



Flanders
State of the Art

4.0 INDUSTRY

MANUFACTURING 4.0 INSIGHTS AND OPPORTUNITIES

IN IRELAND

FLANDERS INVESTMENT & TRADE MARKET SURVEY



MANUFACTURING 4.0

Insights and Opportunities in Ireland

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1. OVERVIEW

1.1 Introduction to Ireland

Industry 4.0 is the general name given to the disruptive industrial revolution, a revolution in global manufacturing - the 4th Industrial Revolution.

Ireland has transformed its industrial base from basic agriculture into an efficient, modern manufacturing and production base. With manufacturing output of € 124 billion per year, Ireland’s manufacturing sector is now half as big as the UK’s € 253 billion, despite the UK having more than 13 times Ireland’s population. Accounting for 1% of the EU’s total population, Ireland produces 5% of its manufactured goods exports to the rest of the world.¹

Around 260,000 people are employed in the Irish manufacturing sector, which accounts for over 12% of total employment, making manufacturing a clear driver of economic success. Despite general inflation and significant labour and supply chain challenges, Irish companies are optimistic for further manufacturing growth. Essential elements for this being digital transformation, increasing graduates’ talent and developing sustainable manufacturing processes.

Economic Overview

Over recent months, inflation has picked-up sharply, with price pressures exacerbated by the invasion of Ukraine. Consumer Price Index (CPI) inflation increased by around 8.1% by Q3 2022. In response, the Irish Government has introduced a range of measures to mitigate these cost of living pressures, providing supports to households and companies.²

Parts of the multinational sector continue to perform very strongly, notably the pharmaceutical, medtech and ICT sectors. In the first half of the year, the volume of goods exports originating in Ireland increased by a quarter over the same period last year. Services exports remained strong, led by ICT exports, Ireland is now one of the major exporters globally in this sector.³

Since 2017 manufacturing costs have been growing steadily, and picked up pace over the past year due to numerous factors including COVID-19 stoppages, warehousing issues, Brexit-related transport paperwork and shipping delays. The invasion of Ukraine has further exacerbated all of these issues, mainly in the form of a rise in commodity prices. These external impacts are felt on input costs, especially core materials inputs and energy.

Energy prices are expected to stay elevated into 2023 before easing back.⁴ Based on this and other price pressures, the current rate of inflation is expected to rise to 8.3% by the end of the year before declining to 6% in 2023.⁵ Projections for growth in domestic economic activity remain

¹ Irish Times – 30/07/2022 - [David McWilliams: Here's a way to lower houses prices and make all Irish people richer – The Irish Times](#)

² ESRI Quarterly Economic Commentary, October 2022 - https://www.esri.ie/system/files/publications/QEC2022AUT_0.pdf

³ Central Statistics Office, Goods Exports and Imports June 2022 - <https://www.cso.ie/en/releasesandpublications/ep/p-gei/goodsexportsandimportsJune2022/#:~:text=Seasonally%20adjusted%20goods%20exports%20were,million%20compared%20with%20May%202022.>

⁴ Market Observatory for Electricity - [quarterly_report_on_european_electricity_markets_q1_2022.pdf](#) (europa.eu)

⁵ Economic Forecast for Ireland - [Economic forecast for Ireland](#) (europa.eu)

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positive but have been revised down by the Central Bank of Ireland, relative to what was expected previously. It is therefore assumed that a relatively normal trading scenario will exist for any Flemish exporters hoping to enter the Irish market. As a member of the Eurozone, any fluctuations and uncertainty experienced in the UK market, has a minimal effect on business relationships with Ireland’s continental neighbours.

Employment reached an all-time high in the second quarter of this year, helped in part by the various supports put in place by the Irish Government during the pandemic. In keeping with the outlook for demand however, employment growth is expected to slow in the near-term; that said, the unemployment rate is expected to remain at relatively low levels throughout the forecast horizon.⁶

1.2 Doing business in Ireland

Ease of Doing Business

In the most recent figures from 2019 - 2020, Ireland ranked 24th in the World and 8th in EU on the Ease of Doing Business Index.⁷

To maintain this good score, the Irish Government and investment authorities have emphasised the importance of minimising regulatory issues - to make Ireland a more attractive location in which domestic and foreign investors can set up and develop their operations. Improving Ireland’s business environment and enhancing the reputation as being ‘business friendly’ has led many European goods and service providers to set up in Ireland rather than the UK.

Other considerations for FDI attractiveness are the quality of the workforce with particular reference to its flexibility. Also a strong work ethic and high levels of education, political and tax stability, English speaking member of the Eurozone and accessible tax benefits and grants for IP and R&D, are all elements that make Ireland a top destination.

Ireland has therefore succeeded in building an international industry ecosystem that is diverse in its activities and enjoys a world-leading reputation in several sectors such as aircraft leasing, insurance, banking and investment management. The same can be said for its Life Sciences sector, similar to Flanders, Ireland has provided infrastructure, high level graduates and tax incentives for the multinational medical device and biopharma industries to locate in Ireland with relative ease.

Disruptions caused by Brexit

The EU-UK Trade & Cooperation Agreement (TCA) has added a layer of paperwork for Belgian exporters into the UK that has been time consuming and expensive. The filing of customs declarations and the registering for VAT has added to the workload for the movement of goods into the UK. It has been a similar experience for Irish traders. With a new administration now in place in the UK, discussions are resuming on arrangements for implementing the Protocol on Ireland and Northern Ireland within the EU-UK Withdrawal Agreement. The UK authorities have

⁶ Department of Finance, Budget 2023 Fiscal Outlook - [gov.ie](http://www.gov.ie) - Budget 2023: Budget Publications (www.gov.ie)
⁷ World Bank Data - <https://data.worldbank.org/indicator/IC.BUS.EASE.XQ?locations=IE-EU>

The Materials Research Institute in Athlone is the only dedicated thermoplastic polymer processing research institute in Ireland. Based at the Technological University of the Shannon, it has equipment for injection moulding, extrusion, melt spinning, compounding, vacuum forming, compression moulding and blow moulding. The Materials Research Institute is also home to the Applied Polymer Technologies (APT) Technology Gateway. These centres have partnerships with such industry heavyweights as Indorama Ventures and Steris; and also with academic centres like the Mayo Clinic in USA. It would be an attractive partner for any Flemish company interested in exploring and innovating their products.

Irish companies on the radar

[Dentaltech](#) is Ireland’s largest provider and manufacturer of bespoke, high-quality dentures. It uses cutting-edge technology that allows dentists to create revolutionary 3D printed dental prosthetics within days.

Operating for nearly 50 years, Dentaltech is an Irish-owned family business that operates specialist denture clinics in Dublin, Waterford, and Wexford. The company manufactures their dentures at its in-house clinical laboratory in Dublin, which is the world’s largest certified digital printed dentures facility outside of the US and Canada. Using the most advanced digital oral scanning techniques alongside 3D design and printing technology to produce better fitting oral care.

In addition, the digital transformation significantly reduces the level of waste production in Dentaltech clinics. This is a clear step towards integrating more sustainable goals into the dental industry.

3. ROBOTICS/COBOTICS

Robotics refers to the design, manufacture, and use of robots for personal and commercial use. While we are yet to see robot assistants in every home, technological advances have made robots increasingly complex and sophisticated. They are used in fields as wide-ranging as manufacturing, health and safety, and human assistance.

[Cobotics Skillnet](#) is a business support network for companies in the robotics and automation tech sector in Ireland. It is part of the Government agency Skillnet Ireland, which supports businesses across the country in upskilling their employees. With supporting member companies such as Boston Scientific and Stryker, it demonstrates the real appetite for skills and service providers in this ecosystem.

Another global life sciences company, Allergan is introducing automated manufacturing processes using high-end robotics at its ocular implant facility in Westport in the West of Ireland. This new technology will be used to produce products that have the potential to revolutionise the treatment of common eye conditions such as glaucoma.

Irish companies on the radar

[CXV Global](#) delivers core technology leading solutions in the areas of IT & Real Time Automation, Machine Vision, Serialisation, Digital Transformation and Professional and Managed Services to global customers in high-end R&D & Manufacturing sites. CXV Global works closely together with their Flanders based partner [VistaLink](#), who are a specialised machine vision system integrator. Utilising the latest developments in machine vision technology, as 3D and artificial intelligence, VistaLink is delivering custom solutions to end customers, machine builders and OEMs in regulated industries. Additionally, VistaLink provides a range of modular products off the shelf.

[Fire1 Foundry](#) uses robotic process automation and cognitive AI, having developed an implantable sensor for the remote monitoring of heart failure patients. The company raised € 40m in a Series C round in 2018 to develop this sensor. In 2020 it also received a further € 7.5m from The Ireland Strategic Investment Fund (ISIF).

[Robotics and Drives](#) was founded in 2005 by directors Ken McNevin, Stephen Nolan and Sharon McNevin in Mullingar, in response to the growing need for Robotics and Automation for manufacturing in Ireland. Robotics and Drives are currently the largest robotics solutions provider in Ireland and is still privately owned. They have invested in a custom 4000 square metre facility in Mullingar as well as an integrated Robotics training centre on the same campus and currently employ 35 people, mainly highly skilled robotic engineers.

4. HEALTHTECH AND MEDTECH



The biopharma, medtech, and digital health sectors in Ireland are renowned for attracting international investment with over 700 companies active across the country, employing 84,000 people directly, and making a global impact with exports in excess of € 105 billion.

Many of these Irish companies provide contract manufacturing, planning & developing, clinical research, legal and other support services. Like in most countries, there are a number of large companies such as Stryker Corporation, AbbVie and Janssen Ireland, that are integrated into multinational corporations, yet most of the production is located in Ireland. The R&D intensity is higher than in other industries, which applies to the health tech sector in the whole of Europe.

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Since technology is developing fast, some companies have started to rely on a co-creation model instead of traditional R&D process.

The Galway region is the centre for innovation in this area; the [Atlantic Technological University \(ATU\) Innovation Hubs](#) provide a centre for availing of expertise – the fruits of decades of multinationals operating in the region – from world-leading suppliers, a rich pool of talent, university research programmes and Government supports. There have been many successful spin outs in the area of medical tech and medical devices, such as [InVera Medical](#), [CrannMed](#) and [LociOrthopaedics](#).

5. VIRTUAL, AUGMENTED AND MIXED REALITY

Virtual reality (VR) offers immersive digital experiences that simulate the real world, while augmented reality (AR) merges the digital and physical worlds.

[Skillnet Ireland](#), a business support agency of the Government of Ireland, responsible for advancing the competitiveness, productivity and innovation of businesses operating in Ireland through enterprise led workforce development, recently collaborated with Technological University (TU) Dublin on a new manufacturing course for the pharmaceutical sector, teaching participants the basics of powder handling using a customised VR platform.

TU Dublin is also collaborating with Intel Ireland on an applied research project that will explore the use of VR technologies for training simulation programmes in Intel. The partnership will see Intel engage the expertise of a range of emerging technologies available from the Virtual Interaction Research Lab (VIRaL) and School of Media at TU Dublin.

Irish companies on the radar

Irish VR production studio [VRAI](#) creates powerful VR training experiences with a focus on hazardous material training. Their platform Hazardous Environment Awareness Training (HEAT) uses both VR and artificial intelligence (AI) to make training more authentic and measurable, while reducing risk to the employee.

[Digisoft](#) is using digital twin technology to create training environments for life sciences labs. Their product CyberTwin creates a digital replicate of labs and facilities to ensure an efficient and safe working environment by eliminating unnecessary visitors.

Irish game development studio [War Ducks](#) has released several best-selling VR games including Sneaky Bears and Rollercoaster Legends. The studio is now in the process of developing one of the industry’s most anticipated AR game for mobile, which will be released later this year.



[Volograms](#), a spin-off from Trinity College Dublin, has taken this technology to the next level. Their platform enables the capture of real people into volumetric holograms, volograms, which can be enjoyed within all kinds of AR & VR experiences, apps and social media.¹⁰

There are synergies and connections to be made between Flemish and Irish developers and companies in this exciting new area of technology. The many uses for VR can be applied to manufacturers, education centres or medical device developers in the Flanders region.

6. AI, DATA ANALYTICS, CLOUD



By 2025, it is estimated that 26-30 billion of devices in the home and workplace will be equipped with sensors, processors and embedded software, and connected to the Internet of Things (IoT).¹¹ Combined with other technologies, such as cloud computing and artificial intelligence, they enable the automation of entire business processes, including repetitive intellectual tasks previously performed by humans.

Globally, Ireland is well regarded in its AI readiness, ranking 17th (out of 160 countries) in the Oxford Insight AI Readiness report 2021.¹² However, in order to be able to show the trustworthiness of AI products and services and compete on a global scale, AI products need to be monitored by a certification scheme which would be based on the international and European standards currently being developed.¹³ The [National Standards Authority](#) is heavily involved in this process.

Enterprise Ireland have launched a € 9K digital voucher to allow SMEs to establish their digital potential using a Smart Industry Readiness Index (SIRI) methodology provided by IMR (Irish Manufacturing Research) or alternatively the Digital Operations Maturity Assessment (DOMA), provided by PWC. According to Accenture research, technology early adopters are growing at rate 5 times that of adoption laggards.¹⁴

¹⁰ Enterprise Ireland - <https://irishadvantage.com/irish-immersive-technology-companies/>
¹¹ European Patent Office, Future of Manufacturing - <https://www.epo.org/news-events/in-focus/future-of-manufacturing.html>
¹² Oxford Insights - <https://www.oxfordinsights.com/>
¹³ EU Digital Single Market - https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/excellence-trust-artificial-intelligence_en
¹⁴ 2022 Accenture Digital Index - <https://www.accenture.com/ie-en/insights/about/the-digital-index>

7. SUSTAINABLE MANUFACTURING

Most large organisations now have a Sustainability Officer, or at least a policy on reducing carbon emissions. The manufacturing industry is no different. There is a focus on sustainable factories, sourcing practices and low carbon supply chains. Consumers are also looking for sustainable packaging. In addition, over half (57%) of Irish companies confirmed that they have a sustainability plan in place to make improvements throughout 2022. Key areas of investment include energy consumption (22%), packaging reduction (18%) and water usage (16%).¹⁶

Ireland is again leading the way in attracting foreign and indigenous investment in the Smart factory sector. A planned vaccine production facility by China's WuXi Biologics will be located in Dundalk in the East of Ireland, creating 200 jobs. Earlier in the year, Merck announced it is expanding its membrane and filtration manufacturing capabilities in Ireland. The company will invest approximately € 440 million to increase membrane manufacturing capacity in Carrigtwohill and to build a new manufacturing facility at Blarney Business Park, both in Cork, Ireland. The investment, which is the largest in a single site ever for Merck's Life Science business sector, will create more than 370 permanent jobs by the end of 2027. Keytruda. Shire, now owned by Takeda, has also announced two major investments in the last few years, including a new cell therapy facility in Dublin.

Several pharma sites in Ireland are considered "lighthouse projects" in terms of "Industry 4.0" adoption and are supported by Ireland's large IT industry. Some companies, such as Novartis and Eli Lilly and Company, are using their facilities in Ireland to implement next-generation platforms and data analytics operations.

Reuse and recycling of building materials represents a massively underappreciated avenue for reaching global climate goals, which would help the EU heavy industry get halfway towards its net-zero goals by 2050.¹⁷ Continued mainstreaming of digital tools like BIM and material passports and Reversible Building Designs can support with this.

There are capacity requirements in this area in Ireland, where Flemish companies can also apply to speed the delivery of housing stock, green construction methods, retrofitting technology and smart manufacture in the building sector.

Irish companies on the radar

In 2020 [IMS](#), an Irish construction waste management and resource recovery company, collected over 3,000 tonnes of concrete waste from a Dublin Airport critical runway taxiway project which was constructed by Balfour Beatty. They used the waste in the production of Greenstone, a NSAI certified aggregate made from recycled construction waste. Following a detailed Life Cycle Assessment (LCA) and independent verification, Greenstone recycled aggregate have been certified to have a carbon footprint of only 5% of virgin aggregates. The results of the LCA have been used

¹⁶ PWC Report - <https://www.pwc.ie/media-centre/press-releases/2021/love-food-and-pwc-report-shows-strong-growth-expectations.html>

¹⁷ Material Economics – Circular Economy - <https://materialeconomics.com/publications/the-circular-economy>



Smart Freight Solutions – The new administrative burdens will make transiting through Great Britain more onerous for Irish hauliers, there is a market for smart solutions to the logistics issues faced.

Cybersecurity Solutions – Consultants in this area required across all types of emerging technologies used in the scope of machinery. Control and safety systems are important to avoid technical problems or deliberate and malicious hacking.

App Developers - Blockchain application providers for the agri-food and beverage sectors.

Prototype Developers – High value engineering services are in strong demand, the ability to rapidly configure machines to adapt to customer-supplied specifications.

Virtual Modelling Systems – Software and product design services.

Disruptive Technologists - The Disruptive Technologies Innovation Fund (DTIF) is a € 500 million fund established under Project Ireland 2040 and is run by the Department of Business, Enterprise and Innovation with administrative support from Enterprise Ireland. It is open to and requires collaboration from partners – that could be from the Flanders region.¹⁸

Safety Consultants – Advisors on the use of AI or Automation systems in an industrial environment and the effects on plant or factory floor safety. For example Standards Support companies, to meet compliance with EU technical regulations. In this case, Irish and Belgian standard would be harmonised under common EU regulations. Also the regular functional safety requirements for Industry 4.0. e.g. networks, security, robots/cobots, software, and the semiconductors used to implement these features.

Data Privacy Consultants – Where human and robotic activities are interconnected, there will be a need for service providers in this area. It is not currently regulated and may become a high demand sector in the future.

Digitalisation Service Integrators – 5G network providers and engineers to create reliable and secure connectivity in manufacturing settings.

Workforce Education Providers – Companies are relying on external skills educators to update employees skills in statistics, programming, data science, technology infrastructure and software development.

¹⁸ Disruptive Technology Fund - <https://enterprise.gov.ie/en/news-and-events/department-news/2022/april/202204221.html>



11. CONCLUSION

The Irish economy withstood the global pandemic very well. The phasing-out of temporary budgetary supports during the spring of this year, for example, did not result in any negative fall-out in the labour market – employment in the second quarter reached its highest level ever, while the unemployment rate fell to just over 4 per cent over the summer, an extraordinary rebound in such a short timeframe.¹⁹

The perfect storm of COVID-19, Brexit, container shortages, high demand and transport bottlenecks, all drove lead times and input prices in one direction in 2022. Inflation rates have accelerated successively over 2022. In Q3 2022 the headline inflation numbers were dominated by dramatic gas price increases driven by a combination of high demand, reduced supply and taking coal off the grid. These drivers have been further exacerbated by colder temperatures and less wind for renewable sources. Supply chain constraints, in particular semi-conductor chips are also a factor affecting both Irish and Flemish manufacturers.

However, a PWC survey of CEOs in 2022 reports a 10 year high in optimism. Key findings are:

- 77% predict a stronger global economy by end 2022. Only 15% expect a weaker outcome,
- 91% of Irish CEOs are upbeat about Ireland's economy in 2022,
- Risks and threats for 2022 are similar to global peers and include supply chain, cyber threats, health risks, macroeconomic volatility, talent shortage, inflation and climate change,
- Fundamentals for the Irish economy and manufacturing are strong and well positioned to deal with these headwinds.²⁰

To stay competitive and retain a strong manufacturing base in Ireland, investment in digital and associated new skillsets is crucial. Ireland has a recognised strong track record in innovation and will no doubt embrace the opportunities presented with Industry 4.0 transformation.

In this context of Irish business optimism, it is worth exploring this market more – Flemish exporters and innovators can find enthusiastic partners in Ireland if they are willing to branch out. Irish firms are being encouraged to consider diversifying out of and away from UK markets. The ideal scenario would be a switch from UK to EU sources for digital and innovative products and services in the medium or long term. This would involve a push by Flemish exporters to introduce their services in a proactive manner.

The Dublin office of Flanders Investment and Trade remains at your service to answer any queries and create introductions to Irish service providers and innovators in this vibrant area of Manufacturing innovation. Do not hesitate to make contact.

¹⁹ Ireland Budget 2023 - Economic Statement - [gov.ie - Budget 2023: Budget Publications \(www.gov.ie\)](https://www.gov.ie/en/publications-and-statements/publication-budget-2023/)

²⁰ PWC CEO Survey 2022 - <https://www.pwc.ie/reports/ceo-survey-2022.html>



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