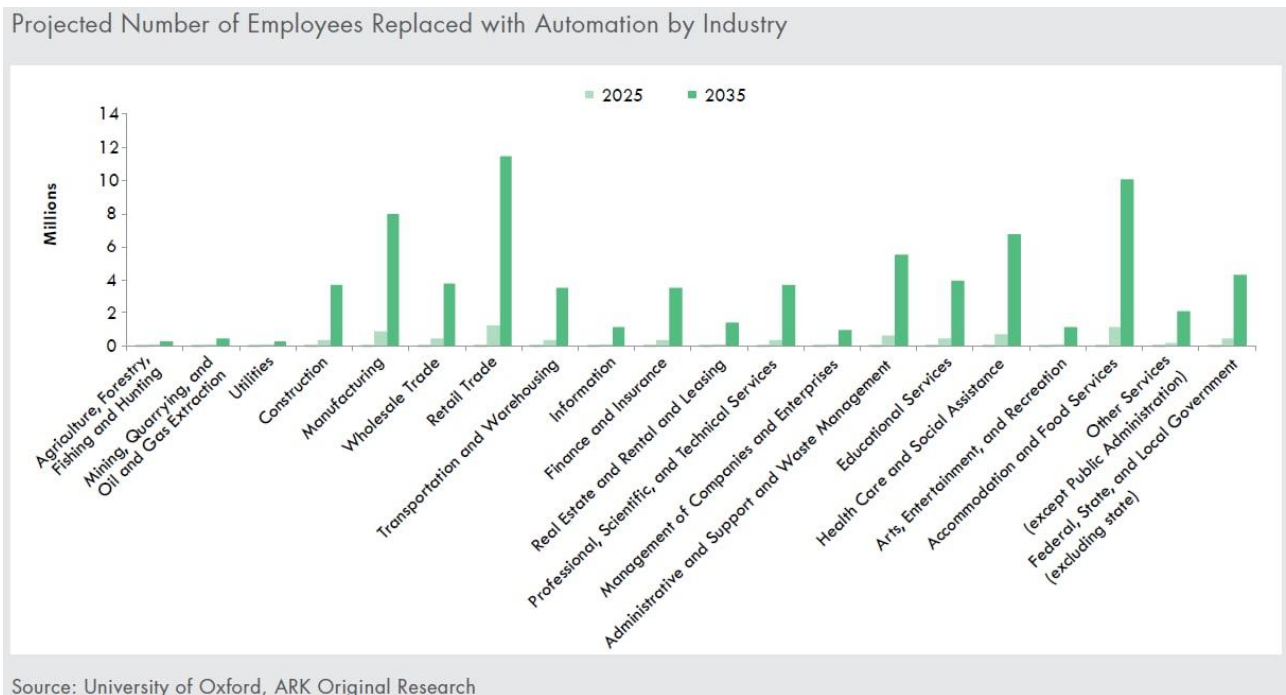
Limits

Now that we've discussed the benefits of automation and some possible applications, it's important to understand how this advancement is viewed by the majority of the population, and what the limitations of the technology might be. As we've already seen, mechanization first and automation now bring benefits such as: improved productivity, more efficient use of materials, shorter working hours, reduced lead times, and much more.

What are the disadvantages ?

In addition to the countless benefits, there are also barriers to mass implementation, such as:

- **Initial investment:** At this time, only companies with deep pockets can afford to automate most business processes, as the technological cost is still very high. However, it must be noted that the cost of technology has already improved from a few years ago, thanks to technological advancement and increasing adoption.

- **Mass Unemployment:** The biggest concern since the early days of automation systems is that excessive automation will lead to an almost total replacement of most tasks, thus leading to mass unemployment. In fact, a study by *Oxford University* and *ARK Invest* on the future of employment related to computerization, analyzes for each sector the probability that tasks will be replaced by automated systems, this is the result:

Projected Number of Employees Replaced with Automation by Industry

Source: University of Oxford, ARK Original Research

As you can see, according to this research, the jobs that will be most automated awat between 2025 and 2035 are those inherent to: Manufacturing, Retail, Transportation and Warehousing, Waste Management, Healthcare, Food Service, and Agriculture. According to ARK's calculations, automation could replace 75 million jobs by 2035 in the U.S. alone.

What impact could this have on the workforce?

Certainly, automation will drastically change the conception and organization of work, many positions will no longer have any sense of existence, especially if repetitive and more easily automated, such as warehouse workers, cashiers, but also workers in the tourism and hotel industry. The call centers are destined to empty, thanks to the entry in the field of artificial intelligence and cognitive computing. For years now, even the world's largest banks are finding it more convenient to save money by cutting staff in favor of more efficient automation, with branches halved thanks to ATMs, home banking and mobile banking.

But the situation may not be so bad.

The data and assumptions made above lead many people, including some researchers, to think that this will all lead to mass unemployment. In reality, that's not the case, and history should have already taught us that. In fact, automation since the 1970s had a steady spread with no decline in jobs, but rather a dramatic change in the composition of the workforce.

Laid-off workers filled new jobs, with new industries created. Sure, it's not easy to retrain certain groups of workers, but it's not impossible. Since 2013, corporate spending on training has increased by an average of 15%. In addition to this, it is estimated that automation will bring a major increase in global economic growth, with analysts estimating a 40% increase compared to a world without automation, by 2035.This increase in global GDP due to technology, will surely lead to the creation of new business models and therefore new jobs.

We must also remember that complete automation will not be achieved overnight, but it is an evolutionary process that will transform the conception of work, a simpler, safer and also better paid job. We are very confident in saying that mass unemployment is not a risk element for the space.

Selected Companies

ABB (**$ABB**)

Company Profile:

- *HQ:* Zurich
- *Market Cap.:* $70 Bn
- *Stock price:* $35

ABB (an acronym for Asea Brown Boveri) is a Swiss-Swedish multinational company headquartered in Zurich and active in robotics, power and automation in more than 100 countries. It manufactures and sells electrification, industrial automation, robotics and motion products for utility, industrial and transportation and infrastructure customers worldwide. The third largest shareholder is BlackRock.

The company has a strong discrete robotics and automation segment that develops industrial robots, robotic solutions and systems, field services, and digital services. In its latest report, the company beat earnings and revenue estimates, with total revenue up 7%, with the robotics and automation segment alone up 27% year-over-year. It could be very interesting to watch this develop.

INTUITIVE SURGICAL ($ISRG)

Company Profile:

- *HQ:* California
- *Market Cap.:* $98 Bn
- *Stock Price:* $830

Intuitive Surgical Inc. is a U.S. company that designs and builds robotic surgical systems for minimally invasive surgery, most notably with their Da Vinci Surgical System, a robotic surgery system that allows an operator to perform surgery while maneuvering it remotely. It is primarily used for prostatectomy, heart valve implantation and in gynecological surgery. The acquisition cost is c.a. $1.5 million. The combination of artificial intelligence and surgical robots has the potential to create better outcomes, fewer complications, shorter hospital stays, faster recoveries and lower total costs.

Intuitive already uses an impressive amount of data and analytics to help surgeons evaluate and improve their outcomes. Artificial intelligence will serve to deepen this effort to help physicians improve their decision-making and hone their skills.

BAIDU ([$BIDU](#))

Company Profile:

- *HQ:* Pechino

- *Market Cap.:* $65 Bn

- *Stock Price:* $193

Baidu is the leading Chinese search engine, but like major tech companies it is getting involved in many other areas. In fact, the reason we selected Baidu in an area like automation is because of its commitment to artificial intelligence and autonomous driving, with the Apollo program, a proprietary software platform dedicated to autonomous driving. The program was unveiled in 2017 and aims to put more and more self-driving vehicles on the road, and is moving at a very interesting pace to compete with Alphabet's (Google) Waymo project. Guangzhou citizens can already use integrated apps to access robotaxis, automated shuttles and self-driving buses. The Apollo project boasts 210 global partners from both China and the West, such as Bmw, Ford and Toyota.

Also important to note is that Baidu announced that it has signed a partnership with Geely, one of China's largest automakers (It owns Volvo, Lotus, Lynk & Co, is the largest shareholder in Mercedes and owns 50% of Smart). Although the company's main business is not focused on robotics and automation, we thought it was worth reporting it, as Baidu could be a key player in the self-driving car landscape, despite strong competition from Google and Tesla.

Conclusions

It is evident how automation will be a natural and inevitable evolution of human history. Even during the first industrial revolution there was a fear that machines could replace humans, leaving them without a job and purposeless. As we have learned from our own history, work evolves in relation to technology, so we don't think the specific technology that is the subject of this report has any particular obstacles along the way, other than those dictated by time. The current pandemic has certainly sped up the process, and many researchers agree that nearly half of all jobs can be automated within 20 years.

This is a significant number, and it makes you realize how important it is to watch the developments of this mega trend. What's more, you have to think that the speed at which humans evolve is exponential, which means that the more time passes, the faster technologies will be improved and applied. Just compare the technological evolution of the last 50 years with that of the previous 50 years.

We believe that the sectors that will benefit most from these changes are industry, logistics, transport, IT and health. The aim of this report is also to make people think about the possibility of being replaced by a robot within 20 years. So, our advice is to try to acquire skills and know-how that are difficult to replicate and automate, in order to make your position almost immune to automation. We will be happy to discuss with you on the developments in technology in the years to come.

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