



MANUFACTURING OUTLOOK

BOOSTING IRELAND'S COMPETITIVENESS

The Irish manufacturing landscape is changing and companies that invest in R&D will be best positioned to develop, grow and embrace the opportunities that lie ahead.

With over 231,000 people employed in the Irish manufacturing sector and in excess of 4,000 manufacturers operating throughout the country, the manufacturing sector continues to play an important role within the economy.

But the traditional manufacturing landscape as we know it is changing, not just in Ireland but around the world, according to **Michéal Cassidy, Chief Technical Officer and co-founder of Irish Manufacturing Research (IMR)**, a not-for-profit research centre. The IMR works with a wide range of stakeholders including Enterprise Ireland, IDA Ireland, as well as over 150 large and small Irish and international manufacturers that are seeking to innovate and develop new products and processes across a wide spectrum of industries.

"How goods and products are manufactured and distributed to the end user are benefitting from significant advances in cognitive technologies, artificial intelligence (AI), robotics, virtual and augmented reality, big data and the Internet of Things," he says.

He points out that this new paradigm is known as Industry 4.0 and represents the next step on from the so-called third industrial revolution which involved the widespread adoption of computer technology. Industry 4.0, however, enhances many of the technologies and processes developed with a wide range of smart and autonomous cloud and mobile-based systems through the application of big data and machine learning.

He adds that the impact of Industry 4.0 will be widespread and few industries and companies around the world will be left untouched by the sheer magnitude of the developments taking place. It will have significant ramifications for policy makers and how they plan their industrial strategies while it will also have implications for foreign direct investment (FDI) flows around the

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Michéal Cassidy
Chief Technical
Officer and Co-founder,
Irish Manufacturing
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**IRISH
MANUFACTURING
RESEARCH**

world as many manufacturers look to bring some manufacturing processes onshore and away from low-cost labour locations closer to their customers.

Through the work of a number of State agencies and organisations like IMR, as well as support from the EU, Ireland is already embracing Industry 4.0, says Michéal.

"We have over 60 researchers at the moment and two research labs - one in Rathcoole in Dublin and one in Mullingar. They are a resource for industry to develop things in as close to a live manufacturing environment as possible," he says. ►

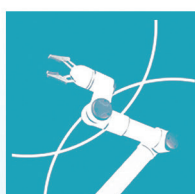
IRISH MANUFACTURING RESEARCH - FOUR THEMATIC PILLARS



DIGITISATION

Data driven business

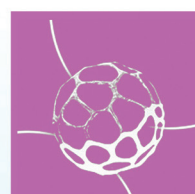
What IMR does
Helps industry to gain value and competitive advantage from data through extraction and transformation to action.



AUTOMATION & CONTROL

Self Adaptive
Autonomous
Automation

What IMR does
Helps industry to develop and deploy automation and control technologies and strategies.



DESIGN FOR MANUFACTURE

Customer Defined
Manufacturing

What IMR does
Helps industry to design and manufacture complex products and processes on emerging technologies.



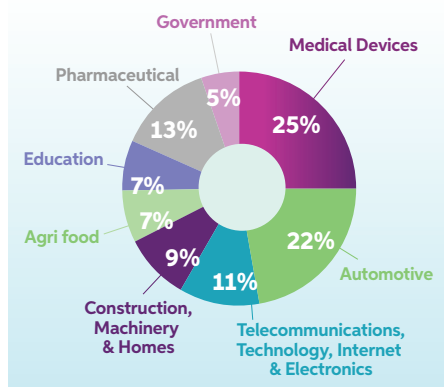
SUSTAINABLE MANUFACTURE

Zero Net Carbon
Manufacturing

What IMR does
Helps industry to maximise energy efficiency, minimise environmental impact and create value.

Source: IMR October 2019

IMR CLIENTS EMBRACING INDUSTRY 4.0



Source: IMR October 2019

"We work very closely with industry and academia and we do a lot of pilot studies in factory environments. So, we use real data, we deal with real problems and turn emerging technologies and academic insights into practical solutions for industry. Essentially, we sit at the higher technology readiness end of the research value chain," he explains.

IMR is also part of a select EU network of Industry 4.0 manufacturing digital innovation hubs under the I4MS flagship EU program - that provide a one-stop-shop for manufacturing companies to access all of the supports they need to become ready for the next generation of digital manufacturing.

I4MS is one of the EU's biggest ever investment programmes in research and innovation and follows on from the 2016 report *Digitising European Industry: Reaping the Full Benefits of a Digital Single Market* which aims to make Europe a leading location for digital innovation as well as Industry 4.0.

According to Michéal, the work of IMR is enabling Irish manufacturers to be leaders in advanced manufacturing, through a holistic service offering to industry that will support the Engineer of the Future, the Factory of the Future & Sustainable Manufacturing in a low carbon economy, consolidated and delivered through four thematic pillars all of which align with the push towards Industry 4.0.

"The four thematic pillars of IMR are Digitisation in Process and Service, Automation and Advanced Control, Design for Manufacturing, and Sustainable Manufacturing (see infographic on page 1). IMR has defined them this way to make sure that we're more about solution delivery and solving problems as opposed to pushing technology for the sake of it. We bring together various matrix teams including partners outside of our own organisation. We also partner very closely with the academic sector and with commercial operators in the manufacturing sector because our mandate is to solve problems for industry in the most efficient way possible and often that's about taking components of existing technology or leveraging the capacity that we have in the research ecosystem already. But we bring them altogether to first understand what the true problem is and then try to develop a solution," he says.

Through the work carried out by IMR and the different State agencies, Michéal points out that Ireland is enjoying a growing reputation on the international stage.

"Ireland scores very well in research carried out by Roland Berger, which is well-known in the global research industry when it comes to identifying countries in terms of their readiness to adopting Industry 4.0 technologies. The research shows that Ireland comes second only to Germany in terms of global readiness," says Michéal.

While Ireland might score well in terms of its readiness, we should not be complacent says Michéal. "Readiness doesn't necessarily translate into action. One of the metrics we look at in terms of engagement is the percentage of business expenditure that goes on R&D and, unfortunately, Ireland, at 1%, lags The Organisation for Economic

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Co-operation and Development (OECD) average of 2% in terms of expenditure on R&D. Our readiness isn't being fully capitalised upon and we certainly see that there is an opportunity for additional investment and engagement in R&D," he adds.

"IMR was established to address the need for industry-focused R&D, training for the manufacturing sector and to provide a catalyst for industry to start investing in R&D. There's also a lot of willingness from the State to invest in R&D through its various agencies like Enterprise Ireland while the EU, under its Horizon 2020 programme, also has a range of supports to help manufacturers. We can help manufacturers tap into these. There is also a big awareness and networking aspect in all of this and IMR is providing a resource for the manufacturing industry

to demystify and de-risk their investment into Industry 4.0 and to help it understand the value proposition in all of this. We also identify examples and case-studies that demonstrate the business successes and positive returns on investment (ROI). We share these successes through our industry network and in the public domain while we try to encourage more manufacturers to engage in R&D across both product development and in their manufacturing processes," says Michéal.

Currently, IMR's client base is divided 50:50 in terms of international and indigenous manufacturers and the companies themselves are drawn from a wide range of industries, from automotive, pharmaceutical, aerospace right through to medical devices, telecommunications, construction and agri-food.

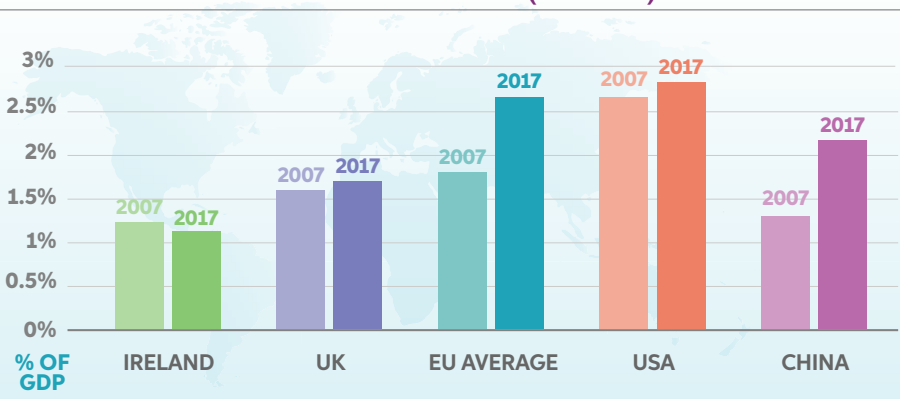
Michéal points out that one of the major areas of concern for countries like Ireland are the changing skill sets and capabilities that are required for people working in manufacturing.

"There's a big need for additional development in terms of skills, particularly advanced skills in areas like 3D printing, data analytics and advanced robotics. We need to ramp these up at a much faster pace in terms of making the courses available in 3rd level but also to support life-long and professional training programmes to service what is a growing part of the manufacturing ecosystem," he says.

"I think a big part of this is that for many years manufacturing was not seen as a very enticing career proposition. There is a viewpoint out there that manufacturing careers are low-level and low-skilled work. The truth is that some of the most advanced businesses that we have on the planet, never mind in this country, are manufacturing enterprises. Some of the most appealing jobs with the most interesting challenges are in manufacturing. These companies are always looking for both graduates and post-graduates to fill those jobs," he adds.

"The reality is that manufacturing is going through an inflection point and jobs within the sector are becoming more highly skilled. Industry 4.0 is about making the manufacturing environment more intelligent, more capable, more productive, and having a sustainable environmental impact. It's important that Irish manufacturers and indeed potential jobseekers embrace this. Otherwise they will get left behind and their competitiveness will be seriously undermined," concludes Michéal. ■

R&D EXPENDITURE: HOW IRELAND STACKS UP (% OF GDP)



Source: Eurostat April 2019

SUPPORTING IRISH MANUFACTURERS

AIB is committed to backing the Irish manufacturing sector as it develops its R&D capacity and expands its global footprint.

Irish manufacturers continue to face ongoing economic headwinds with Brexit uncertainty and global trade tensions converging to make the outlook somewhat uncertain, according to **Elaine Dunne, Head of Manufacturing, AIB Business Banking.**

"The AIB Manufacturing Purchasing Managers Index (PMI) for August, for example, showed that manufacturing conditions in Ireland deteriorated for the third month running and sentiment among Irish manufacturers, while still positive, was at a three-year low," she says.

"However, for Ireland to retain its reputation as an innovative player globally, Irish manufacturers cannot afford to take a wait-and-see attitude to emerging technologies as with the onset of Industry 4.0, the pace of change is fast. The capacity of manufacturers to innovate and respond to these changes will determine their sustainability into the future," she says.

"Innovation in the Irish manufacturing sector is, in part, influenced by the presence of multinational firms. This has had a positive impact on indigenous manufacturers as it has afforded them the opportunity to become an integral part of their global supply chains, opening up new markets in the process," says Elaine.

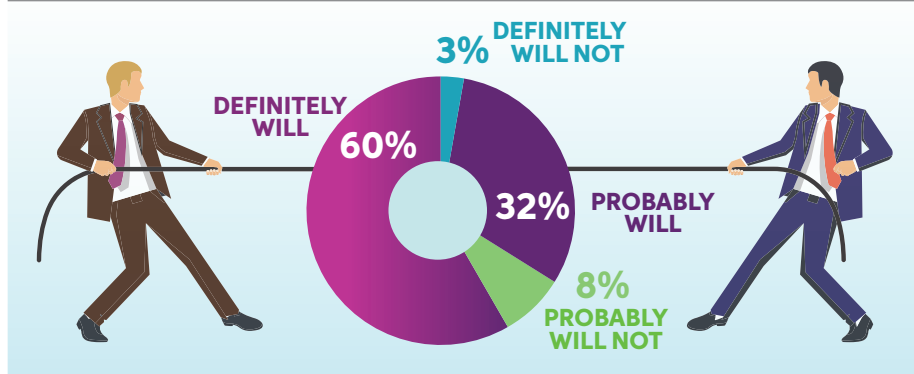
"The role of Irish companies within these supply chains is evolving and becoming more embedded into the manufacturing ecosystem as trusted partners who are engaged in their own innovation and product design to solve problems for these larger global companies."

She adds: "Investment in R&D is recognized as a pathway for companies to grow. Whilst total business expenditure on R&D increased by 37% between 2013 and 2017, spend by SMEs in the same period only grew by 1%." (Source: CSO).

Manufacturers looking to develop their R&D capacity should consider the many State and EU incentives that are available, she adds.

"Strengthening the innovation capabilities of our client companies is a key objective for Enterprise Ireland. We encourage companies to hire dedicated Innovation Managers. Furthermore, our range of financial incentives are directed at companies exploring new ideas for products and services, undertaking the R&D to bring those ideas through to the market and building a strategy around owning and exploiting the intellectual property that results from the R&D," says **Tom Kelly, Manager in the Innovation and Competitiveness Division at Enterprise Ireland.** "Manufacturers however may lack in-house experience but there are supports available to them. Collaborating with other companies and with the

IMR SURVEY: COMPANIES VIEW ON INDUSTRY 4.0 & BOOSTING COMPETITIVENESS



Source: IMR October 2019

"AIB has a positive view of the Manufacturing sector. The Bank is committed to supporting this key sector."

publicly funded research performing organizations (RPO) such as IMR and the different Institutes of Technology is one of the most effective ways in raising the technological capability of a company. The evidence indicates that these collaborations correlate with increased sales growth. Even for small companies with little or no dedicated R&D resource, working with these centres can be very beneficial and by availing of our Innovation Vouchers, they can reduce the overall costs to the company significantly," adds Tom.

"AIB has a positive view of the Manufacturing sector. The Bank is committed to supporting this key sector. Our customers are increasingly aware of the impact emerging technologies will have on their business but to varying degrees," says Elaine.

"We see the positive correlation between manufacturers with a strong innovation culture and their ability to scale and enter new markets. This is across many sectors including med-tech, aerospace, waste, agri, construction and packaging, among others. The drivers for innovation include product development, new markets and streamlining processes along with diversification of their supply chain," she says.

"We are seeing strong demand for finance for investment across all the regions from manufacturers with a strong innovation culture. Companies that are embedding R&D and continual process innovation as part of their

business-as-usual strategy are realising the benefits in the form of new product development and entry into new markets," she adds.

"Manufacturers are also gaining competitive advantage by investing in automation. Ultimately, this strategy will safeguard their future as they face a challenging business environment. Whilst traditional sub-sectors are also expanding and diversifying, this is more reactive and at a slower pace. We are seeing a similar correlation with our Corporate customers," she points out.

"Our customers continue to invest in innovation to ensure competitive advantages are retained and strengthened. We are seeing confidence from our customers through expansionary capital expenditure and increased M&A activity," says **Enda Kinsella, Director & Head of Manufacturing, AIB Corporate Banking.**

"AIB Corporate Banking is keen to support our manufacturing customers in delivering on their strategies and we remain committed to working with them in managing Brexit-related risks. Our outlook for the sector is positive and manufacturing remains a key sector for AIB," he adds.

"We have witnessed the positive impact of investment by customers in advanced technologies in terms of growth opportunities and improved efficiencies. We have a team of dedicated relationship managers across the country who have a strong desire to develop relationships with manufacturing companies. Through a combination of their local knowledge, coupled with a central sectoral expertise, we understand the opportunities and challenges that manufacturers face and we have a suite of products and services to assist with business growth, concludes Elaine Dunne. ■



Elaine Dunne
Head of Manufacturing
Sector Specialist and
Strategy Team,
AIB Business Banking.



CASE STUDIES

Two successful manufacturers that are customers of AIB, share their insights into the changing nature of their businesses and the importance of R&D.



Niall Fay

As one of the leading home heating appliance manufacturers in Ireland, **Grant Engineering in Birr, Co. Offaly**, is also recognised for the innovative products it has made for the heating and plumbing industry in Ireland.

For more than 40 years it has been designing, manufacturing and supplying highly efficient and reliable heating products such as oil boilers, heat pumps, cylinders, solar panels and biomass boilers to its customers.

A key part of the company's success is its commitment to R&D, says **Niall Fay, Grant Engineering Director and General Manager**.

"We hold nearly 40 patents, which is testimony to the level and quality of the research we have undertaken," he says. "This work plays a vital role in terms of developing and protecting our products."

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Niall identifies three distinct aspects of R&D which Grant Engineering engages in- product development, product improvement and process improvement.

"Product development enables us to protect unique innovations to our products and bring them to market under patent protection, while product improvement enables us to make existing products more appealing by incorporating feedback from engineers, installers and homeowners," he explains.

Process improvement is where elements such as lean manufacturing and lean design are applied in combination with elements of Industry 4.0 which, he adds, will play a significant role in manufacturing in the future.

"The company has also worked closely with Irish Manufacturing Research and Enterprise Ireland to introduce robotic automation to its plant, a move which has been very successful.

"Industry 4.0 is an opportunity for companies such as Grant Engineering," he says. "We are already seeing the emergence of autonomous factories and while the capital cost of such initiatives is prohibitive for some small and medium sized Irish companies, there will be aspects of Industry 4.0 that can be implemented - such as automated guided vehicles or AGVs."

Regardless of scale, all manufacturing companies will eventually have elements of Industry 4.0 in their business, he adds.

Niall also adds that Enterprise Ireland plays a vital role in supporting the Irish manufacturing industry and is continually upgrading and enhancing its offering. Grant Engineering has also carried out projects with Irish Manufacturing Research in areas such as automation and big data.

In terms of other supports, he suggests accelerated capital allowances for indigenous manufacturers to help them offset the cost of investing in automation would help improve Irish indigenous industries' productivity dramatically.

Grant Engineering has banked with AIB since the business was established in the 1970s and Niall says the bank has been very supportive of the business over that time. "We have a long-standing relationship with the corporate finance and foreign exchange teams as well as the business banking side of the bank," he concludes. ■

Founded more than 20 years ago by Rita Shah and Oliver Brady, **Shabra Group** is the largest plastics recycler in Ireland and every year the company recycles over 10,000 tonnes of plastics annually.

Located in Castleblaney, Co. Monaghan, the company plays an important role in the recycling of plastic, an issue which looms large on the EU's environmental agenda. In December 2015, the European Commission published an action plan for a circular economy and identified the recycling of plastics as a key priority and if Ireland is to adhere to the EU's strict guidelines, it will need to increase its plastic packaging recycling by up to 80% by 2030.

A key element of the EU's circular economy strategy is the design, production and recycling of plastic and how its impact on the environment can be minimised while at the same time creating added value, boosting innovation and ultimately curbing plastic pollution and the serious impact it has on the environment.

Innovation and an investment in R&D have always been central to the Shabra's strategic business plan and it has worked closely with Irish Manufacturing Research (IMR) to achieve this explains **Managing Director, Shabra Group, Rita Shah**.



Rita Shah

"We have an in-house testing laboratory, but to add value it is imperative to understand and ensure the product we manufacture is of the highest quality and meets the needs of our existing customers as well as attracting new clients."

"Shabra was the first company to build a state-of-the-art reprocessing facility for waste plastics bottles and film in 1995 and is still the leader in this industry," she says. "We have an ongoing programme of R&D to streamline our processes and optimisation of raw materials, and to capitalise on the development of new manufacturing techniques to ensure that Shabra continues to be recognised as best in class," she says.

"The key areas of R&D for the company are that by applying research and development we are working in line with lean manufacturing and reprocessing of the products," says Shah. "We have an in-house testing laboratory, but to add value it is imperative to understand and ensure the product we manufacture is of the highest quality and meets the needs of our existing customers as well as attracting new clients," she adds.

Rita points out that AIB has been a close business support partner to Shabra since 1995. "The bank continues to work very closely with the owners to ensure the ongoing success of our growth and ultimately contributing to green employment and the increase in recycling/reprocessing of waste plastics throughout Ireland." ■

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