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# CFO 4.0

Essential financial competencies for  
successful transition to Industry 4.0

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## Contents

1. Introducing CFO 4.0	4
2. CFO 4.0: Key competencies	6
3. The scale of the commercial benefit for CFO 4.0	12
4. Finance 4.0 in action: A pioneering story	14
5. Financing tools for CFO 4.0	15
6. Digital Productivity Bonus: A country perspective	18

# Management Summary

- The challenges of Industry 4.0<sup>1</sup> are giving rise to a new genre of Chief Financial Officer – CFO 4.0 – finance heads who have a deep, holistic understanding of the competitive advantages of digital transformation, the competencies required to identify, evaluate and implement new business models for Industry 4.0, and the essential capability to drive and enable the transformation process.
- According to research by Siemens Financial Services, five key competencies are required of a CFO 4.0:
  - A comprehensive understanding of available financing options that can enable a commercially sustainable transition to Industry 4.0
  - The ability to introduce relevant financing options at an early stage of the strategic Industry 4.0 process in order to access and take advantage of the full range of potential solutions
  - Specific Industry 4.0 knowledge and expertise – related to finance, technology, operations and market analyses – in order to accurately assess digitalization opportunity vs. digitalization risk
  - The capability to build predictive Industry 4.0 business models, return-on-investment metrics and performance-monitoring processes
  - The proficiency to create an effective phased plan to operationalize the business's move to Industry 4.0
- The deployment of these competencies and capabilities forms the foundation for each CFO 4.0 that enables him or her to generate tangible competitive and commercial gains for the company
- The commercial gains that CFO 4.0 has paved the way for are considerable and can, to an extent, be reliably modeled
- Previous research<sup>2</sup> from Siemens Financial Services has highlighted measurable improvements in manufacturing productivity as an important starting point for the business case of digital transformation, typically delivering returns of between 6.3% and 9.8% of annual turnover



# Introducing CFO 4.0

Research from many commentators has firmly underlined the clear and urgent need to digitally transform in order for manufacturers to maintain and grow their competitive position in local and world markets<sup>3</sup>. It therefore follows that a manufacturer would come to the conclusion that it needs to upgrade to Industry 4.0 in order to remain competitive in the emerging digital world. Businesses and trade bodies have been stressing the urgency of digital transformation for some years. Now, even economists and governments<sup>4</sup> are committed to the idea. Recent research from Siemens Financial Services – with manufacturers and manufacturing experts around the world – has further emphasized that most industry players recognize the commercial imperative of digital transformation<sup>5</sup>.

Deciding to transform is one thing. Analyzing and articulating the commercial imperatives to do so – and the risk of not acting – is another. Operationalizing 4.0 is yet more challenging and complex. Digital transformation is now a matter of “How,” “How quickly,” “How much” and “How in practice.” Moreover, there is also the issue of how to implement Industry 4.0 in a commercially sustainable way, with investments focused on digital transformation that truly deliver measurable commercial and competitive benefits over time. The path may not be as simple as acquiring next-generation technology, although digitalized technology platforms are the essential building blocks. Moving from a relatively analogue manufacturing environment to a digitalized one is potentially very disruptive to a business – and it is a challenge in its own right to manage such disruption.

The challenges of moving to Industry 4.0 typically come in three forms: operational, customer value proposition development, and financial<sup>6</sup>.

- Operationally, the switch to new operating platforms requires extensive testing, piloting and training before a reliable full rollout can occur. This can involve running old and new platforms in parallel until reliable performance of the new platform is proven.
- Then there is the manner in which a manufacturer’s new value proposition for customers (enhanced by digital transformation) should be introduced to the market. Businesses seek both to promise exciting products or services to customers **and** to be able to deliver them effectively. Disappointed or disillusioned customers are likely to look elsewhere.
- Finally, transition can demand substantial expenditure. Running parallel systems without supporting financing arrangements can be a source of organizational strain that is not commercially sustainable, even in the short-term. Such financial challenges may thwart liquidity and prevent a manufacturer from making not only the initial investment in Industry 4.0, but also other (often complementary) essential investments – for example in product development, sales or marketing.

*“We’re seeing a distinct rise in financing support from financiers that really understand the manufacturing sector, and so we need to make sure that we have the expertise ourselves to identify real expertise on the subject of digitization, rather than empty marketing slogans.”*

Spain – Machine Tools

*“The real issue is what is the economic impact of digitalization – within the company, within industries, within interdependent supply chains. And that’s the question we need smart CFOs to answer.”*

Russia – Telecoms Equipment

How, then, can manufacturers manage the disruption that comes with the transition to Industry 4.0 or digital transformation? The CEO of a manufacturing company is ultimately responsible for ensuring that the overall business strategy and direction is sound and sustainable. Additionally, a growing reliance is now being placed on the CFO to enable digital transition without undue strain on the business. Respondents to SFS research<sup>7</sup> – manufacturers and expert management consultants – have firmly emphasized that planning for Industry 4.0 needs to start with comprehensive awareness and understanding of the available financing options in order to make the affordable technological possibilities at a business’s disposal transparent. Appropriately applied financing instruments can enable a wider range of Industry 4.0 options for a business making its options more financially sustainable, in a sector where slim profit margins are often the norm compared with other industries.

Implementing Industry 4.0 starts with the expertise and input of CEO and CFO, supported by senior colleagues in engineering, operations, HR, sales and marketing. Various commentators<sup>8</sup> have remarked on how the role of the manufacturing CFO has taken a leap up the strategic enablement ladder. They note that this is largely due to the advent of Industry 4.0 and the disruptive step-changes that it requires of manufacturers who want to remain competitive by becoming more efficient and offering an improved, digitally enabled value proposition for customers.

Based on SFS global research<sup>9</sup>, this paper has canvassed expert opinion on the core competencies and expertise required of the new genre of manufacturing CFO, or “CFO 4.0” as it is referred to here. What qualities and capabilities does he or she have to deliver to their organization? Why are those qualities strategically important to the company? What does a CFO 4.0 have to enable to put their organization at the head of its field? In short, what is the CFO’s role in making Industry 4.0 real in their company? The next section of this short paper outlines the core competencies and capabilities required of a CFO 4.0 to move an organization to Industry 4.0.

*“For the challenge of digital transformation we have to explore absolutely every single available financing option, and that means maintaining knowledge and fluency in these techniques. The art of the CFO is to source tailor-made solutions, or at least our own individualized combination of standard techniques.”*

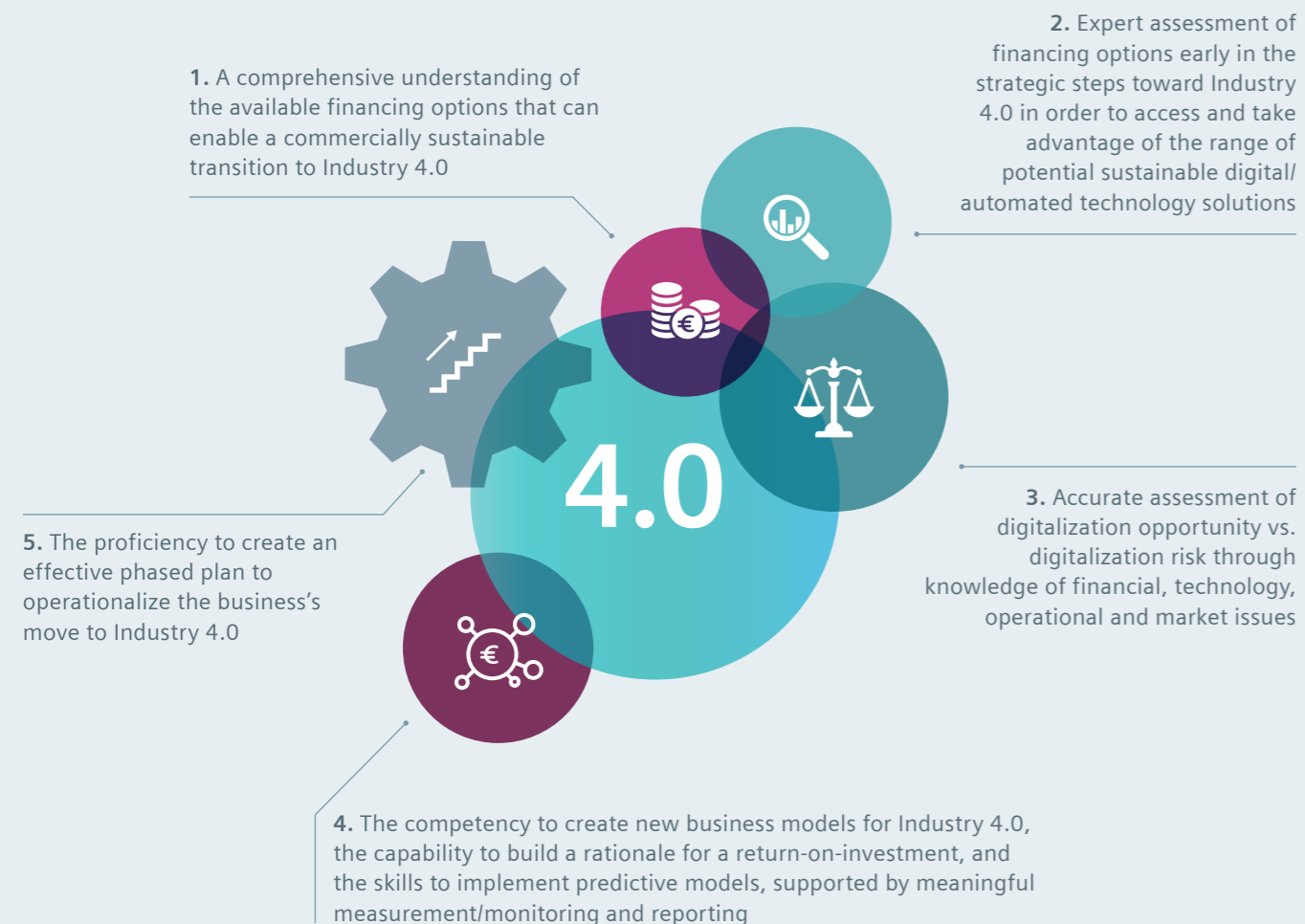
Turkey – Machine Tools

# CFO 4.0: Key competencies

A number of studies have already identified that the role of the manufacturing CFO is fundamentally changing<sup>10</sup>. The increasingly enabling role that CFO 4.0 is now playing – as “adviser, enabler and [for reporting data] operator” – has been shown to focus on supporting three main objectives achievable through digital transformation: revenue growth, profitability enhancement, and operational excellence. CFO 4.0 is the creator of a growing number of lead indicators for the business, as well as the master of measurability, according to one survey of manufacturers. This survey listed priorities such as “connecting workflow and production processes,” “medium- to long-term thinking in order to anchor the digitization agenda across the board” and “better transparency and higher control through digitalization.”<sup>11</sup>

How, then, does achieving such objectives translate into the key set of competencies for a CFO 4.0? Our research respondents<sup>12</sup> were able to identify five principal capabilities that characterize the CFO 4.0. They are described below (in no particular order of precedence).

*According to our research respondents, these five key competencies and capabilities enable CFO 4.0 to effectively contribute to the organization's adoption of Industry 4.0.*



## CFO 4.0 competency 1

A comprehensive understanding of the available financing options that can enable a commercially sustainable transition to Industry 4.0

CFO 4.0 is expected to be a virtuoso in all financing instruments and options currently available on the market that allow an organization to move to Industry 4.0 in a commercially sustainable manner. A wide range of financing techniques are now available to manufacturing organizations – from simple equipment and technology finance to total solution finance (embracing, for example, machinery, technology, software, installation, maintenance, services, and tech upgrades) and corporate finance solutions that drive overall business strategy and growth. The financial virtuoso CFO 4.0 has to be cognizant of the financing tools that can help (financially) ease the transition to digitalized and automated Industry 4.0 platforms – leveraging both the knowledge of the options and financing structures specifically suited to Industry 4.0 transition. For example, a CFO 4.0 needs to effectively apply (where relevant) options such as pay-to-use or pay-for-performance. Specialist knowledge of the available financing tools, paired with a holistic view of the sector value chain, has the potential to shape the company's approach to the investment process and can ultimately underpin the business's goal to outperform the competition in the longer term.



## CFO 4.0 competency 2

Expert assessment of financing options early in the strategic steps toward Industry 4.0 in order to access and take advantage of the range of potential sustainable digital/automated technology solutions

Previous SFS research<sup>13</sup> has identified that digital transformation pioneers are using the financing expertise of CFO 4.0 to open up a wider range of digital/automated technology investment options. With the confidence that technology acquisition can be made financially sustainable, manufacturers are considering more ambitious technology options – ones that potentially give them greater competitive advantage in an Industry 4.0 world where the first-mover advantage can be critical.

CFO 4.0 is tasked with using specialist knowledge to create sustainable financing structures that address the cash-flow/working capital/budgetary challenges that might otherwise narrow the company's technology investment outlook and choices. At the same time, CFO 4.0 needs the skills and insight to differentiate between the available financier offerings. Does the financier have its own understanding of the opportunities created for manufacturers by Industry 4.0 and, accordingly, the challenges of implementation? Is the financing partner familiar with the underlying technology and the business benefits to be expected from its implementation? Can the financier support concepts such as pay-for-performance arrangements? What is the impact of the financing arrangement on existing lines of credit? CFO 4.0 has to go beyond the well-established knowledge of financing options in order to answer such questions.





### CFO 4.0 competency 3

Accurate assessment of digitalization opportunity vs. digitalization risk through knowledge of financial, technology, operational and market issues

Whereas operations, information technology, market analysis and finance might have historically been distinct areas of expertise in a manufacturing company, these boundaries are increasingly challenged by the need for a “culture of collaboration,” which commentators have identified as an important element for Industry 4.0 success. CFO 4.0 therefore embraces these dimensions, with an expertise that effectively links technological/operational performance to commercial outcomes enabled by appropriate financing methods. CFO 4.0 must understand market and supply-chain dependencies, in financial as well as technological terms. It is essential for a CFO 4.0 to understand whether Industry 4.0 investments are likely to produce benefits on a standalone basis or whether the expected return-on-investment could be undermined by the vagaries of supply chain partners.

Additionally developing (or outsourcing) the right workforce skillsets could also materially influence Industry 4.0 return-on-investment. Such insights from CFO 4.0 (in collaboration with the complementary expertise of other C-level colleagues) will shape the effectiveness of Industry 4.0 plans and ultimately determine the suitability of different financial arrangements. CFO 4.0 needs to systematically understand the working capital impacts/enablers of the different investment dimensions and alternatives as well as potential options for risk mitigation.

*“We now have to look at all available options to decide what works for us... For digital transformation, we’d like to avoid touching our standard lines of relationship business credit – instead exploring the emerging resources of other specialist finance solutions.”*

Sweden – Metalworking

*“There is sometimes a lack of financial vision at board level – yet finance is so often the key commercial enabler. Such vision as there is is too often based on immediate tactical needs, yet there is a need for a specific vision in the broader context – using financial expertise to generate growth over the next 10-20 years.”*

Poland – Steel Products



### CFO 4.0 competency 4

The competency to create new business models for Industry 4.0, the capability to build a rationale for a return-on-investment, and the skills to implement predictive models, supported by meaningful measurement/monitoring and reporting

Having a realistic grasp of the expected business results of an Industry 4.0 investment is not only the hallmark of CFO 4.0; it is also an essential quality of an Industry 4.0 financing partner. In collaboration with the Chief Executive and the Chief Engineering/Operations Executive, CFO 4.0 is the prime mover in building a return-on-investment model that judiciously estimates, monitors and measures the commercial benefits resulting from an Industry 4.0 investment. While a body of proven return-on-investment examples exists, few provide the investing manufacturer with the precise models that can be applied comprehensively to individual situations. Much then relies on CFO 4.0 managing investment risk and developing appropriate own models.

Predictive models have to be built on the basis of available data to project the likely commercial benefits from Industry 4.0 investment and then to identify and assess meaningful performance parameters of digital/automated platforms. Such parameters will strike a balance between delivering

short-term operational successes versus longer-term customer and shareholder value. Among these measures, CFO 4.0 has to determine best and worst-case scenarios – the positive commercial impact (or not) of over-performance, and the impact of underperformance. Additional factors such as market protection/penetration, operational savings, and competitive advantages have to be considered as well. The transition period and its potential disruption to the existing status quo will also need to be painstakingly thought out, as will the role of smart financing to help manage the transition between old and new platforms. CFO 4.0 is responsible for creating the initial business case for digital transformation investment, including defined measures of commercial impact, as well as ensuring appropriate measures are established to monitor speed and reliability of return-on-investment.

*“Big data – particularly usage and productivity data from the production line – is very valuable to more sophisticated Industry 4.0 financing arrangements. Many have begun talking about it, but very few have started to put this talk into practice and base payments on such monitoring and analysis. We are just in the beginning here.”*

Germany – Electronic Components

*“We envisage that the pace of digital transformation in India will be somewhat slower than in other parts of the world because of a number of factors – technical maturity, emerging government support, infrastructure, and so on. But happen it will, whatever the relative speeds. And we should not be blinded or restricted by perceived average rates of development – each company can choose its own pace of digital transformation, depending on its financing capacity, wherever it is in the world.”*

India – Construction Equipment

*“Smart CFOs are looking for cooperative relationships with suppliers to support and capitalize the process of digital transformation.”*

USA – Travel equipment



### CFO 4.0 competency 5

The proficiency to create an effective phased plan to operationalize the business’s move to Industry 4.0

Once an Industry 4.0 strategy has been formulated, and underpinned by a strong rationale based on transparent data and projections, it has to be operationalized into a practical, staged plan with effective progress reporting. A digitalized environment provides a wealth of data flows that can be used to measure and monitor Industry 4.0 progress – within the company, in terms of customer impact, and in terms of supply chain efficiency and agility. Performance data analysis most naturally resides with the CFO’s office. Now, however, the data flows are not just financial (sales, cash flow, working capital, payments, etc.), but are enhanced with additional production data, supply chain performance information, inventory throughput, logistics and much more.

Using these data flows, effective and realistic business models are created. These predictive models are then implemented through a staged plan with clear commercial goals and outcomes at each review – using data feeds (from production, finance, etc.) to measure improvements, adjust the plan, and even report usage for pay-to-use financing arrangements. Finance is deployed to smooth business disruption for each plan phase. Financing structures can flex, if required, at each phase review and can ensure that financial and commercial sustainability are maintained throughout the process of digital transformation.

Some CFOs are also incorporating the emerging set of Industry 4.0 employee skills/training requirements into their staged planning. This can represent an important dimension (and risk) when managing return-on-investment. Expanding existing financial data analysis skills into a wider, more holistic dashboard on linked financial-operational performance is a natural progression for the CFO’s office. It is also essential to monitoring and managing return on a company’s Industry 4.0 investments.

Key reporting stages are built into a smart Industry 4.0 transition plan, with agile assessment of achievements and review of any need for plan adaptation in the light of emerging information. CFO 4.0 will have anticipated the impact of over- or underperformance and will have set up financing arrangements that ensure built-in flexibility. Typical examples of flexible financing that addresses Industry 4.0 challenges include transition finance, which smooths cash flow while legacy systems are maintained and new systems tested. Other Industry 4.0 finance arrangements also enable upgrade or add-on options that allow additional Industry 4.0 technology to be added rapidly once the previous investment phase has proven return-on-investment. Moreover, refinancing arrangements can also lower the cost of existing debt, giving manufacturers the ability to focus on such Industry 4.0 upgrades.

*“So first you need to set up an action plan and define your strategy. Then you can use the opinions and ideas that are derived from the experience of other companies in the industry.”*

UK – Plastic Injection Molding



# The scale of the commercial benefit for CFO 4.0

The commercial benefits that a CFO 4.0 can enable are considerable. Reference to research conducted by SFS helps to quantify the bottom-line gains that digital transformation is likely to deliver, made possible by the appropriate application of the competencies engendered in CFO 4.0.

The majority of manufacturers and industry experts interviewed for SFS research<sup>14</sup> confirmed that the ability to **increase manufacturing productivity** is a universal starting point for determining measurable value from digitalization. The ability to manufacture the same product volume at less cost, or manufacture more products for little or no increase in costs, resonates with manufacturers considering digital technology investment as a competitive enabler. This was considered to be applicable to both manufacturers taking their first steps into automation and those planning to install the latest sensor-based technology to fully digitalize their production environment.

The SFS research revealed that by automating and digitalizing production systems, manufacturers can expect to make production productivity gains equivalent to between 6.3% and 9.8% of their annual revenues. Termed the **Digitalization Productivity Bonus**, this gain was identified by respondents as an extremely reliable starting point to make a business case for investing in Industry 4.0 technology upgrades. The focus for companies choosing to deploy the **Digitalization Productivity Bonus** varies from organization to organization – from returning value to shareholders, to increasing investment in product innovation, to driving more competitive market positions.

The World Economic Forum reported the “combined value – to society and industry – of digital transformation across industries could be greater than \$100 trillion over the next 10 years.”<sup>15</sup> Such figures, though impressive, do not provide tangible insight into the likely gains for organizations in individual sectors. Accordingly, the SFS report applied the Digitalization Productivity Bonus model to a variety of key manufacturing sectors in order to highlight the scale of gain that Industry 4.0 is expected to deliver in the manufacturing industries concerned (shown in the accompanying table).

It should be stressed that these figures only represent a calculable starting point for the benefits of Industry 4.0 transition for CFO 4.0. Other Industry 4.0 benefits are certainly real – such as competitive differentiation – but are more difficult to precisely calculate in financial terms. The Digitalization Productivity Bonus therefore provides a reliable initial basis to justify the cost of Industry 4.0 investments, even though the full advantages of digital transformation are likely to be much greater.

*“If you look at our industry, and at many other industries too, the technology we need is changing and developing all the time.”*

*The changes are so fast-paced when it comes to digital industry. So financing tools and techniques need to match and accommodate that pace of change. The time to invest is getting shorter.”*

Electronic Components, Germany

## Global Digitalization Productivity Bonus: A global perspective



# Financing tools for CFO 4.0

## Finance 4.0 in action: A pioneering story

New financing structures are being developed to support the CFO 4.0 as he or she seeks to enable digital transformation. These are principally coming from specialist financiers who understand Industry 4.0 technology, the way it works in practice, the hard commercial benefits it can deliver, and the financing techniques most appropriate to make its acquisition affordable and commercially sustainable.

Increasing numbers of manufacturers are seeking financing solutions to enable acquisition of Industry 4.0 technology on a pay-per-use basis. The goal is to match payments more closely to actual usage – a clear benefit for working capital management. Such arrangements, however, must make commercial sense for the technology supplier, the financier and the manufacturer. A pay-per-use type of approach will normally involve minimum usage commitments on the part of the manufacturer acquiring the next-generation technology. One of the critical factors, therefore, is to agree on the basis for measuring usage, as the minimum number of processes to which the manufacturer commits usually forms the basis of these types of contracts.

Specialist financiers are now harnessing the digital, sensor-based capabilities of Industry 4.0 technology to enable such pay-per-use arrangements. Sensor-derived data has been much discussed as enabling predictive maintenance and providing real-time data flows for analytics that allow production processes to be refined and optimized. Now, those data flows can also be used by financiers to understand and monitor patterns of usage, uptime and other variables as the basis for pay-per-use types of arrangement.

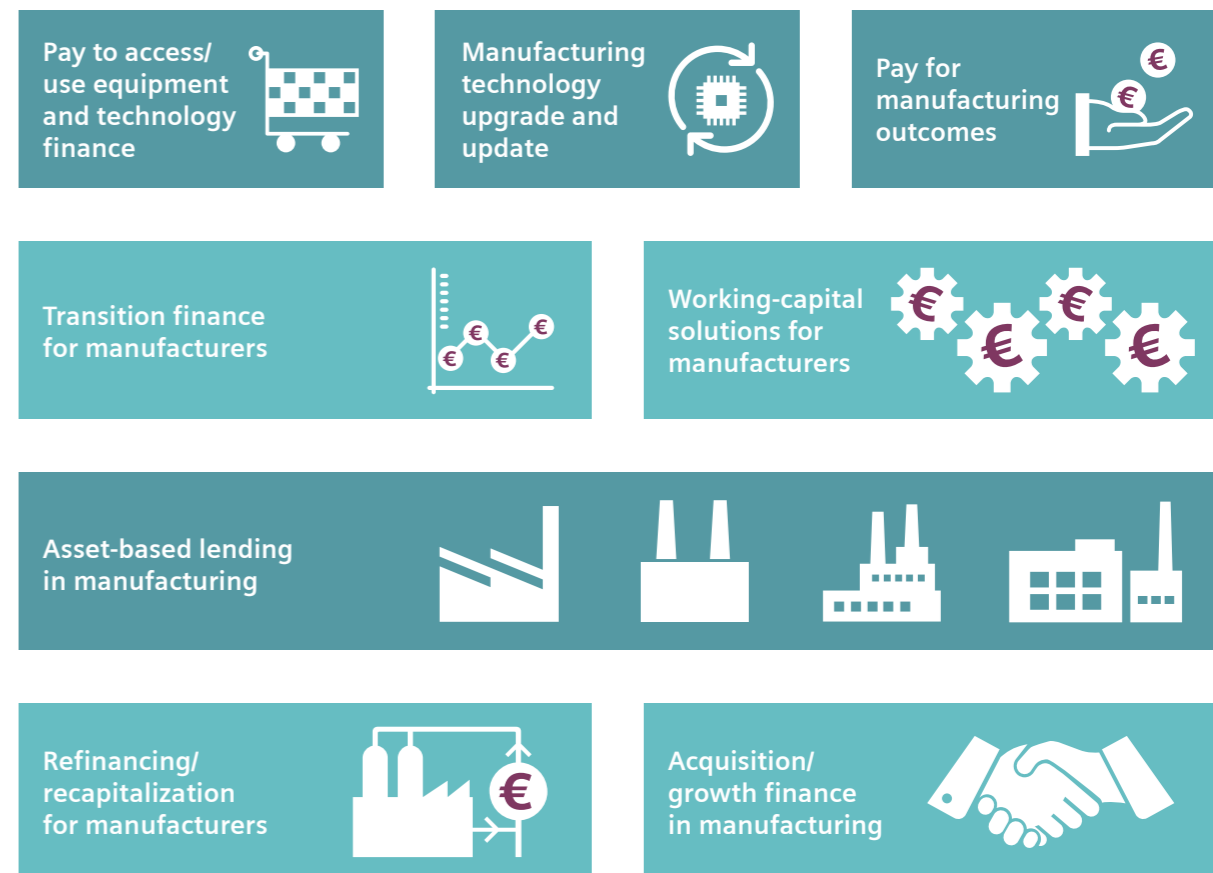
MindSphere, a cloud-based, open IoT operating system from Siemens connects products, plants, systems, and machines, which enables manufacturers to harness a wealth of data generated by the Internet of Things (IoT) with advanced analytics, is already being used to monitor usage to underpin pay-per-use financing arrangements, among a pioneering selection of manufacturing customers. One current example is a machine tools original equipment manufacturer (OEM). The machine tools company offers customers equipment with sensors that can provide live feeds to MindSphere. Customers that agree to have their operations securely monitored in this way are able to work with Siemens Financial Services on a payment plan that takes into account their expected usage of the digitalized equipment. Payments are determined based on expected minimum volumes during a half-capacity shift, and charges are levied on a “per use” basis over and above this minimum. This helps those manufacturers very precisely align their payments with revenues generated by their access to Industry 4.0 technology, thus improving their cash-flow profile.

Ongoing research<sup>16</sup> has identified a number of specialist financing methods that are being deployed by CFO 4.0 to upgrade the digitalized, automated operating platforms of Industry 4.0. The specialized range of financing techniques – which this paper has dubbed Finance 4.0 – covers the gamut of requirements, from the acquisition of a single digitalized piece of equipment to financing a whole new factory or even acquiring a competitor.

Finance 4.0 arrangements tend to be offered by specialist providers that have a deep understanding not only of how the digitalized technology works, but also how that technology can be practically implemented to deliver the **Digitalization Productivity Bonus** and other benefits of

digitalization. At times, the financing arrangement will be an embedded part of the value proposition, offered right at the beginning of the sales cycle. At others, the technology provider will refer its customer to one or more finance providers to fund a sale. Complete solutions should be taken into consideration in order to identify the best financial package that will effectively digitalize a manufacturing facility’s entire operation – from equipment to software to production line to the full enterprise.

Between them, this range of Finance 4.0 techniques allows organizations large and small to access the **Digitalization Productivity Bonus**. It is worth briefly explaining how each works.





## Pay-to-access/use equipment and technology finance

Designed to enable the acquisition of a system or piece of equipment, this will usually be some form of finance lease, operating lease, rental or hire-purchase arrangement. Financiers with a deep knowledge of manufacturing will flex the finance period and terms to align with the likely benefits the manufacturer will gain from the technology. Often this type of financing will cover associated costs of ownership, such as maintenance, into a “bundled” monthly payment. To enable rapid purchasing decisions, a financier will often have a “master” agreement with a manufacturer, streamlining the process of arranging future leases.

## Technology upgrade and update

Since technology innovation and upgrade periods are shortening in a digitalized world<sup>17</sup>, equipment and technology finance can also offer options for upgrading during the financing period, offering protection against technological obsolescence. Upgrades might involve replacing with a newer model, or retrofitting enhancements onto the main technology platform.

## Software finance

Although in rare cases the transformation to a digitalized Industry 4.0 world involves solely a software investment, most solutions will involve both hardware and software. This is recognized by specialist financiers who have the capability of financing such hybrid requirements. Knowledge of how the software is implemented and the business outcomes it is likely to produce allows these financiers to understand the associated risk and embrace the software element into a total financing package.

## Pay-for-outcomes

The industry is seeing an increasing number of financing agreements in which payments are predicated on the expected business benefits, or “outcomes,” that the technology makes possible<sup>18</sup>. Savings or gains from access to the technology are used to fund monthly payments, making the technology cost-neutral for the manufacturer. For example, energy-efficient equipment delivers cost savings through lower energy consumption, and a financing plan aligns payments to the rate of savings made each month.

## Transition finance

While the benefits of moving to a digitalized manufacturing environment are clear, the transition process has to be carefully managed and commercial risk eliminated by rigorously testing new technology in the real-world production environment. Recognizing the challenges of transition, financing arrangements are available that defer payment for a new system until it is reliably up and running, removing the financial challenge of having to pay for the new system while the old one is still running.

## Working capital solutions

Cash flow and working capital challenges can arise well before the point of actually acquiring digitalized technology. Digitalization may increase production capacity and productivity, while improving price competitiveness, to the extent that a manufacturer’s order book experiences a sudden and/or significant upswing. This is good news, but brings its own challenges – such as suddenly having to buy in greater quantities of raw materials or component parts. Financing services – usually based on some form of invoice finance – are available to help manage the cash-flow challenges that success through digitalization brings.

## Asset-based lending

With digitalization, manufacturers may experience tightened liquidity due to rapid growth. Asset-based lending allows a borrower to access the cash that may be tied up in working capital assets. A revolving line of credit, secured by the borrower’s accounts receivable and inventory, provides the liquidity needed to meet daily cash needs. The manufacturer could use the cash to help fund ongoing operations, growth, acquisitions or restructuring as a result of digitalized upgrades.

## Acquisition/ growth financing

Manufacturers who invest in digitalization will reap the benefits, taking market share from those who do not. Growth by acquisition will, on occasion, make good business sense for these digital winners, whether it means acquiring ailing competitors or making strategic moves into new geographies and markets. In these situations, financiers are offering tailored corporate loan facilities and revolving credit – to be used for daily corporate use and for strategic growth. Sometimes these manifest as multilender syndicated facilities.

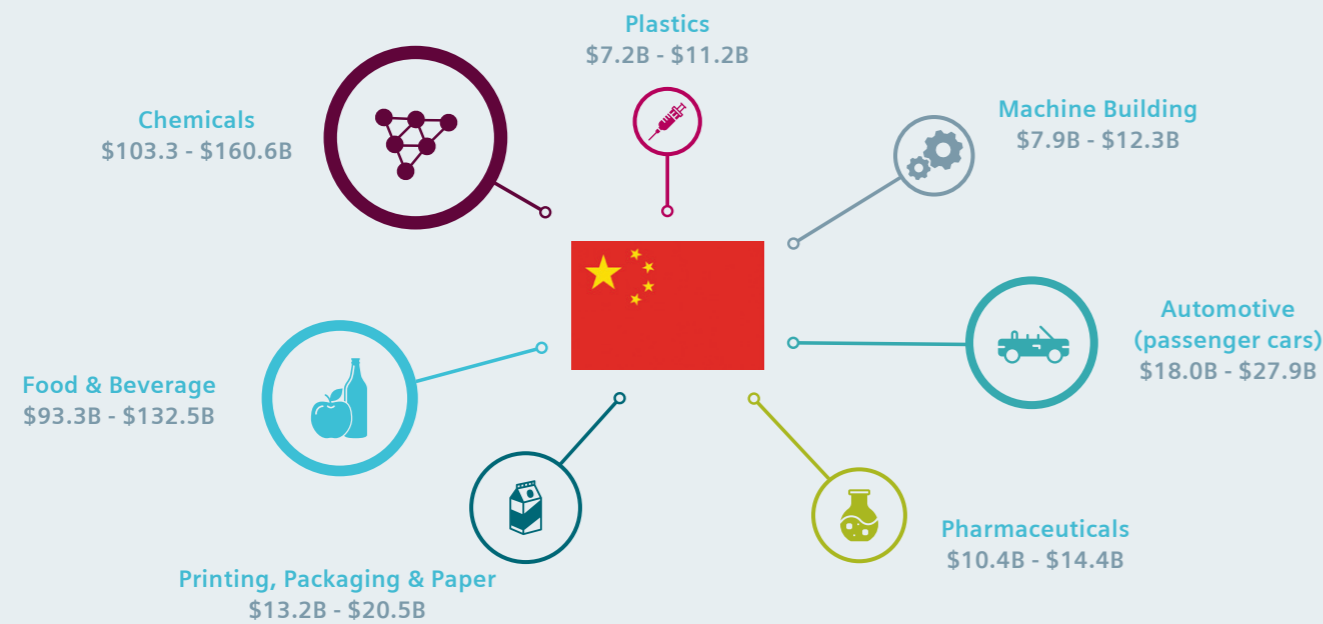
## Refinancing/ recapitalization

A manufacturer may need to manage debt or may experience a change in financial ownership. Financiers offer term loans and revolving credit facilities that allow manufacturers to adjust their capital structures in order to improve debt, make distributions to shareholders and facilitate ownership changes that lower the overall cost of capital. With digitalization, manufacturers could easily outgrow their legacy capital structures and may need to refinance debt at more competitive rates.

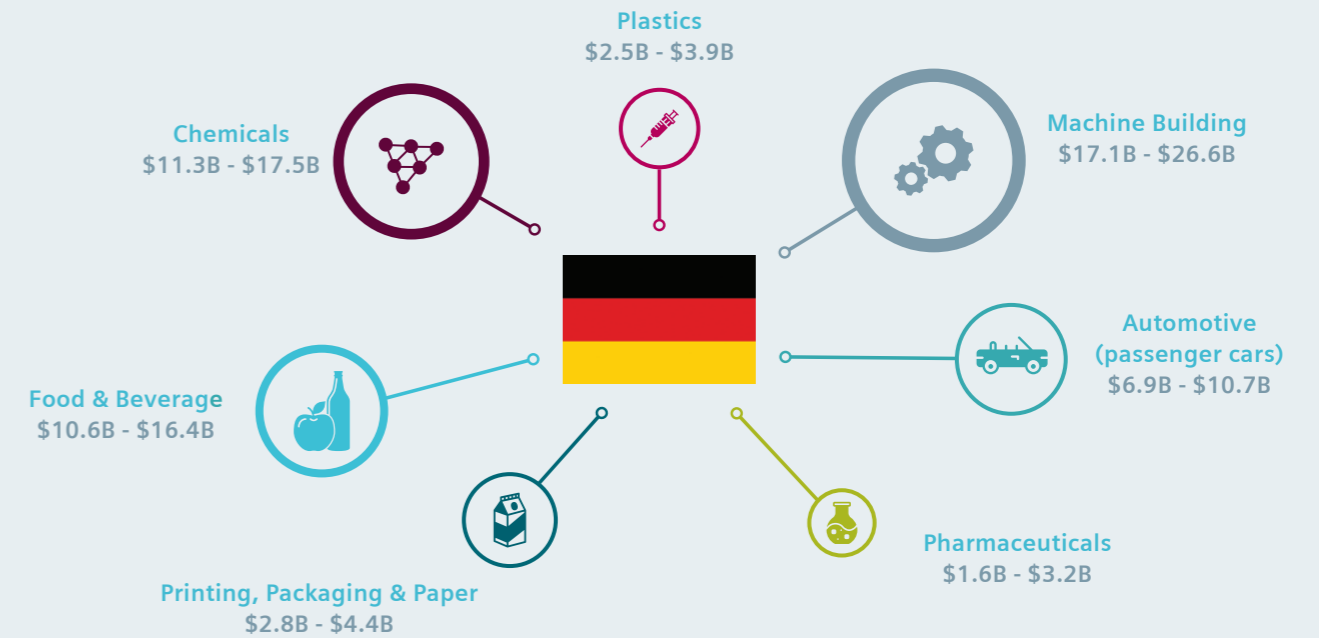
# Digital Productivity Bonus: A country perspective

**Digital Productivity Bonus (\$ billion) by country.**  
The sector bubble size is relative, biggest to smallest, for each sector within the country.

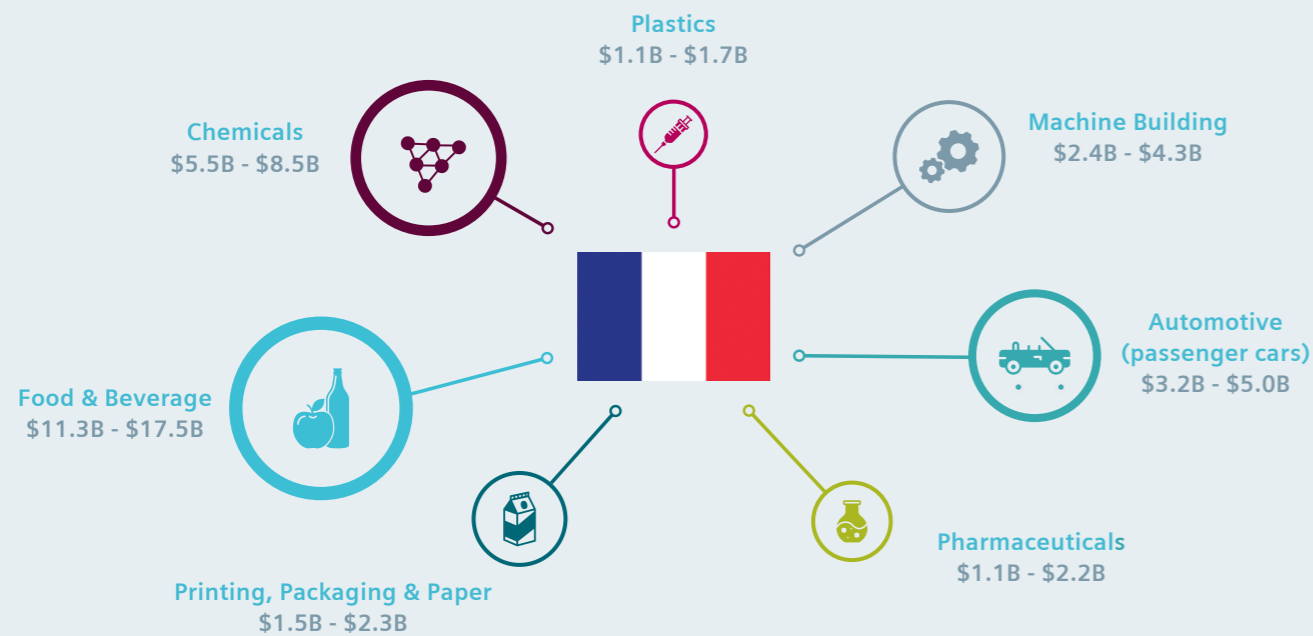
## China



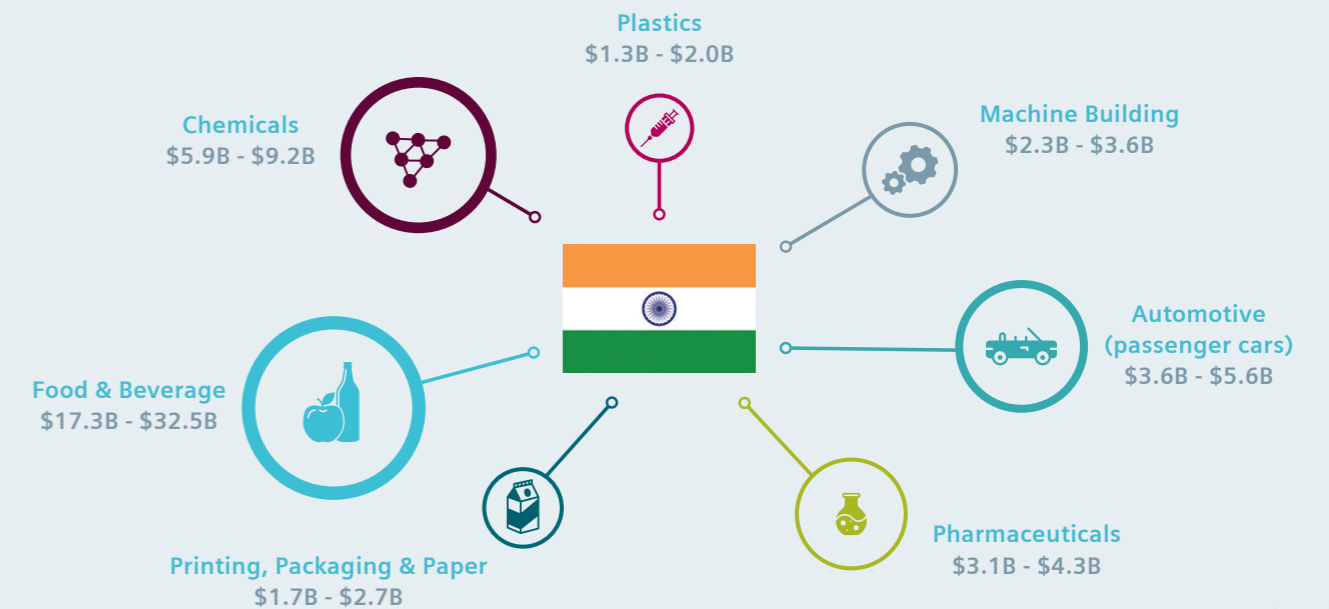
## Germany



## France



## India

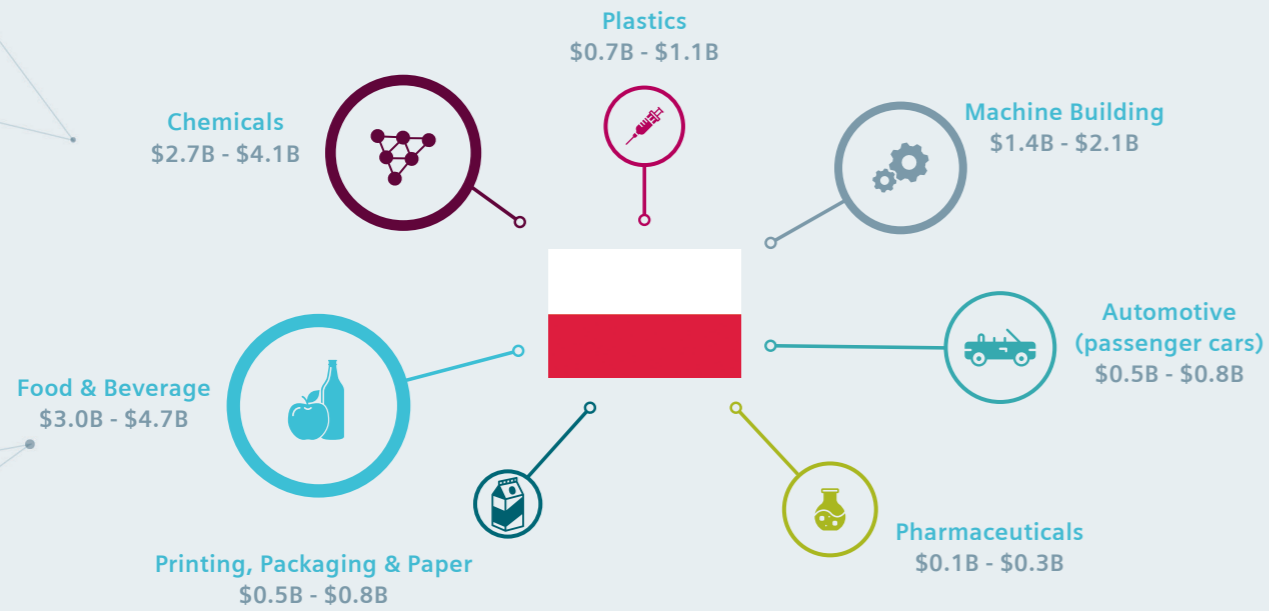




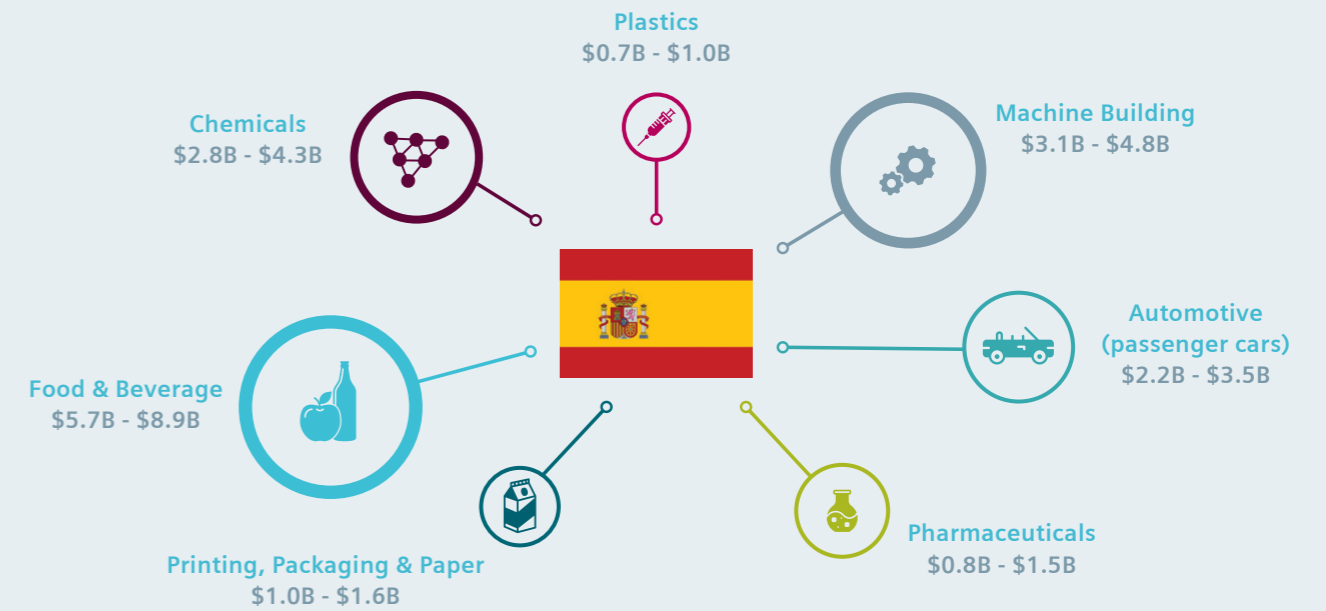
**Digital Productivity Bonus (\$ billion) by country.**

The sector bubble size is relative, biggest to smallest, for each sector within the country.

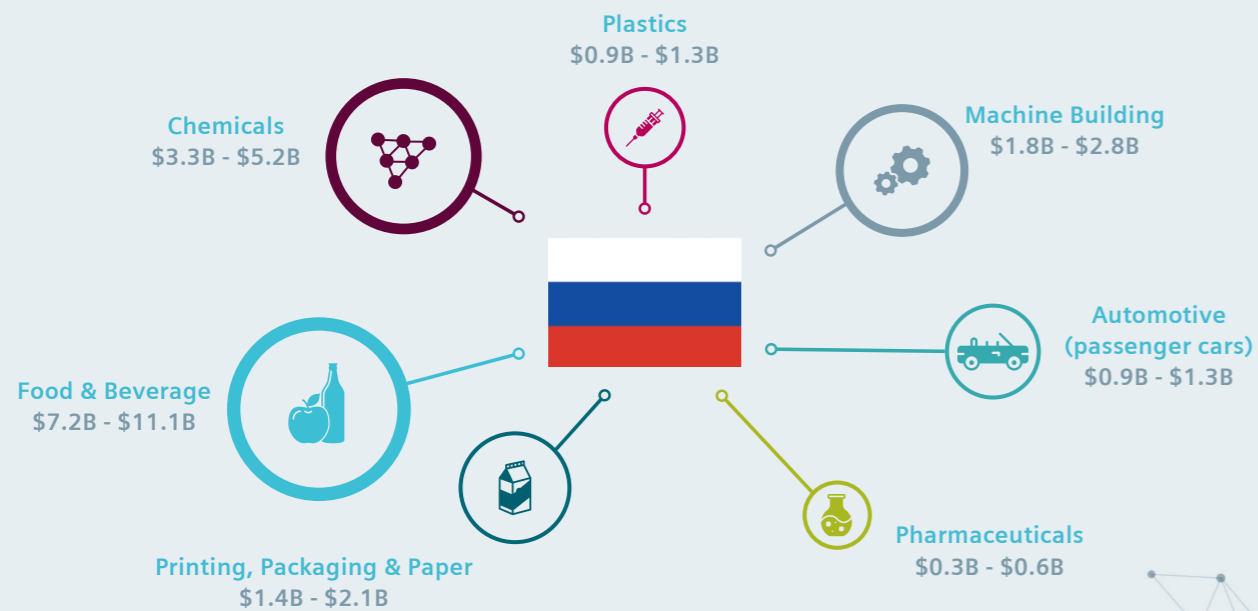
**Poland**



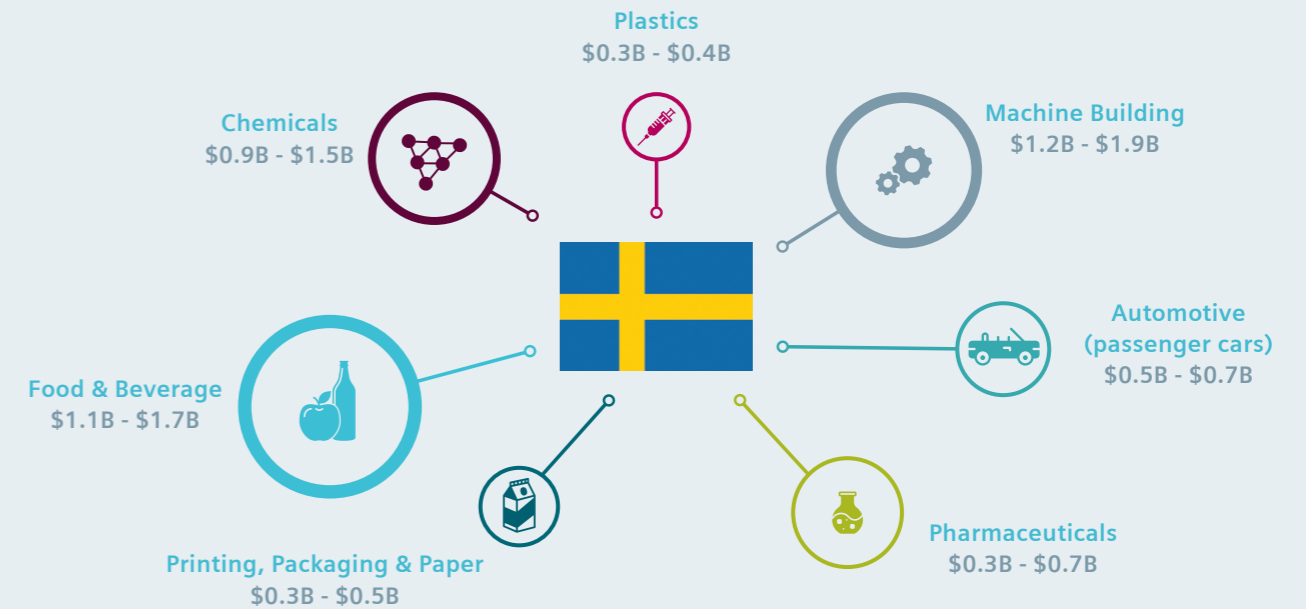
**Spain**



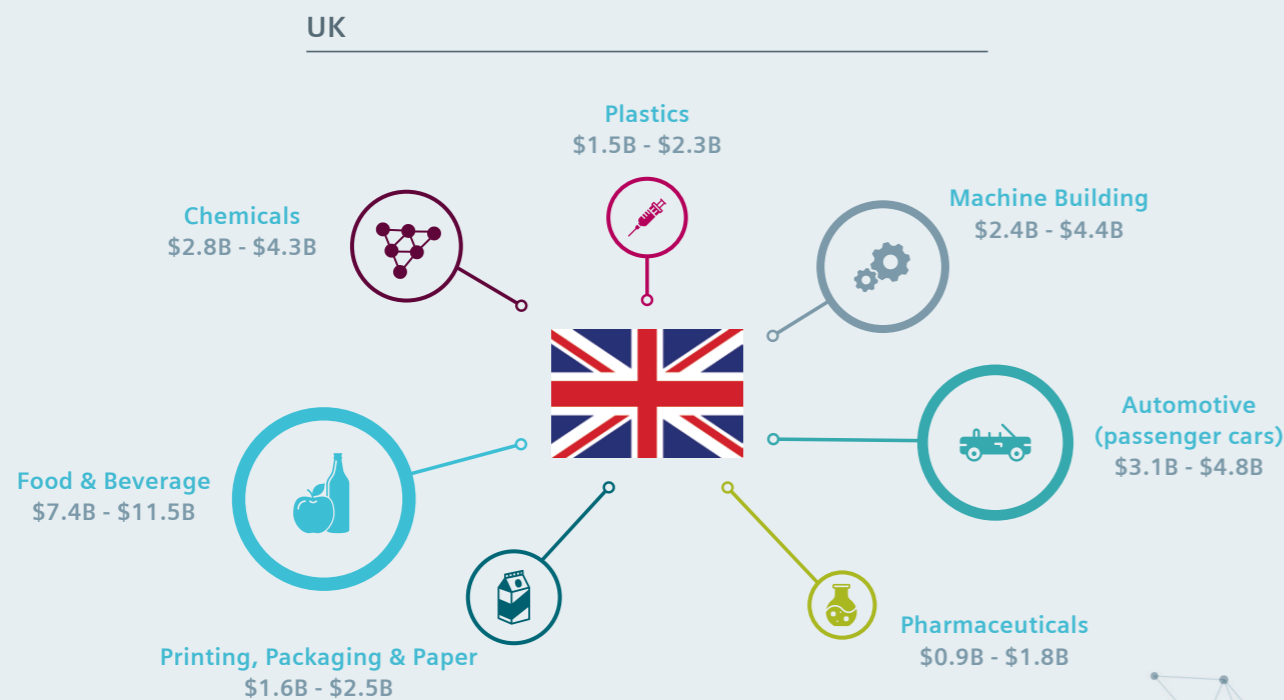
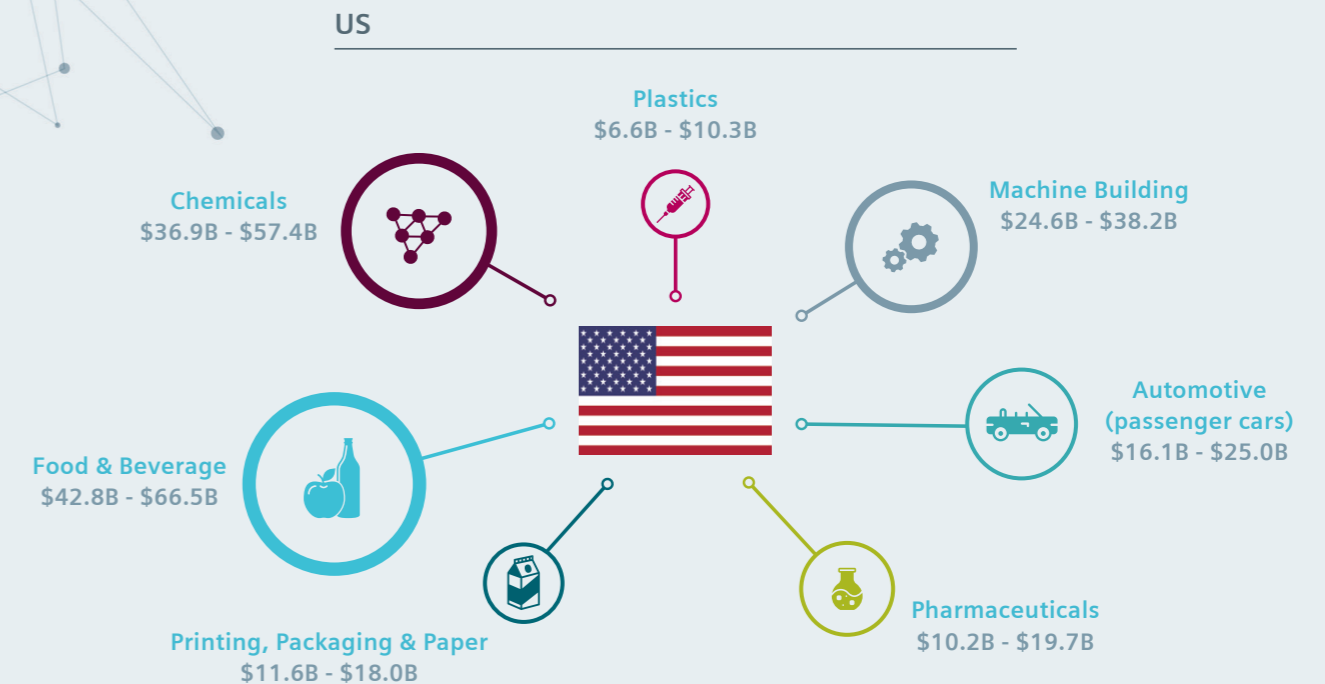
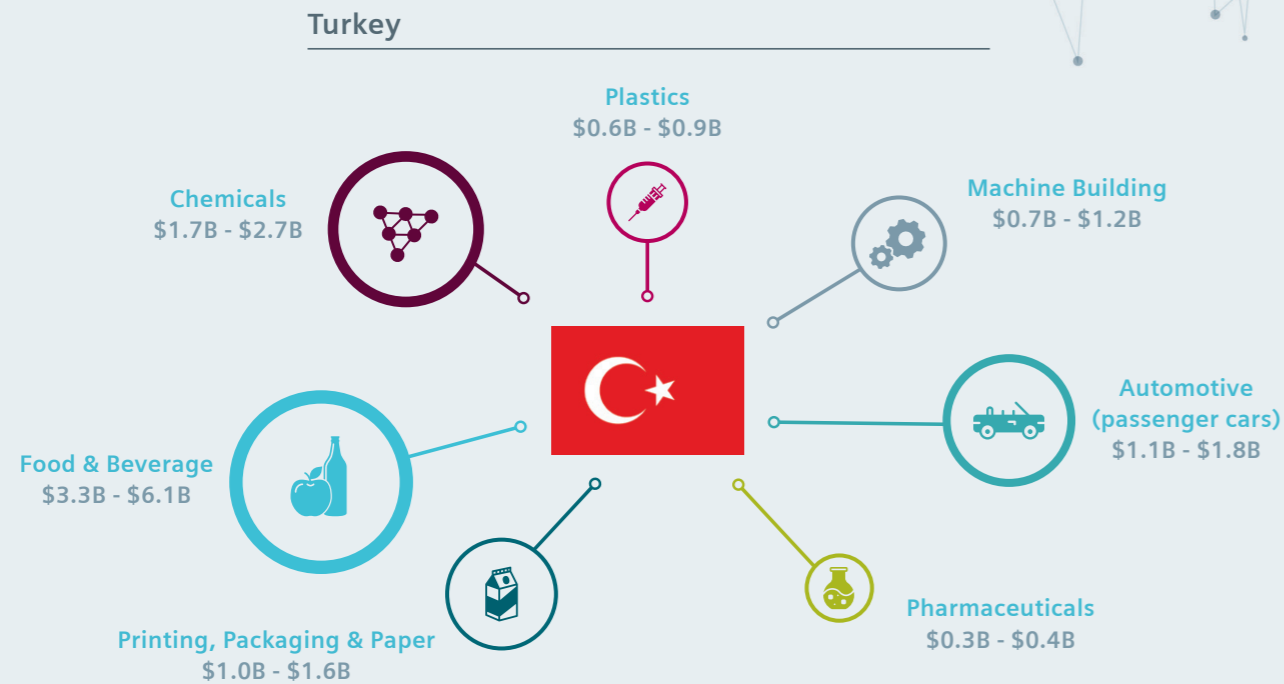
**Russia**



**Sweden**



**Digital Productivity Bonus (\$ billion) by country.**  
 The sector bubble size is relative, biggest to smallest, for each sector within the country.



## Key references

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15. World Economic Forum, \$100 Trillion by 2025: the Digital Dividend for Society and Business, 22 Jan. 2016
16. Over 150 interviews with manufacturing CFOs conducted by telephone between July 2015 and February 2017
17. According to Siemens Financial Services research, published in Investing in Success (2016), 67% of manufacturing respondents observed that technology replacement/upgrade cycles are shortening
18. This whole subject is discussed in a Siemens Financial Services research paper, Opportunities and Outcomes, February 2017



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