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From sustainability to the connected worker:

What's driving Smart Manufacturing?

An opportunity to reset and drive momentum with Smart Manufacturing

The life sciences industry is experiencing a profound shift towards precision and personalised medicine. At the same time, in response to the unprecedented geopolitical change and turmoil of recent years, many life sciences organisations are focusing on rebuilding local supply chains with localised production to bolster their resilience.

These two macro trends present a significant opportunity to reset and build future-ready facilities that take advantage of the increased speed, productivity and agility that Smart Manufacturing (otherwise known as manufacturing 4.0) has to offer.

In this report, we look at the key factors that are driving Smart Manufacturing within life sciences, as well as the opportunities and challenges that organisations feel are ahead of them. Our research highlights the importance of sustainability and employee welfare, plus the need to prioritise the foundational technologies and tap into data that can rapidly advance Smart Manufacturing.

Smart Manufacturing will undoubtedly transform operations for life sciences organisations around the world; the race is on to see who can unlock its full potential.

Executive SUMMARY

From mechanisation to mass production, manufacturing processes have come a long way and continue to evolve. Now, smart technologies are catapulting life sciences organisations into a bold new era.

With the greater connectivity and data that Smart Manufacturing brings, organisations can improve quality and safety, optimise processes, minimise downtime and boost productivity. There are endless possibilities, so we wanted to see how life sciences organisations plan to embrace these opportunities while avoiding the potential pitfalls.

We approached and asked senior decision makers at 150 manufacturing organisations in both the UK and Ireland; 'Why does Smart Manufacturing matter?' 89% said they have a clear Smart Manufacturing strategy in place. However, there are still key challenges to overcome to truly benefit from it.

ABOUT OUR RESEARCH

150 manufacturing organisations in both the UK and Ireland.

* An even divide between Life Sciences and Industrial Manufacturers

Four key trends emerged from our research:

Data is becoming more important: Organisations are increasingly leveraging the power of data and analytics to optimise manufacturing quality and supply chain operations.

Sustainability is a major driver: In a world with limited resources, life science organisations understand the need to prioritise sustainability, and this is the driving force behind the push towards Smart Manufacturing for most respondents.

Connected workers improve safety: Using smart technologies to improve employee safety and productivity is seen as a highly anticipated outcome of Smart Manufacturing. The use of smart devices and wearables by workers, and the real-time monitoring of data enabled by smart technology, can improve productivity, compliance and significantly reduce risk.

Skill shortages risk progress: A lack of skilled resource risks holding manufacturers back from implementing their plans.

The cloud is key: The cloud is seen as a critical foundational component to the success of Smart Manufacturing. A robust cloud foundation enables far greater opportunities when it comes to data.

Data is DRIVING CHANGE

Smart Manufacturing connects devices and systems to deliver data at scale. That's why most respondents told us that leveraging the power of data and analytics in manufacturing quality and supply chain operations is an important aspect of their Smart Manufacturing strategy. The data that connected systems generate helps life sciences organisations to predict outcomes, spot issues early on and continuously improve their processes. It's clear that the need to access data from manufacturing IT, OT systems, including lab equipment is rising in importance across the board.

47% of life sciences organisations say that big data analytics is crucial to the success of their Smart Manufacturing strategy.

With so many innovative technologies becoming more accessible, life sciences organisations are positive about the impact they can have. Improved access to data for decision-making is a highly anticipated outcome of Smart Manufacturing, with 15% of respondents considering it their most anticipated outcome and 23% stating it's their second-most anticipated.

Leveraging the power of analytics
Smart Manufacturing opens the door to new technologies that can help life sciences organisations leverage data analytics.

A plant control tower
is an end-to-end cloud solution which can help to improve the visibility of production lines and machines by providing data in real-time dashboards. This can help to break down silos across a manufacturing plant, tailored next generation user experience for respective roles and improve transparency, which leads to better-informed decision making.

Process analytical technology
enables Critical Quality Attributes of products to be measured in real time. The analytics can be used to predict the quality of the end material and the impact of changing the process parameters. This can reduce the development and manufacturing times and improve quality.

Digital twin technology
can help organisations to develop new products or modify existing ones by using data to predict outcomes. A digital twin of a production plant and process can used to simulate production line, predict failures, optimise the process, predict batch outcomes as well as train personnel on complex processes or production lines.

Reducing carbon emissions with a smart approach to SUSTAINABILITY

Research has found that healthcare systems in industrial nations account for nearly 4% of their greenhouse gas emissions. This is due to the industry's high energy and water usage, and the chemicals and materials needed for drug manufacturing. It represents a higher proportion of emissions than either the aviation or shipping industries.

Fortunately, life sciences organisations aren't shying away from their responsibilities to reduce their impact on the environment.

40% told us that sustainability was their main reason for pursuing Smart Manufacturing projects.

Delivering sustainable strategies

Many life sciences organisations are being very clear about their own sustainability strategies. 89% of respondents say that sustainability is business critical for their organisation, while 85% are acting upon their sustainability goals.

A key driver is the need to reduce the energy and water needed within the manufacturing process. Smart technologies have now made it much easier to incorporate sensors into plants and machines to measure energy consumption and context.

In addition to reducing consumption, life sciences organisations are also seeing the importance of using renewable energy at source or in their plants.

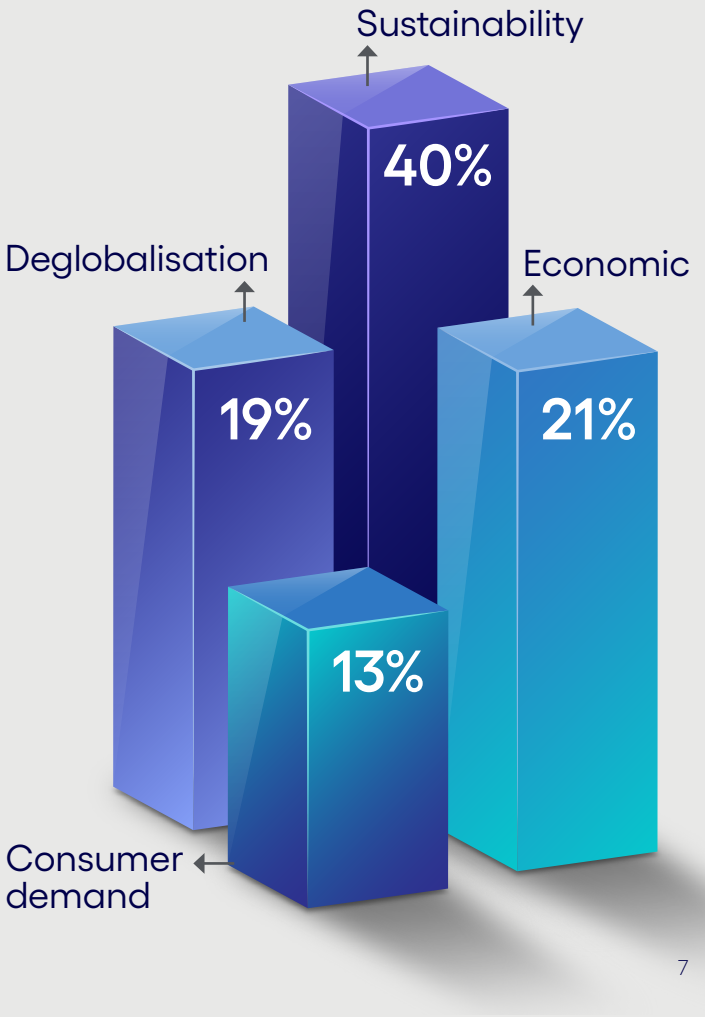
- Leading science and technology company, Merck, has committed to covering 100% of their current electricity purchases in the European Union and Switzerland with renewable energy certificates from 2025 onwards.
- Corning Life Sciences have installed thousands of solar panels at their facilities in China, Amsterdam, Netherlands and New York.
- The life sciences building at the University of Washington has solar cells on the south side which will generate enough energy to light 12,400 square feet of internal space.

Organisations are also considering the carbon emissions across their supply chains, as 85% say they are working on sustainability in their professional partnerships and with suppliers.

The way that products are packaged also has an impact on the environment. Organisations are now incorporating Design for Sustainability standards into their packaging development to help reduce the amount used and the energy needed to make it, while also introducing more sustainable materials. More consideration is also being given to the circularity of products when they reach end-of-life.

85% say they are working on sustainability in their professional partnerships and with suppliers.

Drivers of Smart Manufacturing in life sciences



Connected workers are transforming EMPLOYEE SAFETY

Safety and compliance has always been of paramount concern for life sciences organisations, and our research shows that it is now increasing in importance.

87% of life sciences respondents reported that safety has become a larger priority for their organisation in the last five years.

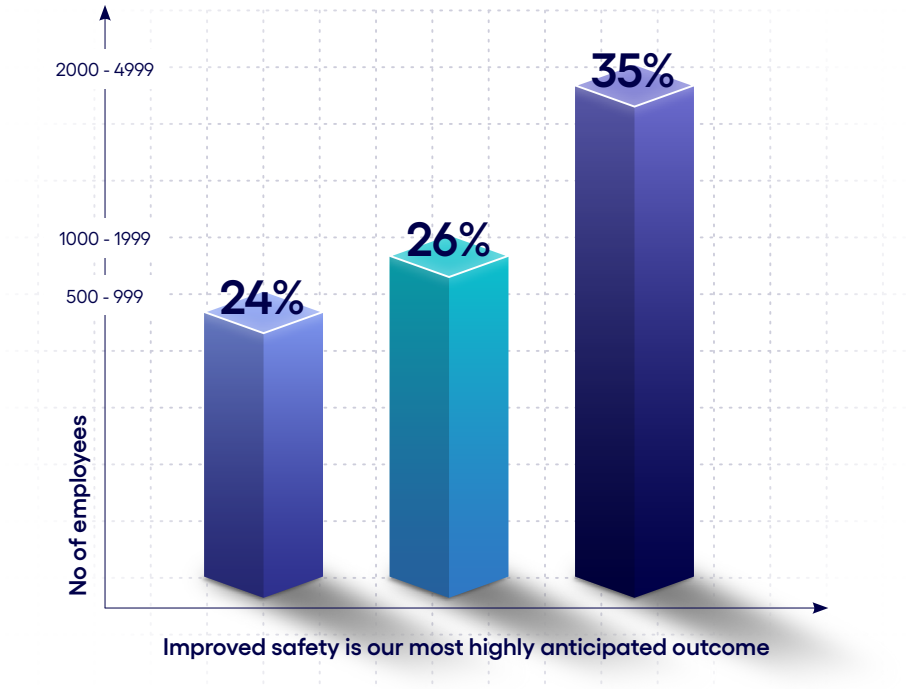
Smart, wearable devices are now much more accessible and cost-effective. They can be worn by employees throughout their time at work, firstly being used to authenticate their identity and allowing them access to sterile and non-sterile areas, logging the operational activities and continually monitoring their health and safety within labs or on production lines.

Smart bands, watches, glasses and even full protective suits can monitor a worker's physical health and their mental workload to spot signs of fatigue and alert them to risks. Augmented and virtual reality can be used to guide an employee through a task to reduce errors and improve quality.

Smart devices can also enable employees to capture and process complex data in real time without needing to step away from their task, which can reduce time and boost productivity. Increasing use of industrial mobile devices with intuitive user experience on applications, enables right insights to workers and decision making.

Larger organisations, with over 2,000 employees, can clearly see these benefits and are prioritising health and safety. Over a third (35%) told us that improving the safety of their employees was their most highly anticipated outcome of introducing smart initiatives.

Wearable technology is being used to connect workers



Skills needed to implement SMART MANUFACTURING are in short supply

While our research shows that organisations are keen to implement Smart Manufacturing processes, finding skilled resource is a challenge.

42% of organisations with over 5,000 employees told us that a lack of experienced talent is a major barrier to pushing ahead with their Smart Manufacturing plans.

This barrier decreases to 17% for smaller organisations, which are likely to have fewer positions that they need to fill and smaller-scale Smart Manufacturing programs.

In the era of Smart Manufacturing, life sciences organisations must be able to attract and retain employees who are capable of accelerating the use of IoT, cloud and data analytics within a manufacturing context.

Fortunately, this talent shortage may not last forever as according to recent statistics from UCAS, there are more STEM post-secondary students enrolled in UK universities than at any point in history, with a 400% increase in AI-related courses in the last decade.

Existing employees within life sciences organisations must also be capable of adapting to rapid change and upskilling to use new technologies. Digital adoption within a workforce can vary considerably across an organisation, especially when there is a mix of older and newer facilities. Where there are legacy processes that have been embedded for a significant period, employees can find themselves on a steep learning curve to adapt to a Smart Manufacturing strategy.

79% Have widely implemented cloud computing overall.

Foundational technologies are critical to SMART PROCESSES

As we have already seen, leveraging the power of data and analytics is now crucially important. However, to significantly scale Smart Manufacturing processes, organisations must be able to gather, store, interpret and transfer data quickly and effectively, and this requires the cloud.

Historically, life sciences organisations have been slower to adopt a cloud strategy compared to other industries, but over the past two years this has started to change rapidly. Leading product vendors offering manufacturing and quality business capabilities have started offering compliant cloud hosted /SaaS applications. The industry is now more open to cloud and it is part of their agenda.

84% of respondents told us that the cloud is 'important' to the success of their Smart Manufacturing strategy or they 'can't do without it'.

The scale of cloud adoption does vary though. While 73% of life sciences organisations have used cloud computing to augment manufacturing processes, just over half (52%) say they have used cloud widely and just over a quarter (16%) have gone as far as their technology currently permits.

Other technologies are also key to the success of Smart Manufacturing programs, such as Industrial IoT, AI and machine learning which can tackle huge data sets and deliver insights much more quickly, helping to speed up processes, lower total cost of ownership and lead to better outcomes.

The top three technologies that are critical for Smart Manufacturing success

35% AI / ML

31% 5G

29% Cloud

Conclusion

Our research shows that life sciences organisations are well on the way to implementing Smart Manufacturing processes, driven by the need for greater sustainability and improved safety. Ultimately this marks an exciting new era for life sciences which will help to improve outcomes for patients around the world.

Although organisations clearly see the benefits of Smart Manufacturing, implementation is complex. There is the reliance on a robust cloud foundation and data management to consider, and the lack of experienced talent to overcome.

Yet organisations with clear strategies, and the right partners to support their plans, have a vital opportunity to leverage Smart Manufacturing technologies and optimise their operations, improve productivity, drive innovation, and open new streams of valuable data. This will drive the growth and resilience that is needed to support patients in a rapidly changing world.

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About Cognizant

With a network of 30,000+ professionals in 37 countries, Cognizant is the global partner that empowers life sciences manufacturing. Our expertise enhances system performance, streamlines supply chains and bolsters Manufacturing 4.0 and Lab 4.0 initiatives to ensure seamless operations and GMP compliance. Our services focus on achieving speed to value, while building long-term strategies to realise the benefits of Smart Manufacturing.

www.cognizant.com/pharmamanufacturing

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About Microsoft

(Nasdaq “MSFT” @microsoft) enables digital transformation for the era of an intelligent cloud and an intelligent edge. Its mission is to empower every person and every organisation on the planet to achieve more.